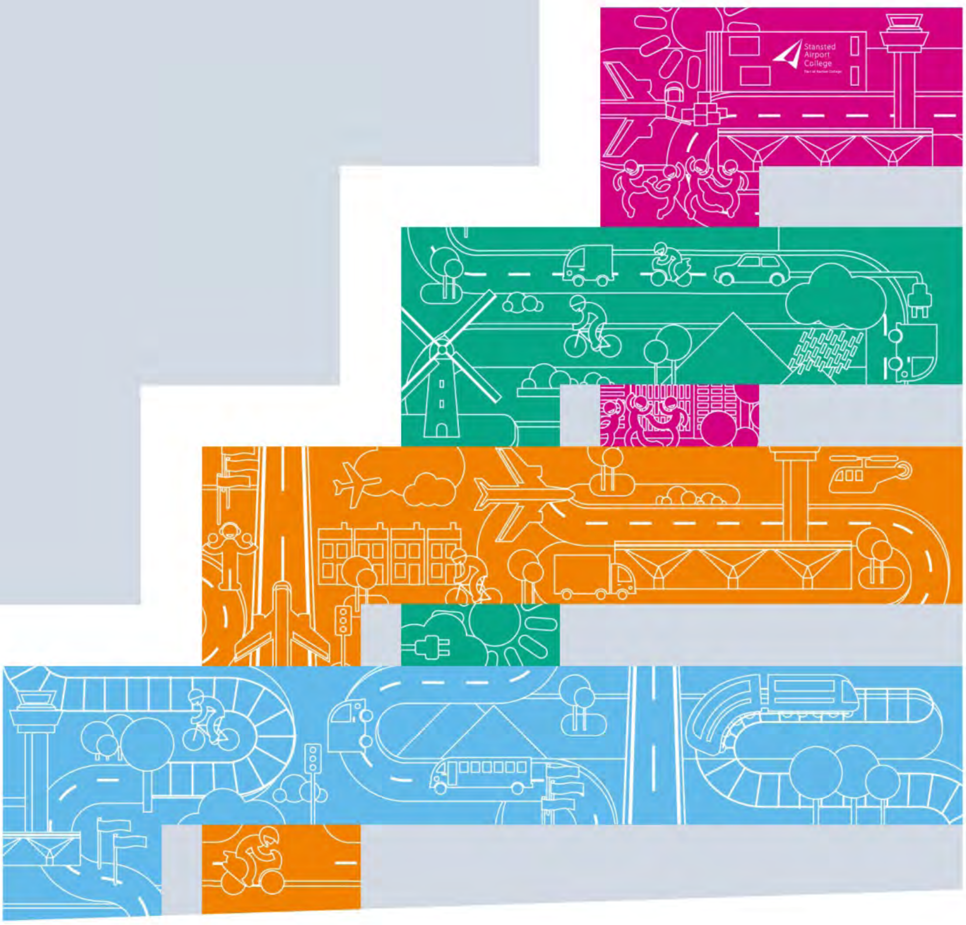
TRANSFORMING LONDON STANSTED AIRPORT

35+ PLANNING APPLICATION

Environmental Statement Volume 1



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GLOSSARY OF TERMINOLOGY AND ABBREVIATIONS

2015 SDP	Stansted Sustainable Development Plan (2015) – A masterplan document that provides a framework for sustainable growth of the airport, comprising of an introductory summary plus four detailed plans (Economy & Surface Access, Land Use, Environment, and Community).
25+ application	Section 73 application (UDC ref: UTT/0717/06/FUL) submitted in 2006 and consented at appeal (PINS ref: APP/C1570/A/06/2032287) to increase the passenger cap to 35mppa and aircraft movements to 264,000 ATMs plus 10,000 GA. The application was accompanied by an ES.
35+ application	The application for full planning permission for new airfield infrastructure, with an associated increase of the passenger cap to 43mppa and a singular aircraft movement limit. The application is accompanied by this ES.
AADT	Annual Average Daily Traffic Flows
AC	Airports Commission
ACA	Airport Carbon Accreditation
ACAF	Airport Commission Appraisal Framework
ACDM	Airport Collaborative Decision Making
ACL	Airports Coordination Limited
ADF	Aircraft De-icing Fluids
ADMS	Atmospheric Dispersion Modelling System
AEED	Aircraft Engine Emissions Databank
AGA	Abellio Greater Anglia
Airside	The areas of the airport which require full security screening to gain access to.
ANASE	Attitudes to Noise from Aviation Sources in England
ANIS	Air Noise Index Study
ANOMS	Airport Noise Monitoring and Management System
AOA	Airport Operators Association
APD	Air Passenger Duty

APEC	Air Pollution Exposure Criteria
APF	Aviation Policy Framework
APIS	Air Pollution Information System
Applicant	Stansted Airport Limited (STAL)
APU	Auxiliary Power Unit – Internal aircraft engine, usually tail-mounted, for powering aircraft systems including hydraulics & air for engine start and cabin conditioning.
APV	Advanced Passenger Vehicle
AQMA	Air Quality Management Area
ARFF	Airport Rescue and Fire Fighting service
ARP	UK Adaptation Reporting Power
ASAS	Airport's Surface Access Strategy
ATC	Air Traffic Control
ATM	Air Transport Movement
ATWP	Air Transport White Paper
BAA	British Aviation Authority
BAP	Biodiversity Action Plan
BAU	Business As Usual
Bellyhold Cargo	Cargo carried on passenger aircraft.
BPM	Best Practicable Means
BS	British Standard
CAA	Civil Aviation Authority
CAEP	Committee on Aviation Environmental Protection
CAGR	Compound Aggregate Growth Rate
CATM	Cargo Air Transport Movement
CCAPR	Climate Change Adaptation Progress Report
CCC	Committee on Climate Change

CCG	Clinical Commissioning Group
CCRA	UK Climate Change Risk Assessment
CDA	Continuous Descent Approach
CEMP	Construction Environmental Management Plan
CERC	Cambridge Environmental Research Consultants
CH_4	Methane
CIL	Community Infrastructure Levy
CIP	STAL's Capital Investment Programme
Climate	Description of the long-term pattern of weather in a particular area, typically over a 30-year period.
Climate change	A change in climate conditions that can be statistically identified by changes in the mean and/or variability of its properties that persists for decades or longer.
Climate hazard	An extreme weather event which poses a threat to an environment, population or development.
Climate impact	The impact of an extreme weather event on an environment, population or development.
Climate risk	Likelihood of a climate hazard occurring multiplied by the potential impact of this hazard.
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CoCP	Code of Construction Practice
COMEAP	Committee on the Medical Effects of Air Pollutants
Construction Phase assessment	Assessment of the construction of the new airfield infrastructure between 2021 and 2022. The 'Construction Assessment Year' is 2022.
CORSIA	Carbon Offset and Reduction Scheme for International Aviation
CRFs	Concentration-Response Factors
CRTN	Calculation of Road Traffic Noise
CSR	Corporate Social Responsibility

CTMP	Construction Transport Management Plan
DAP	Director of Airspace Policy (CAA)
DAS	(Natural England's) Discretionary Advice Service
dB	Decibel
DBEIS	Department for Business, Energy and Industrial Strategy
DCLG	Department for Communities and Local Government
Defra	Department for Environment, Food and Rural Affairs
Development Case	The proposed development, i.e. allow growth up 43mppa to make the best and more efficient use of the existing single runway.
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges
Do Minimum scenario	The existing 35mppa cap and aircraft movement limits are retained.
EA	Environment Agency
EASA	European Aviation Safety Agency
ECC	Essex County Council
EDMS	Emissions and Dispersion Modelling System
EEA	European Economic Area
EFT	Emissions Factor Toolkit
EGR	Engine Ground Run-up
EHDC	East Hertfordshire District Council
EIA	Environmental Impact Assessment
EMEP/EEA	European Environment Agency
END	European Noise Directive
ERCD	Civil Aviation Authority – Environmental Research and Consultancy Department
ES	Environmental Statement

EU	European Union
EU ETS	European Union Emissions Trading Scheme
EUROCONTROL	European Organisation for the Safety of Air Navigation
Extreme weather event	Events at the extremes of the full range of weather conditions and climate patterns experienced in the past.
FDI	Foreign Direct Investment
FEGP	Fixed Electrical Ground Power – Ground based system of electrical power on all permanent south side stands capable of providing electricity for aircraft systems at 115/200volts 400HZ. Separate transformers are available for aircraft requiring 28volts.
FOCA	Swiss Federal Office for Civil Association
FOD	Foreign Object Debris
FOI	Swedish Defence Research Agency
FRA	Flood Risk Assessment
GA	General Aviation
GDP	Gross Domestic Product
GFC	Global Financial Crisis
GHG	Greenhouse Gas
GPDO	General Permitted Development Order
GPU	Ground Power Unit – Diesel powered mobile generator for providing aircraft power on stand.
GSE	Ground Support Equipment
GVA	Gross Value Added
H_2O	Water (vapour)
HAL	Heathrow Airport Limited
HAP	Health Action Plan
HCC	Hertfordshire County Council
HE	Highways England

HFCs	Hydrofluorocarbons
HGV	Heavy Goods Vehicle
HIA	Health Impact Assessment
HM	Her Majesty
HML	High Mast Lighting
HRA	Habitats Regulations Assessment
HVAC	Heating, Ventilation and Air-Conditioning
HYENA	Hypertension and Exposure to Noise near Airports Study
IAQM	Institute of Air Quality Management
IATA	International Air Transport Association
ICAO	International Civil Aviation Organisation
IEMA	Institute of Environmental Management and Assessment
ILS	Instrument Landing System
IPC	Infrastructure Planning Commission
JSNAs	Joint Strategic Needs Assessments
kW/hr	Kilowatt-hour
LAeq	Equivalent Continuous Sound Level – Level of a notional steady sound, which at a given position and over a defined period of time would have the same weighted acoustic energy as the fluctuating noise. 16-hr LAeq, for the 16-hour period 0700 to 2300 (local time) and for an average summer day, is used as the UK index of exposure to aircraft noise. In this volume, LAeq is used to denote the 16-hour LAeq.
LAMP	London Airspace Management Programme
Landside	The areas of the airport which do not require full security screening to gain access to.
LCC	Low Cost Carrier
LCLIPs	Local Climate Impact Profiles
LEP	Local Enterprise Partnership

Listed Building	Building identified on the English Heritage statutory list as being historically and/or architecturally important.
LLFA	Lead Local Flood Authority
LOAEL	Lowest Observed Adverse Effect Level
LPA	Local Planning Authority – Uttlesford District Council (UDC)
LPG	Liquefied Petroleum Gas
LSCC	London Stansted Cambridge Corridor
LSOAs	Lower Super Output Areas
LTO	Landing and take-off
LTP	Local Transport Plan
LWS	Local Wildlife Sites
M.A.G.	Manchester Airports Group
MCC	Manual Classified Counts
mppa	Million passengers per annum
MRO	Maintenance-Repair-Overhaul
NAEI	National Atmospheric Emissions Inventory
NAP	Noise Action Plan
NATS	NATS Holdings (formerly National Air Traffic Services)
NE	Natural England
NF_3	Nitrogen trifluoride
NMKTS	Noise Monitoring and Track Keeping System
NNAS	National Noise Attitude Survey
NNR	National Nature Reserve
NO	Nitric oxide
NO_2	Nitrogen dioxide
NOEL	No Observed Effect Level

NOx	Nitrogen oxides
NPPF	National Planning Policy Framework
NPPG	National Planning Policy Guidance
NPR	Noise Preferential Routes
NPS	National Policy Statement
NPSE	Noise Policy Statement for England
NRMM	Non-Road Mobile Machinery
NSIP	Nationally Significant Infrastructure Project
NTS	Non-Technical Summary
O_3	Ozone
OEF	Oxford Economic Forecasting
OLS	Obstacle Limitation Surfaces
Operational Phase assessment	The changes between the Do Minimum and Development Case in 2028 (the Principal Assessment Year).
OS	Ordnance Survey
PATM	Passenger Air Traffic Movements
Pax	Passengers
PBN	Performance Based Navigation
PCM	Pollution Climate Mapping
PD	Permitted Development
PEA	Preliminary Ecological Appraisal
Pertinent EIA law	Town and Country Planning (Environmental Impact Assessment) Regulations 2017 or the 'EIA Regulations'.
PFCs	Perfluorocarbons
PIA	Personal Injury Accident
PINS	Planning Inspectorate

PM_{10}	Particulate Matter that is 10 micrometres or less in diameter
$PM_{2.5}$	Particulate Matter that is 2.5 micrometres or less in diameter
pNO_2	Primary NO_2 - Nitrogen Dioxide emitted directly from a source.
PPE	Personal Protective Equipment
PPG	Planning Practice Guidance
Principal Assessment Year	The year in which the proposed cap will be reached under Development Case is 2028. The ES assesses and describes the incremental changes in effects between the Do Minimum and Development Case scenarios in this year.
PRM	Passengers with reduced mobility
PRNAV	Precision Area Navigation
Project	Stansted Airport 35+ Project; 35+ Project; Building for the Future: 35+
Proposed Development	▪ Two new links to the runway: Rapid Exit Taxiway (RET) to the south-west and Rapid Access Taxiway (RAT) to the north-east; ▪ Six additional stands in the mid-airfield: Yankee Remote Stands; ▪ Three additional stands at the north-eastern end of the airfield: Echo Stands; and ▪ An increase in the annual number of passengers of 8mppa, from the existing permitted 35mppa to 43mppa.
PSZ	Public Safety Zone
PTI	Public Transport Interchange
R3	The ‘third runway’ proposed at London Heathrow Airport
RAF	Royal Air Force
RANCH	Road Traffic and Aircraft Noise Exposure and Children’s Cognition and Health
RAT	Runway Access Taxiway
Resilience	The ability of a system to anticipate, withstand, adapt to and recover from shocks and stresses.
RET	Runway Exit Taxiway
REVIHAAP	Review of Evidence on Health Aspects of Air Pollution
RTPI	Royal Town Planning Institute
SAC	Special Area of Conservation

SARPs	Standards and Recommended Practices
SATF	Stansted Area Transport Forum
SCI	Statement of Community Involvement
SEGS	Stand Entry Guidance System
SEL	Sound Exposure Level
SF_6	Sulphur hexafluoride
SIDS	Standard Instrument Departures
SiEL	Single Event Level
SIGS	Sound Insulation Grant Scheme
Site	Stansted Airport; Stansted; the airport
SOAEL	Significant Observed Adverse Effect Level
SoNA	Survey of Noise Attitudes
SPD	Supplementary Planning Document
SPG	Supplementary Planning Guidance
SSE	Stop Stansted Expansion
SSSI	Site of Special Scientific Interest
STAL	Stansted Airport Limited
STEM	Science, Technology, Engineering and Maths
SuDS	Sustainable Drainage Systems
TA	Transport Assessment
TMA	Terminal manoeuvring area – a designated area of controlled airspace surrounding a major airport where there is a high volume of traffic.
TOCs	Train Operating Companies
Transitional Year	The year in which the existing cap will be reached under Do Minimum and Development Case scenarios is 2023. This does not need to be assessed, therefore it is described as the future baseline.
TWUL	Thames Water Utilities Limited

UAEL	Unacceptable Adverse Effect Level
UDC	Uttlesford District Council
UK	United Kingdom
UU	Unilateral Undertaking
VDGS	Visual Docking Guidance Systems
vpd	Vehicles per day
WAML	London to Cambridge West Anglia Main Line
WCS	Water Cycle Study
Weather	Conditions of the atmosphere over a short period of time (minutes to months).
WFD	Water Framework Directive
WG	Weather Generator
WHO	World Health Organisation
WMS	Water Management System
WWTP	Waste Water Treatment Plant

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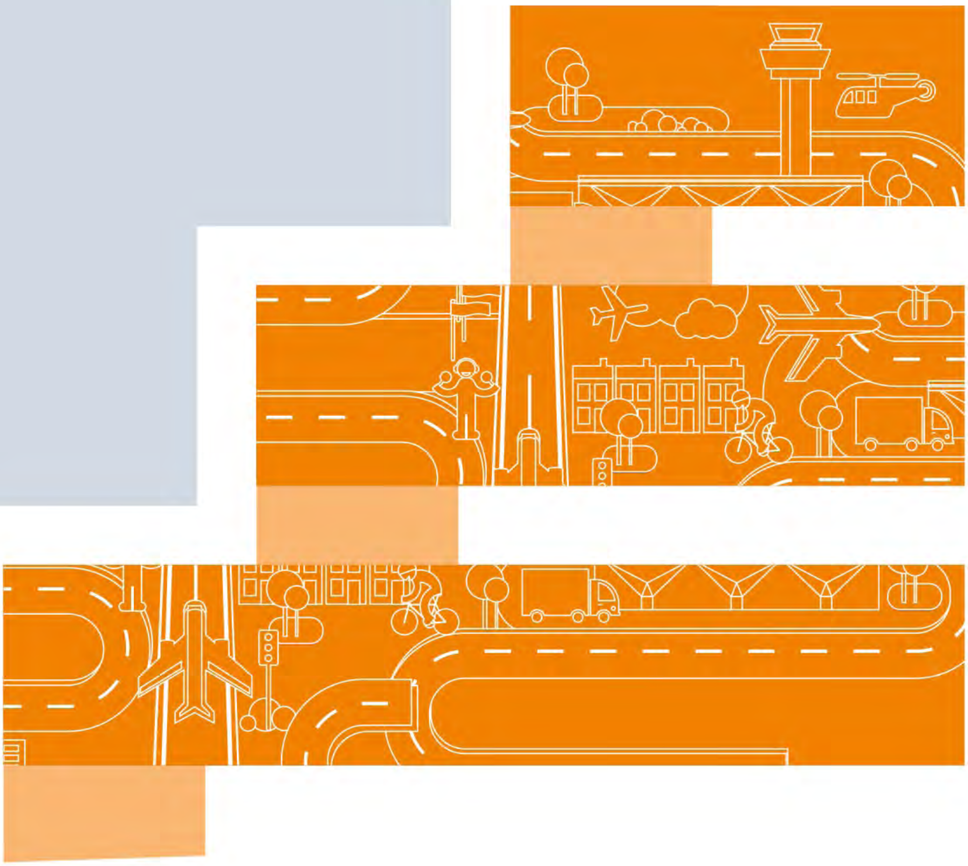
Chapter 1 Introduction



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1 INTRODUCTION

1.1 This Environmental Statement (ES) has been prepared in conjunction with a planning application by Stansted Airport Limited (STAL) ('the Applicant') to Uttlesford District Council (UDC), which seeks permission to provide new airfield infrastructure. This new infrastructure will enable Stansted Airport ('the airport') to make better and more efficient use of its existing single runway, which will in turn enable it to increase its passenger throughput to 43 million in accordance with the aspirations set out in the 2015 Stansted Airport Sustainable Development Plan (SDP) [1].

1.2 The planning application seeks permission for an additional rapid access taxiway (RAT) and an additional rapid exit taxiway (RET) to serve the existing runway, together with nine additional aircraft parking stands. STAL also seeks permission for a proposed 23% uplift to its existing annual passenger cap of 35 million passengers per annum (mppa) to 43mppa, whilst retaining its approved limit of 274,000 total aircraft movements per annum. Together, these physical and operational changes comprise the proposed development (also referred to as '35+ Project').

1.3 In 2016 the airport handled approximately 24.3 million passengers, increasing to 25.9 million in 2017, which represents an annual growth rate of approximately 6.6%. In 2017 there were 189,921 aircraft movements, of which 161,318 were passenger air transport movements (PATMs), 12,492 were cargo air transport movements (CATMs) and 16,111 were 'other' movements including general aviation (GA) and positioning flights. In 2017 Stansted also handled 263,120 tonnes of cargo.

1.4 As set out in ES Chapter 4 (Aviation Forecasts), the airport is forecast to continue to grow rapidly over the next decade; reaching 35mppa by 2023 and 43mppa by 2028, assuming that the existing annual passenger cap imposed by the 2008 planning permission (the 25+ permission) is increased. These growth projections are based on a set of up-to-date independent air traffic forecasts that have been prepared by leading aviation specialists ICF Aviation Services Group (ICF).

1.5 To accommodate this predicted growth, the planning application seeks permission for the development and operation of new airfield infrastructure, which is described later in this chapter and more fully in ES Chapter 3 (Description of Site, Proposed Development, Policy Context and Alternatives).

1.6 This ES and its supporting technical appendices present the findings of the Environmental Impact Assessment (EIA) which has been undertaken in accordance with the requirements of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 [2] (herein the 'EIA Regulations'). The ES provides part of the information that will be used by UDC in its determination of the planning application submitted for the proposed development.

1.7 The technical and geographic scope of the EIA was informed by various baseline studies, surveys, consultations, modelling and technical assessments conducted by STAL and its appointed team of topic specialists. As described in ES Chapter 2 (EIA Methodology), a Scoping Report was prepared to identify the potentially significant environmental effects of the proposed development that needed to be considered in the ES and to outline the approach employed to undertaking the assessment of these effects. This Scoping Report was submitted to UDC in June 2017, who consulted widely before issuing its Scoping Opinion dated 21st December 2017.

Background

1.8 Stansted Airport is wholly located within the district of Uttlesford in the county of Essex and primarily serves the East of England, the South East and London. The location of the airport is shown in Figure 1.1.

1.9 Stansted Airport was granted outline planning permission to expand the passenger terminal and provide additional aircraft parking stands, taxiways and other associated facilities and infrastructure in May 2003 (UDC ref: UTT/1000/01/OP). This permission imposed a passenger limit of up to 25mppa and up to 241,000 air transport movements (ATMs) (referred to as the '15+ permission').

1.10 In 2006 the previous owners of the airport (British Airports Authority, BAA) submitted an application to UDC under Section 73 of the Town and Country Planning Act 1990 to seek a material amendment to the 2003 consent. Following an appeal, planning permission was eventually granted in 2008 for an uplift of the approved passenger and flight movement caps to 35mppa and 264,000 ATMs, as well as a limit of 10,000 'other' movements, including GA and positioning flights. This is referred to as the '25+ permission'.

1.11 In 2013, Stansted Airport was acquired by the Manchester Airports Group (MAG) and since then has experienced strong growth in annual passenger numbers resulting in a record of 25.9mppa in 2017. It is presently the fourth largest airport in the UK by annual passenger numbers and the gateway to the East of England. In 2017, the airport was served by 22 airlines carrying passengers to over 190 destinations across 38 countries. The airport continues to attract more airlines and routes, e.g. most recently Emirates and Primera.

1.12 STAL's vision for the future growth of the airport is outlined in the SDP, which was published in 2015 following extensive public consultation. The 2015 SDP provides the overarching framework to guide sustainable development and growth of the airport under a single runway operation. The 2015 SDP is underpinned by six key guiding principles:

- *"Support Stansted in becoming the best London airport;*
- *Proactively plan for growth to make best use of existing capacity;*
- *Support prosperity and economic growth in the region;*
- *Actively manage and contain environmental impacts;*
- *Be active and supportive partners in the local community; and*
- *Maintain Stansted's position as the best in the UK for public transport".*

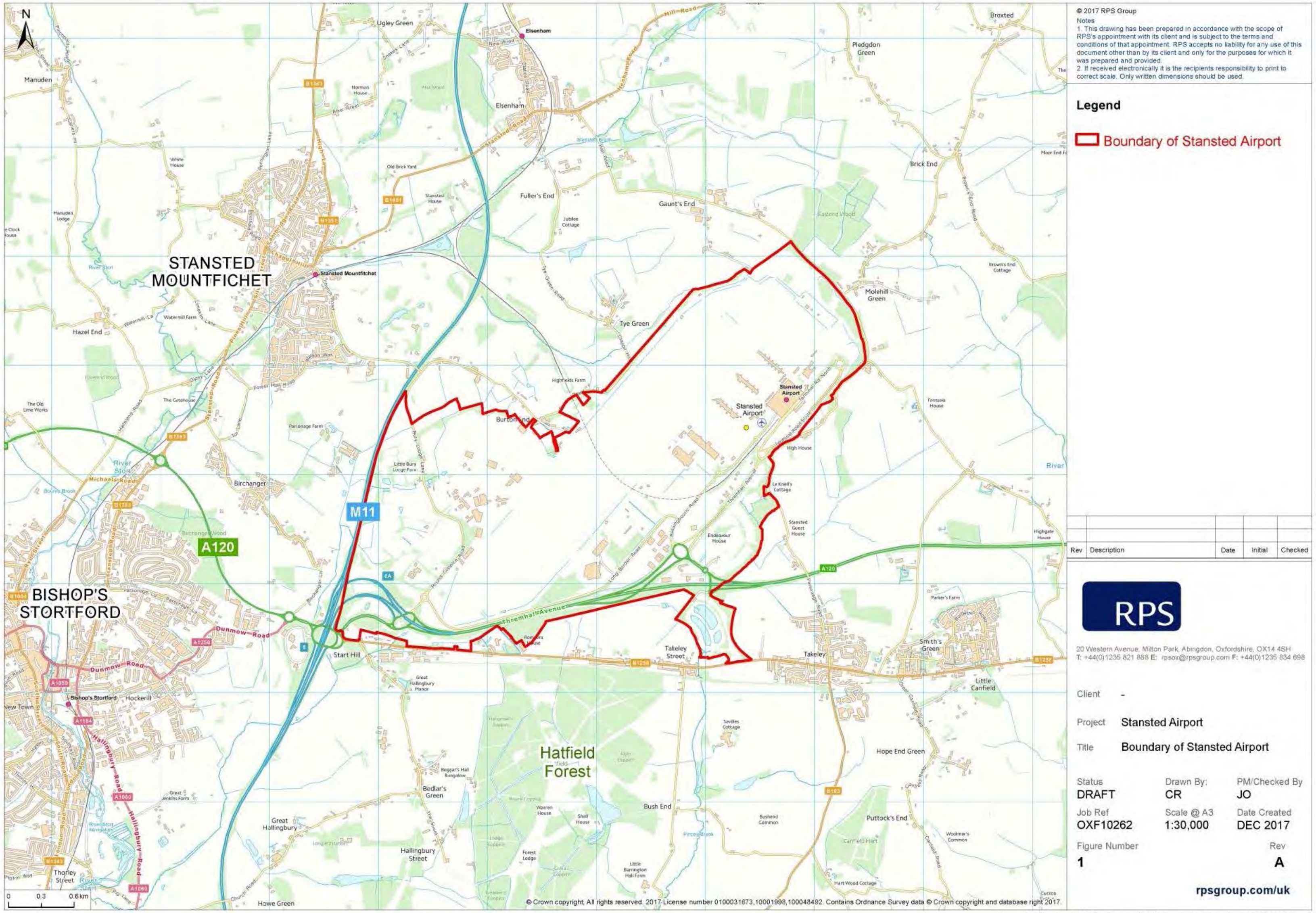


Figure 1.1: Location of Stansted Airport

Summary of Proposed Development

1.13 The proposed development comprises:

- The development of new airfield infrastructure occupying around 9 hectares (ha) of land within the existing airside operational area of the airport, including:
  - A Rapid Exit Taxiway (RET) linking to the runway from the south-west (known as Mike Romeo RET);
  - A Rapid Access Taxiway (RAT) at the north-eastern end of the runway (known as Runway Tango 22/04 RAT);
  - Six additional aircraft parking stands located in the middle part of the airfield (known as the Yankee Remote Stands); and
  - Three additional aircraft parking stands located to the north of the existing Echo Stands at the north-eastern end of the airfield;
- An 8mppa (23%) increase in the number of passengers that the airport is allowed to cater for in a calendar year, rising from 35mppa to 43mppa; and
- A combined annual aircraft movement limit of 274,000.

1.14 The location and configuration of the proposed airfield infrastructure is shown in blue in Figure 1.2.

1.15 The proposed development will allow the airport to make better and more efficient use of the existing runway in the period up to 2028 and beyond, in line with the stated vision set out in the 2015 SDP. This approach is endorsed by emerging Government policy to encourage all airports to maximise the utilisation of their existing runways in the short term, in order to meet predicted demand. The proposed airfield infrastructure will enhance the use of Stansted's single runway, improve airfield performance and reduce congestion during peak periods. As such, it will enable the most efficient, practical use of the runway in the foreseeable future, accounting for other operational constraints such as: daily flight profiles (i.e. the balance of departures and arrivals); its night flights quota (set by the Government); its seasonal and leisure market characteristics; and, existing noise and other environmental controls, which will be retained and/or enhanced under the proposals.

1.16 Specifically, the proposed taxiways will allow aircraft to join and depart the runway more efficiently and thereby reduce congestion on the airfield, while the proposed new aircraft parking stands will help meet the increased level of aircraft throughput (up to the existing limit of 274,000 movements per annum), whilst supporting demand for additional based aircraft and overnight parking.

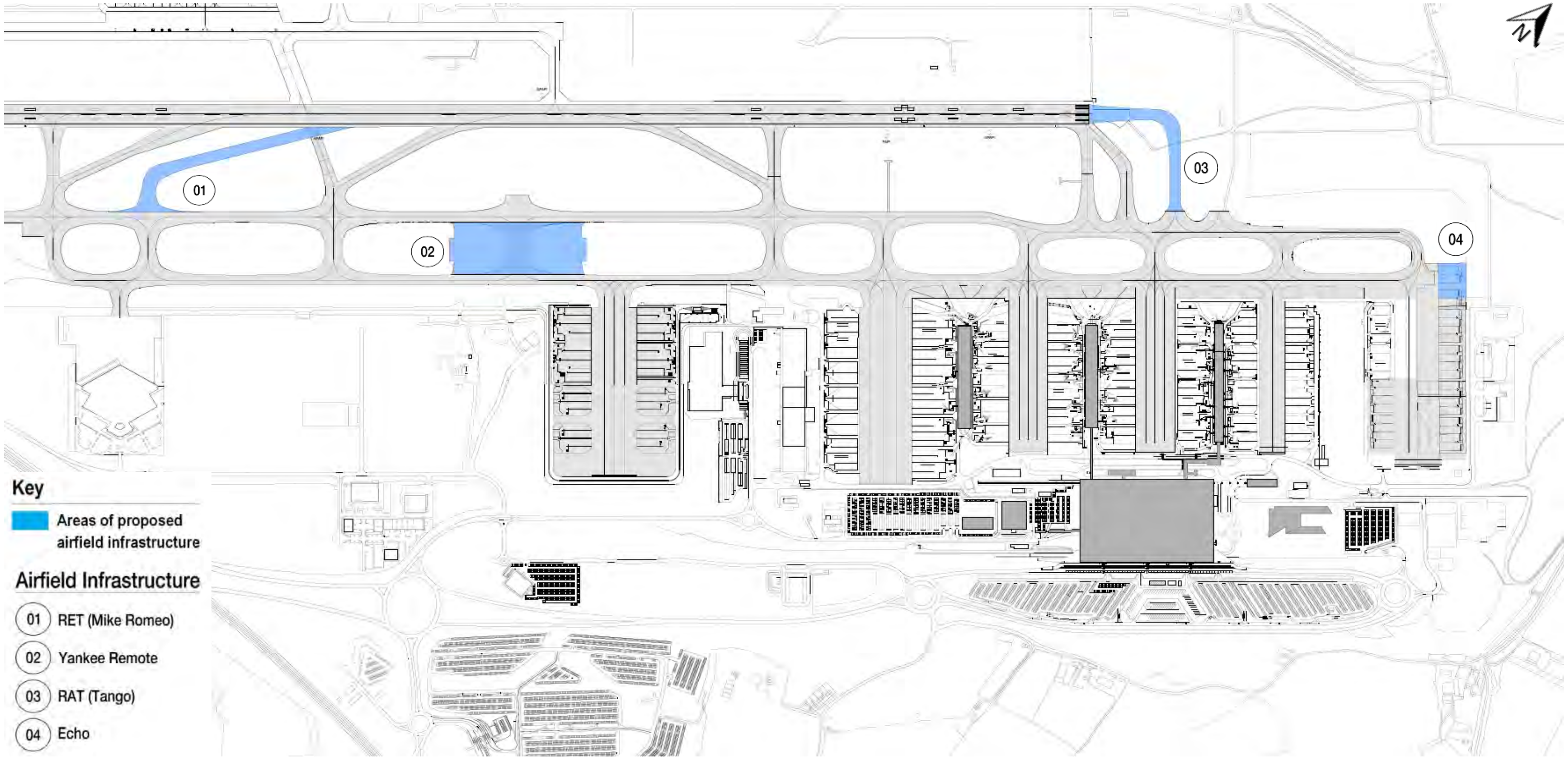


Figure 1.2: Location of the proposed new airfield infrastructure (source: Pascall+Watson)

Environmental Impact Assessment (EIA)

1.17 Planning applications for developments that are subject to the EIA Regulations are termed 'EIA development'. The requirement for an EIA is either mandatory or conditional, depending on the classification of the development project. This is based, in turn, on the likelihood of significant environmental effects arising, together with the nature, scale and complexity of the proposed development.

1.18 Reference to development in this instance is Schedule 2, paragraph 10(e): *"Construction of airfields"*, where the applicable screening thresholds and criteria are:

"(i) The development involves an extension to a runway; or
(ii) The area of the works exceeds 1 hectare".

1.19 In recognition that the proposed development meets the threshold (ii) above and that it has the potential to give rise to significant environmental effects by virtue of its *"nature, scale and location"*, STAL decided to commence with the EIA process at an early stage without first requesting a Screening Opinion from UDC. Accordingly, this ES has been prepared to report the findings of the EIA.

1.20 The definition of what constitutes a 'significant environmental effect' is explained further in ES Chapter 2 (EIA Methodology). However, in general terms, significant adverse environmental effects are those which are of sufficient magnitude or importance to be considered by UDC as being material to the planning determination process and for which it may choose to impose planning conditions and/or obligations to control such effects.

1.21 In accordance with Regulation 15 of the EIA Regulations, a request for an EIA Scoping Opinion was made to UDC on the 1st June 2017, supported by a comprehensive Scoping Report. Scoping constitutes an important stage of the EIA process as it allows for the 'likely' significant environmental effects arising from a development, both adverse and beneficial, to be identified and agreed with the local planning authority, the statutory consultees and other stakeholders at an early stage. This process also ensures that the eventual ES does not become unduly long, imbalanced or difficult for the reader to access key information. As such, peripheral issues ('non-significant effects') have either been scoped out of the ES or are presented in a more concise form within it. This ensures that the ES remains proportionate and focused on the main effects of the development, as encouraged by the Government's National Planning Guidance on EIA (see ES Chapter 2).

1.22 As referred to earlier in this chapter and described more fully in ES Chapter 2, UDC's Scoping Opinion is dated 21st December 2017. This Opinion was preceded by a number of meetings with UDC Officers in order to discuss the ongoing EIA process and to consider the feedback and representations from stakeholders and other third parties. In addition, meetings were held with various statutory consultees during summer and autumn 2017 (e.g. Natural England, Essex County Council and Thames Water) at which the EIA and its component technical assessments were discussed. As such, the scope of the EIA was informed by these consultations prior to receipt of UDC's formal Scoping Opinion. Notwithstanding, the final content, structure and approach of the ES is based on UDC's final Scoping Opinion, as required by Regulation 4(a) at Part 5 of the EIA Regulations.

Structure of the Environmental Statement

1.23 RPS Planning and Development Ltd. (RPS) and a team of topic specialists (as listed in Table 1.2 at the end of this chapter) were commissioned by STAL to undertake the EIA and prepare the ES in accordance with the EIA Regulations and other relevant guidance, policies and standards.

1.24 Although there is no statutory provision that stipulates the form of an ES, it must contain the information specified in Part II of Schedule 4, and "*as much of the relevant information in Part I of the EIA Regulations as is reasonably required to assess the potential effects of the proposed development and which the Applicant can reasonably be required to compile".*

1.25 Schedule 4 of the EIA Regulations specifies what should be included in an ES. This includes:

"A description of the likely significant effects of the development on the environment resulting from, inter alia:

(a) The construction and existence of the development, including, where relevant, demolition works;

(b) The use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources;

(c) The emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;

(d) The risks to human health, cultural heritage or the environment (for example due to accidents or disasters);

(e) The accumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;

(f) The impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change;

(g) The technologies and the substances used."

1.26 Schedule 4 of the EIA Regulations further requires the ES to provide:

"The description of the likely significant effects [including] direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development" and:

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

1.27 This ES contains the above details and draws primarily on information and material provided by STAL (the Applicant) and its appointed consultant team. Where necessary, this information has been supplemented by data provided by UDC, other statutory bodies and proprietary research organisations.

1.28 The inclusion of the information required by Regulation 18(3), Schedule 4 of the EIA Regulations is summarised in Table 1.1 below.

Table 1.1: Schedule 4 checklist

Specified information	Location within
1. A description of the development, including in particular:	
(a) a description of the location of the development;	Chapter 1 Chapter 3
(b) a description of the physical characteristics of the whole development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases;	Chapter 1 Chapter 3 Chapter 5
(c) a description of the main characteristics of the operational phase of the development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used;	Chapters 3 – 5 Chapters 15 – 16
(d) an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced during the construction and operation phases).	Chapter 5 Chapters 7 – 10 Chapters 12 – 13 Chapters 15 – 16
2. A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.	Chapters 2 – 3
3. A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.	All technical chapters (6 – 16)
4. A description of the factors specified in regulation 4(2) likely to be significantly affected by the development: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.	All technical chapters (6 – 16)

Specified information	Location within
5. A description of the likely significant effects of the development on the environment resulting from, inter alia:	
(a) the construction and existence of the development, including, where relevant, demolition works;	Chapter 5 plus all technical chapters (6 – 16)
(b) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources;	Chapter 5 Chapter 16
(c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;	Chapter 7 Chapter 8 Chapter 9 Chapter 16
(d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);	Chapter 14 Chapter 16
(e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;	Chapter 3 Chapter 17
(f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change;	Chapter 13
(g) the technologies and the substances used.	Chapter 5 plus all technical chapters (6 – 16)
The description of the likely significant effects on the factors specified in regulation 4(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project, including in particular those established under Council Directive 92/43/EEC(a) and Directive 2009/147/EC(b).	All technical chapters (6 – 16), where applicable
6. A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.	All technical chapters (6 – 16)
7. A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment	All technical chapters (6 – 16) plus Chapter 18

Specified information	Location within
are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.	
8. A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to EU legislation such as Directive 2012/18/EU(c) of the European Parliament and of the Council or Council Directive 2009/71/Euratom(d) or UK environmental assessments may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.	Chapter 13 Chapter 16
9. A non-technical summary of the information provided under paragraphs 1 to 8.	Non-Technical Summary (separate document)
10. A reference list detailing the sources used for the descriptions and assessments included in the environmental statement.	All chapters, where relevant

1.29 The ES for the proposed development comprises three main volumes which contain a suite of figures, tables, technical analysis, model outputs, survey information and supporting reference documents. The three ES volumes are Volume 1 (Main ES Text and Figures), Volume 2 (ES Technical Appendices) and Volume 3 (Transport Assessment). A standalone Non-Technical Summary (NTS) has also been produced to accompany the ES. Further details on the ES Volumes are described in the following sections.

Volume 1: Environmental Statement Main Text and Figures

1.30 Following this introductory chapter, the ES is structured as follows:

- Chapter 2: EIA Methodology;
- Chapter 3: Description of Site, Proposed Development, Policy Context and Alternatives;
- Chapter 4: Aviation Forecasts;
- Chapter 5: Development Programme and Construction Environmental Management;
- Chapter 6: Surface Access and Transport;
- Chapter 7: Air Noise;
- Chapter 8: Ground Noise;

- Chapter 9: Surface Access Noise;
- Chapter 10: Air Quality;
- Chapter 11: Socio-Economic Impacts;
- Chapter 12: Carbon Emissions;
- Chapter 13: Climate Change;
- Chapter 14: Public Health and Wellbeing;
- Chapter 15: Water Resources and Flood Risk;
- Chapter 16: Non-Significant Topics;
- Chapter 17: Cumulative Effects; and
- Chapter 18: Summary of Mitigation and Residual Effects.

Volume 2: Environmental Statement Technical Appendices

1.31 ES Volume 2 provides a set of technical appendices including reports, surveys and data which have informed the preparation of the EIA. This information is supplied as a separate volume to prevent the main body of the ES becoming excessively long and cumbersome.

Volume 3: Transport Assessment

1.32 The Transport Assessment (TA) is included as ES Volume 3 in order for it to be made readily accessible to relevant consultees such as the Highways England and Essex County Council. This document provides details of the traffic model employed in the assessment (Tempro); traffic survey data; current parking and other travel modes and facilities at the airport; forecast travel demand; highways and public transport impact assessments; and details of proposed mitigation measures.

Non-Technical Summary (NTS)

1.33 A standalone NTS presents a summary of the ES in plain English, non-technical language, as required by the EIA Regulations. The NTS provides a concise outline of the proposed development, the potential environmental effects identified and mitigation measures proposed to avoid, reduce or offset these effects, as well as any related remaining ('residual') impacts.

Project Team

1.34 This EIA process and the compilation of this ES have been managed by RPS (London) and STAL, supported by a number of specialist consultants and technical experts. This team is identified in Table 1.2 below, along with their respective disciplines, project roles and contribution to the EIA.

Table 1.2: '35+ Project' EIA Team and Project Roles

Organisation	Role/Topic Lead
Stansted Airport Limited (STAL)	Applicant, Project Manager and Planning Advisor.
RPS Consulting Services Ltd.	EIA Coordinator and Lead ES Author (Chapters 1, 2, 3, 5, 16, 17 and 18 and NTS), and joint authors of Aviation Forecasts and Water Resources and Flood Risk ES chapters. Preparation of Public Health and Wellbeing ES chapter, and associated HIA. Preparation of Preliminary Ecological Appraisal and Ecology Mitigation Strategy associated with Non-Significant Topics ES chapter.
ICF Aviation Services Group (ICF)	Preparation of passenger demand and traffic forecasts, and joint authors of Aviation Forecasts ES chapter.
Steer Davies Gleave (SDG)	Preparation of Surface Access and Transport ES chapter and separate Transport Assessment.
Cole Jarman Associates	Preparation of Air Noise, Ground Noise and Surface Access Noise ES chapters.
Arup	Preparation of Air Quality, Climate Change and Carbon Emissions ES chapters.
Optimal Economics	Preparation of Socio-Economic Impacts ES chapter.
WSP	Joint author of Water Resources and Flood Risk ES chapter, and preparation of associated Flood Risk Assessment and Drainage Strategy.

Competency of ES Authors

1.35 Pursuant to Regulation 18 (5) of Part 5 of the EIA Regulations:

(a) The developer must ensure that the environmental statement is prepared by competent experts; and

(b) The environmental statement must be accompanied by a statement from the developer outlining the relevant expertise or qualifications of such experts

1.36 A signed 'Statement of Competence' for the appointed EIA consultant team has been provided by STAL to UDC in the supporting documentation accompanying the planning application. This is provided at ES Appendix 1.1.

References

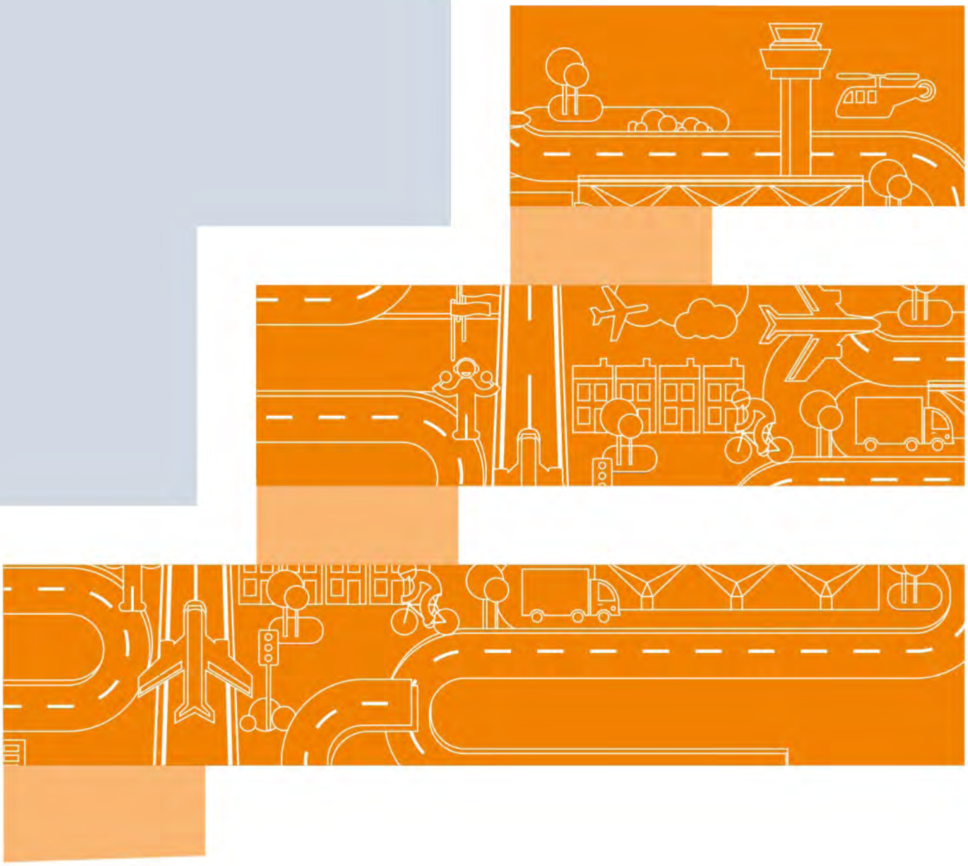
1 London Stansted Airport (2015) Sustainable Development Plan 2015.

2 HMSO (2017) Town and Country Planning (Environmental Impact Assessment) Regulations 2017.

TRANSFORMING LONDON STANSTED AIRPORT

35+ PLANNING APPLICATION

Chapter 2
EIA Methodology



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2 EIA METHODOLOGY

2.1 This chapter describes the methodology, the approach and the key stages of the EIA process and explains the terminology, assessment criteria and generic categories of 'significance' used within this ES.

2.2 The technical scope, assumptions and methodology of the EIA and its component impact assessments was informed by the completion of Scoping Report which was issued to UDC on 2nd June 2017. As described in this chapter, this report was the subject of wide consultation with responses received from numerous stakeholders including statutory and non-statutory consultees, parish councils, and other interested parties and individuals.

2.3 A separate public consultation exercise was undertaken by STAL between 6th and 24th July 2017, and revealed the extent of community concern over the originally proposed increase in aircraft movements. Following consideration of these concerns, a decision was taken by STAL not to pursue increased movement limits and the nature of the proposal in the Scoping Report was amended on 18th October 2017 accordingly. Thereafter, a formal Scoping Opinion was issued by the Council, dated 21st December 2017. This chapter describes the outcome of the scoping and consultation process and provides an account of how the matters raised in UDC's Scoping Opinion have been addressed in the ES.

2.4 The ES, which is based on UDC's Scoping Opinion, describes the likely significant environmental effects of the proposed development, utilising current knowledge of the airport site and the surrounding environment. Based on the findings of the studies undertaken as part of the EIA, methods of preventing, reducing, or offsetting any significant negative ('adverse') effects and enhancing positive ('beneficial') effects of the proposed development are set out in each relevant topic chapter of the ES.

EIA Statutory Requirements and Guidance

2.5 The EIA and resulting preparation of the ES have been undertaken in accordance with the requirements of the EIA Regulations and current guidance for EIA, in particular with regard to:

- The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations)[1], which were brought into effect by the UK Government on 16th May 2017. These new EIA Regulations implement the requirements of the European Union (EU) Directive 2014/52/EC, amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment;

- The Department for Communities and Local Government Planning Practice Guidance (PPG) on EIA[2] – updated to account for the new EIA Regulations on 28th July 2017; and

- The Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Impact Assessment 2004[3].

EIA Process and Key Stages

2.6 EIA is intended to be an iterative process which extends from the project inception stage through to the final design, consenting, construction and operational stages. This ensures that all likely significant environmental effects are either ‘designed-out’ at the planning stage or mitigated, managed and controlled to acceptable levels through subsequent stages of project development. As required under the EIA Regulations 2017, all significant environmental effects must now be monitored at the construction and operational stages to ensure that mitigation is effective. Such environmental monitoring and management can be secured through planning conditions or other mechanisms agreed with the local planning authority and statutory bodies.

2.7 The key stages of the EIA process are illustrated in Figure 2.1 below. Currently, the EIA has entered the ES Submission stage, as highlighted in red.

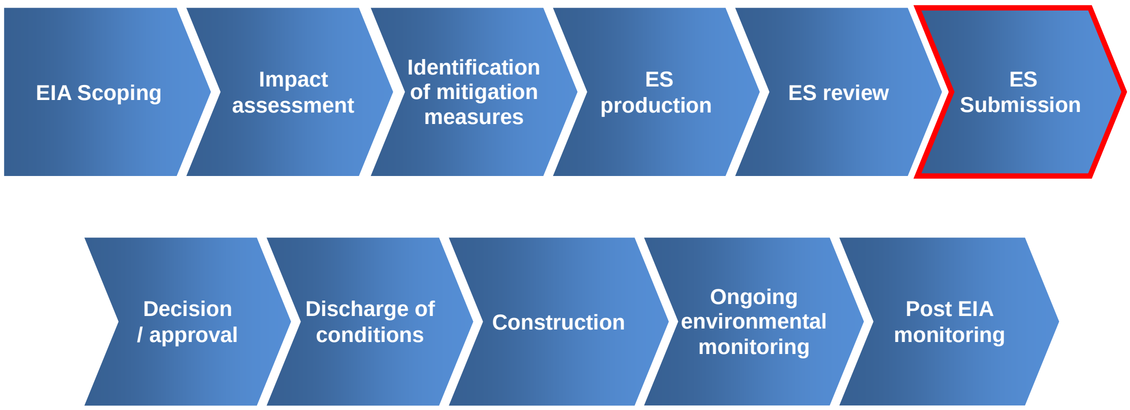

Figure 2.1: Key stages of the EIA process

2.8 The main steps undertaken in the preparation of this ES were as follows:

- Scoping and stakeholder consultation;
- Establishment of baseline;
- Finalisation of scope, following receipt of UDC Scoping Opinion;
- Impact assessment;
- Identification of additional mitigation and enhancement measures;
- Preparation of the ES and Non-Technical Summary (NTS).

2.9 It should be noted that not all of these steps follow a strict order such that, for instance, the establishment of the baseline conditions through surveys and other means may extend into the impact assessment phase due to seasonal and other considerations.

Scoping

Initial Scoping Study and Report (January to May 2017)

2.10 Early in the EIA process, a scoping study was carried out by STAL and its appointed team of specialist consultants. The results of this scoping stage were presented in a Scoping Report coordinated by RPS (refer to ES Appendix 2.1), which had the objective of furnishing UDC and other project stakeholders with the required information on the intended technical scope, content, assumptions and methodology to be used in the EIA and, thereafter, to enable the Council to provide a formal Scoping Opinion.

2.11 The Scoping Report described the planning background and principal elements of the proposed development, as well as outlining Stansted Airport's projected growth (i.e. air traffic and passenger forecasts) which underpin the case for a change to currently permitted operations. It then set out in detail the intended scope of the EIA in respect of those topics which were considered to be materially affected/altered by the proposed development and those which had the potential to give rise to 'significant effects on the environment'.

2.12 The Scoping Report also described those topics which were identified to be scoped out of the EIA, on the basis that they will remain substantially unaffected and/or do not have the potential to give rise to significant environmental effects. The core topics of surface access transport, noise (air, ground and surface access), air quality, socio-economics, carbon emissions, climate change and population, and public health were proposed for full consideration in the ES. None of these environmental aspects were predicted to give rise to significant effects; however, it was considered that they should be 'scoped-in' to the EIA in order to provide a balanced and comprehensive ES. Additionally, where the information available at the scoping stage was insufficient to enable a robust conclusion to be reached as to whether or not a potential effect was likely to be significant, the effect was taken forward for further assessment in the EIA.

Request for Scoping Opinion (June 2017)

2.13 An EIA Scoping Report was submitted to UDC on the 1st June 2017, together with a request for a formal Scoping Opinion in accordance with Regulation 15, Part 4 of the EIA Regulations 2017.

2.14 Following this submission, the Council consulted widely on the Scoping Report including with statutory and non-statutory consultees, local parish councils and members of the public (see below). Several meetings were subsequently held between UDC Officers, STAL and its consultants in order to discuss the responses received, as well as to clarify and, where necessary amend, the scope of the EIA and its component technical studies. Specific meetings on the EIA scope were held on 12th July, 20th July and 31st August 2017.

2.15 At the time of preparing the EIA Scoping Report, the proposed development included the replacement of the existing aircraft movement limit of 274,000 (i.e. the aggregation of the Passenger Air Transport Movement (PATM), Cargo Air Transport Movement (CATM) and other, including General Aviation (GA), aircraft numbers approved by condition ATM1 and ATM2 of the 2008 planning permission) with a new combined limit of 285,000. This would have allowed for approximately 11,000 (4%) more aircraft movements per annum by 2029 than is currently permitted. In conjunction with this increase in flights, STAL were minded to seek permission from UDC to replace the existing 35mppa cap with a new cap of 44.5mppa (i.e. 1.5 million more passengers than the 43mppa cap for which permission is now being sought).

Alteration to the Request for EIA Scoping Opinion (October 2017)

2.16 As reported in the Statement of Community Involvement (SCI) submitted with this planning application, STAL undertook a series of consultation events in the towns and villages surrounding the airport between 6th and 24th July 2017, as part of the pre-application process. The feedback from this consultation revealed that the proposed increase in the number of aircraft movements was a key area of concern to the community. Accordingly, in forming a balanced view between airport capacity and community impact, STAL took a decision not to seek any increase to the existing 274,000 aircraft movement limit. It was also decided at that time to amend the proposals to limit growth of the airport to 43mppa by 2028. On this basis, a planning application would be framed to seek permission to develop a small amount of new airfield infrastructure coupled with a more modest 8mppa (23%) increase to the existing passenger cap of 35mppa.

2.17 In view of the above, STAL submitted an 'Alteration to the Request for EIA Scoping Opinion' to UDC on 18th October 2017, a copy of which is provided at ES Appendix 2.2. In this letter, the change to the proposals was explained as follows:

"Having listened to concerns of local residents at the consultation events and reflected carefully, we are adapting our proposals so growth of the airport can be met within the current total movement limit of 274,000. We believe this approach provides the most appropriate balance of economic, environmental and social considerations for airport growth over the next ten years.

In detail, this results in an alteration to the number of passengers to 43mppa and a forecast year of 2028 for the purposes of the modelling for the Environmental Impact Assessment."

2.18 The letter also provided a tabulated summary of the aviation forecasts supporting the planning case, which are described in detail in ES Chapter 4 (Aviation Forecasts).

2.19 Whilst the exclusion of additional aircraft movements and the smaller increase in passenger numbers sought would be likely to give rise to a corresponding reduction in environmental effects, these changes were not considered material to the scope of the EIA. Accordingly, it was not considered necessary to revise the Scoping Report at this juncture, and the letter concluded that:

"Further, the EIA topics contained within our original Scoping Opinion request remain the same as we still consider these to be the most appropriate method to address the impacts of the proposed development. The formal scoping opinion of the Council is outstanding as the time of writing. However, I would ask that in respect of the changes outlined in this letter, the Council continues to consider the Scoping Report as previously submitted and alongside the consultation responses received to date, in order to form a Scoping Opinion".

Matters Raised in Response to the Scoping Report

2.20 As required by Regulation 15 (4) of Part 4 of the EIA Regulations, UDC engaged with statutory consultees and other key stakeholder organisations before determining its Scoping Opinion. Responses and representations on the proposed scope of the EIA were received by the organisations listed in Table 2.1.

2.21 The representations received on the Scoping Report have been reviewed and all relevant comments have been addressed within the technical chapters of this ES (Chapters 6 -16). A full account of the representations received is provided at ES Appendix 2.3, whilst Table 2.1 below provides a summary of them (grouped according to the main EIA topics).

Table 2.1: Summary of consultation bodies representations on Scoping Report

Consultation Body	Response Date	Main EIA topics referred to in response
Uttlesford District Council, Environmental Health	10/07/2017	Air quality Noise Public health and wellbeing
Environment Agency	26/06/2017	Air quality Construction waste Ecology Water resources Water quality
Historic England	19/06/2017	Air quality Archaeology
Natural England	07/07/2017	Ecology Surface access
Essex County Council, Archaeological Advice	08/06/2017	Archaeology
Essex County Council, Ecological Advice	22/06/2017	Ecology
Essex County Council, Highway Authority	23/06/2017	Surface Access
Essex County Council, SuDS	07/07/2017	Drainage and flood risk
Essex County Council	07/09/2017	Air noise Public health and wellbeing Socio-economic impacts Surface access Water
Hertfordshire County Council, Environment Department	26/06/2017	Cumulative schemes Ecology Planning Surface access
Hertfordshire County Council, Public Health	23/06/2017	Public health and wellbeing
National Trust	03/08/2017	Air quality Ecology Heritage Socio-economic impacts
Network Rail	14/06/2017	Surface access
Chelmsford City Council, Transport	30/06/2017	Surface access
Harlow Council	11/08/2017	Air quality Climate change

Consultation Body	Response Date	Main EIA topics referred to in response
		Noise Public health and wellbeing Surface access
East Herts Council	11/08/2017	Air quality Noise Socio-economic impacts Surface access
STAL Aerodrome Safeguarding Authority	22/06/2017	Major accidents and disasters
37 no. Parish Councils	Various	Various
Stop Stansted Expansion	14/07/2017	Various

2.22 In light of the range of responses received on the EIA Scoping Report, and the subsequent amendment to the nature of the planning proposal (as described above), it was decided by mutual agreement between STAL and UDC, that the statutory 5-week period for the LPA to issue its Scoping Opinion could be waived in this instance. This allowed UDC adequate time to consult and deliberate upon the issues raised and formulate a thorough Scoping Opinion.

UDC Scoping Opinion (December 2017)

2.23 UDC issued its Scoping Opinion via an email to STAL on 22nd December 2017 (although the letter is dated 21st December 2017). A copy of the Scoping Opinion and covering letter are provided at ES Appendix 2.4.

2.24 Overall, UDC agreed with the general approach to the EIA and the proposed coverage of the ES, stating:

"UDC concludes, subject to what is set out below, that this Section appropriately identifies at this stage the relevant categories for consideration of potential likely significant effects in the environmental statement:

a) Construction Programme and Effects

b) Surface Access and Transport

c) Noise

i. Air Noise

ii. Ground Noise

iii. Surface Access Noise

d) Air Quality

e) Socio-Economic Effects

f) Carbon

g) Climate Change

h) *Public Health and Well-Being*

i) *Cumulative Effects".*

2.25 UDC's Scoping Opinion (ES Appendix 2.4) confirmed that the following EIA topics could be scoped out of any further assessment in the ES, for reasons set out in the Scoping Report (ES Appendix 2.1) and repeated in the Opinion. The rationale for scoping out these topics was mainly on the grounds that they will not be materially influenced by the proposed development and/or would be unlikely to represent 'significant environmental effects':

- **Ground Conditions and Contamination** (paragraph 82);
- **Archaeology and Built Heritage** (paragraph 83);
- **Landscape and Visual Impact** (paragraph 84);
- **Waste** (paragraph 85); but UDC requested that waste management and recycling measures should be set out in the ES (see paragraph 86). This information is provided in the 'Waste' sub-section of Chapter 16 (Non-significant Topics); and
- **Major Accidents and/or Disasters** (paragraphs 87 – 89). Matters raised with respect to the Cadent Gas Network, the airport's Public Safety Zones (PSZ), and temporary and permanent lighting are dealt with in or Chapter 16.

2.26 In addition to the above, UDC's Scoping Opinion also requested that the ES (or separate reports accompanying the planning application), should provide further information on the following topics:

- **Water Resources, Drainage and Flood Risk** (paragraphs 77, 79 and 80). Accordingly, a further chapter of the ES, Chapter 15 (Water Resources and Flood Risk), has been prepared to provide the requested information including on flood risk, drainage, foul water treatment and potable water consumption. This chapter is informed by a standalone Flood Risk Assessment and Drainage Strategy (ES Appendix 15.1).
- **Ecology and Biodiversity** (paragraphs 70 – 77). Whilst UDC accepted the case for scoping out any further consideration of adverse effects on the ecology of Hatfield Forrest NNR and SSSI, Elsenham Woods SSSI and other local SSSIs, for the sake of completeness Chapter 10 (Air Quality) examines the potential for the proposed development to increase nitrogen deposition at these designated woodlands. Additionally, although not referred to in the Scoping Opinion, other ecological effects including from the loss of airfield grassland habitat under the proposed development, are considered in both ES Chapter 16 (Non-Significant Topics) and the Preliminary Ecological Appraisal (PEA) (ES Appendix 16.1). Lastly, accounting for comments made by the Environment Agency on the Scoping report, which are reflected in paragraph 77 of UDC's Scoping Opinion, ES Chapter 15 qualitatively assesses the potential for impacts from contaminated surface water run-off on the water ecology environment.

2.27 Other specific matters raised in UDC's Scoping Opinion are summarised in the first column of Table 2.2 below, with the second column providing a response to these matters; describing how the issue has been addressed in the ES, or, explaining why the requested information is not applicable and/or providing clarification of the assessment approach adopted. These responses have been provided by STAL's technical consultants as ES chapter authors and are further elaborated upon in the corresponding chapters of the ES. As the majority of UDC's requested information related to detailed components of the air noise assessment, the responses in Table 2.2 are inevitably weighted towards these issues. Further details on this subject are provided in ES Chapter 7 (Air Noise).

2.28 Many of the items of the Scoping Opinion that have been the subject of ongoing discussions with UDC and the relevant consultees prior to the receipt of the Scoping Opinion.

Table 2.2: Scoping Opinion key items and responses

Summary of key items raised in the Scoping Opinion	Response
Paragraph 18 of the Scoping Opinion requires that the proposed assessment be consistent in its approach and methodology with the 25+ ES (2006), unless a different approach or methodology is considered more appropriate and is justified.	The methodology and approach of this ES and topic chapters is generally consistent with that of the 25+ ES (2006) and cross references to the findings of this ES are made where applicable (e.g. air noise). However, since 2006 there have been some important changes/ advancements in the following areas: a) EIA practice (e.g. the introduction of the IEMA Quality Mark guidelines, 2011); b) Legislation and policy (e.g. the NPPF 2008, Climate Change Act 2008 and, most notably, the new EIA Regulations enacted in May 2017); c) Assessment methodologies (e.g. the use different Nx air noise metrics and new air quality standards); and d) Operational changes which have occurred at the airport in the intervening period (e.g. the introduction new generation aircraft, airspace changes and the use Precision Area Navigation (PRNAV), etc.). Collectively, these changes mean that to replicate precisely the methodologies used in the 2006 would be inappropriate and, indeed, render the ES non-compliant with the current EIA Regulations and guidance. The 2006 ES considered a range of passenger scenarios (35mppa and 40mppa) and a fleet mix sensitivity test, neither of which are applicable for the current EIA/ES. These variables were assessed for the 25+ planning application/ES because: a) it was proposed by the applicant that a passenger limit would be no longer be imposed on the future growth of the airport and a higher number of passengers could give rise to the need for more airport facilities (40mppa sensitivity); and b) in the event of no passenger limit, an alternative fleet mix could by itself give rise to a higher number of passengers (37.5mppa) and there could be variances in environmental impact. Ultimately, condition MPPA1 to limit passengers to 35mppa was subsequently imposed by the Secretary of State in granting planning permission in 2008. Conversely, the current planning application assumes (indeed seeks approval for) a combined annual limit of 274,000 aircraft movements and a maximum passenger cap of 43mppa. Therefore, growth beyond these permitted operations would not be feasible, by virtue of the controls placed on the airport by UDC in granting permission. In the covering letter to its Scoping Opinion, UDC acknowledges the above by stating:

Summary of key items raised in the Scoping Opinion	Response
	"UDC cannot grant planning permission for more than that which is envisaged to be applied for and so could not permit more than the envisaged increase". Therefore, it would be serve no meaningful purpose for the ES to consider the environmental effects of any greater level of growth in passenger numbers (>43mppa) or aircraft movements (>274,000) to that for which planning permission is sought. Similarly, the potential for widely varying differences in the core forecasts/ assumptions which underpin the EIA (including factors such as fleet mix composition, passenger loadings, and average mode of operation of the runway) are not considered to be plausible or 'likely' scenarios in the context of the EIA Regulations. The reasons for this are further explained in the 'Alternatives' sub section of ES Chapter 3 (Description of Site, Proposed Development, Policy Context and Alternatives), and also within Chapter 4 (Aviation Forecasts) and Chapter 7 (Air Noise).
Paragraph 19 requires that the data and information used for any 'baseline scenario' be current data and, so far as reasonably practicable, no more than 2 years old.	2016 has been adopted as the baseline year throughout this ES to ensure a consistent benchmark for the impact assessment work. This draws upon data gathered in that calendar year, wherever possible. However, some older survey information (e.g. the 2015 Stansted Airport Employee Travel Survey) has been used in the absence of more up to date, validated data. Where this is the case, the relevant chapters of the ES provide professional commentary on the continued applicability of such 'older' baseline data. Occasional references are also made in the ES to most recent (2017) statistics. However, the full dataset for any calendar of airport operations usually requires a minimum period of 3 - 6 months to collate, validate and publish (including obtaining accurate data from UDC and other third party sources). Therefore, it has not been possible to use 2017 as the baseline; nor is this considered necessary.
Paragraph 21 suggests that sensitivity tests to be carried out to test the robustness of the assumptions made in relation to the operational limits being applied for, consistent with the approach adopted for the 25+ ES. In case there is a departure from this approach, the proposed assessment must adequately explain the basis for it.	For the reasons set out above, the benefit and rationale for applying any 'sensitivity tests' to the ES is limited and these are not considered necessary in order to understand the 'main' and 'likely' significant environmental effects of the proposed development.
Paragraph 23 suggests that a 'fleet mix sensitivity test' should be considered in the ES, using a similar approach to that adopted for the 25+ ES. This should include the continued use of older, noisier aircraft, to be applied to both the passenger and cargo fleet mix. Sensitivity tests around the introduction of increased long-haul flights and long/short haul flight mix are also recommended.	Notwithstanding the response to the matters raised by paragraph 18 of UDC's Scoping Opinion (as set out above), ES Chapter 7 and its associated appendices does present a '+/- 10%' aircraft mix sensitivity test in a graphical manner, in order to respond to this request from UDC. However, the following factors should be noted: ▪ The aviation industry is quite different in 2017 when compared with 2006 and there has been a marked shift in individual airlines making investments in greater numbers of fewer types of aircraft. Narrow body, twin engine aircraft that once were limited in range are now capable of flying further and sustaining longer legs. This is more economical in respect of fuel and significantly reduces likelihood of a more wide body,

Summary of key items raised in the Scoping Opinion	Response
	'heavier' aircraft in the ICF forecasts. ▪ The main air noise assessment already applies a cautious (i.e. 'pessimistic') approach whereby only a modest rate of aircraft replacement (i.e. to Next Generation aircraft) has been applied to the core assessment. Accordingly, the resulting air noise contours can be considered to represent a reasonable 'worst case' position. ▪ Future air noise levels are dependent on a commercially realistic rate of replacement of older noisier aircraft by newer quieter variants, based on the published investment plans by the airlines such as Ryanair. Therefore, an assessment has been be made of the likely noise effects arising if the rate of replacement is 10% quicker (better case scenario) or 10% slower (very worst case scenario). No greater variance to these fleet mix scenarios is considered realistic or plausible.
Paragraph 24 suggest that a runway modal split sensitivity test is applied, using a 10% more westerly and 10% more easterly runway operation, consistent with the approach adopted for the 25+ ES. In addition, 100% Leq single direction runway usage contours are required in order to provide a worst case scenario.	A described in ES Chapter 7, all air noise contours have been prepared based on the long term average modal split of the use of the runway (averaged over the last 20 years), which is: 73%SW – 27%NE. With regard to the suggestion of providing 100% Leq single direction contours, the professional view of STAL's noise consultants (Cole Jarman Associates) which is reflected in the air noise study presented at ES Chapter 7, is that producing 100% single mode LAeq contours will not assist in an overall assessment of noise effects as it is unclear exactly what those contours will signify. A single mode westerly contour would apply to less than 10% of the total days in 2017 whereas a single mode easterly contour would apply to more than 50%: this differential is not reflected in the shape and extent of the single mode contours, but is reflected in the aggregate summers day contours. This same point was reflected by the Inspector in his report of the 2008 Inquiry into the 25+ application. He stated "*They are of interest, but in my view add little to the assessment. I accept BAA's point that they represent an extreme case in which the Airport operated in the same mode all summer, a most unlikely eventuality as I understand it.*"[4]
Paragraph 32 suggests that an Outline Construction Environmental Management Plan (OCEMP) and a Code of Construction Practice (CCP) should be included with the application.	ES Chapter 5 (Development Programme and Construction Environmental Management) describes the environmental management and control measures which will be put in place once the construction contract is let (in around 2020). This includes adherence to both a CEMP and CoCP, copies of which will be submitted to UDC at that time (i.e. once the appointed contractor has provided method statements for the works and proposed specific environmental management and monitoring procedures etc.). Chapter 5 describes the main elements of the CEMP and CoCP. However, until the precise details of the construction methodology and programme are known, it is not feasible to finalise the CEMP of CoCP or to submit these with the planning application. Instead, the approval of these documents can be secured by

Summary of key items raised in the Scoping Opinion	Response
	condition, as required.
Paragraph 43 requires a +/- 10% sensitivity test to be undertaken for surface access impacts.	As set out above, the planning application seeks to limit the maximum number of passengers to 43mppa and therefore an additional 10% of passengers would not be permissible. Similarly, there is no realistic prospect of passenger numbers being 10% less by 2028 as explained in ES Chapter 4. However, even if that were the case, traffic and related surface access impacts would be less than reported in this ES and the accompanying Transport Assessment (TA) (ES Volume 3). Additionally, the number of airport employees in Development Case has been calculated using established ratios and an agreed methodology, such that a +/- 10% variance in employees is unlikely, as described in ES Chapter 11 (Socio-Economic Impacts). In view of the above, there is be no logical reason or necessity to apply a +/- 10% sensitivity to determine the surface access impacts.
Paragraph 47 suggests the following should be addressed in noise assessment contained in the ES: a) A detailed, robust and comprehensive assessment to be undertaken, taking account of its particular rural location where background noise levels can be low, heightening sensitivity to incremental increases in noise. b) Assessment of the Air Noise impacts in accordance with the Airspace Design Environmental Requirements Technical Annex, CAP 1616a (December 2017). c) A table for all actual aircraft types using the airport, and an assessment for helicopters in relation to their particular flight path(s), and, as is here anticipated, also an assessment of the Forecast aircraft types. d) The results of the 25+ ES, for example with regard to Air Noise. e) The baseline data and considerations to address the actual current air traffic movements, and permitted limits as well as envisaged	a) A detailed, robust and comprehensive assessment has been undertaken with regard to prevailing background noise levels, as described in ES Chapter 7. b) This is not an airspace change application, as no increase in the number of permitted operations and no changes to aircraft routes are proposed. Nevertheless, air noise contours are plotted using metrics and at levels as set out in relevant Civil Aviation Authority (CAA) documents. The air noise assessment presented in Chapter 7 gives full consideration to all the standard noise metrics defined in the recent CAA documents and applies them where they are considered most relevant to this application. c) The schedules presented in ES Appendix 7.3 set out by ANCON type the numbers of aircraft that are operating during the relevant assessment period for all cases. Helicopter types and numbers are identified. d) The assessment of air noise references the results of the 25+ ES in a manner that allows a fair and reasonable comparison of forecast noise levels with those set out in 2006. e) The assessment of air noise does not include sensitivity testing in the manner carried out for the 25+ ES, for the reasons set out above in response to paragraph 23 of the Scoping Opinion.

Summary of key items raised in the Scoping Opinion	Response
permitted limits. It is also noted that the 25+ ES considered the then 35mppa case and against a number of sensitivity tests in relation to Air Noise. UDC requires that the approach of using sensitivity testing for Air Noise be used in this ES.	
f) Night noise to be addressed robustly and comprehensively.	f) Night noise has been addressed robustly and comprehensively.
g) Night noise restrictions to be reviewed and their impact on aircraft movements assessed and explained.	g) Due account is taken of the provisions in the current Night Noise Restrictions that came into force for a five-year period commencing October 2017.
h) Assessment of the overall impact from new generation aircraft.	h) The impact from new generation aircraft has been properly assessed and is central to the proposition that noise levels will not be materially higher in the future than envisaged under the 25+ permission.
i) Assessment of air noise generated by helicopters as a separate source of air noise.	i) It is not necessary or appropriate to assess helicopters as a separate source of noise for the following reasons: ▪ The air noise assessment undertaken for the 25+ application did not consider noise from helicopters separately to that from fixed wing aircraft; ▪ The number of helicopter movements on a typical summer day has been considered and it is noted that in any period this number is very small and makes up not more than 1% of the total flights for any given assessment case; and ▪ By 2028, the Development Case full capacity assessment year, if the development goes ahead it is forecast that there will be no helicopters scheduled to operate during either the daytime or night-time periods.
j) Description of the rationale for the particular proposed geographical area.	j) The geographical area of the air noise assessment is described in ES Chapter 7. This has been defined on the basis that, after investigation, it encapsulates all locations forecast to be exposed to air noise levels at or above the Lowest Observed Adverse Effect Level (LOAEL).
k) Incorporation of any new evidence on the impacts of aviation noise that the World Health Organisation (WHO) may publish before a determination to grant planning permission.	k) The emerging health evidence base is being monitored, but the new WHO guidance has not been published at the time of writing. The health evidence base applicable to the proposed development is discussed in ES Chapter 14 (Public Health and Wellbeing) and in Annex 14.1.3 to the Health Impact Assessment (HIA) at ES Appendix 14.1.
l) The likely implications of the London Airspace Management Programme (LAMP) and the assumptions with regard to the introduction of Performance Based navigation (PBN), so far as reasonably practicable.	l) LAMP has been abandoned and there is no current programme affecting routing into and out of the airport. Any assumptions regarding PBN on any departures routes are properly addressed in this ES.

Summary of key items raised in the Scoping Opinion	Response
Paragraphs 59 and 61 consider that the scope of the proposed Health Impact Assessment (HIA) appears too narrow and recommend meetings with local Directors of Public Health or their representatives.	The scope of the HIA has been consulted via the Scoping Report, which indicated that the Essex and Hertfordshire Directors of Public Health and UDC Senior Health and Wellbeing Officer would be consulted via the scoping request and a meeting if that were desired. Whilst the Hertfordshire Director of Public Health responded to the Scoping Report, no meeting was requested.
Paragraph 62 notes that the Scoping Report proposes to use the 25+ ES as a baseline for an HIA.	This appears to be a misunderstanding. The Scoping Report states that the future baseline is 35mppa Do Minimum scenario, which has been reflected in ES Chapter 14 and the HIA (ES Appendix 14.1).
Paragraph 64 suggests very early engagement with Public Health England and the use of air quality information from the Committee on the Medical Effects of Air Pollutants (COMEAP), part of Public Health England.	COMEAP evidence has been referenced in the HIA. Public Health England has been consulted during the scoping process and has not requested further engagement.
Paragraph 65 requires early engagement with NHS England and local relevant Clinical Commissioning Groups to address any potential impact upon the services that they commission.	It is not considered that the changes to health outcomes predicted, which are <0.5% of baseline rates, would affect the capacity of health care services. As the proposed physical development of the airport is limited, it is considered that any construction workforce required is unlikely to impact upon local health care capacity. Given the future baseline labour market surplus predicted and described in ES Chapter 11, the operational employment generated would not be expected to lead to additional demand on healthcare services.

Agreed Content of ES

2.29 Pursuant to Regulation 15(4) of the EIA Regulations an ES must:

(a) "be based on the most recent scoping opinion or direction issued (so far as the proposed development remains materially the same as the proposed development which was subject to that opinion or direction); and

(b) include the information reasonably required for reaching a reasoned conclusion on the significant effects of the development on the environment, taking into account current knowledge and methods of assessment."

2.30 The nature of the proposed development and assumptions, forecasts and other related details remain unchanged since the request for a Scoping Opinion (and subsequent letter regarding the changes to the proposed development) was made. Therefore, in line with UDC's Scoping Opinion (which takes these subsequent changes into account), the ES presents the results of the assessment in a series of individual chapters for the following topics:

- Construction Programme and Environmental Management;
- Surface Access and Transport;
- Air Noise;
- Ground Noise;
- Surface Access Noise;
- Air Quality;
- Socio-Economic Impacts;
- Carbon Emissions;
- Climate Change;
- Public Health and Wellbeing;
- Water Resources and Flood Risk; and
- Cumulative Effects.

2.31 As stated in the Scoping Report, not all of these topics are of equal importance or complexity and most do not have the potential for 'significant environmental effects' to materialise, particularly accounting for committed mitigation measures which are described in each topic chapter and again in ES Chapter 18 (Summary of Mitigation and Residual Effects). As such, the ES chapters are proportionate in size and depth to the effects that have been assessed, with some of the supporting data and modelling work presented in the corresponding technical appendices contained in ES Volume 2. This avoids the main volume of the ES (Volume 1) becoming unduly long or presenting information which is not important to the reader's understanding of the main environmental effects resulting from the proposed development. This approach is further supported by the guidance provided in the PPG on EIA, which states:

"Whilst every Environmental Statement should provide a full factual description of the development, the emphasis of Schedule 4 is on the "main" or "significant" environmental effects to which a development is likely to give rise. The Environmental Statement should be proportionate and not be any longer than is necessary to assess properly those effects. Where, for example, only one environmental factor is likely to be significantly affected, the assessment should focus on that issue only. Impacts which have little or no significance for the particular development in question will need only very brief treatment to indicate that their possible relevance has been considered".

2.32 In accordance with this guidance, the 'operational' effects of the proposed development that are most relevant include: the changes in surface access traffic; air noise; ground noise; air quality; socio-economic conditions; and public health. The ES therefore focuses on these topics, but it also considers other important effects related to surface access noise, carbon, climate change, and water resources.

2.33 All operational effects are assessed by quantifying the difference between the Do Minimum (35mppa) scenario and the Development Case (43mppa) in the Principal Assessment Year of 2028, as described below. For some topics (e.g. air quality and noise) it is also relevant to consider the change in environmental conditions between the Baseline Year (2016), the Transitional Year (2023) and Principal Assessment Year (2028). Where this is the case, this is explained further in the individual topic chapters of this ES.

2.34 There is also the potential for some temporary construction effects (e.g. noise, dust, heavy goods vehicle (HGV) traffic etc.) to arise during the construction of the new airfield infrastructure. Accordingly, such effects are considered within the respective technical chapters of this ES. It should be noted however that due to the limited extent, location and nature of these construction works, significant environmental effects are not anticipated as long as appropriate environmental controls are in place, as set out in ES Chapter 5 (Development Programme and Construction Environmental Management).

2.35 The construction phase is anticipated to take place over a maximum of 12 months between 2021 and 2022. A description of the main construction activities, plant and materials is provided in Chapter 5 and these details have been used to inform the assessment of related environmental effects, as required.

EIA Baseline

2.36 In accordance with Schedule 4, Part II of the EIA Regulations, it is necessary to describe the existing baseline environmental conditions within the ES, which constitute the prevailing conditions (i.e. in the period 2015-2017) at the airport and within its area of influence. The area of influence ('Study Area') will vary between topics, and is defined in each respective chapter, as required.

2.37 A wide range of baseline data on the environment has been captured and used to inform the environmental assessment work. Data was obtained from a combination of sources, including:

- Internal documentary records including information held by STAL, historical and contemporary records;
- Ongoing survey information from within and outside the airport boundary, including ground and air noise levels, air quality data, employment and parking data;
- Information published in the STAL's 2015 Sustainable Development Plan (SDP);
- Information contained in the 2006 ES prepared for the 25+ application; and
- Relevant data from statutory and non-statutory consultees.

2.38 The baseline information obtained is included in each of the respective topic chapters of this ES, as required to describe the aspects of the environment with the potential to be affected by the proposed development. However, it is also relevant to consider how these baseline conditions may change over time before the proposed development is implemented. Therefore, where possible, the existing baseline data has been extrapolated and modelled to identify the likely 'projected baseline' conditions in 2021 (i.e. the commencement date for construction) and in 2023 (i.e. the date at which the existing 35mppa limit is projected to be reached).

2.39 For the purposes of this ES, this projected baseline is referred to as the 'Do Minimum' scenario rather than the 'Do Nothing' scenario. This is because certain planned changes to the airport will occur prior to the 35mppa cap being reached in 2023, with or without the lifting of the existing annual passenger cap. These planned developments will either be built out under the extant parts of the 2003 and 2008 planning permissions, as described in ES Chapter 3 (Description of Site, Proposed Development, Policy Context and Alternatives) or implemented by STAL in accordance with its permitted development rights under Class F or Part 8 of the Town and Country Planning (General Permitted Development) (England) Order 2015. Such developments include:

- New Arrivals Terminal – this was granted planning permission in April 2017 and a start on site is anticipated early 2019, with completion in summer 2020. It forms part of the Stansted Transformation Project (STP)[5];
- Echo apron and stands – the completion of the originally conceived apron areas associated with the 15+ planning permission phase, granted in April 1999, has been undertaken over a series of phased works. The last element which will result in the remainder of the Echo cul-de-sac being completed has now commenced. It is anticipated the stands will be in operational use in late 2018; and

- Additional car parks – to cater for 43mppa will be provided over time in line with the airport's overall approach to sustainable access to the airport and within the airport boundary. Land for additional surface car parking sites exists on the 'south side' of the airfield and there is future potential for multi-level parking on existing car parks.

2.40 In all cases, it has been assumed that these planned developments will be in place and operational by 2020. Therefore, there will be no cumulative construction or other 'in combination' effects.

Baseline Year for Assessment and Baseline Year Assumptions

2.41 Table 2.3 below provides a summary of the existing (2016) and projected throughput of the airport in the Do Minimum baseline. Further details are provided in ES Chapter 4 (Aviation Forecasts).

Table 2.3: Summary of existing and projected baseline – key statistics

	2016 (Existing Baseline)	2021 (Construction Baseline)	2023 (Do Minimum Baseline)
Total Passengers ('000s)	24,300	32,600	35,000
Passenger ATMs ('000s)	152	199	213
Cargo ATMs ('000s)	12	13	14
Other ('000s)	16	19	19
Total Movements ('000s)	181	231	247

Note: Rounding has been applied to these figures to the nearest 1000.

Impact Assessment Assumptions

2.42 In the EIA process, predicted changes to environmental conditions as a result of the proposed development (in the Development Case) are measured against the Do Minimum baseline. Conclusions are then drawn as to the nature of the effects (i.e. positive, negative, short, medium or long term, temporal or permanent etc.) and their overall significance by the application of professional judgement, legal thresholds and other guidance, as described below and in the corresponding technical chapters of this ES

Geographic Scope of the EIA

2.43 The geographical extent of the assessment (the 'Study Area') varies depending on the effects being assessed. Certain environmental effects are largely confined within the boundaries of the airport or its immediate environs, such as ground conditions, archaeology and waste, whilst other effects, extend considerably beyond the airport boundary, such as air quality, air noise and socio-economic effects. For instance, as described in ES Chapter 11 (Socio-Economic Impacts) effects were assessed for this topic over a study area comprising the East of England and London, with a focus on the London-Stansted-Cambridge corridor.

2.44 The geographical scope of each component assessment of the EIA is described in the corresponding technical chapter of the ES.

Temporal Scope of the EIA – EIA Assessment Years and Scenarios

2.45 The EIA is based on the passenger and aircraft movement forecast information set out in ES Chapter 4 (Aviation Forecasts). A summary of the key forecast statistics in the Development Case (i.e. with the proposed development) is presented in Table 2.4 below for ease of reference.

2.46 In accordance with convention and best practice standards, the EIA has focused on assessing the difference in environmental effects between the Do Minimum scenario and the Development Case. Under the Do Minimum scenario, the existing annual 35mppa passenger cap is retained, whilst under the Development Case it is assumed that the airport can continue to grow and make better and more efficient use of its existing single runway to handle the increase in passengers to 43mppa, which is projected to be reached in 2028. For all environmental topics, the ES therefore assesses and describes the incremental changes in effects between these two scenarios, adopting 2028 as the **Principal Assessment Year**.

Table 2.4: Summary of Do Minimum vs Development Case – key statistics

	2023 Transitional Year		2028 Principal Assessment Year	
	Do Minimum Scenario	Development Case	Do Minimum Scenario	Development Case
Total passengers ('000s)	35,000	36,400	35,000	43,000
Passenger ATMs ('000s)	213	219	212	253
Cargo ATMs ('000s)	14	14	17	16
Other ('000s)	19	20	20	5
Total Movements ('000s)	247	253	249	274

Note: Rounding has been applied to these figures to the nearest 1000.

2.47 As illustrated by Tables 2.3 and 2.4 above, the existing 35mppa cap will have been reached by 2023 under both the Do Minimum and Development Case scenarios. For the purposes of the EIA, 2023 is therefore adopted as the **Transitional Year** of the proposed development. This is the first year during which a noticeable divergence will occur between the 'status quo' of retaining the 35mppa cap and the additional growth stimulated by the removal of this cap.

2.48 As described in Chapter 4, the forecasts show very little difference between the Do Minimum and Development Case forecast scenarios in terms of passenger numbers and aircraft movements before 2023. As such, the environmental effects during this Transitional Year do not warrant detailed assessment in all cases, except for air quality and air noise.

Alternative Assessment Years

2.49 Between the 2023 Transitional Year and the 2028 Principal Assessment Year the forecasts show a marked and progressive divergence between the Development Case and Do Minimum scenario. However, as explained in the Scoping Report and ES Chapter 4, there is no obvious intervening year before 2028, or after, which would derive more pronounced environmental effects than those which would occur in 2028 because this is the year when 43mppa is forecast to be reached. The notable exception to this pattern is for air noise where a further assessment year of 2024 is also considered because this constitutes the 'worst case year' for air noise, for the reasons described in Chapter 7 (Air Noise).

Alternative Forecast Scenarios

2.50 As set out in ES Chapter 4, STAL's forecasting team, advised by ICF and ACL, has not identified any realistic alternative lower or higher growth forecasts up to 2028.

2.51 Notwithstanding, even if the growth in passenger numbers and aircraft movements were slower to materialise than currently assumed (e.g. due to unforeseen effects on the economy after Brexit) then the consequence of reaching the upper projections for passenger and aircraft movements (up to the combined limit of 274,000 movements) at a later year would not derive any materially different environmental effects than those which would be expected to occur in 2028. Equally, more ambitious growth projections for Stansted, such that the respective 35mppa and 43mppa thresholds would be achieved before 2022/2023 and 2028, are also considered unlikely, as described in Chapter 4.

2.52 Accounting for the above, it was not considered necessary for the EIA to apply any particular sensitivity tests for alternative forecasts or assessment years outside of the 2023 Transitional Year and 2028 Principal Assessment Year, with the exception of air noise (which also assesses 2024).

2.53 Whilst UDC considered that some 'sensitivity tests' should be applied to the fleet mix, runway direction and other factors (as set out in Table 2.2 above), their Scoping Opinion agreed the specific assessment years applied in the EIA and did not identify a need for additional assessments of earlier years (pre 2023) or later years (post 2030) to be completed.

Historic Forecasts

Whilst Stansted and the UK aviation market have experienced marked fluctuations over the past decade or so, especially following the immediate aftermath of the global economic and financial crisis in 2008 and 2009 (and the subsequent strong economic recovery from 2013 onwards), it is relevant to consider the forecasts which underpinned the ES completed in 2006 in support of the 25+ application, particularly with respect to the projected air noise contours and associated effects. These historic forecasts are therefore considered in ES Chapters 4 and 7.

Assessment of Environmental Effects and Use of Significance Criteria

2.54 An ES should focus on assessing the consequential environmental effects of the proposed development, rather than solely on the activities or changes/impacts that cause them. The terms 'impacts' and 'effects' are often used interchangeably in ESs, due partly to the inconsistent terminology used in the EIA Regulations themselves. However, in this ES, the term 'effect' is used consistently to describe the consequence of the predicted change or impact upon a particular environmental receptor, including people. In addition, a negative effect from the proposed development would only transpire if the impacts (e.g. changes in air noise levels) are greater under the Development Case than in the future Do Minimum baseline. In all other cases, the effects can only be neutral or positive.

2.55 One of the requirements of an ES is to establish whether identified environmental effects should be deemed 'significant' accounting for the availability and likely effectiveness of mitigation measures to *"avoid, prevent or reduce and, if possible, offset likely significant adverse effects"*.

2.56 The EIA Regulations and associated PPG do not define what constitutes a 'significant environmental effect' as this may vary between topics and be influenced by such factors as the sensitivity of the receiving environment and the susceptibility of local receptors to change. Moreover, in the absence of definitive legal standards for all topics, assigning levels of significance to predicted effects is often a matter of judgement and not necessarily a measure of the 'acceptability' or 'unacceptability' of such effects. Indeed, it remains the decision of the local planning authority (in this case UDC) as to whether the reported environmental effects should be considered significant and the weight to be given to them in reaching a planning decision.

2.57 Notwithstanding the above, a set of generic significance criteria can be applied based on established best practice in EIA, as shown in Tables 2.5 and 2.6 below. These criteria have been used for most assessments, whilst some topics use a derivation of these criteria to account for sector-specific guidance, including that recently published by IEMA for assessing climate change and health impacts, together with environmental quality standards (e.g. the national Air Quality Objectives) and policy tests contained in the NPPG and associated technical guidance (e.g. for assessing noise and road traffic impacts).

2.58 The specific criteria used to assess significance for each environmental topic are defined in the corresponding topic chapter of this ES.

Table 2.5: Impact magnitude matrix

Sensitivity /value of receptor	Magnitude of effect or impact			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

Table 2.6: Significance criteria

Level of Significance	Description
Major	Very large or large change in environmental or socio-economic conditions, which is irreversible and pronounced. Effects, both adverse and beneficial, which are likely to be important considerations at a national, regional or district level because they contribute to achieving national, regional or local objectives, or could result in exceedance of statutory objectives and/or breaches of legislation. **Major effects are deemed significant in the context of EIA.**
Moderate	Intermediate change in environmental or socio-economic conditions leading to measurable effects, both adverse and beneficial, which are likely to be important considerations at a local or district level. **Moderate effects are deemed significant in the context of EIA.**
Minor	Small change in environmental or socio-economic conditions. These effects may be raised as local issues but are unlikely to be of importance in the decision making process. **Minor effects are not normally deemed significant in the context of EIA.**
Negligible	No discernible change in environmental or socio-economic conditions. An effect that is likely to have a negligible or neutral influence, irrespective of other effects. **Negligible effects are not significant in the context of EIA.**

2.59 Following their identification, all significant effects are classified on the basis of their nature and duration as follows:

- **Beneficial** – effects that have a positive influence on receptors and resources;
- **Adverse** – effects that have a negative influence on receptors and resources;
- **Temporary** – effects that persist for a limited period only (due for example, to particular construction activities taking place for a short period of time);
- **Permanent** – effects that result from an irreversible change to the baseline environment (e.g. land-take) or which persist for the foreseeable future (e.g. noise from regular or continuous operations or activities);
- **Direct** – effects that arise from the impact of activities that form an integral part of the proposed development (e.g. direct employment and income generation) and which occur at the same time and place;

- **Indirect** – effects that arise from the impact of activities that do not explicitly form part of the proposed development (e.g. off-site infrastructure upgrades to accommodate the development), which may occur later in time and/or are geographically remote from the site, but are nonetheless reasonably foreseeable and measurable;
- **Secondary** – effects that arise as a consequence of an initial effect of the proposed development (e.g. induced employment elsewhere); and
- **Cumulative** – effects that can arise from a combination of different effects at a specific location or the interaction of different effects over different periods of time.

Identification of Additional Mitigation and Enhancement Measures

2.60 Where potentially significant adverse environmental effects have been identified through the EIA, mitigation measures have been proposed to prevent, reduce or offset these through appropriate environmental controls and/or compensation measures. Where positive effects have been identified, measures are proposed to enhance these effects through new initiatives or by the strengthening of existing commitments and plans introduced by the airport in recent years.

2.61 A substantial level of environmental mitigation and community investment already takes place at Stansted in response to controls imposed by the Government (e.g. night noise restrictions and quotas and the airport's Noise Action Plan) and UDC; commitments under existing planning conditions and Section 106 Agreements/ Unilateral Undertakings (e.g. the airport's Sound Insulation Grant Scheme and contributions to Community Trust Fund) and other initiatives (e.g. supporting or chairing various business, employment and transport forums).

2.62 In 2015 STAL published its long-term masterplan for Stansted in line with Government guidance. The 2015 SDP is a comprehensive summary of the vision and objectives for Stansted and the consequential effects of growth up to the capacity of the single runway. The SDP comprises four detailed volumes setting out issues, objectives and policies under the headings of: Environment, Community, Land Use, Economy and Surface Access[6]. The SDP is described more fully in ES Chapter 3 (Site Description, Proposed Development, Policy Context and Alternatives).

2.63 This existing package of mitigation and enhancement measures will be built upon, where required, to mitigate any impacts associated with the proposed development. Specific mitigation and enhancement measures are discussed within the individual topic chapters, whilst ES Chapter 18 (Summary of Mitigation and Residual Effects) presents a summary of both existing and proposed mitigation and draws conclusions on the residual (remaining) effects of the proposed development with such measures in place.

Cumulative and Interactive Effects

Type 1 Cumulative Effects

2.64 With regard to Type 1 cumulative effects (i.e. 'in combination' effects of the proposed development coinciding with other, unrelated developments), a number of committed schemes have been identified as relevant for inclusion within the ES. A list of potential cumulative schemes was included in the Scoping Report of June 2017 (ES Appendix 2.1) and this list was further amended in January 2018 following ongoing consultation with UDC. The details of these cumulative schemes are provided in Table 17.1 of ES Chapter 17 (Cumulative Effects).

2.65 For the purposes of the EIA, Type 1 cumulative effects are generally considered to arise from the combination of effects from the proposed development and permitted developments (not yet constructed or currently under construction) in the vicinity of the airport, acting together to generate elevated levels of impact. Examples of these kinds of effects include:

- Traffic generated from major residential and commercial developments, affecting the surrounding road network;
- Emissions from such developments and associated traffic affecting local air quality conditions (e.g. in Bishops Stortford Air Quality Management Area (AQMA)); and
- Future environmental, infrastructure and community enhancements funded by joint contributions of developers.

2.66 It should be noted that most, if not all, of these 'cumulative developments' identified in Table 17.1 of Chapter 17 are likely to be built out and fully operational before 2028. They therefore form part of the projected baseline for the EIA, against which the environmental effects of the proposed development have been assessed (e.g. new residential receptors within the air noise contours).

2.67 The 'screening criteria' adopted to identify the Type 1 cumulative schemes, as set out in the Scoping Report, were as follows:

- Residential developments over 30 units that are situated within 2 km of the airport boundary or else within the defined study area for each respective environmental topic discipline;
- Developments which could be 'EIA development' in their own right and which meet or exceed the relevant screening thresholds contained in the EIA Regulations; and
- Developments which have been granted planning permission, have received resolution to grant, or were determined before December 2017.

2.68 Further developments in the wider area of influence around the airport are already factored into the approved transport model (Tempro), so the associated effects of traffic noise and exhaust emissions are accounted for in these assessments. The traffic 'growth factor' and other assumptions which underpin the Tempro model are described in the TA, which is contained in ES Volume 3,

'On Airport' Projects – Intra and Inter Cumulative Effects

2.69 In addition to off-airport developments, there is the potential for 'inter' and 'intra' project effects within the airport boundary due to the overlap of different planned capital investment projects by STAL as part of the STP. The potential for such cumulative effects is considered in ES Chapter 17. However, as stated above, it is expected that most scheduled airport improvement projects, advanced in accordance with the STP, will be completed by the summer of 2020 and therefore cumulative effects with the proposed development (i.e. commencing construction in 2021) are not anticipated.

Interactive Effects – Type 2 Cumulative Effects

2.70 Type 2 (interactive) cumulative effects constitute the net effect of two or more separate environmental impacts from the proposed development (e.g. surface access traffic noise and aircraft noise) occurring at a single sensitive receptor; where individually these impacts result in a minor effect but, in combination, they could create a moderate (or even major) adverse effect on that particular receptor.

2.71 Interactive (or synergistic) effects can also arise where effects from one environmental element bring about changes in another environmental element. Examples of the main types of interactive effects are as follows:

- Effects of traffic on air quality;
- Effects of traffic on noise;
- Effects of air quality on human health and wellbeing; and
- Effects of noise on human health and wellbeing.

2.72 These interactive effects are considered in the respective topic chapters of this ES where appropriate and, in particular, these are addressed within ES Chapter 14 (Public Health and Wellbeing) and the accompanying HIA (ES Appendix 14.1).

Structure and Approach to ES Topic Chapters

2.73 All of the individual topic chapters (6 to 15) follow a consistent structure, as set out below.

2.74 In the majority of cases, the ES topic chapters are also supported by separate technical appendices which include supporting baseline data, figures, reports and plans. Where relevant, the interrelationship between topics (e.g. transport and air quality) is explained within the chapters and cross-references are made between chapters or sub-sections.

Introduction

2.75 This provides a summary of the structure and content of the chapter, highlighting the key issues, and identifying the lead author of the chapter.

Legislation, Guidance and Planning Policy Context

2.76 This section summarises relevant legislation, industry guidance and the key national, regional and local policies and standards that are applicable to the particular environmental topic under consideration and the assessment undertaken. Where appropriate, it also provides a topic-specific overview of relevant existing planning conditions and legal obligations attached to previous planning permissions. Planning policies which are equally applicable to other EIA topics are described in ES Appendix 3.1 to avoid undue repetition within each chapter.

Assessment Methodology and Significance Criteria

2.77 This section describes any assumptions made and any assessment limitations, as well as the methods used to carry out the technical assessment, including how the study area for the assessment was determined. It also includes an outline of the approach used to define the significance of environmental effects for the individual topic with reference to published standards, guidelines and relevant significance criteria.

2.78 Where a detailed methodological description is required, this has been provided in the appropriate technical appendix.

Baseline Conditions

2.79 Relevant aspects of the existing baseline conditions at the airport and surrounding area are described for the environmental topic being considered. This is generally based on either a 2015 or 2016 dataset, depending on availability. Where necessary (and feasible), the likely future baseline conditions have been projected forward to the 2023 Transitional Year under the Do Minimum (35mppa) scenario, as described earlier in this chapter. This assumes that the separate developments at the airport, brought forward under the extant parts of the 15+ and 25+ planning permissions (or through permitted development rights) as well as the new arrivals terminal granted planning permission in 2017, will mostly be in place before 2020.

2.80 The baseline sections of each topic chapter also describe the receptors or resources that could be affected by the construction or operation of the proposed development, and defines the relative sensitivity or importance of these. Together, this provides the context against which the environmental effects of the proposed development have been assessed.

Incorporated Mitigation

2.81 Incorporated mitigation measures are described in the impact assessment section to account for those measures that are already committed to, in place and/or will be extended to the construction and operational phases of the proposed development. This is sometimes referred to as 'designed in' mitigation and includes obligations under extant planning conditions and S106 Agreements/ Unilateral Undertakings (where these remain relevant) from previous planning permissions, as well as commitments made by the airport in the 2015 SDP. As such, the assessment of effects will be undertaken on the basis that a number of mitigation measures are assumed to already be implemented as part of both the 'Do Minimum' 35mppa scenario and will be retained/ re-imposed by UDC in the granting of any planning permission for the proposed development.

Impact Assessment

2.82 The potential for temporary environmental effects from the construction of the new airfield infrastructure, as described in Chapter 1 (Introduction) and Chapter 3 (Description of Site, Proposed Development, Policy Context and Alternatives) is considered within each ES topic chapter, where applicable. An illustrative programme and description of the main construction activities, plant/equipment and materials is provided in Chapter 5 (Development Programme and Construction Environmental Management). These details have been used to inform the assessment of related environmental effects.

2.83 As described previously, the likely operational effects arising from the proposed development have been considered by comparing the difference in environmental effects between the Development Case and the Do Minimum scenario from the point at which the existing 35mppa cap will be reached, which is predicted to occur in 2023. However, for most of the EIA topics, the impact assessments are predicated on a Principal Assessment Year of 2028 only – representing the point at which the maximum or worst-case effects of the proposed development will manifest (i.e. 43mppa and 274,000 aircraft movements). The rationale for the choice of assessment years is described in each chapter, as appropriate.

Additional Mitigation Measures and Residual Effects

2.84 This section of each topic chapter outlines any further mitigation measures and enhancements that will be committed to by STAL to enhance the beneficial effects of the proposed development, or otherwise to avoid, reduce or offset any adverse effects identified in the preceding impact assessment. Such measures can relate to design, construction, operational controls, as well as community investment by the airport.

Non-Technical Summary (NTS)

2.85 A standalone NTS of the ES has been prepared, as required by Regulation 18(3) of the EIA Regulations. This presents, in non-technical language, a summary of:

- The proposed development;
- The purpose and scope of the ES;
- The main findings of each chapter of the ES;
- The mitigation and enhancement measures proposed by STAL, in addition to commitments already as part of the 2015 SDP;
- Details on how to access/ obtain the full ES and technical appendices (i.e. at the offices of UDC, libraries and/or other public places) plus the cost of purchasing these documents in hard copy or CD Rom format; and
- The contact details for making comments/ representations on the ES.

References

1 Town and Country Planning (Environmental Impact Assessment) Regulations 2017. Available at: http://www.legislation.gov.uk/uksi/2017/571/contents/made (last date accessed 29th January 2018).

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Chapter 3 Description of Site, Proposed Development, Policy Context and Alternatives

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3 DESCRIPTION OF SITE, PROPOSED DEVELOPMENT, POLICY CONTEXT AND ALTERNATIVES

Introduction

3.1 This chapter of the ES provides a detailed description of the existing airport, together with the physical and planning context of the site. It considers key local, regional and national planning policies and industry guidance and standards of relevance to the continued growth of Stansted. It also describes the previous planning permissions granted in 2003 (the 15+ permission) and 2008 (the 25+ permission). Further details are provided on the proposed airfield infrastructure works and the associated replacement of the existing annual cap on passenger numbers.

3.2 This chapter should be read in conjunction with the Planning Statement submitted with the application, as well as other chapters of this ES, particularly Chapters 4 (Aviation Forecasts) and 5 (Development Programme and Construction Environmental Management).

Site Context

3.3 Stansted Airport is located approximately 56km (35 miles) north-east of London, and 50km (31 miles) south-east of Cambridge. It lies in a predominantly rural setting, wholly within the local authority administrative district of Uttlesford in the county of Essex, as shown in Figure 3.1.

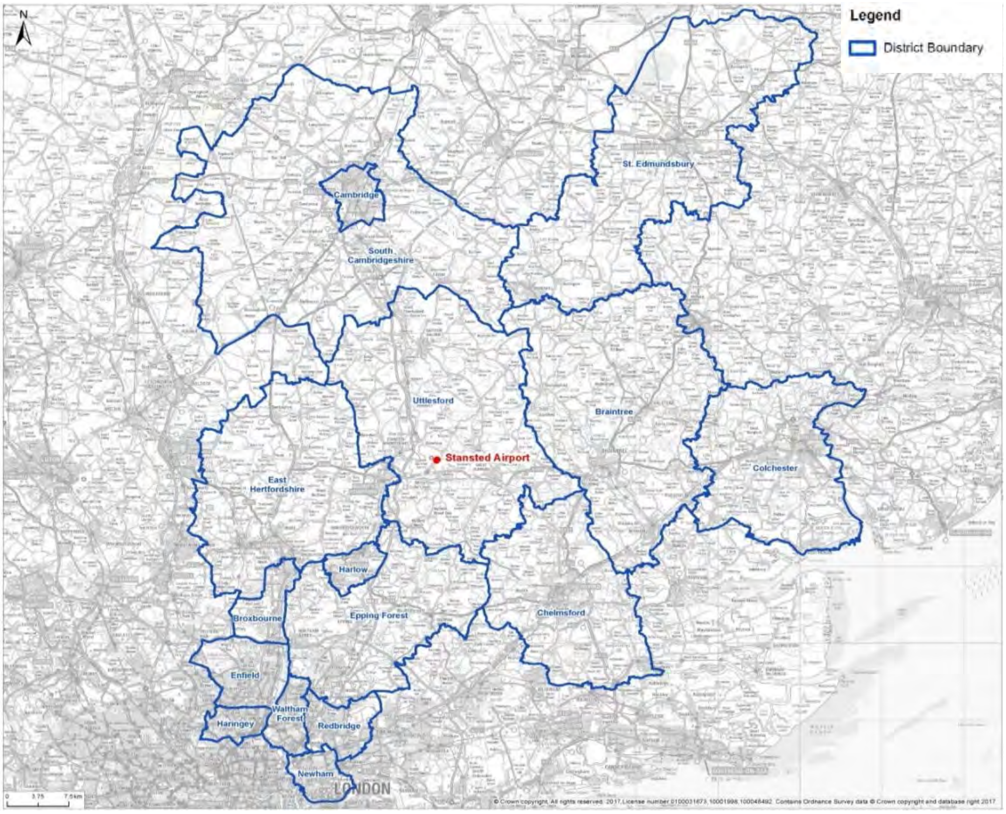


Figure 3.1: Stansted Airport in its surrounding regional context

3.4 Some 8km (5 miles) to the east of the airport boundary is Great Dunmow, whilst Stansted Mountfitchet lies about 3.5km (2 miles) to the north-west. Bishop's Stortford is located 3.5km (2 miles) to the west, within the administrative district of East Hertfordshire, which in turn lies within the county of Hertfordshire. Harlow is located some 16km (10 miles) to the south.

3.5 The London to Cambridge West Anglia Main Line (WAML) runs in a north to south direction approximately 3km (1.8 miles) to the west of the airport boundary. The airport's own railway station, Stansted Airport, provides frequent rail services to London Liverpool Street and the surrounding area, via the Stansted Express service. This service runs every 15 minutes throughout the day. There are two trains an hour to Cambridge, one of which continues to Birmingham.

3.6 Road access is mainly from the M11 motorway and the A120. The M11 (London to Cambridge) motorway runs north/south immediately to the west of the airport boundary, whilst a section of the A120 trunk road passes along the airport's southern boundary. These main highways meet at Junction 8 of the M11 motorway, which is located less than 0.5km (0.31 miles) to the south-west of the airport boundary. Local road access to the airport is provided via two minor roads, Bury Lodge Lane (west) and Parsonage Road / Hall Road (east).

3.7 The airport can also be accessed more widely from across London, the East of England and the Midlands. Around 23 million people live within two hours' drive of the airport. It is one of the main international gateways to the UK and is the third busiest point of entry for non-UK residents arriving by air.

3.8 In 2017, 22 passenger and 16 cargo airlines operated from Stansted with the largest airline, Ryanair, handling over 80% of all passengers. The airport is served by an extensive air route network connecting to over 190 destinations across Europe, North Africa, Central and North America. Further details are provided in ES Chapter 4 (Aviation Forecasts).

Regional Economic Context

3.9 The East of England region is a key driver of the UK economy. The region has been growing rapidly and has benefited from one of the highest levels of gross value added (GVA) growth by any UK region outside of London since 2010[1]. The region is home to over 550,000 private businesses with a combined turnover of £358 billion[2].

3.10 The airport is located strategically in the centre of the London-Stansted-Cambridge Growth Corridor. Its catchment area therefore includes the following:

- The City of London – the world's foremost financial centre;
- Europe's leading life sciences cluster – with over 600 life science businesses employing almost 25,000 people[3];
- The UK's largest cluster of Information and Communications Technology (ICT) and digital firms[4] – concentrated in London and Cambridge – with 12,400 businesses and 91,000 employees. The Cambridge pole of the corridor is home to Microsoft's European Research and Development (R&D) headquarters and ARM while Google's Campus and Tech City anchor the London pole;
- Harlow Enterprise Zone – a key area for life sciences, medical technology, and pharmaceuticals including Imperial College's Phenome Centre in Harlow; and
- Enfield industrial cluster – London's second largest strategic industrial cluster home to over 12,000 businesses, including Johnson Matthey, Coca Cola Enterprises Limited and Arla Foods, employing over 132,000 people[5].

3.11 Along with finance and banking, life sciences and technology businesses are increasingly important sectors of the UK economy. All of these sectors are reliant on a well-connected international air transport network. Stansted, for example, is the closest airport to the rapidly growing life sciences cluster in Cambridge.

3.12 In addition, Stansted is a key node on the A120 Haven Gateway Corridor that spans North Essex and South Suffolk, which constitutes a distinct economic sub region based upon its strong links with the Haven Ports of Felixstowe and Harwich.

3.13 By nature of its air route network, Stansted is also a key entry point for visitors from overseas. Inbound tourism is an important economic driver for the UK and a sector highlighted for its growth potential. London remains a key global destination for visitors, leisure, sport, culture, business and tourism. Maintaining and enhancing air route connectivity is a vital part of the UK's long-term competitiveness in these markets.

3.14 The socio-economic effects of the airport's growth and development are further described in ES Chapter 11 (Socio-Economic Impacts).

Historical Context

3.15 Stansted Airport was first developed as a USAF Air Base that was operational between 1943 and 1946. This original facility, with its configuration of three runways, was constructed by United States Army engineering battalions, and became operational in 1943. At the end of World War II, the airfield was handed over to the UK Air Ministry. The first civil aviation flights commenced on 14th December 1946. The existing single runway was extended to its present length of 3,048m around 1954. Thereafter, a mixture of passenger and cargo operations used the airport, operating from facilities on the northern part of the airport.

3.16 Following national debate, and several commissions and public inquiries throughout the 1960's and 1970's, the Government granted permission in 1985 to build the present modern airport complex and its supporting infrastructure to the south of the runway. The first phase of the main terminal building opened in 1991. Subsequent permissions allowed the extension of the main terminal building and the development of other aviation support facilities and infrastructure.

Current Airfield Layout and Infrastructure

Airport Layout

3.17 Stansted Airport covers an area of approximately 957 ha. The airfield consists of a single main runway and a network of taxiways and aprons, which collectively form the movement areas for aircraft operations. Other elements supporting the operations of aircraft include the Air Traffic Control (ATC) tower located on the south-eastern side of the runway from which aerodrome and surface movement control is provided, non-visual navigation aids, radar surveillance systems and the Airport Rescue and Fire Fighting (ARFF) service.

3.18 The range of associated facilities and infrastructure supporting the airfield comprises: a main terminal building and three satellite piers; an airport track transit system; air cargo centre and hangars; fuel farm; hotels; offices; operational facilities and accommodation; car parking; and a waste handling facility.

3.19 The existing layout of the airport is shown on Figures 3.2 and 3.3, and individual elements are described in the following sections.

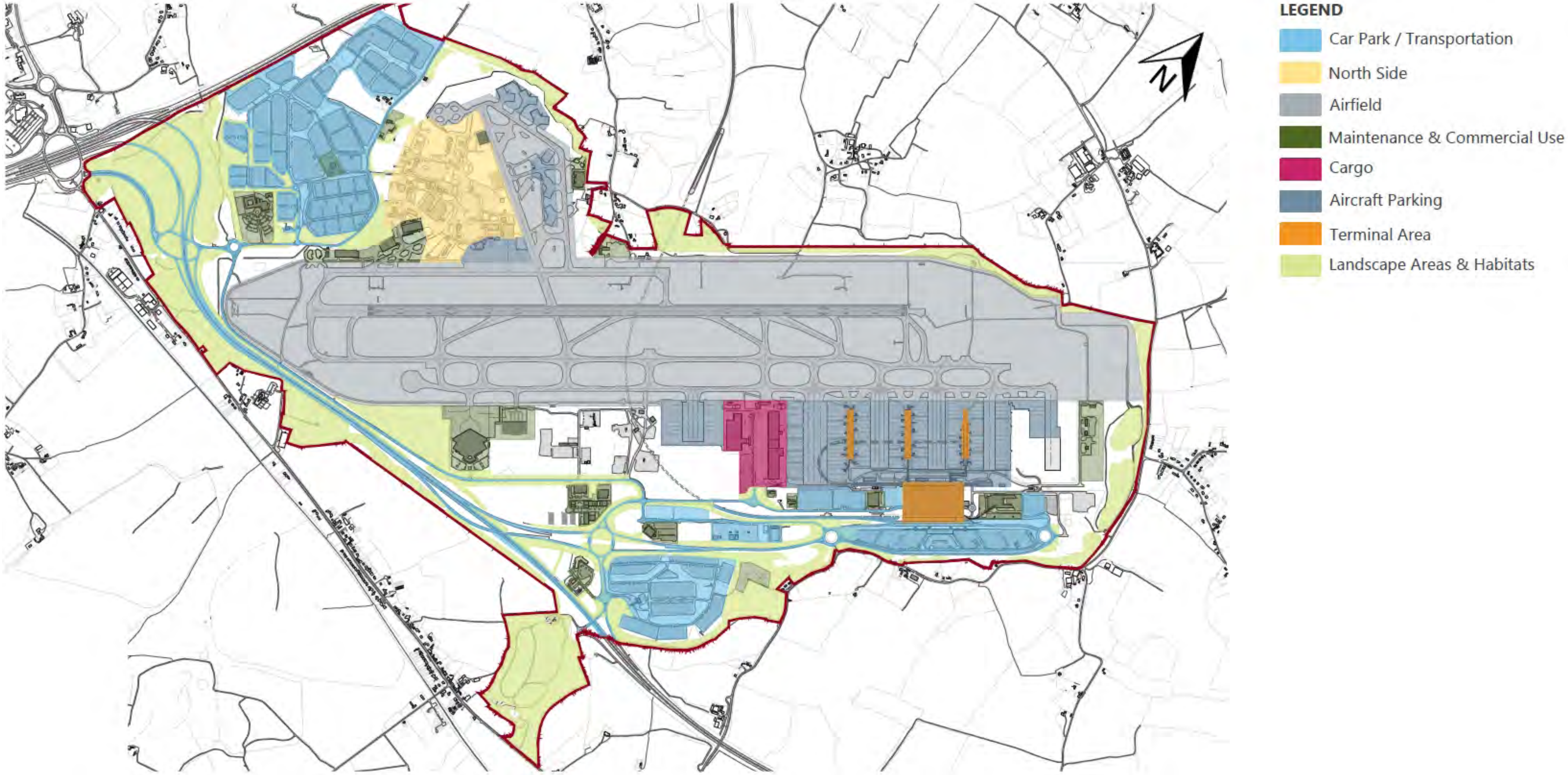


Figure 3.2: Current layout of Stansted Airport

Figure 3.3: Aerial view (north-west, looking across the airport to the south-east)

The Runway and Apron

3.20 Stansted Airport has a single runway (04/22) which is 3,048m long and 46m wide, aligned on a south-west/north-east axis. The airfield layout is able to accommodate the largest, long haul wide-body aircraft (equivalent to Code F), such as the Airbus A380-800 and the Boeing B747-800.

3.21 The ‘standard’ runway modal split, applying a 20-year average of annual aircraft movements, is approximately 73% south-westerly operations (Runway 22) and 27% north-easterly operations (Runway 04).

3.22 A twin parallel taxiway system on the south side of the runway provides access to the terminal, cargo area and principal aircraft maintenance areas. A further parallel taxiway to the north of the runway provides access to the Business Aviation termini, other aircraft maintenance facilities and remote aircraft parking stands.

3.23 The existing aircraft parking stands at the airport can be configured to accommodate large, wide-body aircraft such as a Boeing B777-300, or a higher number of smaller, narrow-body aircraft such as Boeing B737-800. At full capacity, the current number of aircraft parking stands can accommodate up to 83 narrow-body aircraft, of which 67 are dedicated to the transport of passengers and 16 for cargo.

Terminal Campus

3.24 The main terminal building is located to the south of the runway and covers approximately 4.6 ha, providing processing facilities for inbound and outbound, international and domestic passengers.

3.25 A major expansion of the main terminal building took place between 2007 and 2009. This added approximately 5,900 sqm of floorspace to provide space for additional baggage carousels, a new immigration and passport control hall and a modernised arrivals hall with improved facilities.

3.26 The main terminal building is a contemporary rectangular steel and glass structure. The building has three levels and is 119.68m AOD to eaves and 123.02m AOD to roof ridge (whereupon land level is 98.80m AOD). Internally, the space is organised into three core functional passenger processing areas: ‘Check-in’ and the main concourse is to the front of the building, ‘Departures’ towards the rear left (west) of the building and ‘Arrivals’ on the rear right (north) of the building.

3.27 There are three satellite piers connected to the main terminal building for flight departures and arrivals. These provide passenger access to aircraft parking stands and are located to the north-west of the main terminal building. Pertinent details of each satellite are summarised below:

- Satellite 1 is accessed by the airport transit system and is located the furthest distance from the main terminal building at 300m; this satellite is for international flights only;

- Satellite 2 is split into two sections: international flight gates that are accessed by the transit system, and further gates, which are accessed via a walkway from the main terminal building for domestic arrivals; and

- Satellite 3 is accessed via a walkway from the main terminal building; and is used for international flights only.

3.28 An Advanced Passenger Vehicle (APV) building, which is accessed via a walkway from the main terminal, provides a bussed gate facility for passenger access to aircraft parked on remote stands.

New Arrivals Building

3.29 On 7th April 2017 planning permission (ref. UTT/16/3566/FUL) was granted for the erection of a separate 34,384 sqm arrivals building adjacent to the existing main terminal building. The new arrivals building will enable all the current arrivals facilities to be transferred from the main terminal building, which as a result can then be entirely dedicated to handling flight departures. This will also enable the existing arrivals area to be reconfigured to provide additional check-in and bag drop facilities, a second security search area, improved and more efficient international departure lounge capacity, and the ability to develop more customised and different facilities for certain airlines or groups of passengers.

ATC Tower

3.30 Stansted's current air traffic control tower replaced the old control tower in 1995. It is located on the south-eastern part of the airfield a short distance to the south of the main terminal building. At 60m in height, it is one of the tallest ATC towers in the UK.

Cargo, Maintenance and Other Facilities

3.31 As shown on Figure 3.2 above, the cargo centre is located to the west of the main terminal building. This is approximately 55,000 sqm (gross floor area) and includes storage and handling buildings with full airside access to aircraft parking stands. It comprises a line of transit sheds with an airside frontage onto the western apron and a parallel transit shed operated by 'FedEx'. Dedicated cargo aircraft parking stands are available to the south-west of this facility. These are shown in Figure 3.2.

3.32 The cargo area is served from the airport's internal road network. Associated staff and lorry parking is available on-site.

3.33 There are several additional cargo buildings and hangars situated around the airfield. The principal aircraft maintenance facility to the south of the runway comprises the 'Diamond Hangar', capable of accommodating two large, wide-body Boeing B747 freighter aircraft, with two engine ground run-up (EGR) pens, and supporting accommodation, car parking and a dedicated Ryanair hangar. The aircraft maintenance-repair-overhaul (MRO) activities that are typically performed at the airport are Checks A and B. These checks are undertaken either on-stand while the aircraft is parked or in the hangar overnight or between one and three days. These are necessary to ensure that aircraft are maintained and operated to the highest standards of aviation safety at all times.

3.34 The airport fire station is located immediately to the north of the cargo transit sheds.

3.35 The GA facilities and some aircraft maintenance facilities are located to the north of the runway at 'Northside', as shown on Figure 3.2. Some office accommodation and supporting operational facilities including motor transport and the fuel farm are also located in this area.

3.36 The airport's aviation fuel farm comprises three tanks currently with permission granted for one more, the development of which has commenced. There is reserved land available for two further tanks which would result in a total of three additional tanks in parallel formation to the existing layout.

Hotels and Offices

3.37 There are five hotels located at the airport:

- The Radisson Blu Hotel, and Hampton by Hilton, both located adjacent to, and either side of, the main terminal building;
- Novotel, located to the north of the runway; and,
- Holiday Inn Express and Premier Inn, which are part of the South Gate site on the A120.

3.38 The Novotel and Holiday Inn Express operate regular shuttle bus services to/from the main terminal building.

3.39 There are a number of offices around the airport including Enterprise House and Endeavour House, which provide the main offices for STAL as well as a range of airport tenants. Other landside commercial accommodation to the south of the runway includes: support offices, car rental bases for four operators, in-flight catering and ground handling agents' accommodation.

Waste and Drainage Facilities

3.40 The airport manages waste in accordance with the principles of the '4R' waste hierarchy: reduce, reuse, recycle, and recovery. The airport generates and manages large quantities of waste. In 2017 the airport produced approximately 6,908 tonnes of waste, corresponding to approximately 0.26kg waste per passenger. This is from aircraft cleaning, servicing, catering, cleaning of offices and the terminal building, retail, catering, security and cargo. The airport has published targets to reduce the amount of waste that is generated with a minimum target of 70% to be recycled by 2020 and to send zero waste to landfill. The waste facilities are contained within the under croft service bay area of the Terminal, accessed from Bassingbourn Road and Gorfield Road.

3.41 The airport is served by an extensive network of drainage infrastructure, with around 130 km of drains and sewers, 30 pumping stations and 50 oil interceptors across the site. Surface and rain water run-off mainly flows into a series of onsite balancing ponds, whereupon, following a period of settlement, clean water is discharged directly into local watercourses under Environmental Permits. The airport seeks to maximise natural infiltration and to reduce peak surface water flows to these balancing ponds.

3.42 The balancing ponds allow the airport to control the volume and rate of water discharge and to minimise the risk of pollution. In recent years, improvements have been made to increase the performance of the existing balancing ponds and construct a new balancing pond to improve the control of de-icing chemicals.

3.43 Drains serve most of the impermeable area and storm water runoff (containing glycol de-icing agents used in the winter period) flows to pond C for transfer to Thames Water Utilities Ltd (TWUL) for treatment. Water that does not contain de-icer is discharged to the Pincey Brook watercourse.

3.44 Foul water management on the airport is divided into two general areas:

- The north-side foul sewer system collects all foul flows to the north-west of the runway, which are collected and flow by gravity to the TWUL pumping station to the western side of the M11 motorway for onward pumping to Bishop's Stortford Waste Water Treatment Plant (WWTP); and

- The south-side foul sewer system collects all foul flows to the south-east of the runway, which are collected via gravity sewers at the TWUL pumping station to the south of the runway, adjacent to pond C, and are pumped for treatment at Bishop's Stortford WWTP.

3.45 Details of the airport's surface and foul water drainage, potable water supply, conservation and efficiency measures and targets are described in further detail in ES Chapter 15 (Water Resources and Flood Risk).

Surface Access

Accessibility by Car

3.46 The airport is well served by road, having direct connections to the trunk road network. Traffic to and from the south via the M11 motorway has direct access from slip roads, whilst traffic to and from the north (via M11) and west (via A120) access the airport from the A120 via Junction 8 of the M11 motorway. Traffic from the east has direct access to and from the airport via a grade separated junction on the A120.

3.47 The airport has a network of approximately 37km (23 miles) of on-site roads within its boundary, for which the airport itself is the Highway Authority. A service area, with petrol filling station, is located on the South Gate site, to the south of the mid-stay car park.

Car Parks

3.48 Figure 3.4 below shows key transport facilities in and around the airport, as well as the location of car parks within the airport boundary.

3.49 There are approximately 30,750 passenger car parking spaces on site (as of December 2017), all at surface level, comprising:

- Long-stay car park (including meet and greet storage): 21,950 dedicated long-stay car parking spaces are provided in the north-western area of the airport, accessed from Bury Lodge Lane.;

- Mid-stay car park: 5,100 mid-stay car parking spaces are provided at South Gate, in the southern part of the airport; and

- Short-stay: 4 short-stay car parks are located adjacent to the terminal building proving 2,300 car parking spaces. The 'orange' and 'red' zones are located in closest proximity to the airport, and are considered as 'Short-Stay Premium' parking areas. The 'green' and 'blue' zones are a short walking distance (less than 200m) from the main terminal building and are considered to be 'Short-stay' and 'Short-stay Economy' parking, respectively.

3.50 The airport also offers a ‘meet and greet’ parking service, which acts as a form of valet service outside of the airport terminal. Meet and greet cars are typically stored within the long-stay car parking area, although this can vary depending on the time of the year.

3.51 A special service is available for visitors with reduced mobility (PRM) to assist with their journey through the terminal building and satellite piers. This includes Blue Badge spaces within the Express Set Down area on the terminal forecourt, accessible drop off/pick up bays in the coach station for coaches who require to deploy their wheelchair lift, and numerous help points located throughout the car parks for passengers who require assistance.

3.52 In addition, a total of 2,230 car parking spaces are available for airport staff in a number of dedicated employee car parks near the main employment centres across the site. Many of these are communal facilities, such as those adjacent to Enterprise House that serves the terminal complex, those in the cargo area and those at Coopers End Road.

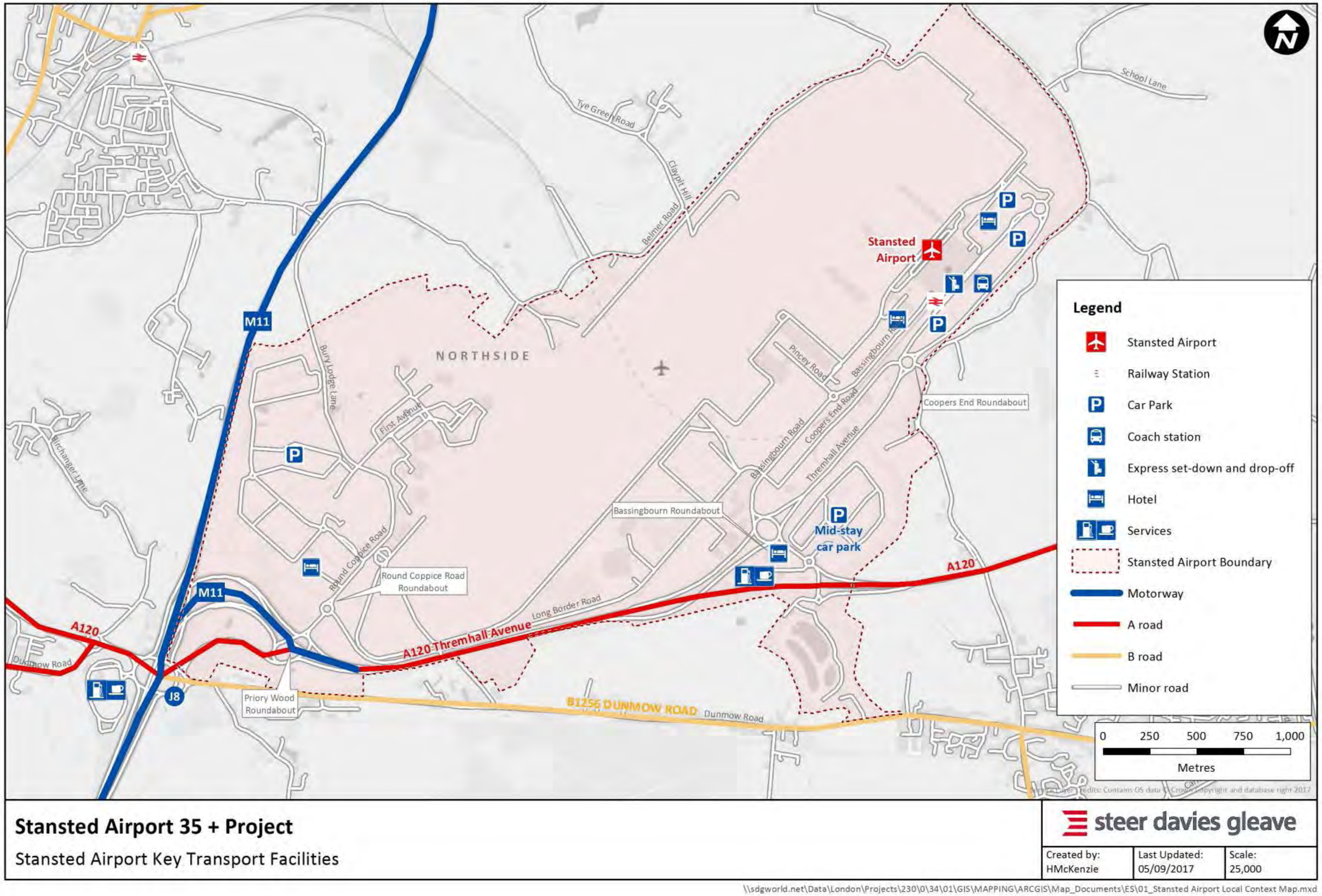


Figure 3.4: Airport key transport facilities

Accessibility by Non-Car Modes

3.53 The airport's Public Transport Interchange (PTI) comprises the rail station and bus and coach station. The bus and coach station is located on the forecourt, immediately in front of the main terminal building. The rail station is located directly beneath the main terminal building and is accessed by internal escalators, ramps, walkways and lifts.

Walking

3.54 Pedestrian infrastructure comprises footpaths to key locations including the main terminal building and routes to and from nearby facilities where footways and crossings are provided to facilitate movement around the vehicle and taxi pick-up and drop-off areas.

Cycling

3.55 There are numerous cycle routes within the airport site which provide connections to and from local towns and villages. To the south of the airport, there is a shared use footway/cycleway along the northern side of Long Border Road. This extends from Round Coppice Roundabout to the Diamond Hangar where it then becomes an on-road cycle lane. There are also many other cycle routes to the west and south or the airport, as described in ES Chapter 6 (Surface Access and Transport).

3.56 Cycle parking shelters are located throughout the airport in 11 locations such as the employee car parks and adjacent to the PTI.

Taxi

3.57 The main terminal building has a single level forecourt, primarily for the set-down and pick up of passengers including by taxi.

3.58 Whilst most taxi use is by off-site private hire operators, licensed taxi and car hire services are available on site. STAL has contracts with these concessionaires to ensure that customer service and vehicle quality is maintained.

Buses and Coaches

3.59 The bus and coach station is located in front of the main terminal building.

3.60 Coach services provide high frequency, express connections to London and several locations nationwide, including Birmingham, Cambridge, Thetford, Norwich, Oxford, Nottingham, Milton Keynes, Brighton and Ipswich. There are currently three main operators (National Express, Stansted Citylink and Airport Bus Express) serving London and providing 18 coaches per hour at peak times to London Liverpool Street, Kings Cross St Pancras, Victoria, Stratford, Golders Green, Paddington, Waterloo and Marble Arch.

3.61 Inter-airport coach connections are provided between Stansted and the other London airports including Heathrow, Gatwick, Luton and Southend.

3.62 A number of key local bus routes serve passengers and employees in the nearby communities, with over 300 daily bus movements providing connections to Bishop's Stortford and Stansted Mountfitchet, as well as the main towns within the Eastern counties (Harlow, Bishop's Stortford, Great Dunmow, Braintree, Chelmsford, Colchester, Stevenage, Southend, Saffron Walden and Colchester), and the Stansted Flyer, which is a demand responsive service to key towns in Essex and Kent.

Rail

3.63 Stansted Airport railway station is linked directly to the main terminal building directly below the main concourse and has three platforms.

3.64 The Stansted Express Service operates to London Liverpool Street with all services stopping at Tottenham Hale. Intermediate stops are made by alternative services at Stansted Mountfitchet, Bishop's Stortford and Harlow. These services run every 15 minutes throughout the day.

3.65 Some services stop at additional stations including Sawbridgeworth, Waltham Cross, Enfield Lock and Brimsdown to serve those passengers commuting into London. Depending on the number of stops in either direction, journey times between the airport and London Liverpool Street vary from between 45 minutes to 57 minutes.

3.66 CrossCountry Trains operate services to and from the airport to Birmingham New Street at a frequency of one train per hour. At peak times there are two services in either direction which call at a number of stations including: Cambridge, Ely, Peterborough, Leicester and Nuneaton. Greater Anglia also operates an hourly service to Cambridge, running two trains an hour between the city and Stansted.

Planning and Aviation Policy Context

3.67 This section provides a summary review of the national, regional and local policies and guidance that are relevant to this ES and are material considerations in the determination of this planning application. This section should be read in conjunction with ES Appendix 3.1 (Planning and Aviation Policy) and the Planning Statement accompanying the planning application.

National Policy

National Planning Policy Framework (NPPF)

3.68 The proposed development has regard to the National Planning Policy Framework (NPPF) (March 2012), which should be read alongside the National Planning Practice Guidance (NPPG) online resource.

3.69 The policies contained within the NPPF articulate the Government's vision of sustainable development, which should be interpreted and applied locally to meet local aspirations. The NPPF also identifies a presumption in favour of sustainable development. There are three dimensions to sustainable development: an economic role, a social role and an environmental role. These should not be seen in isolation as economic growth can contribute to higher environmental standards.

3.70 With specific reference to airports, paragraph 31 of the NPPF states that local authorities should work with neighbouring authorities and transport providers to develop strategies for the provision of viable infrastructure necessary to support sustainable development, including large scale facilities or transport investment which support the growth of airports.

3.71 Paragraph 33 adds that when planning for airports and airfields that are not subject to a separate national policy statement (NPS), plans should take account of their growth and role in serving business, leisure, training and emergency service needs. The NPPF specifies that such plans should take account of the principles set out in the relevant NPSs and the Government's Aviation Policy Framework (APF).

Aviation Policy Framework (APF)

3.72 The APF was published in March 2013 and set out principles for the independent Airports Commission (AC) to take into account in their recommendations and reports. The APF outlines the Government's wider aviation objectives and principles to guide plans and decisions at the local and regional level, to the extent that it is relevant to that area. The APF seeks to strike the right balance between aviation growth, economic wellbeing, respect of the environment and protection of quality of life.

3.73 The APF identified the medium to long-term capacity and connectivity challenge facing many of the UK's main airports. With specific reference to Stansted, at the time of publication of the APF in 2013 (i.e. in the aftermath of the global financial crisis) the airport was forecast to reach capacity by the early 2030s. However, as set out in ES Chapter 4 (Aviation Forecasts), since that time Stansted has expanded in response to the UK's significantly improved economic climate and strong market demand for air travel in London and the South East of England.

3.74 With regard to adding capacity at Stansted Airport, the AC report recognised the strategic importance of Stansted to the wider London air transport system and suggested that there is merit in reviewing the Stansted planning cap if and when the airport moves closer to full capacity. The report acknowledged that Stansted had experienced rapid growth since MAG's purchase, which if sustained over a long period, would bring the airport to full capacity in the 2020s.

Emerging Aviation Policy

3.75 The Government is currently reviewing a number of aviation policies and is looking to update the overarching strategy for the sector, in order to better respond to future challenges and opportunities.

3.76 In this respect, a consultation on UK Airspace Policy was undertaken between January and May 2017 in support of airspace modernisation to deliver benefits for the UK economy, passengers, communities and the environment. This can be achieved through reducing congestion, optimising of traffic flows in/out of the London terminal manoeuvring area (TMA), reducing track miles/fuel burn/emissions, and minimising time in hold and operations at sub-optimum performance levels.

3.77 In parallel with the consultation on UK Airspace Policy, a consultation on a draft Airports NPS[6] began in February 2017. Whilst the focus of this document is the proposed North West Runway at Heathrow, the draft NPS also acknowledges the overarching need for additional airport capacity in the South East of England.

3.78 Consultation on the draft Airports NPS and UK Airspace Policy is being run in parallel due to the interrelationship of the issues they address (especially air noise). Both consultations ended on 25th May 2017.

3.79 In addition to the above, a separate consultation on the next night flights regime at London's three designated airports (Heathrow, Gatwick and Stansted) concluded on the 28th February 2017. The proposed new restrictions are scheduled to take effect in October 2017 and the Government is proposing that they last for a period of five years.

3.80 The result of the above consultation, studies and reports will inform the development of a new Aviation Strategy. It is anticipated that this new strategy will set out the Government's vision for the wider aviation sector and will eventually replace the 2013 APF.

3.81 In July 2017 the Government published 'Beyond the Horizon: The Future of UK Aviation'. This is a call for evidence as part of the development of a new aviation strategy that looks beyond the development of an additional runway at Heathrow and sets out a long-term vision for the aviation sector to 2050. The document supports the growth of the UK aviation sector and aims to:

"Achieve a safe, secure and sustainable aviation sector that meets the needs of consumers and of a global, outward-looking Britain[7]."

Local Policy and Guidance

Development Plan

3.82 The development plan for Stansted Airport is currently made up of the following documents:

- Adopted Uttlesford Local Plan (January 2005);
- Essex Minerals Local Plan (July 2014); and

- Essex County Council and Southend-on-Sea Borough Council Waste Local Plan (September 2001).

Uttlesford Emerging Local Plan

3.83 On 12th July 2017 UDC published a Regulation 18 Draft Local Plan for consultation. The consultation recently concluded on the 4th September 2017.

3.84 The draft new Local Plan promotes and encourages the economic development of the district. With specific reference to Stansted Airport, one of the plans overarching objectives is to accommodate development by:

- "*utilising the full capacity of the existing runway and providing for the maximum number of connecting journeys by air passengers and workers to be made by public transport; and*
- *Ensuring that appropriate surface access infrastructure and service capacity will be provided without impacting on capacity to meet the demands of other network users[8]."*

3.85 Appropriate references to other relevant extracts from the Regulation 18 Local Plan are provided in the technical chapters of this ES.

Other Policy and Guidance

London Stansted Cambridge Corridor (LSCC) Growth Commission

3.86 The LSCC was launched in June 2013 as a strategic partnership of public and private organisations covering the London-Stansted-Cambridge-Peterborough Corridor. The LSCC Consortium subsequently set up the LSCC Growth Commission.

3.87 UDC's draft new Local Plan sets out the Council's vision for the LSCC Core Area, of which the airport is recognised as a pivotal part due to its support of the area's economic ambitions. The document notes that together with Stansted Airport, the local authorities will deliver sustainable growth which supports the economic ambitions of the LSCC.

3.88 In July 2016 the LSCC Growth Commission published a report titled 'Findings and Recommendations of the LSCC Growth Commission', which outlines a 20-year vision for the Corridor to become one of the top 'knowledge regions' in the world and identified the growth of Stansted Airport as being crucial to the economic development of the LSCC.

Stansted Sustainable Development Plan (SDP) 2015

3.89 Accordingly, in line with the Government's advice as set out in the APF, after months of consultation STAL and published its final Sustainable Development Plan 2015 (SDP) on 4th March 2015.

3.90 The 2015 SDP constitutes the airport's 'master plan' and is a living document that will remain under constant review and evolve over time. It provides the blueprint for growth based on the development of the airport's single runway capacity and sets out the strategic framework in which to tackle some of the key challenges facing the airport.

3.91 The 2015 SDP sets out STAL's vision for the airport, which is described as:

"To grow Stansted to better serve the region, including attracting a wider range of airlines and new routes...this is vital to sustain prosperity and create jobs and investment in our region. The plan looks at ways to make efficient use of our current single runway, develop and improve surface access links and strengthen our community engagement programme while at the same time being mindful of the environmental impacts, ensuring we strike the right balance between growth and sustainability".

3.92 This vision is underpinned by six guiding principles:

- *"Support Stansted in becoming the best London airport;*
- *Proactively plan for growth to make best use of existing capacity;*
- *Support prosperity and economic growth in the region;*
- *Actively manage and contain environmental impacts;*
- *Be active and supportive partners in the local community; and*
- *Maintain Stansted's position as the best airport in the UK for public transport".*

3.93 The 2015 SDP is composed of an introductory summary document and four detailed plans, which set out in greater detail the airport's strategic objectives and actions to drive economic growth, enhance surface access and transport connectivity, develop land on and around the airport, and to balance increased operations in a way that reduces the airport's impact on the community and the environment. In summary, the:

- **Economy & Surface Access Plan** – outlines how the airport can support the sustainable growth of the local, regional and national economy and how it can contribute to and enhance the economic wellbeing of the local area. It also sets out plans for maximising the connectivity of the airport whilst ensuring that the airport is fully accessible for its catchment area;
- **Land Use Plan** – identifies the land, the uses and the facilities required to support the best and most efficient use of the airport's single runway capacity, providing a safe, efficient and commercial operation for all businesses to grow and thrive;
- **Community Plan** – sets out how the airport intends to focus on engagement with local communities and contribute to the social and economic well-being of those living around Stansted. This plan acknowledges that the airport seeks to adopt a responsible approach to the development of positive relationships with the local community and address any community issues openly and transparently, by maximising the benefits and minimising the adverse impacts wherever possible.
- **Environment Plan** – focuses on reducing the global and local environmental impacts of airport development and operations. This plan sets out the approach to managing the impact of airport operations on the environment, from reducing aircraft noise and carbon emissions to managing and controlling impacts relating to water, waste, ecology and noise.

3.94 The 2015 SDP identified that the current 35mppa cap was expected to be approached within the next 10 years (i.e. by 2025). It goes on to say:

"Beyond that, we estimate that the airport could grow to handle in the region of 40 – 45mppa within the current boundaries and physical constraints, as a result of improvements to the way in which we operate and use our facilities. The exact capacity will be a product of our route network, aircraft size, the spread of traffic through the day and year and the capacity drivers described in our Land Use Plan".

3.95 As described in ES Chapter 4 (Aviation Forecasts), passenger numbers are growing even more rapidly than anticipated in 2015 – reaching 25.9mppa in 2017. Moreover, independent forecasts prepared by ICF in mid-2017 now predict that the 35mppa cap will be reached by 2022/ 2023 and that 43mppa would be achieved by 2028. Therefore, STAL wishes to secure planning permission for the improvements to the airport's runway and airfield infrastructure as soon as possible to enable it (and its partner airlines) sufficient lead-in time to plan for and deliver the necessary capital investment to meet this demand and, ultimately, to allow it to make the better and more efficient use of its single runway.

Stansted Airport Planning Background

2003 Planning Permission (15+ Permission)

3.96 In May 2003 outline planning permission (UDC ref: UTT/1000/01/OP) was granted for the:

“Extension to the passenger terminal; provision of additional aircraft stands and taxiways, aircraft maintenance facilities, offices, cargo handling facilities, aviation fuel storage, passenger and staff car parking and other operational and industrial support accommodation; alterations to airport roads, terminal forecourt and the Stansted rail, coach and bus station; together with associated landscaping and infrastructure.”

3.97 The conditions attached to this planning permission, referred to as the ‘2003 Planning Permission’, included a number of restrictions on passenger throughput and aircraft movements, the most relevant of which were:

“***MPPA1*** *The passenger throughput at Stansted Airport shall not exceed 25 million passengers in any twelve calendar month period.”*

*“**ATM1** Subject to ATM2 below, from the date that the terminal extension hereby permitted within Site “A” opens for public use, there shall be at Stansted Airport a limit on the number of occasions on which aircraft may take-off or land at Stansted Airport of 241,000 ATMs during any period of one year of which no more than 22,500 shall be CATMs (Cargo Air Transport Movements).*

*“**ATM2** The limit in condition ATM1 shall not apply to aircraft taking-off or landing at Stansted Airport in any of the following circumstances of case, namely:*

(a) The aircraft is not carrying, for fire or reward, any passengers or cargo;

(b) The aircraft is engaged on non-scheduled air transport services where the passenger seating capacity of the aircraft does not exceed ten;

(c) The aircraft is required to land at the airport because of an emergency or any other circumstance beyond control of the operator and commander of the aircraft;

(d) The aircraft is engaged on the queen’s flight, or on a flight operated primarily for the purposes of the transport of government ministers or visiting heads of state or dignitaries for abroad.”

3.98 The application therefore allowed for an annual passenger throughput of 25mppa and 241,000 ATMs, excluding GA movements.

2008 Planning Permission (25+ Permission)

3.99 In April 2006 an application (UDC ref: UTT/0717/06/FUL) was submitted to increase the limits of conditions ATM1 and MPPA1, to enable the airport’s growth beyond 25mppa and 241,000 ATMs, and facilitate more efficient use of the existing runway. The proposals were to amend the 2003 Planning Permission as follows:

“Extension to the passenger terminal, provision of additional aircraft stands and taxiways, aircraft maintenance facilities, offices, cargo handling facilities, aviation fuel storage, passenger and staff car parking and other operational and industrial support accommodation; alterations to airport roads, terminal forecourt and the Stansted rail, coach and bus station;

together with associated landscaping and infrastructure as permitted under application UTT/1000/01/OP but without complying with Condition MPPA1 and varying Condition ATM1 to 264,000 ATMs."

3.100 In November 2006 UDC refused the planning application. A public inquiry was conducted from May until October 2007. Subsequently, the Planning Inspector made his recommendations in January 2008. In line with the Inspector's recommendations, the then Secretary of State for Transport and the Secretary of State for Communities and Local Government, allowed BAA's appeal in October 2008. A series of legal challenges by community campaign group Stop Stansted Expansion (SSE) were rejected by the High Court in 2009.

3.101 The 2008 permission allows for up to 35mppa and up to 264,000 ATMs, along with 10,000 additional GA aircraft movements. This was conditioned as follows:

*"**MPPA1** The passenger throughput at Stansted Airport shall not exceed 35 million passengers in any twelve calendar month period."*

*"**ATM1** Subject to ATM2 below, from the date that the terminal extension hereby permitted within Site "A" opens for public use, there shall be at Stansted Airport a limit on the number of occasions on which aircraft may take-off or land at Stansted Airport of 264,000 ATMs (Air Transport Movements) during any 12 calendar month period, of which no more than 243,500 shall be PATMs (Passenger Air Transport Movements) and no more than 20,500 shall be CATMs (Cargo Air Transport Movements)."*

*"**ATM2** The limit in condition ATM1 shall not apply to aircraft taking-off or landing at Stansted Airport in any of the following circumstances of cases, namely:*

(a) The aircraft is not carrying, for hire or reward, any passengers or cargo;

(b) The aircraft is engaged on non-scheduled air transport services where the passenger seating capacity of the aircraft does not exceed ten;

(c) The aircraft is required to land at the airport because of an emergency or any other circumstance beyond control of the operator and commander of the aircraft; and

(d) The aircraft is engaged on the Queen's flight, or on a flight operated primarily for the purposes of the transport of government Ministers or visiting Heads of State or dignitaries from abroad.

The total number of take-offs and landings by aircraft in categories (a) and (b) above combined shall not exceed 10,000 in any 12 calendar month period."

3.102 The 25+ permission contains a number of developments across the airport site, individually reference "A-S". The permission has been commenced, as a result of development of site "P", in March 2017 and a number of associated conditions have been discharged. In addition, STAL is bound by Unilateral Undertakings with UDC and other stakeholders which includes, *inter alia*, a commitment to help fund improvements to Junction 8 of the M11 motorway and other mitigation measures. Much of the development associated with the permission has however, not been built and is no longer part of STAL's thinking. The consent for developments referenced "C" to "S" in this permission has now expired and although permission for developments "A" and "B" remain extant until October 2018, they are unlikely to proceed.

New Arrivals Building

3.103 In April 2017 an application (ref. UTT/16/3566/FUL) was approved for:

"A dedicated terminal facility for arriving passengers (34,384sqm); an associated forecourt; and altered access and service roads."

3.104 As outlined above, this dedicated arrivals building is designed to cater for passenger growth and also to allow more space to be devoted to departing passengers in the existing building. This will help make efficient use of existing facilities and significantly improve customer service standards for passengers and airlines, and enhance the overall travel experience.

Proposed Development ('35+ Project')

3.105 As outlined in ES Chapter 4 (Aviation Forecasts), Stansted Airport has experienced significant growth since MAG's acquisition in 2013 with 25.9mppa travelling through the airport in 2017, increasing by 6.6% from 24.3mppa in 2016. As strong growth in annual passenger numbers is predicted to continue over the coming years, STAL is now seeking planning permission for:

- The construction of Rapid Access and Rapid Exit taxiways and additional aircraft stands within the airfield to support growth and improve operational flexibility and resilience; and
- An increase in the annual number of passengers from the existing permitted level of 35mppa to 43mppa – an increase of 8mppa (23%).

3.106 The new airfield infrastructure is positioned to allow arriving and departing aircraft to safely and smoothly enter and exit the runway, therefore improving efficiency and minimising delays and congestion. The locations of the Rapid Exit and Rapid Access Taxiways are based on operational requirements and the performance characteristics of the aircraft using Stansted. The additional aircraft parking stands will improve efficiency and ensure sufficient space to meet peak demand, especially for overnight based aircraft. The locations of the new airfield infrastructure are shown on Figure 3.6 labelled and in darker shading, namely:

- Mike Romeo Rapid Exit Taxiway (RET) – a new link to the south-west of the runway will facilitate prompt aircraft exit from Runway 22;
- Runway Tango Rapid Access Taxiway (RAT) – a new link at the north-eastern end of the runway will allow for additional taxiing space and a new point of access to the – 'start of roll' point on Runway 22 (i.e. the predominant south-westerly operation);
- Yankee Remote Stands – six new aircraft parking stands located in the mid airfield will provide additional parking for six Code C aircraft (i.e. Boeing B737-800) and will mainly be utilised by based aircraft for overnight parking; and
- Three additional Echo Stands – three new stands will be added to the existing Echo Stands, which are located north-east of the airfield, to accommodate additional aircraft parking.

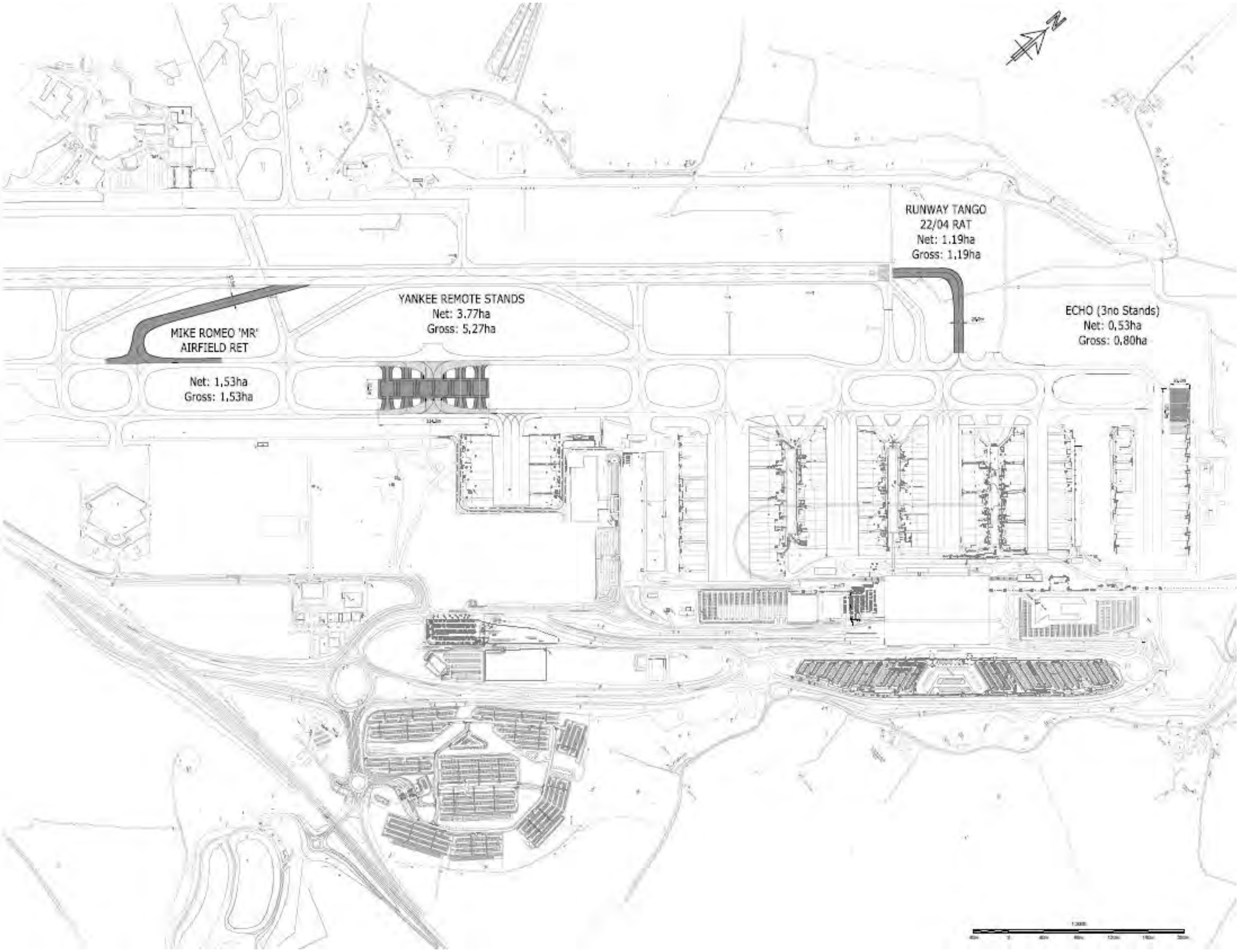


Figure 3.6: Proposed new airfield infrastructure

3.107 The new RAT, RET and aircraft parking stands will be concrete with an asphalt surface, with inset airfield lighting, drainage, cable ducts and other services as necessary, including Fixed Electrical Ground Power (FEGP), fuel hydrants, and Stand Entry Guidance System (SEGS). The timing, form and method of construction of the proposed airfield infrastructure are further described in ES Chapter 5 (Development Programme and Construction Environmental Management).

3.108 The total area that will be occupied by the new airfield infrastructure is approximately 9 ha, covering land that, while open and grassed, was created by the development of the new airport in the early 1990s.

3.109 In summary, the increases proposed to the existing annual passenger cap, supported by a small amount of new airfield infrastructure works, will allow more efficient use of the existing single runway's capacity in the period up to 2028. The proposed development is consistent with prevailing and emerging Government policy and aligns with STAL's vision published in the 2015 SDP.

Alternatives to the Proposed Development

3.110 Schedule 4 of the EIA Regulations states that the following is required within an ES:

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

3.111 When considering the 'reasonable alternatives' for a change to permitted operations and the amending of the existing annual passenger cap and creation of a combined aircraft movement limit, STAL has not identified any credible alternatives which would achieve the overarching objective of making better and more efficient use of the existing single runway or be capable of accommodating the predicted demand of both passengers and airlines in the short to medium term (i.e. beyond 2023).

3.112 Any lesser (i.e. constrained) development of the airport would be at odds with the Government's policy aim of more intensively utilising existing runway capacity in the UK during the period up to 2030 (as described further in ES Chapter 4). Such an alternative would stifle major airport infrastructure investment, limit improvements to the passenger experience and crucially, not derive the same economic benefits to the local and wider region. Moreover, any development proposal on a lesser scale would not provide the operational improvements and resilience required by the airport.

3.113 The requirement of the EIA Regulations for an applicant to also consider 'design alternatives' does not infer that it must undertake a hypothetical design process, especially if no plausible alternatives exist within the confines and specific characteristics of the project. By comparison to other developments captured by the EIA Regulations (e.g. large industrial estates and housing developments where there may be significant flexibility in the disposition of uses, building scales and form, which could in turn result in different environmental effects) developments within an existing airport site are dictated by regulatory, operational, safety and other aviation considerations.

3.114 As described above, the physical components of the proposed development are purely functional, of limited scale and will not be visible beyond the airport operational boundary. In this instance, the design and location of the proposed infrastructure is dictated by a number of factors, including: the fixed position and orientation of the runway and other aircraft manoeuvring areas across the airfield, such as the taxiways and aprons; the space available to site the new RAT and RET and stands; their operational function and interrelationship; and various aviation safety and regulatory requirements. The proposed airfield infrastructure also conforms to the UK CAA, ICAO, and European Aviation Safety Agency (EASA) standards for safe airfield design. As such, no alternative configuration was identified which could meet these requirements, whilst also accommodating the forecast growth and achieving the overarching objective of making 'better and more efficient use' of the existing runway beyond 2023.

3.115 In view of the above, it can be concluded that there are only two feasible alternatives – the 'Do Minimum' scenario and the 'Development Case', as described in ES Chapter 2 (EIA Methodology). The comparative environmental effects of these alternatives form the basis of the assessment presented in this ES.

References

[1] ONS (December 2016) Regional and Sub-Regional GVA.

[2] Department for Business, Energy and Industrial Strategy (October 2016) Business Population Estimates for the UK and Regions, 2016.

[3] London Stansted Cambridge Corridor Growth Commission (July 2016) The Next Global Knowledge Region: Setting the Ambitions and Delivering the Vision.

[4] Ibid.

[5] https://new.enfield.gov.uk/improvingenfield/why-enfield/

[6] Department for Transport (2017) Draft Airports National Policy Statement: New runway capacity and infrastructure at airports in the South East of England.

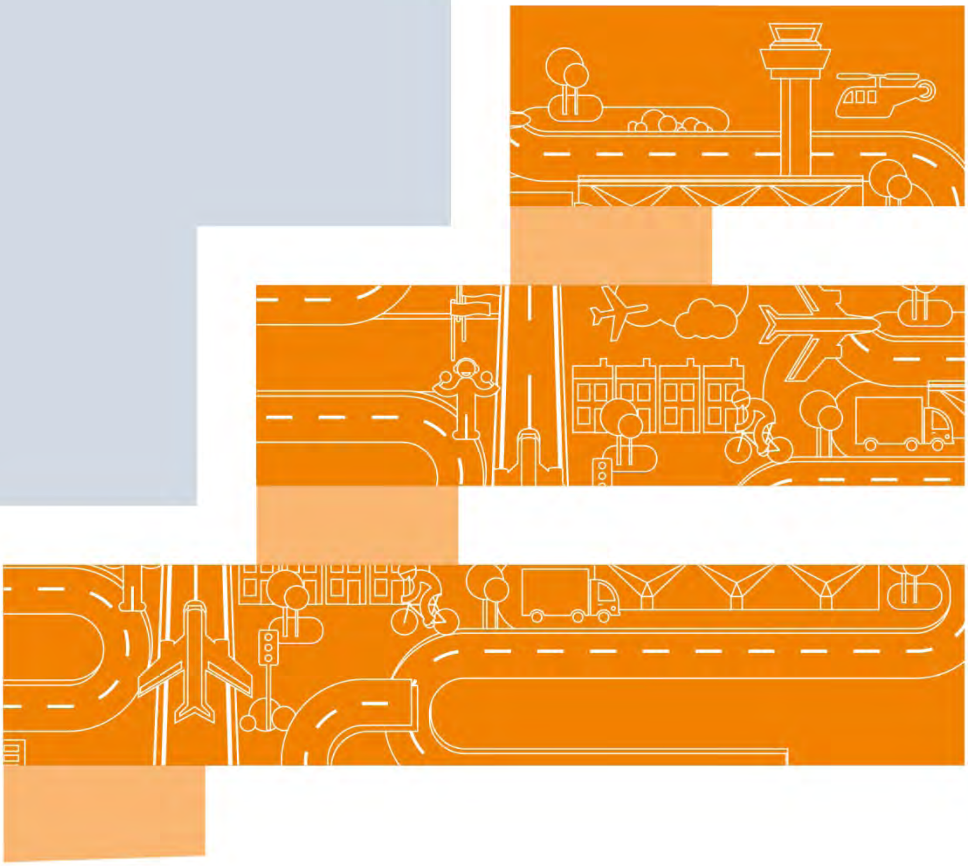
[7] Department for Transport (July 2017) Beyond the horizon: The future of aviation in the UK.

[8] Uttlesford District Council (July 2017) Regulation 18 Local Plan.

TRANSFORMING LONDON STANSTED AIRPORT

35+ PLANNING APPLICATION

Chapter 4 Aviation Forecasts



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MAG
London Stansted Airport

4 AVIATION FORECASTS

Introduction

4.1 This chapter of the ES describes the historic and current growth trends at Stansted and other airports in London and the South East. It explains the context for the proposed development, which has been informed by a set of up-to-date air traffic forecasts that have been prepared by independent leading aviation specialists ICF Aviation Services Group (ICF) (whose credentials are further described in ES Appendix 1.1).

4.2 ICF's forecasts support the case for uplifting the existing passenger limit to 43mppa as envisaged by the 2015 Sustainable Development Plan (SDP). The rationale for the proposed development is further endorsed by emerging Government policy (Revised Draft Airports National Policy Statement (NPS)[1], published in October 2017) to encourage all airports to maximise the utilisation of their existing runways in the short / medium term, given the scale of likely demand.

4.3 In this chapter, the methodology used for the forecasting work is described, followed by the results. These forecasts include the predicted changes in the proportional split of passenger and cargo air transport movements (PATMs and CATMs) and other non-ATM[i] aircraft within the existing 2008 planning cap of 274,000 total aircraft movements. The chapter describes the expected changes in aircraft types at Stansted (the 'fleet mix'), together with the associated increase in seating capacity derived from the introduction of new generation aircraft such as the Boeing 737MAX 200, and how such changes to the fleet can accommodate the predicted growth in passenger numbers over the next decade.

4.4 The various tables and figures, presented herein, illustrate how the proposed development and the associated increase in the passenger cap from 35mppa to 43mppa would influence this growth up to 2028, by comparing the Development Case with the Do Minimum (without development) forecasts. This chapter provides a summary of the statistical data used throughout the EIA process, which has informed the assessment of noise, air quality, surface access traffic and other environmental effects of the proposed development that are reported in more detail the later technical chapters and appendices of the ES.

4.5 This chapter should also be read in conjunction with the further details provided in ES Chapters 2 (EIA Methodology) and 3 (Description of Site, Proposed Development, Policy Context and Alternatives), as well as the Planning Statement submitted with the application.

[i] The CAA define the difference between 'Aircraft Movements' and 'ATMs' as:

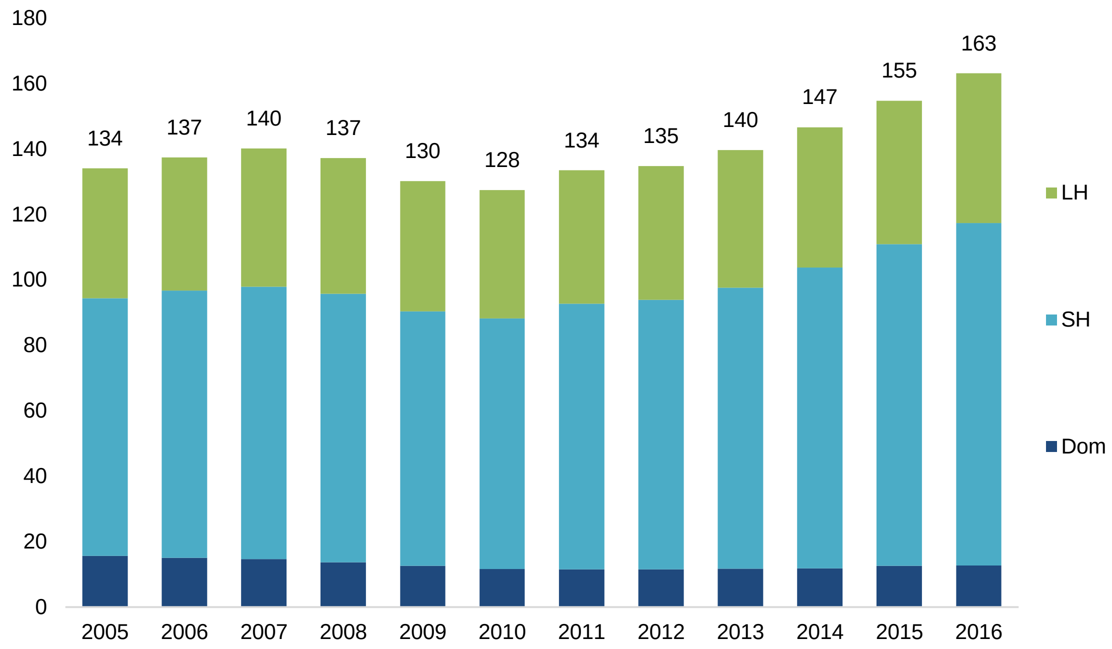
- Aircraft Movement: Any aircraft take-off or landing at an airport. These could be either commercial or non-commercial flights. For airport traffic purposes one arrival and one departure are counted as two movements.
- Air Transport Movements: Landings or take-offs of aircraft engaged on the transport of passengers, freight or mail on commercial terms. All scheduled movements, including those operated empty, loaded charter and air taxi movements are included.

Market Context – Current and Historic Growth Trends

Overview

4.6 Following substantial growth in UK passenger numbers in the 1990s, the number of passengers travelling through UK airports peaked at 235mppa in 2008. The unprecedented global financial crisis (GFC) in 2008 triggered a recession in the UK and a number of other global economies that caused passenger numbers to fall by more than 10% between 2008 and 2010 to around 211mppa. Since 2010 growth in the aviation sector, has steadily recovered and in 2016 more than 268mppa travelled through UK airports.

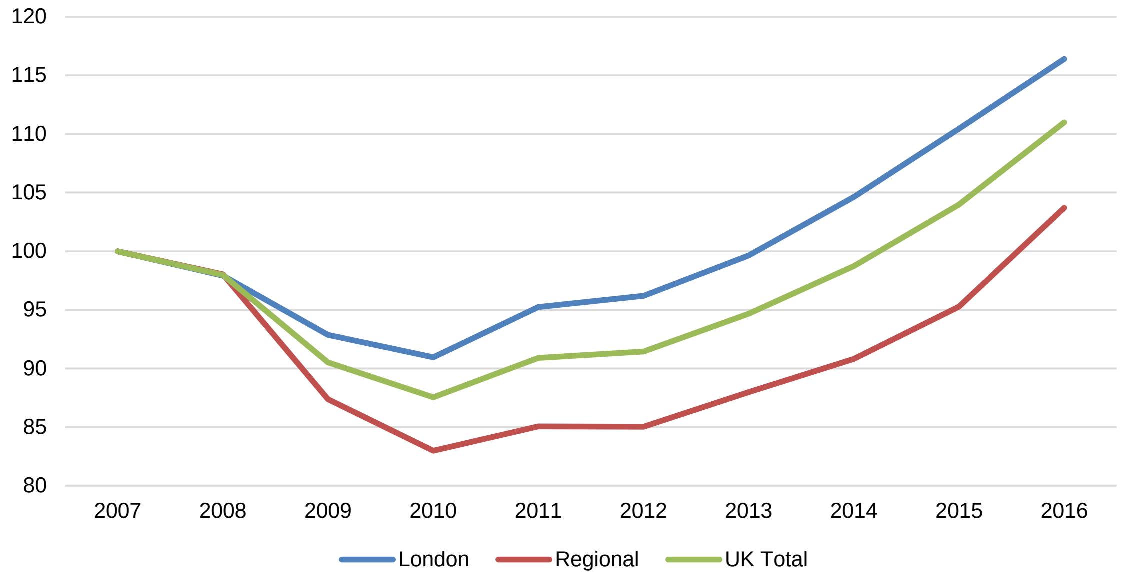
4.7 The London area airports system, comprising Heathrow, Gatwick, Stansted, London City and Luton, dominates UK air passenger numbers. It accounted for 163mppa in 2016, or 60% of all UK passenger traffic. While passenger numbers fell between 2008 and 2010 at all the London airports, the overall reduction was less than for the rest of the UK and recovery to pre-recession levels was slightly faster. Figure 4.1 shows the trend in annual passenger numbers at London's airports, whilst Figure 4.2 compares the indexed growth of London's airports to the UK Regional airports since 2008.



Key: LH = Long Haul; SH = Short Haul; Dom = Domestic/ UK traffic

Source: CAA

Figure 4.1: Annual passengers by type at London airports (m)

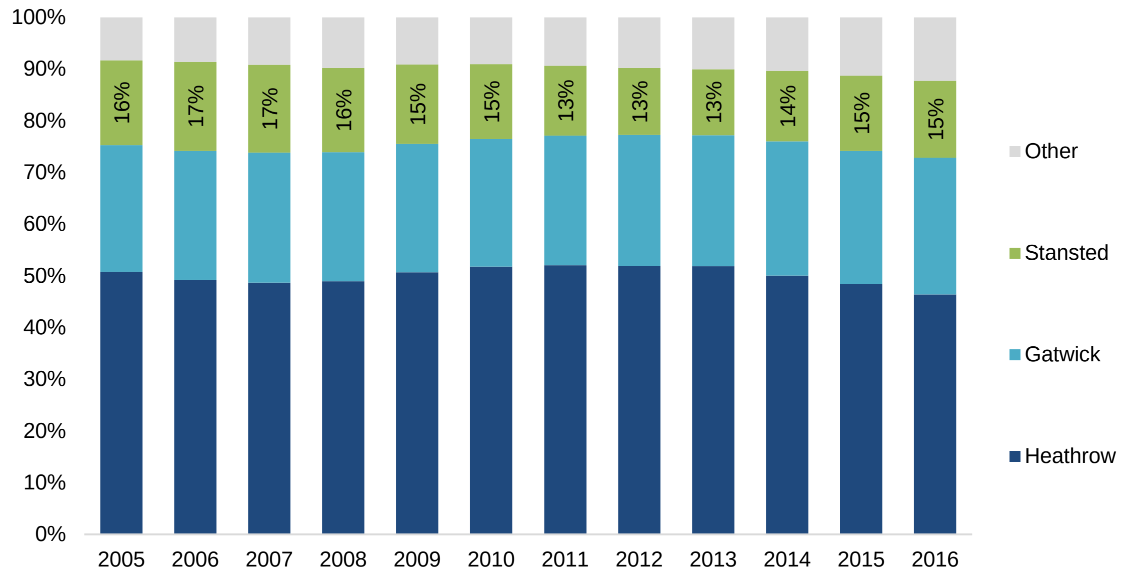


Source: CAA

Figure 4.2: Passenger growth at UK airports (Index; 2007 = 100)

4.8 Also evident from Figure 4.1 is the significance of short haul international traffic (predominantly European markets) to London, which accounted for 64% of total airport passengers in 2016. They have also been the fastest growing markets over the past decade, growing at a compound annual growth rate (CAGR) of 2.5% compared to 1.2% for long-haul markets and 1.7% for total London passengers.

4.9 Almost 90% of London's airport passengers passed through Heathrow, Gatwick or Stansted in 2016. This share has been decreasing, primarily because of capacity constraints at Heathrow. Figure 4.3 shows the historical share of traffic by London airport.



Source: CAA

Figure 4.3: Market share by London airport (% of passengers)

4.10 From a peak of 17% in 2007, Stansted's London market share fell 4 percentage points by 2011. However, since then the airport has been one of the fastest growing airports in the London system, growing by a CAGR of 6.1% between 2011 and 2016 which is 2% higher than the London airport system. As a result, Stansted's market share has grown to 15% in 2016.

4.11 In 2013, Stansted Airport was acquired by the Manchester Airports Group (MAG) and since then has experienced strong growth in annual passenger numbers resulting in a record of 24.3mppa in 2016. Numbers increased further to 25.9m in 2017, a growth of 6.5% compared to 2016. It is currently the fourth largest airport in the UK by annual passenger numbers. In 2016, the airport was served by 22 airlines carrying passengers to over 180 destinations across 40 countries. The majority (94%) of destinations are within Europe with a small proportion of long haul destinations in North Africa, the Middle East and North and Central America. The proportion of long haul destinations is however increasing, with a number of new long haul routes recently announced, namely:

- Emirates announced the launch a new daily route from Stansted to Dubai from June 2018; and
- From April 2018 Primera Air is to offer daily services to New York, from May 2018 four weekly flights to Boston and three weekly flights to Toronto and from August 2018 to Washington DC.

4.12 Stansted is dominated (98%) by scheduled services, primarily operated by low cost carriers.

Market Outlook

4.13 Over the short to medium term (5 to 15 years), demand for air services to and from the UK is expected to continue to grow strongly. Over recent decades passenger demand for air services has tended to rise in line with, and sometimes slightly faster than, overall economic growth. Therefore, notwithstanding periodic global economic fluctuations, the Government predicts that this trend will continue over the long term.

4.14 In its call for evidence consultation paper 'Beyond the horizon: The future of aviation in the UK'[2], the Government supports the recommendation of the Airports Commission that, if the UK is to continue to grow its domestic and international connectivity, and before a new runway is built at Heathrow, there is a need for existing runways throughout the UK to be used more intensively; making best use of existing capacity, provided environmental issues are fully addressed (paragraph 2.10). Moreover, at paragraph 7.20 of this consultation document, it states:

"Strong growth in passengers over the past five years, including in the South East of England is putting significant pressure on existing infrastructure, despite significant financial investments by airports over the past decade. We are aware that a number of airports have plans to invest further, allowing them to accommodate passenger growth over the next decade using their existing runways, which may need to be accompanied by applications to increase existing caps. The government agrees with the Airports Commission's recommendation that there is a requirement for more intensive use of existing airport capacity and is minded to be supportive of all airports who wish to make best use of their existing runways including those in the South East."

4.15 Stansted Airport is well positioned to make a significant contribution to meeting the predicted growth in passenger demand in London and the South East over the next decade. It has the runway capacity to accommodate this growth, unlike Heathrow and Gatwick, which are already effectively full. Securing planning permission for the improvements to the airfield infrastructure would allow the airport (and its partner airlines) sufficient lead-in time to plan for and deliver the necessary capital investment to meet future demand and, ultimately, to allow it to make better and more efficient use of its single runway.

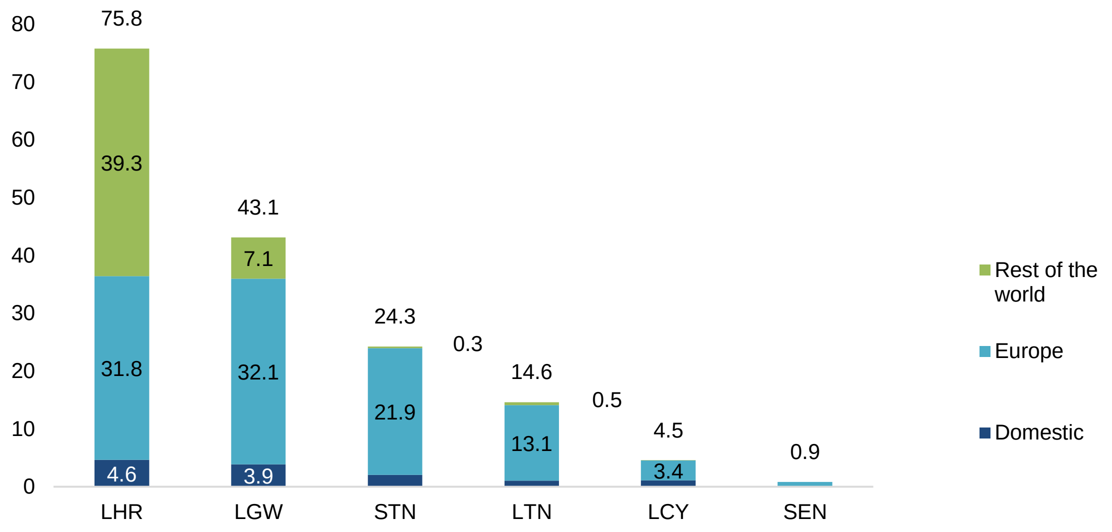
4.16 It is further noted that the Government's position, as set out at paragraph 7.21 of the 'Beyond the horizons' consultation paper is that:

"Airports with planning restrictions that wish to take forward plans to develop their airport and increase the utilisation of existing runways beyond those restrictions will still need to submit a planning application to the relevant authority, which we consider should be judged on the application's individual merits etc...[But].due to the recent rise in growth, the government believes that this issue cannot wait until the publication of a new Aviation Strategy."

Market Characteristics of Stansted Airport

Passengers and Destination

4.17 Stansted Airport is part of the largest city airport system in the world, which in 2016 handled over 163mppa to a range of global destinations. This is illustrated in Figure 4.4 below.



Key:		
	LHR	Heathrow Airport
	LGW	Gatwick Airport
	STN	Stansted Airport
	LTN	London Luton Airport
	LCY	London City Airport
	SEN	London Southend Airport

Source: CAA

Figure 4.4: London airport passenger volumes by destination (2016, mppa)

4.18 Stansted is the third largest airport in the London system. The majority (83%) of London's long haul passengers use Heathrow. However, the short haul and domestic markets are more evenly spread amongst the other airports in the system – Stansted's share of short haul and domestic markets exceeds 20%.

4.19 As further described in ES Chapter 6 (Surface Access and Transport), the airport is well-connected to central London via the Stansted Express direct rail link (47 minutes to Liverpool

Street, with trains running every 15 minutes), as well as being ideally located for boroughs in the North East of London, for which Stansted is the closest airport.

4.20 As well as serving the Greater London area, the airport serves (alongside Luton) the wider East Anglia area, including the key economic drivers of Cambridge (the 'Silicon Fen'), the London Stansted Cambridge Corridor and the newly announced Cambridge-Norwich Tech Corridor.

4.21 Table 4.1 illustrates the catchment areas that are currently utilising Stansted and its share of London airport passengers originating from those catchments.

Table 4.1: Stansted airport catchment

Catchment Area	% of STN Passengers	STN Market Share of Catchment
UK Residents	**61.9%**	**16.9%**
Inner London	*5.1%*	*20.6%*
Outer London NE	*8.9%*	*34.6%*
Outer London SE	*1.6%*	*11.5%*
Outer London SW	*1.1%*	*9.0%*
Outer London NW	*3.2%*	*13.6%*
SE – Essex & Hertfordshire	*7.6%*	*48.8%*
SE – Bedfordshire, Bucks, Herts, Oxfordshire	*2.5%*	*8.6%*
SE – Berkshire, Hants, Surrey, West Sussex	*1.5%*	*4.1%*
SE – East Sussex, Kent	*1.8%*	*7.4%*
Southwest & Wales	*1.8%*	*8.6%*
West Midlands	*1.0%*	*13.5%*
East Midlands	*2.3%*	*18.8%*
East Anglia	*8.6%*	*48.7%*
Rest of UK	*4.2%*	*17.9%*
unknown	*10.6%*	*13.7%*
Foreign Residents	**38.1%**	**18.5%**
Grand Total	**100.0%**	**17.5%**

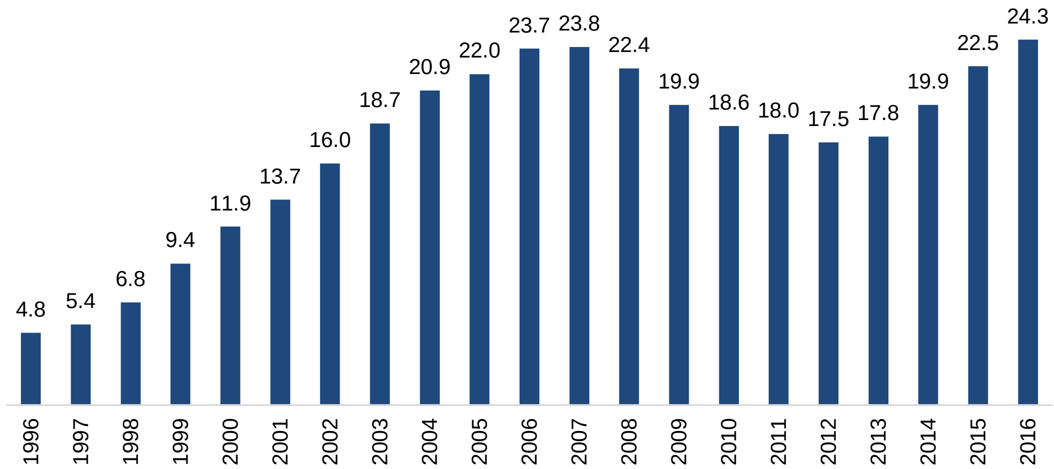
Note: terminating passengers only

Source: CAA Survey 2015

4.22 In Table 4.1 above, 5% of UK residents using Stansted originate from Inner London. The largest single catchment areas are Outer London NE (e.g. Tower Hamlets, Hackney), SE – Essex & Hertfordshire and East Anglia. In each of these core catchment areas, the airport is attracting market shares of more than 30%. Overall, the airport's share of terminating passengers (i.e. excluding transfer passengers) is 17.5%.

4.23 Stansted also attracts a sizeable share of foreign residents – 38% of the total terminating passengers. This compares favourably with Gatwick and Luton (27% and 24% respectively) and is second only to Heathrow (45%) in the London system.

4.24 Figure 4.5 shows the growth trajectory of the airport over the past 20 years.



Source: CAA

Figure 4.5: 1996-2016 Historical passenger growth at Stansted Airport (mppa)

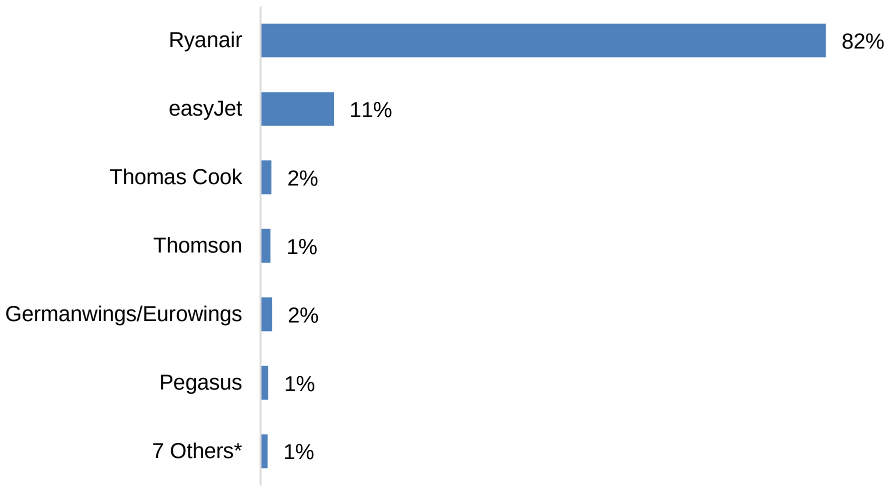
4.25 Stansted's growth in recent years is characterised by three distinct phases. Between 1996 and 2007, the airport grew from under 5mppa to 23.8mppa – a CAGR of 17.3%. This rapid phase of growth was driven principally by Ryanair. This airline, whose main London base was switched from Luton to Stansted in 1991, grew from a network total 4m in 1996 to 42.5m in 2006.

4.26 The second phase was characterised by a significant fall in traffic, with Stansted's throughput dropping from 23.8mppa in 2007 to 17.5mppa in 2012. This decline was driven by many factors including the global recession, protracted uncertainty over the airport's ownership, disputes between the former British Airports Authority (BAA) and major airlines, and stronger competition from other airports. While other airports in the South East started to recover in 2011, Stansted continued to lose passengers as uncertainty remained; particularly following the Competition Commission's ruling that the airport should be sold and the subsequent court appeals by BAA against this ruling.

4.27 Since its acquisition by MAG in 2013, the airport has experienced a strong recovery with annual passenger numbers growing at a CAGR of 11% p.a. between 2013 and 2016. The airport handled a record of 24.3m passengers in 2016 and nearly 26m passengers in 2017.

Airlines

4.28 In 2016, there were 22 airlines operating at Stansted, including low cost carriers such as Ryanair and EasyJet; charter operators such as Thomas Cook and Thomson; and regional operators Flybe and Aurigny. These airlines served more than 180 destinations from Stansted in 2016. The proportional split of airlines presently operating is shown in Figure 4.6.



*airlines counted with a minimum of 20,000 passengers

Source: CAA

Figure 4.6: Stansted Airport passenger share by airline (2016)

4.29 Ryanair accounts for over 80% of the passenger volumes, carrying more than 20mppa passengers in 2016. Stansted was Ryanair's largest base comprising 85% of their London traffic; relatively small operations at Gatwick and Luton make up the remaining 15%.

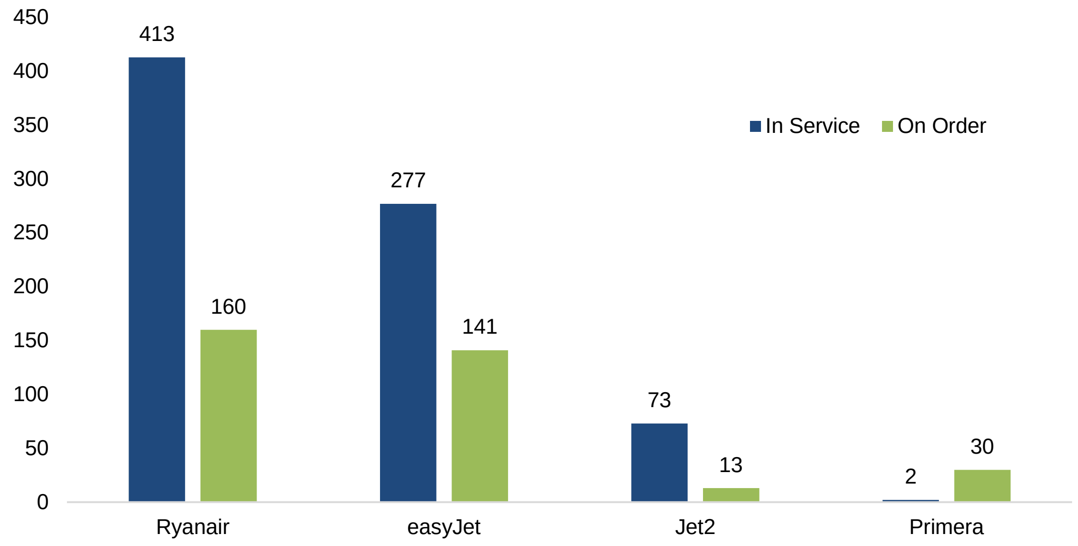
4.30 EasyJet is the second largest carrier at Stansted, accounting for a little over 10% of passengers. The majority of EasyJet's capacity in London is at Gatwick, but, with little room to grow at that airport, Stansted offers an alternative London base for the airline should it wish to grow beyond Gatwick's capability. Thomas Cook and Thomson have long maintained a presence at Stansted, offering traditional summer sun and ski destinations.

4.31 Jet2 established a new base at Stansted in March 2017. This is their only base in London, with seven based aircraft flying to 27 European destinations, making it their fourth largest UK base.

4.32 One of STAL's objectives is to broaden its airline base and secure new routes beyond Europe. This will enable more passengers from its catchment area to utilise Stansted, and avoid longer surface access journeys to Heathrow and Gatwick. In July 2017, it was announced that Danish airline Primera Air is to open a new base at Stansted and start direct flights to New York, Boston, Toronto and Washington from April 2018. In December 2017, Emirates announced a daily service to Dubai that will commence in June 2018. Further long haul services are expected to be launched in the next few years.

4.33 Known fleet plans for the three major airlines at Stansted (Ryanair, EasyJet and Jet2) are illustrated in Figure 4.7, which suggest considerable growth prospects in the coming years, reflected by Jet2's recent commitment to grow to 9 aircraft based at Stansted in 2018. In addition, a relative newcomer (Primera) also has ambitious plans with 30 aircraft on order relative to its current fleet of just two B737-800s, also shown in Figure 4.7.

4.34 Notably, these airlines tend to have larger aircraft on order than in their existing fleet – e.g. Ryanair's B737 Max aircraft have 197 seats compared to 189 for their current fleet; EasyJet have 235-seat A321 and 186-seat A320 aircraft on order compared to an average of 170 seats for their current fleet.



Source: CAPA Fleets database

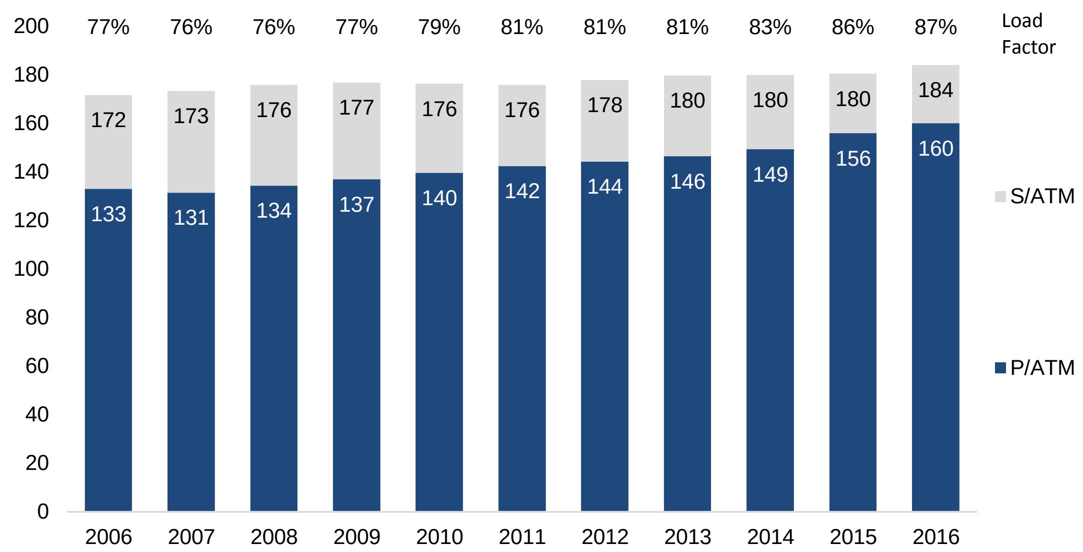
Figure 4.7: Airline fleets (as of November 2017)

4.35 Stansted is also used by companies such as Harrods Aviation and Inflite, which are ground handlers operating private flights, charter flights and state visits.

Proportions of Passenger, Cargo and General Aviation movements

4.36 In 2016, the average passenger aircraft size at Stansted was 184 seats. The annual average load factor was 87%, leading to an average passenger loading of 160 passengers per ATM.

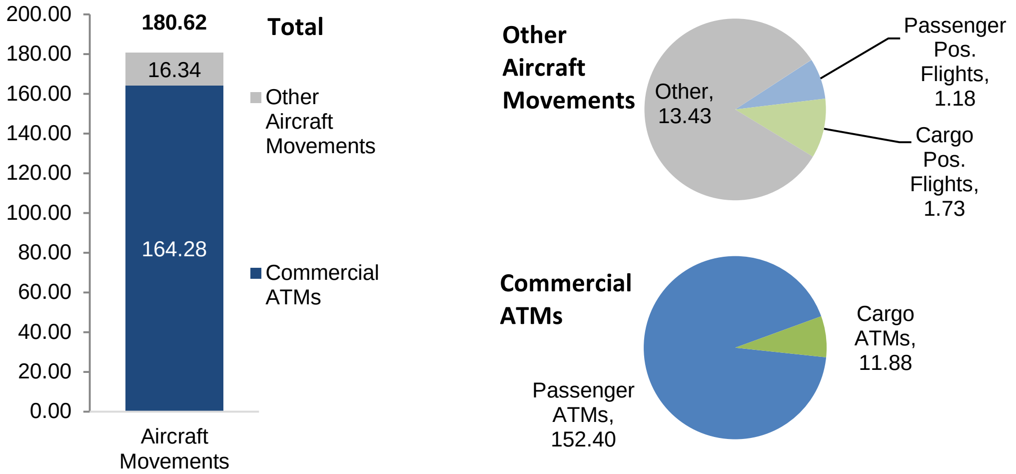
4.37 As displayed in Figure 4.8, average aircraft sizes and average load factors have been consistently growing over the past decade. As a result, the average passenger loading has increased from 133 passengers per ATM in 2006 to 160, a CAGR of 1.8%.



Source: CAA

Figure 4.8: Average aircraft size, load factor & passenger loading at Stansted

4.38 Stansted's 24.3m passengers and an average 160 passengers per ATM equated to approximately 152,000 PATMs in 2016. PATMs made up almost 85% of all aircraft movements, with dedicated air freighters accounting for 14,000 ATMs (CATMs) and a further 15,000 aircraft movements made up of primarily positioning flights and General Aviation. Combined, the airport handled just over 180,000 aircraft movements in 2016. This is shown in Figure 4.9 below.

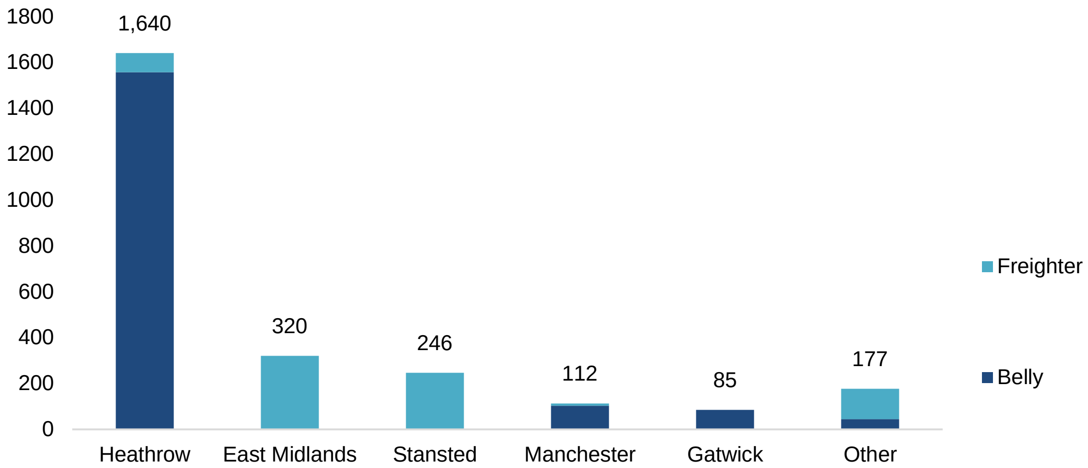


Source: STAL

Figure 4.9: Stansted aircraft movements (000s, 2016)

4.39 Stansted's cargo operators range from international operators such as All Nippon Airways (ANA) and China Southern, to based operations by the large integrators (e.g. Fedex and UPS). Together, these operators handled approximately 250,000 tonnes of cargo in 2016.

4.40 Stansted's 250,000 cargo tonnes makes it the third largest cargo airport in the UK, and the second largest cargo airport (behind Heathrow) in London. It is also the second largest airport for dedicated freighter activity (behind East Midlands).



Source: CAA

Figure 4.10: Cargo volume by UK airport (kilotonnes, 2016)

The Future Growth of Stansted – Aviation Forecasts

4.41 ICF was engaged by STAL to prepare independent traffic forecasts for the airport. This section outlines the forecast methodology used by ICF and summarises the key outputs. These forecasts have been used to inform the assessment scenarios for the various topics within the EIA process, as explained in ES Chapter 2 (EIA Methodology).

4.42 As part of the forecasting process, ICF consulted with STAL's commercial team to incorporate the latest known airline developments and expectations. Airport Coordination Limited (ACL) contributed to the generation of busy day schedules based on outputs from the ICF forecast model.

Forecast Methodology

4.43 London is a complex air transport system comprising six competing airports, and numerous domestic and international airlines. As such, it is impossible to view any of the airports in isolation. The ICF traffic forecast model is predicated on a London-level econometric demand model. This London demand is then allocated to the different airports in the system based on their individual catchments and supply-side factors such as existing route network. Finally, capacity constraints are applied to each airport where appropriate, and 'spilled' traffic (demand that an airport cannot accommodate due to capacity constraints) is re-allocated to airports with available capacity. These three core steps are described in more detail in the following paragraphs.

4.44 Demand for air travel to/from London is projected using established relationships to Gross Domestic Product (GDP). Markets were aggregated into geographic regions and relevant GDP forecasts employed as explanatory variables based on the Point-of-Sale mix of each market (for example markets with a significant outbound component will be more dependent on UK GDP). Factors that influence the price of air travel (and therefore demand) were also considered – namely the GBP exchange rate and oil price.

4.45 The economic forecasts that underpin the ICF traffic forecast were provided by Oxford Economics in July 2016, following the Brexit Referendum result. The economic forecasts were predicated on Oxford Economics' central case[ii].

4.46 This London area demand was then allocated to the airports in the system. This allocation is conducted with consideration to the following factors:

- **Historical base:** The starting point is the actual 2016 baseline year distribution;
- **Local catchment:** Stansted's catchment areas in East Anglia and the North-East of London are among the fastest growing, in terms of economy and population, in the South-East, as described in ES Chapter 11 (Socio-Economic Impacts);
- **Existing network:** The concentration of long haul carriers at Heathrow, for example, means it continues to dominate these markets even in catchment areas where it is not the most convenient and accessible option; and
- **Price and operational considerations:** High aeronautical charges and/or runway limitations (such as at London City Airport) will influence the types of carriers that can viably operate at an airport.

[ii] This is where the UK leaves the EU on unfavourable terms, without negotiating a significant trade deal and the trade relationship between the UK and the EU therefore reverts to WTO rules.

4.47 The initial allocation provides an unconstrained demand forecast for each of the London airports. In the final step, capacity constraints are applied to each of the airports. When these capacity constraints are reached, demand is reallocated or suppressed depending on the suitability and availability of alternatives. The key capacity-related assumptions are outlined below:

- **Heathrow** is currently limited to 480,000 ATMs per year. Following the Government's acceptance of the recommendations of the Airports Commission in October 2016[3] and the subsequent issue of the Draft Airports National Policy Statement (NPS) in February 2017[4], it is assumed that work on Heathrow's third runway will go forward. However, due to delays in commencing the planning process (Heathrow's plans were based on the NPS being prepared in autumn 2015[5]) a delayed opening date of 2030 has been assumed (Heathrow Airport Limited (HAL's) original proposal was for 2026). In the recent House of Commons Transport Select Committee hearings on the Airports NPS (4th December 2017), Caroline Low, who is the director of DfT responsible for airport capacity, simply asserted that *"'we are confident that **2030** can be met"* when questioned on the feasibility of the 3rd runway opening in 2026. A 2030 opening date has therefore been used for these forecasts;

- **Gatwick** is already the busiest single runway airport in the world, and is operating at capacity during large parts of the day. It is expected that the airport could eventually reach its ultimate capacity of 300,000 ATMs (from 277,000 in 2016)[6], notwithstanding the recent 2017 DfT aviation forecasts which assume a runway capacity of 290,000 ATMs. ICF has therefore adopted a more conservative assumption (for Stansted) to reflect the fact that Gatwick ATMs have increased by 2.7% in the period January to October 2017 (compared to the same period for 2016) and that the airport's amplified seasonality leads to significant peak-spreading opportunities.

- **Luton** is assumed to be limited to its existing planning cap of 18mppa. This is consistent with its 2012 planning permission cap;

- **London City** is assumed to be limited to approximately 6.5mppa (consistent with its 2016 planning permission cap); and

- **London Southend** is assumed to be limited to approximately 2mppa (consistent with its current ATM limit of 53,300).

4.48 Stansted Airport's 2008 25+ permission currently caps annual passenger throughput to no more than 35mppa and limits aircraft movements to 274,000 (including 10,000 GA). ICF has prepared two sets of forecasts based on the following scenarios, which are described in detail in ES Chapter 2:

- **Do Minimum Scenario:** Stansted's permitted limits remain unchanged at 35mppa; and

- **Development Case:** Stansted's permitted limit is uplifted to 43mppa, but with no increase in the total aircraft movement limit of 274,000.

4.49 Finally, some bottom-up adjustments in the first 5 years to the Stansted forecasts were made reflecting known route development (e.g. Jet2's new base and projected evolution) as well as incorporating intelligence on expected route development gained from discussions with the airport's commercial forecasting team. It should be noted that details of these assumptions cannot be made public due to the commercially confidential nature of this information.

4.50 Cargo demand was forecast using a similar methodology to passenger demand, starting from a London-wide demand and allocating to airports within the London airport system. In line with passenger demand, increasing capacity constraints at Heathrow in particular (and to a lesser degree Gatwick, which already handles less cargo than Stansted) will result in cargo demand spilling over to Stansted and/or other airports. The extent to which Stansted can take advantage of this demand for cargo is limited by two factors – first, the night jet quota will prevent significant expansion in the night period (where much of the current cargo activity is concentrated), and secondly, the impact of runway capacity constraints that will lead to cargo operations being displaced by passenger operations.

Forecast Results

4.51 At the London level, unconstrained[iii] passenger demand is forecast to grow from 163mppa in 2016 to 206mppa in 2028, equivalent to a CAGR of 1.9% per annum[7]. This unconstrained growth trend is illustrated in Figure 4.11 below.

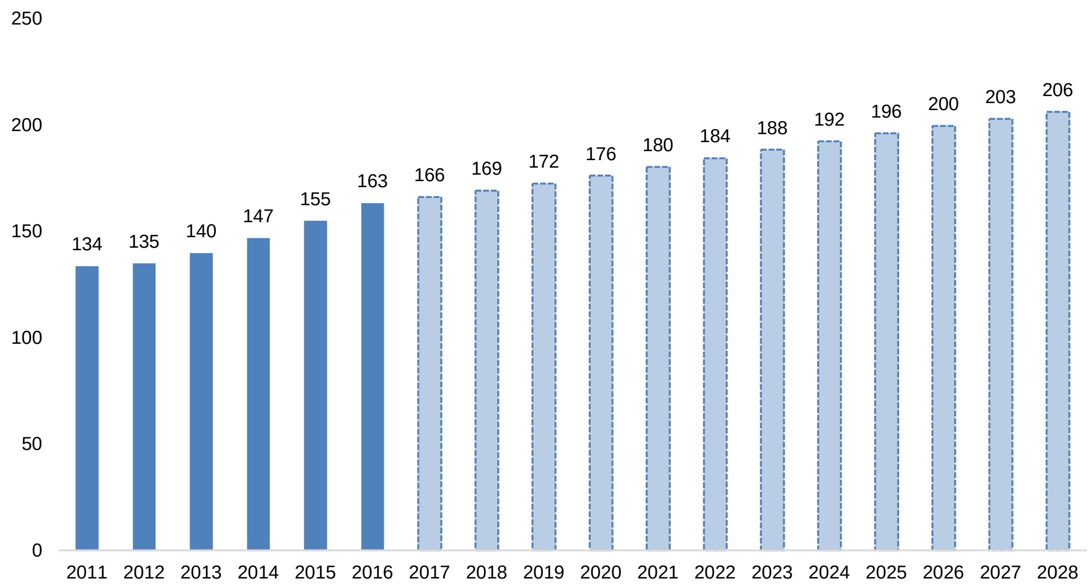


Figure 4.11: London passenger demand forecast (mppa, unconstrained)

4.52 When capacity constraints are applied, the competitive nature of the London market means that most of the traffic overspill from Heathrow and Gatwick is reallocated, and by 2028 the London constrained passenger volumes would be 202mppa (implying approximately 4mppa suppressed demand), as shown in Figure 4.12. It is known that the larger airports manage to attract passengers from outside their core catchment due to the benefits of scale (e.g. more destinations served, higher frequencies), so the re-allocation of demand in many cases will simply be the recapture by non- London airports of demand that had previously been lost.

[iii] Unconstrained refers to the passenger forecasts in the absence of capacity constraints at airports. Constrained forecasts refer to passenger forecasts with capacity constraints applied.

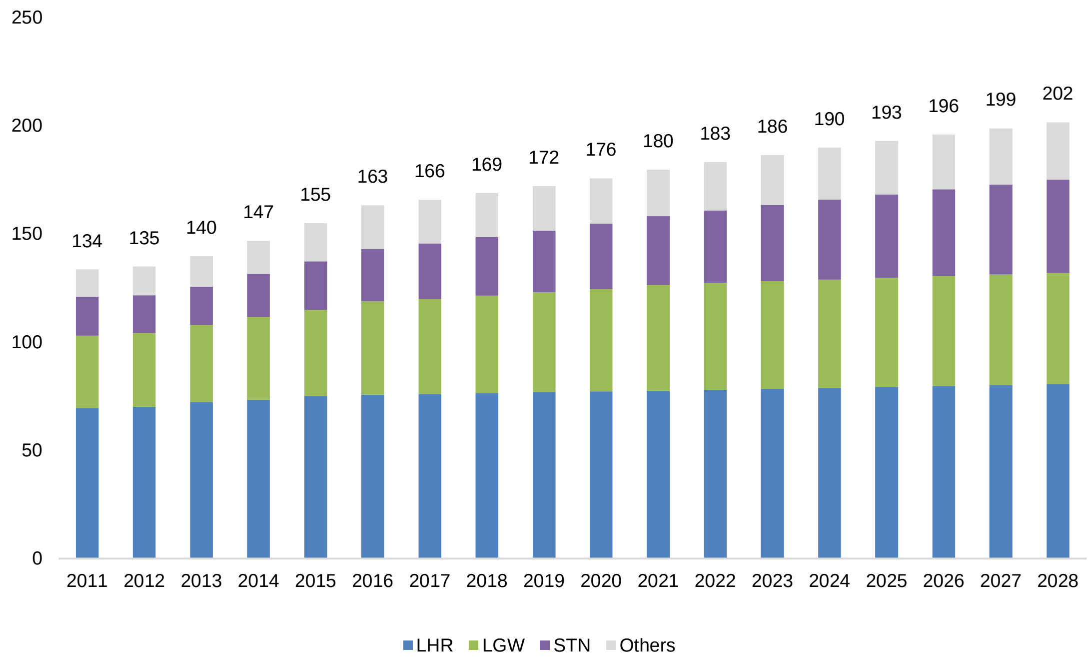


Figure 4.12: London passenger demand forecast (mppa, constrained)

4.53 Stansted is forecast to reach 35mppa by 2023 and 43mppa by 2028 with the proposed development (i.e. in the Development Case), as illustrated in Figure 4.13.

4.54 With the future growth potential being extremely limited at Gatwick and Heathrow (prior to opening of a third runway), Stansted, together with the other London airports, is forecast to benefit. In the 2028 Development Case (43mppa) scenario, the airport's market share of passenger demand in the London airport system is forecast to increase from 15% in 2016 to 18% in 2028.

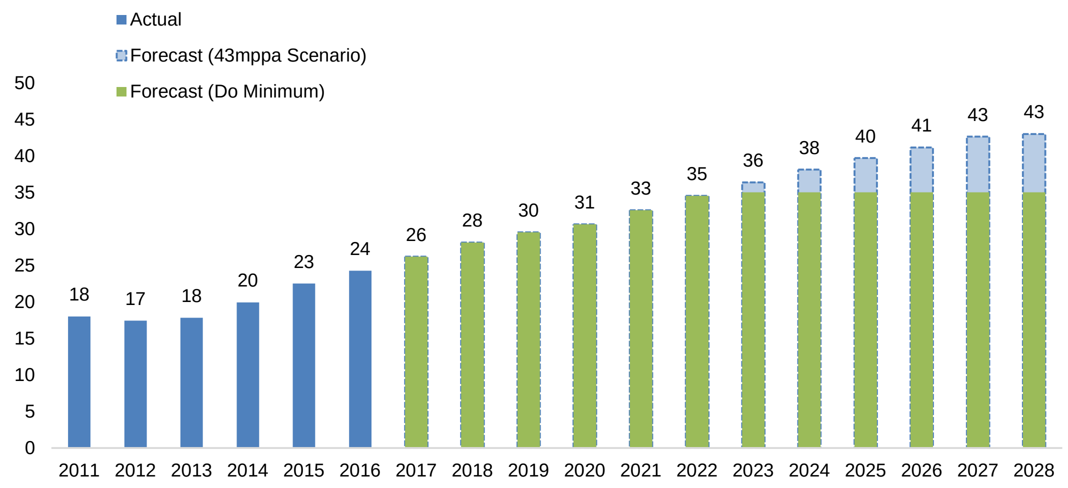


Figure 4.13: Stansted passenger forecast (mppa, constrained)

4.55 Accounting for the fleet replacement trends described previously, ICF predict that the average passenger per ATM will grow from 160 today to 170 by 2028 (a CAGR of just 0.5%).

Specifically, ICF's passenger loading assumptions reflect a number of trends at Stansted, including:

- **Airlines up-gauging (increasing the number of seats per aircraft):** Examples of this include EasyJet phasing out A319s (156 seats) in favour of A320s (186 seats) and A321s (235 seats); and Ryanair's transition to the B737MAX 200 (197 seats) from the B737-800 (189 seats);

- **Introduction of long haul services at Stansted:** Long haul route development will drive increased use of larger wide-body aircraft types (such as the Boeing B787); and

- **Improvements in load factors:** Given the already high load factors achieved by airlines at Stansted, ICF has not assumed load factor growth at an airline level. Marginal improvements are expected due to changes in airline mix, but this amounts to just 1% point over the forecast period (from 87% to 88%).

4.56 Because of the increases in average passenger loading, PATMs are forecast to grow at a slower rate than passengers, reaching just over 253,000 movements by 2028 in the Development Case (43mppa), from 152,000 in 2016. By contrast, without the proposed development, the Do Minimum (35mppa) scenario, PATMs reach 212,500 by 2028.

4.57 Notably, under the Do Minimum scenario fewer annual PATMs are expected than are allowed for under the 2008 25+ planning permission (243,500). This is due to the forecast passenger loading of 144 passengers per PATM at 35mppa, assumed at the time of the 2006 planning application. Stansted's current passenger loadings are already 11% higher than this and will increase further as the average passenger per PATM grows to 170.

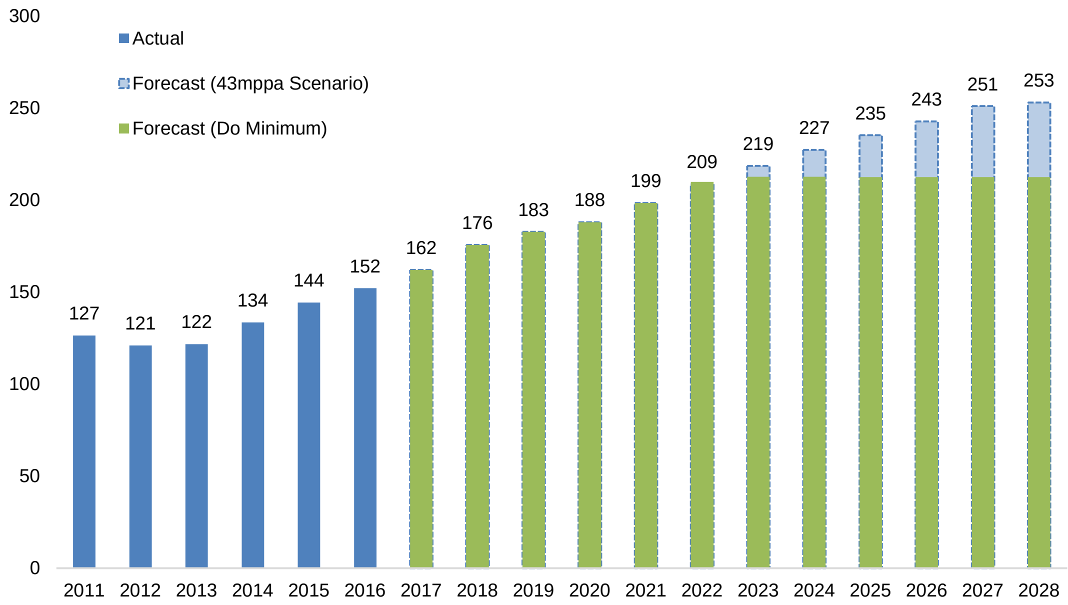


Figure 4.14: Stansted PATMs forecast (000s, constrained)

4.58 The next 10-15 years will also see a significant transition from current generation[iv] aircraft to next generation[v] aircraft. From a 2016 baseline of virtually no 'next generation' aircraft, the

[iv] Current generation aircraft types are those currently in operation (excluding newly developed aircraft, see below). For example A320 family, B737-800s, B747-400.

proportion of these new jets (primarily A320neo and B737Max family aircraft) is forecast to exceed 80% by 2028. This trend is particularly relevant to the calculation of aircraft noise, which is discussed in ES Chapter 7 (Air Noise).

4.59 Cargo volumes are forecast to grow from 209,000 tonnes in 2016 to 376,000 tonnes by 2028, as shown in Figure 4.15. Cargo carried on passenger aircraft ('belly-hold' cargo) is expected to grow from 6,000 tonnes in 2016 to 366,000 tonnes in 2028 because of carrier diversification (i.e. more full-service airlines) and increased long-haul operations. However, dedicated CATMs are forecast to accommodate the majority of the growth in cargo volumes, picking up demand that cannot be accommodated due to capacity constraints at Heathrow (and to a lesser extent Gatwick). CATMs are forecast to grow from just under 12,000 in 2016 to over 16,000 in 2028, as shown in Figure 4.16.

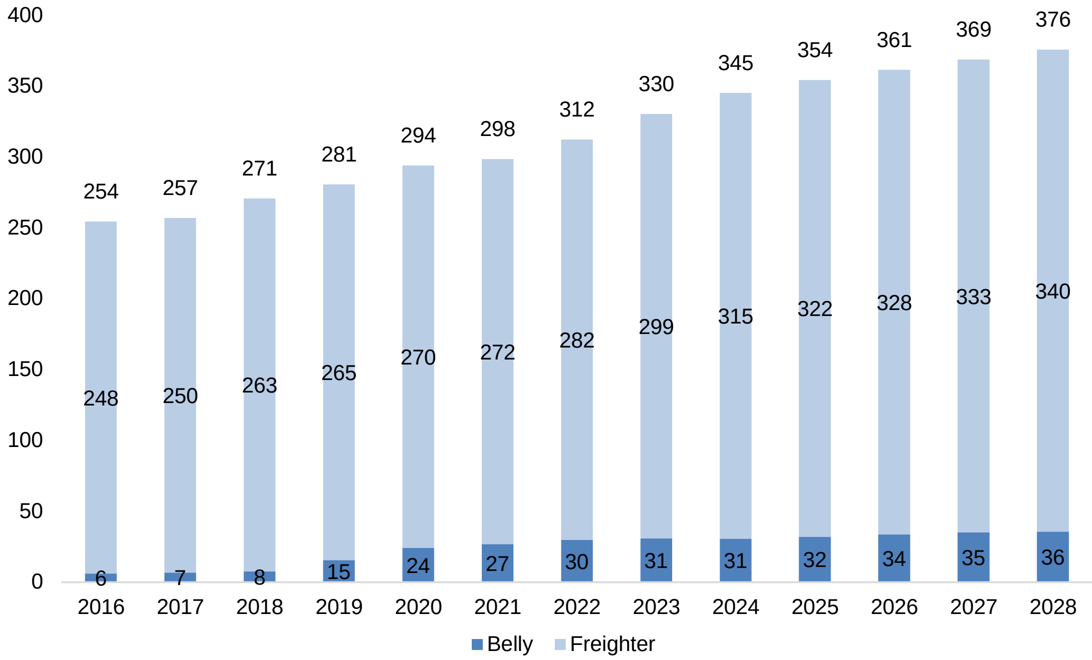


Figure 4.15: Stansted cargo forecast (000s tonnes, constrained, STN 43mppa scenario)

4.60 Other aircraft movements are made up of passenger and cargo positioning flights and other (predominantly GA) flights. ICF assume that positioning flights will grow in line with the respective ATM forecast. GA is assumed to grow while there is space to do so, but will be squeezed out once capacity constraints are applied. By their nature, GA movements are not scheduled as far in advance as commercial operators and consequently, commercial operations have a *de facto* preference for scarce slots. As slot capacity constraints start to bite it is expected that GA movements will reduce, as has been witnessed at other airports around the world.

4.61 As shown in Figure 4.15, Stansted would reach its existing planning cap of 274,000 aircraft movements in 2026. From this point on, additional growth is possible only via displacement and ICF forecast that passenger ATMs will displace GA movements in the first instance. Consequently, these aircraft movements are forecast to decline from 2026 to a minimum level that is necessary for positioning flights implied by the ATM forecast.

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[v] Next generation aircraft types are those that are either in development or that have been recently been released. Examples include the A320neo family, B737 Max family, B787 family.

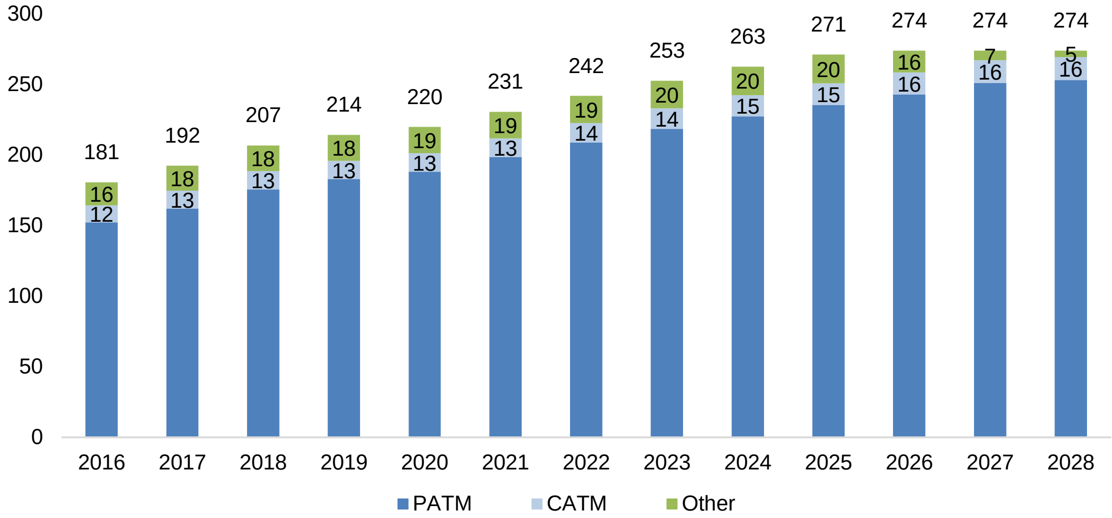

Figure 4.15: Stansted ATM forecast (000s, constrained, STN 43mppa scenario)

Beyond 2028

4.62 Stansted is predicted to have reached its proposed 43mppa passenger limit and existing movement limits by 2028, though the opening of a third runway at Heathrow in 2030 will see some traffic migrate to use the new capacity freeing up space at Stansted for a time. The mechanism that has seen Heathrow passengers over-spilling to Gatwick and Gatwick passengers in turn shifting to Stansted[vi] could be temporarily reversed, and as Heathrow reclaims passengers lost to Gatwick, so Gatwick will reclaim passengers lost to Stansted.

4.63 However, there are many factors that will mitigate the overall impact to Stansted, including:

- Spill accounts for a relatively small proportion of Stansted's traffic. The majority is based on meeting increased demand from the airport's core catchment area;
- Heathrow, post third runway, is likely to remain unattractive to LCC carriers and will have aeronautical charges that are likely to deter significant LCC penetration; and
- The distance between Heathrow and Stansted's core catchment will limit the direct influence of additional capacity at Heathrow on Stansted and of any capacity made available at Gatwick.

4.64 Overall, ICF expect there to be a small dip in traffic at Stansted following the opening of Heathrow's third runway, but the airport will recover quickly as demand in its catchment continues to drive growth.

[vi] Note: this is a highly simplified illustration of the spill process. In reality, traffic is being redistributed across all the London airports.

DFT Forecast Comparison

4.65 In November 2017, the DfT published their 2017 UK aviation forecasts. This was a comprehensive update of the DfT's 2013 forecast, and utilises the same model (and many of the same input assumptions) as the Airports Commission forecasts.

4.66 The DfT model is essentially composed of two core elements: the first is a top-down econometric demand forecast for the UK and the second is an allocation model that assigns the demand to airports and routes. In addition, the DfT aviation forecasts include UK aviation carbon forecasts; these are considered in paragraph 14.16 of ES Chapter 12 (Carbon Emissions).

4.67 At a high level, the ICF approach to modelling London demand is similar to the approach taken by the DfT in forecasting UK demand. The DfT have not published annual figures, but it does publish data for a 2030 'spot year' from which growth rates can be compared to ICF's own (see Table 4.2 below):

Table 4.2: DfT forecast comparison

Metric	2016 – 2030 CAGR
ICF Unconstrained London demand forecast	**1.9%**
DfT Unconstrained UK demand forecast *(table 25)*	**2.1%**
DfT Unconstrained London demand forecast *(journeys starting/ending in London, table 28)*	**1.9%**

Source: ICF, DfT UK Aviation Forecast 2017

4.68 Table 4.2 illustrates a close convergence in the unconstrained demand forecasts. The DfT forecasts are higher than ICF for transfer passengers (which helps lift the DfT total UK forecast growth higher), but the core demand growth rates are very similar.

4.69 Where the methodologies differ is that the DfT does not incorporate any short-term adjustments. So, for example, its forecast is not adjusted for the 2017 year-to-date growth or the growth implied in 2018 by airline's advanced schedules or new route announcements. Nor do they make any allowance for the growth strategies or fleet order books of the airlines serving the UK market. With a narrower scope than the DfT model, ICF were able to incorporate more of these short-term, bottom-up factors that will play such a key role in defining Stansted's traffic in the next 10-15 years.

4.70 Finally, with the emphasis remaining on the Heathrow and Gatwick expansion schemes, the DfT did not choose to model variants on Stansted's capacity assumptions. As such, there is no comparable forecast in the DfT outputs to the Stansted Development Case scenario.

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2 Department for Transport (July 2017) Beyond the horizon: The future of aviation in the UK.

3 "Government decides on new runway at Heathrow" from Department for Transport and the Rt Hon Chris Grayling MP, 25 October 2016, https://www.gov.uk/government/news/government-decides-on-new-runway-at-heathrow

4 "Heathrow expansion: draft Airports National Policy Statement" from Department of Transport, 2 February 2017, https://www.gov.uk/government/consultations/heathrow-expansion-draft-airports-national-policy-statement

5 "Taking Britain Further, Volume 1", Heathrow, p.355, https://your.heathrow.com/takingbritainfurther/wp-content/uploads/2014/05/TBF-Volume-1-72dpi-jm.pdf

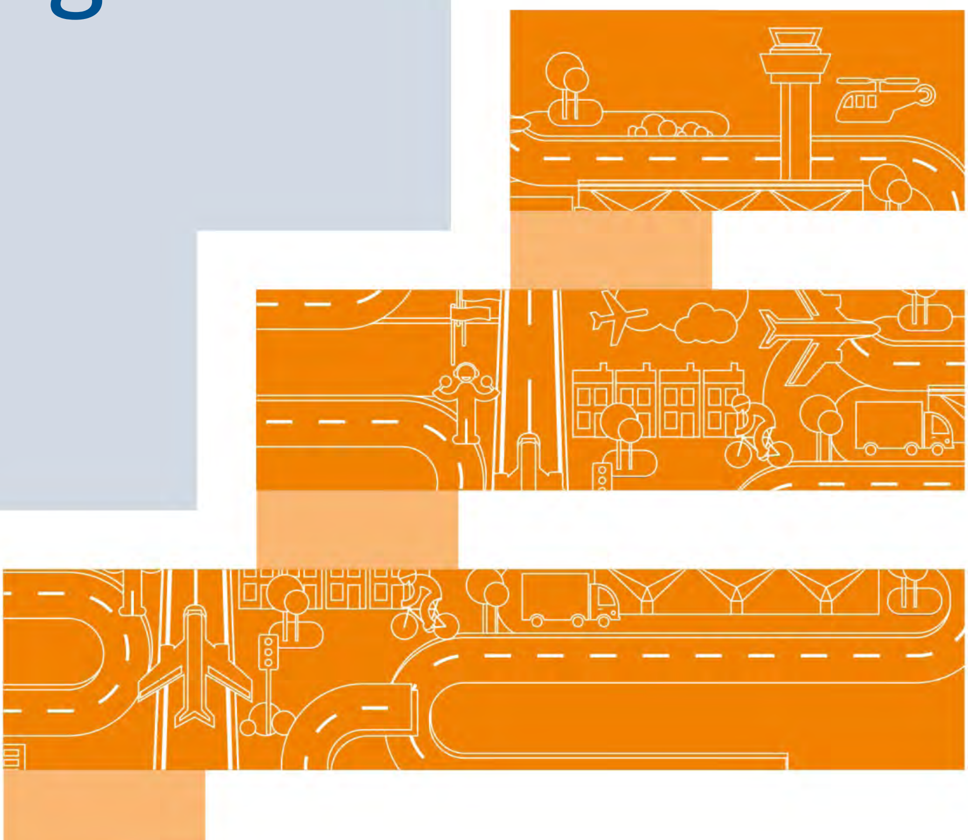
6 Source: CAA.

7 ICF Forecast.

TRANSFORMING LONDON STANSTED AIRPORT

35+ PLANNING APPLICATION

Chapter 5 Development Programme and Construction Environmental Management



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5 DEVELOPMENT PROGRAMME AND CONSTRUCTION ENVIRONMENTAL MANAGEMENT

Introduction

5.1 This chapter first provides an overview of the duration, spatial extent and work activities likely to occur during the construction of the proposed airfield infrastructure, as previously described in ES Chapter 3 (Site Context and Scheme Description).

5.2 The chapter outlines the general environmental management principles and procedures which STAL and its appointed contractors will adopt throughout the construction works, in order to avoid or reduce any adverse environmental effects.

5.3 The chapter concludes with an overview of the likely environmental effects of the construction stage and identifies topic-specific mitigation measures, where applicable. Each subsequent technical chapter of this ES then provides a fuller account of the environmental effects of the construction works and recommended mitigation measures.

5.4 The new infrastructure will be located within four discrete areas on the airfield, as shown in Figure 3.6 and illustrated in more detail in Figures 5.1a – 5.1d. The total site area which will be covered by the proposed development is approx. 9 ha, which includes areas of existing hardstanding. The four areas of new hardstanding to be developed during construction are as follows:

- A new Rapid Exit Taxiway (RET) linking to the runway from the south-west (known as Mike Romeo RET) which will occupy a net area of 1.5 ha;
- A new Rapid Access Taxiway (RAT) at the north-eastern end of the runway (known as Runway Tango 22/04 RAT) which will occupy a net area of 1.2 ha;
- Six additional aircraft parking stands located in the middle part of the airfield (known as the Yankee Remote Stands) which will occupy a net area of 0.53 ha; and
- Three additional aircraft parking stands located to the north of the existing Echo Stands at the north-eastern end of the airfield which will occupy a net area of 3.77 ha.

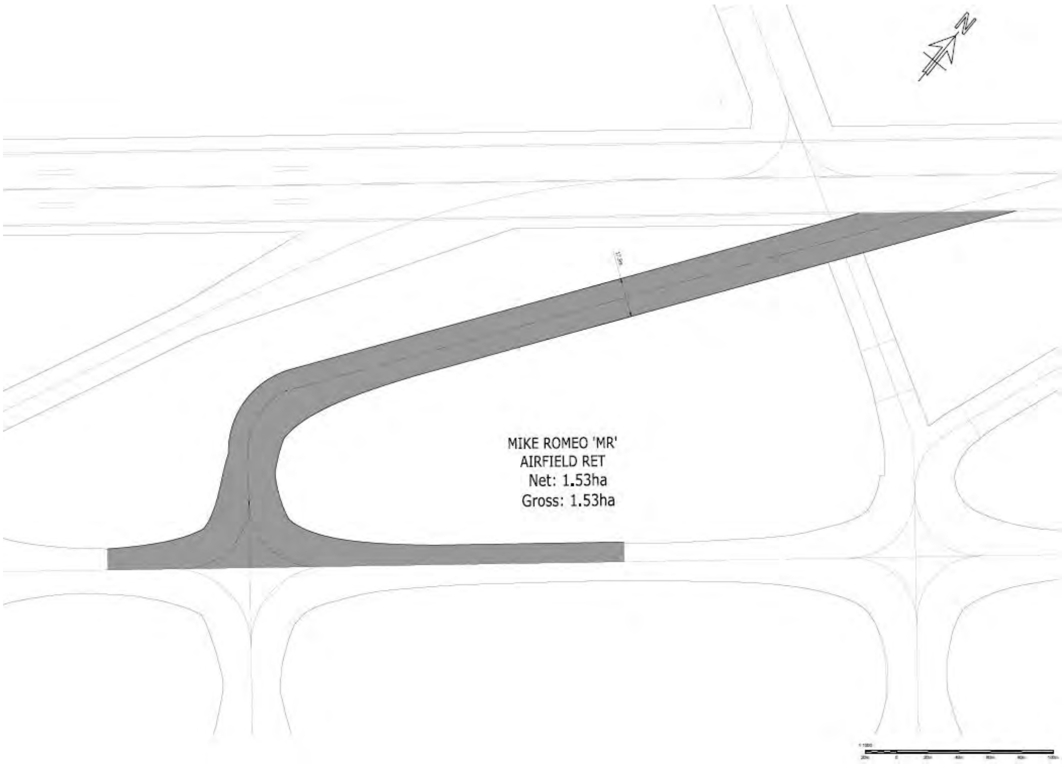


Figure 5.1a: Proposed new airfield infrastructure: Mike Romeo Rapid Exit Taxiway (RET)

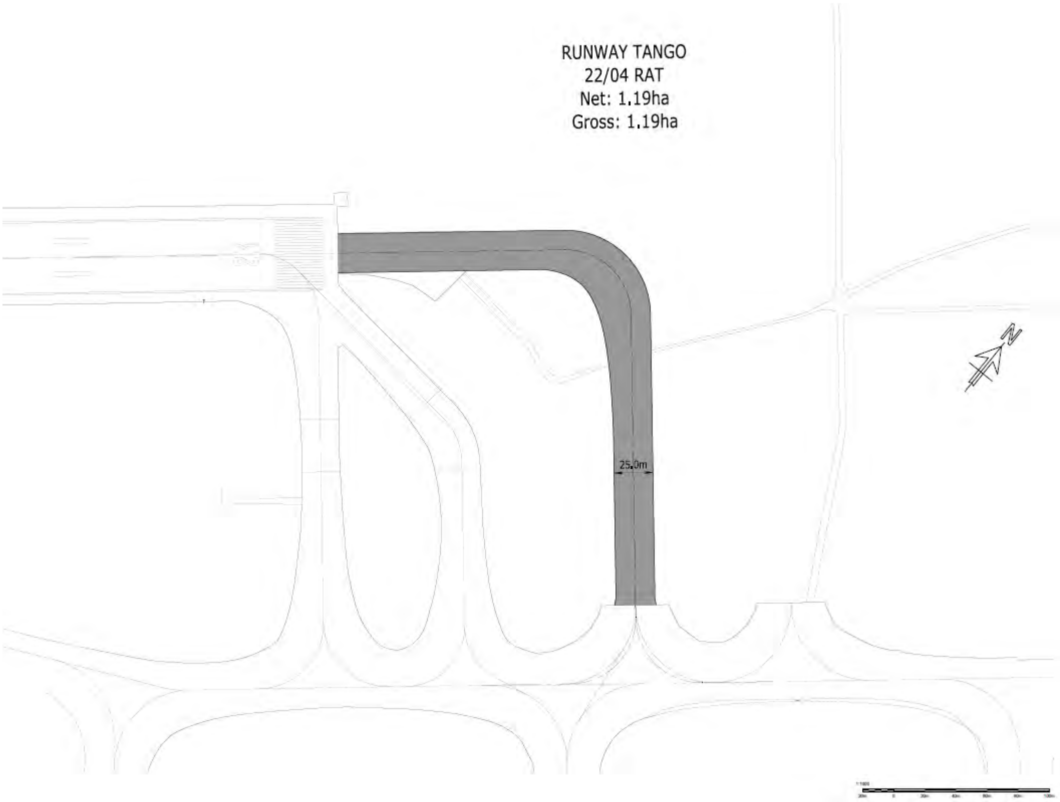


Figure 5.1b: Proposed new airfield infrastructure: Runway Tango Rapid Access Taxiway (RAT)

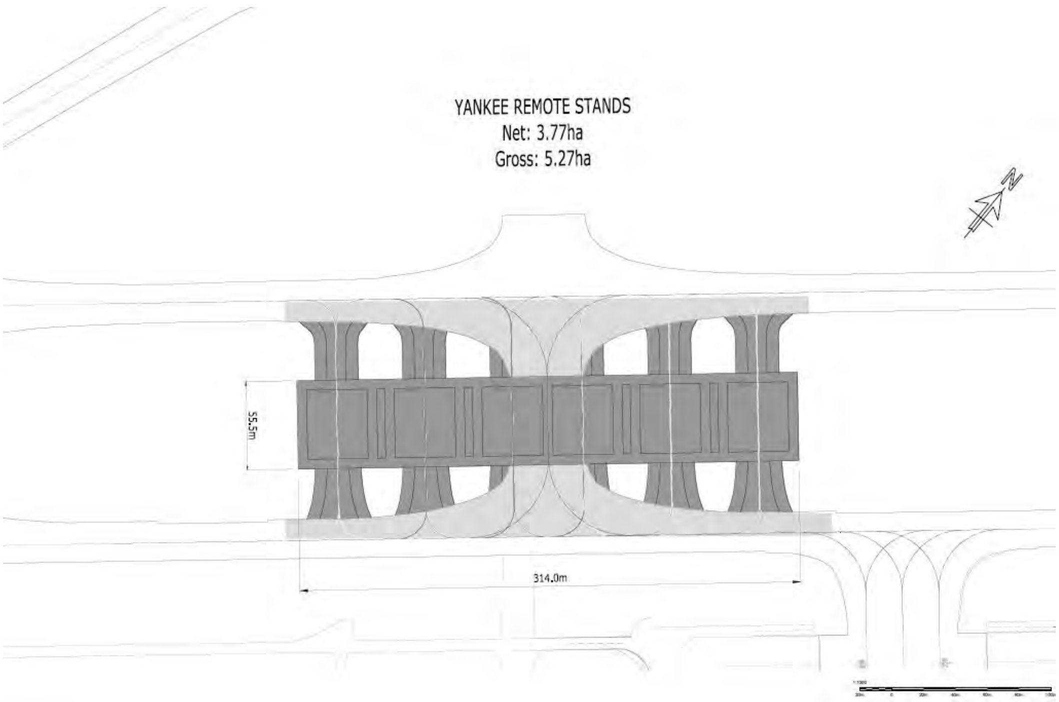


Figure 5.1c: Proposed new airfield infrastructure: Yankee Remote Stands

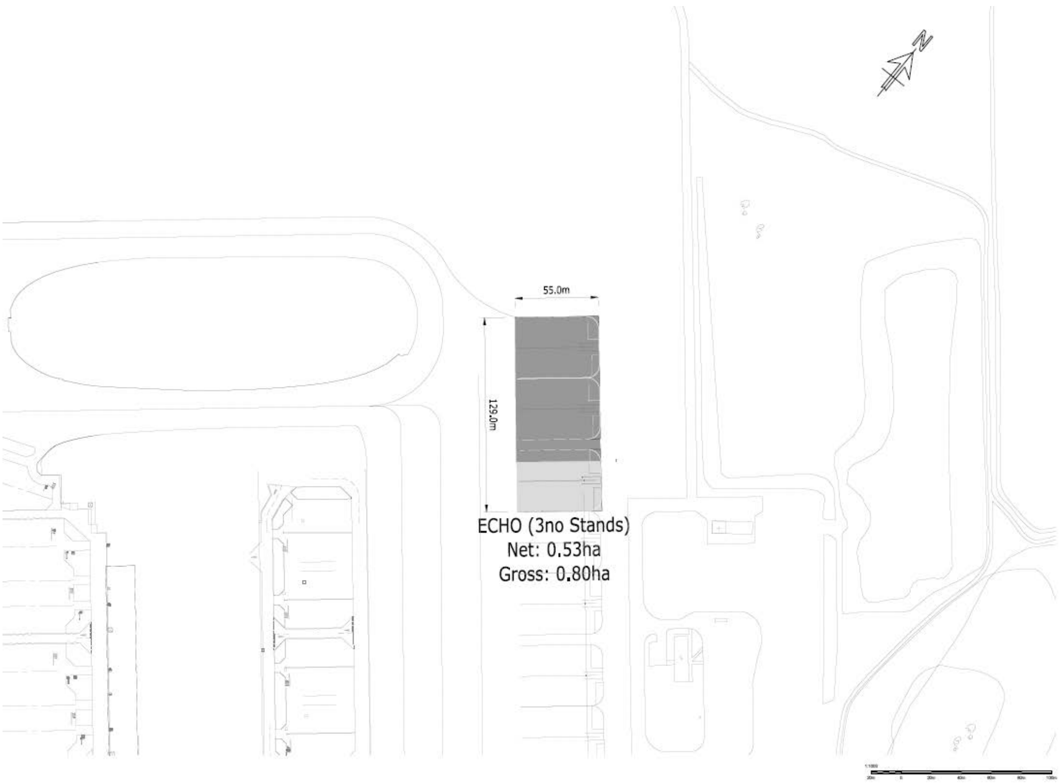


Figure 5.1d: Proposed new airfield infrastructure: Echo Stands

Indicative Construction Programme

5.5 The construction of new airfield infrastructure will comprise a series of phased, but inter-related activities, sequenced over an approximate 12 month period. Construction works are broadly timetabled to start in 2021 and be completed by mid-2022 (i.e. in advance of the existing 35mppa cap being reached). The exact timing and duration of the construction works will be confirmed upon appointment of the Main Contractor, with an indicative programme shown at Figure 5.2.

5.6 Following contract award by STAL, the Main Contractor will be responsible for the development of a detailed construction phasing plan and associated method statement(s), including the Construction Environmental Management Plan (CEMP). This documentation will set out the sequence of works, adhering to the airport's operational requirements and applicable aviation safety standards regulated by the UK Civil Aviation Authority (CAA). Relevant 'standards and recommended practices' (SARPs) established by the International Civil Aviation Organization (ICAO) and European Aviation Safety Agency (EASA) will also be considered, as appropriate.

5.7 As required, method statements will be submitted to the appropriate regulatory agencies (e.g. CAA, UDC, ECC and the EA). Such method statements would typically include:

- Location of the activity and access/egress arrangements;
- Work to be undertaken and methods of construction;
- Plant and materials to be used;
- Labour and supervision requirements;
- Health, safety and environmental procedures;
- Any permit or consent requirements (e.g. discharge consent; waste management licence etc.);
- A Construction Traffic Management Plan (CTMP);
- Emergency response and incident management; and
- Ongoing environmental monitoring and reporting (as part of a CEMP).

ID		Task Mode	Task Name	Duration	Start	Finish	Predecessors
1			**Stansted Airport 35+ Indicative Build Programm**	**320 days**	**Thu 01/04/2**	**Wed 22/06/22**	
2							
3			Design	12 wks	Thu 01/04/21	Wed 23/06/21	
4			Procurement	8 wks	Thu 27/05/21	Wed 21/07/21	3FS-4 wks
5							
6			**Echo Stands**	**80 days**	**Thu 22/07/2**	**Wed 10/11/21**	
7			Mobilisation	4 wks	Thu 22/07/21	Wed 18/08/21	4
8			Enabling Works	2 wks	Thu 12/08/21	Wed 25/08/21	7FS-1 wk
9			Earthworks	6 wks	Thu 19/08/21	Wed 29/09/21	8FS-1 wk
10			Drainage	4 wks	Thu 09/09/21	Wed 06/10/21	9FS-3 wks
11			Utilities	6 wks	Thu 16/09/21	Wed 27/10/21	10FS-3 wks
12			Pavement (DL/PQC)	4 wks	Thu 07/10/21	Wed 03/11/21	11FS-3 wks
13			Line Marking	1 wk	Thu 04/11/21	Wed 10/11/21	12
14							
15			**Yankee Stands**	**110 days**	**Thu 22/07/2**	**Wed 22/12/21**	
16			Mobilisation	4 wks	Thu 22/07/21	Wed 18/08/21	4
17			Enabling Works	2 wks	Thu 12/08/21	Wed 25/08/21	16FS-1 wk
18			Earthworks	8 wks	Thu 19/08/21	Wed 13/10/21	17FS-1 wk
19			Drainage	5 wks	Thu 30/09/21	Wed 03/11/21	18FS-2 wks
20			Utilities	4 wks	Thu 21/10/21	Wed 17/11/21	19FS-2 wks
21			Pavement (DL/PQC)	6 wks	Thu 04/11/21	Wed 15/12/21	20FS-2 wks
22			Line Marking	1 wk	Thu 16/12/21	Wed 22/12/21	21
23							
24			**RET Day & Night Working**	**130 days**	**Thu 23/12/2**	**Wed 22/06/22**	
25			Mobilisation	4 wks	Thu 23/12/21	Wed 19/01/22	4,15
26			Enabling Works	2 wks	Thu 06/01/22	Wed 19/01/22	25FS-2 wks
27			Earthworks	8 wks	Thu 20/01/22	Wed 16/03/22	26
28			Drainage	8 wks	Thu 17/02/22	Wed 13/04/22	27FS-4 wks
29			Utilities	10 wks	Thu 10/03/22	Wed 18/05/22	28FS-5 wks
30			Pavement (DL/PQC)	8 wks	Thu 14/04/22	Wed 08/06/22	29FS-5 wks
31			Asphalt	5 wks	Thu 12/05/22	Wed 15/06/22	30FS-4 wks
32			Line Marking	1 wk	Thu 16/06/22	Wed 22/06/22	31
33							
34			**RAT Day & Night Working**	**130 days**	**Thu 23/12/2**	**Wed 22/06/22**	
35			Mobilisation	4 wks	Thu 23/12/21	Wed 19/01/22	4,15
36			Enabling Works	2 wks	Thu 06/01/22	Wed 19/01/22	35FS-2 wks
37			Earthworks	8 wks	Thu 20/01/22	Wed 16/03/22	36
38			Drainage	8 wks	Thu 17/02/22	Wed 13/04/22	37FS-4 wks
39			Utilities	10 wks	Thu 10/03/22	Wed 18/05/22	38FS-5 wks
40			Pavement (DL/PQC)	8 wks	Thu 14/04/22	Wed 08/06/22	39FS-5 wks
41			Asphalt	5 wks	Thu 12/05/22	Wed 15/06/22	40FS-4 wks
42			Line Marking	1 wk	Thu 16/06/22	Wed 22/06/22	41

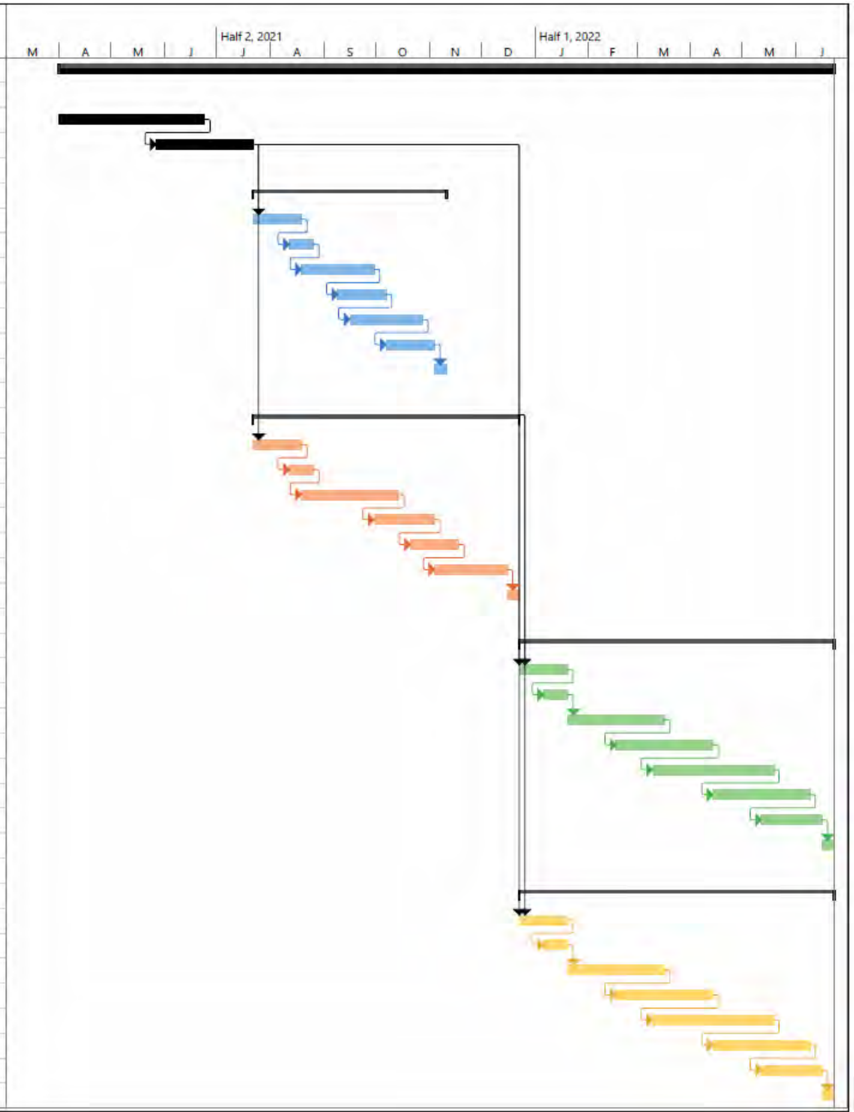


Figure 5.2: Indicative construction programme

General Form of Construction

5.8 The construction of the additional RAT and RET is anticipated to comprise the following:

- Excavation to a depth of approximately 750mm below ground level;
- Re-profiling/compaction of underlying ground;
- Backfill with approximately 250mm sub-base;
- Laying of concrete strips and taxi shoulders, as appropriate;
- Final covering with approximately 200mm dry lean concrete and 150mm black top;
- Installation of lighting, cabling and drainage; and
- Reinstatement of top soil/seeding of adjoining airfield strip.

5.9 The development of the additional Echo and Yankee aircraft parking stands is anticipated to require a similar form of construction but will be concrete surfaced in line with the existing stands. These apron areas will be illuminated by Visual Docking Guidance Systems (VDGSs), which are lighting systems that provide guidance for aircraft entering and exiting the stands. One VDGS will be provided for each of the new Echo stands proposed. The design of which will comply with requisite UK CAA/ICAO/EASA standards.

5.10 The Echo aircraft parking stands will be fully serviced and supplied by 90kVA, 400Hz Fixed Electrical Ground Power (FEGP), whereas the Yankee remote aircraft parking stands will not be equipped with 400Hz FEGP as they will generally be used only for overnight remote aircraft parking rather than loading / unloading passengers.

Enabling Works

5.11 Prior to the commencement of construction works, access points and transport routes are to be agreed and clearly signed by the airport's Highways Working Group and the relevant highway authorities.

5.12 Initial site preparatory works will be undertaken to establish and delineate each of the four work sites on the airfield for the RET, RAT, new Echo stands and Yankee stands, as appropriate. This will include the erection of temporary safety fencing, signage and markers, secure waste management facilities, equipment stores and mobile lighting to illuminate the work sites.

5.13 A landside construction compound will be established to service all airport related construction works, as shown on Figure 5.3. This will be located adjacent to the existing cargo facilities and accessed via Long Boarder Road. Concrete would be batched within this compound and transported airside for the construction works, through a control point. The contractor will be required to identify those areas to be used for temporary stockpiling of construction materials and waste, which will be kept at a low height and securely covered or dampened to prevent fugitive dust episodes.

5.14 Other key activities to be undertaken during the site preparatory phase include the identification and diversion, and/or relocation, of all existing services and utility infrastructure located near the work sites, as well as the installation of temporary environmental management controls (i.e. erosion and sediment control devices). Furthermore, the contractor will be required to excavate trenches and install new underground drainage infrastructure, and electrical and fibre optic cables for the new airfield ground lighting systems.

Main Construction Works

5.15 The main construction works will involve the break out of redundant areas of concrete and soft stripping of airfield grass and soil; followed by the excavation and construction of new airfield pavement areas and associated lighting pits, cable trenches and surface drainage collection systems. Most of the work areas are located on previously engineered/re-profiled ground which has already been disturbed to the proposed depth of the excavation.

5.16 Whilst the soil is exposed, the contractor and the airport safeguarding teams will employ wildlife control and management techniques coupled with the erection of anti-wildlife fencing and netting to ensure birds and other species are not attracted to, or congregate on the excavated ground or temporary spoil heaps.

5.17 At the end of each construction shift, in particular prior to the commencement of the first scheduled aircraft movements following the weekend night-time closure periods (see paragraph 5.28 for operational hours), the contractor will be required to check that all work areas are free of all material, mud and debris which could be blown onto the runway or other aircraft movement areas (i.e. taxiways and aprons). If necessary, the contractor will install screens and other appropriate measures to prevent the accrual of foreign object debris (FOD) on the airfield pavement areas, which will be regularly checked by the STAL Airfield Operations Team.

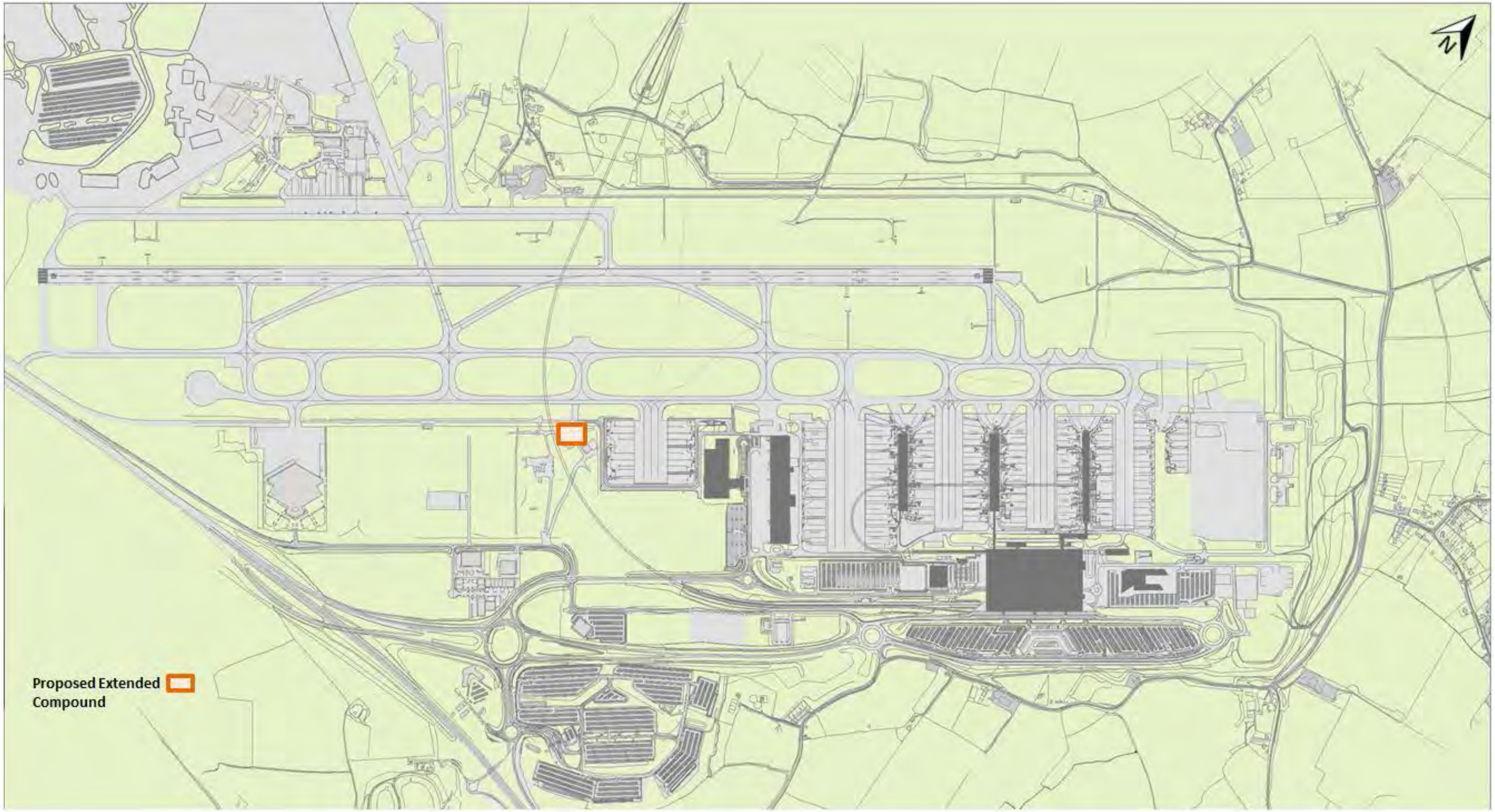


Figure 5.3: Location of construction compound

Finishing Works

5.18 The final phase of the works will involve the application of new pavement markings on the aprons and taxiways, the installation of new airfield signage and the testing of the taxiway guidance system (i.e. new taxiway edge and centreline lights), VDGS, apron lighting, new runway hold/entry signs and lights (including runway stop bars) and other related services such as the power supply. Once the operational readiness testing has been completed, the contractor will proceed with the final general site clean-up and remove all construction plant, equipment and materials, in agreement with STAL Airfield Operations team.

5.19 All new airside apron and taxiway pavement markings, signage and lighting will be consistent with UK and international standards, set by the ICAO, the UK CAA, the EASA and the Airports Council International (ACI).

Construction Plant/Equipment

5.20 The following types of construction plant/equipment are anticipated to be employed on site:

- JCB excavators/scrapers – excavation of areas for new concrete pavement and break out areas of redundant concrete;
- Asphalt pavers/rollers – spreading and compacting materials on new areas of pavement;
- Water pumps – to facilitate the undertaking of excavation and construction works;
- Coring rigs – to test the new pavement area construction;
- Sweepers – to prepare the new pavement areas for operational use and to gather any dust generated by excavation works;
- Groovers – to prepare the new pavement areas for operational use;
- Pavement planers – may be required to re-profile existing areas of pavement to tie in the new construction;
- Rock saws/guillotines/pneumatic drills – break out of existing areas of redundant concrete from the airfield; and
- A concrete batching plant set up within the construction compound (shown on Figure 5.3).

Construction Traffic Management Plan (CTMP)

5.21 A Construction Transport Management Plan (CTMP) will be developed and implemented by the Main Contractor in consultation with STAL's Highways Working Group. The CTMP will contain measures to minimise the number of vehicle movements generated by the construction works (e.g. by maximising load efficiency), and to avoid the potential for road traffic congestion and road-user conflicts on the surrounding road network. No car parking will be provided on site for the contractors, with the use of public transport to be encouraged wherever feasible, taking into account the night time shift patterns associated with the works.

5.22 The majority of construction vehicles will access the site from the strategic road network (the M11 motorway and A120) and then the internal road network (Coopers Road). Daily construction vehicle movements associated with the works are estimated to average 100 and are unlikely to exceed 200 (peak) movements on any given day; where each movement relates to one lorry entering then leaving the site and/or operating within the airport boundaries. For the duration of the 12 month construction programme there will be around 27,700 movements (two-way) in total.

5.23 Additional details of construction vehicle movements and their associated effects are presented in ES Chapter 6 (Surface Access and Transport) and within the Transport Assessment (TA) provided in ES Volume 3.

Waste Management

5.24 Approximately 46,000 m^3 of spoil will be generated by the excavation works for the new taxiways and aircraft parking stands. None of this material is expected to be contaminated, so it is proposed that the topsoil will be reused for landscaping or soil bunds at the airport, and other spoil will be used for the infilling of trench excavations. If additional soil cannot be utilised at the airport, STAL will identify a suitable 'host site' for this material to be stored for use elsewhere.

5.25 Other wastes from construction activities are likely to include the following:

- General waste;
- Building materials;
- Packaging wastes;
- Hazardous waste;
- Liquid waste;
- Paint waste; and
- Electrical waste**.**

5.26 Where practicable, all pavement and concrete arisings (from the breaking out of existing hardstanding in the work areas) will be re-used on-site for construction purposes. Materials which cannot be re-used on site will be recycled, or disposed of via a licensed waste management contractor to a suitably licensed facility. In line with STAL's waste minimisation commitments and recycling targets set out in the 2015 SDP, between 85% and 90% of all construction waste taken off site will be recycled.

5.27 Due to the nature of the material, the absence of rail freight facilities and the relatively modest number of Heavy Goods Vehicle (HGV) movements that the construction project will generate, the transport of materials by rail is not considered to be a realistic proposition. However, as part of the tendering process, the contractors will be required to undertake a feasibility study to assess if certain bulk materials (e.g. limestone aggregate required for concrete batching) can be transported by train to a nearby railhead, prior to being delivered to site by road.

Additional Features and Key Assumptions of the Construction Works

5.28 A summary of the key features and assumptions in respect to construction works is provided below. These have informed the consideration of likely environmental effects reported later in this chapter and within the respective technical topic chapters of this ES:

- All construction works will take place within the airport boundary;
- Due to the proximity of the work areas to the runway, aviation safety and the airport's obstacle limitation surfaces (OLS) must be observed at all times, except when there is a temporary cessation of flights (see below) and in line with UK CAA requirements;
- No works are permitted within 105m from the edge of the runway whilst it is in use. Therefore, during the construction of the final sections of the RAT and RET (to connect these taxiways to the runway) the runway will be closed for 96 six hour periods on 48 consecutive Saturday/ Sunday nights during the 12 month construction programme.
- It is currently envisaged that other construction activities will occur on weekdays (Monday to Friday), during both the day and night time, in order to meet the programme; with night works taking place five nights a week throughout the 12 month construction programme.
- The construction compound will be situated adjacent to the cargo facilities, including the site batching plant and sweeper pit (see Figure 5.3);
- Concrete and asphalt will be supplied from the site batcher and brought to the working areas directly, so as to minimise interference with the operational airport;
- For safety reasons, open excavations will be backfilled at the end of each work shift and all construction vehicles and plant/equipment returned to the construction compound;
- Earthworks will be designed to achieve a neutral 'cut and fill' balance so as to avoid the disposal of spoil off-airport, as far as possible;
- Excess topsoil removed from the location of the new aircraft parking stands and taxiways will be reused for landscaping purposes around the airport's perimeter. If this is not feasible, STAL will identify a suitable 'host site' for this material to be stored for use elsewhere;
- Runoff from all work areas, especially unsealed or exposed areas, will be captured and treated by erosion and sediment controls to remove suspended sediment before being discharged into the existing airport drainage system;
- Wildlife hazards, particularly the risk of bird-strike will be managed through the implementation of appropriate bird control measures to minimise the attractiveness of any earthworks, landscaping or drainage systems to birds and to meet applicable UK CAA aerodrome safeguarding criteria;

- Temporary lighting that may be required during construction will be carefully designed and specified (for location, type, height, brightness, pattern) in accordance with relevant UK CAA Civil Aviation Publications to prevent any infringement of aviation safety requirements, obstruction of airfield ground lighting and/or potential confusion or distraction of pilots;
- The routing of construction traffic to and from the site will generally be via Junction 8 of the M11 motorway and the A120;
- The daily average number of workers on-site during the 12-month construction period will be 50, with this peaking at around 75 workers; and
- Due to the working hours and shift patterns of construction workers, construction traffic movements will predominantly occur outside of the airport's peak hours (07:00 – 08:00; 17:00 – 18:00; 16:00 – 17:00).

Construction Environmental Management

Construction Environmental Management Plan (CEMP)

5.29 In accordance with 'best practice' standards and the statutory regulations applicable to construction (e.g. COPA 1970), a CEMP will be prepared and implemented throughout the works. STAL will first prepare an outline version of this document to include with the tender documents, and the appointed Main Contractor will then be required to expand and refine this CEMP to reflect their specific works methodology, plant and responsible personnel. Once the final CEMP has been approved by STAL and UDC (as required) this will then become contractually binding on both the Main Contractor and their Sub-contractors.

5.30 The CEMP will provide the overarching management framework for the planning and execution of all construction activities. It will incorporate a series of best practice procedures for controlling construction effects, with reference to applicable British Standards, Codes of Practice and the specific mitigation measures identified in this ES. Its primary purposes will be to maintain safe and legally compliant operations throughout the works; to reduce the risk of potential harm to human and environmental receptors; and to minimise disturbance to passengers, airport staff and the neighbouring community.

5.31 The CEMP will set out specific procedures to be implemented to monitor, maintain and report on environmental compliance; to respond immediately to any emergency situation or accidental spillages that arise; and, to take appropriate corrective actions to address any identified non-conformances.

5.32 As illustrated in Figure 5.4 below, the CEMP will be established as a practical and iterative plan for the management of environmental performance throughout the entire construction period. The CEMP will contain a series of organisational (governance) and site-based procedures. Ultimately, it will be the dual responsibility of STAL and the Main Contractor and their Sub-contractors to ensure that appropriate actions are documented, implemented, monitored, reported and reviewed.

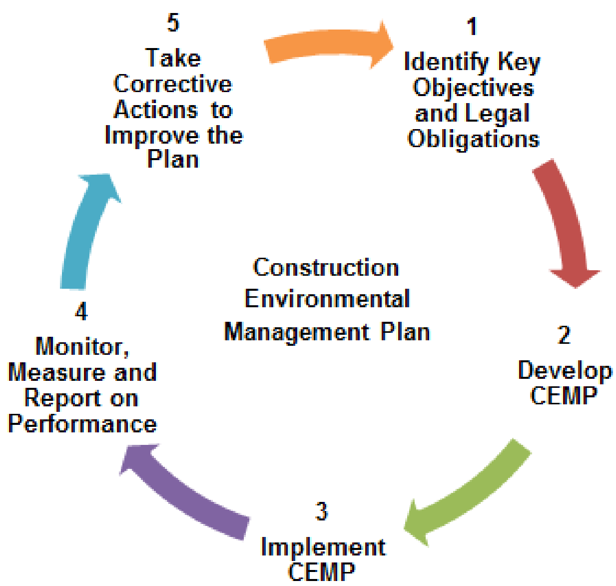


Figure 5.4: The CEMP process

5.33 In accordance with STAL's Environmental Management System (EMS), which is certified under the international standard ISO14001:2015, the airport's existing corporate governance and operational environmental procedures will also be applied to the construction contract. These include, *inter alia*: bird strike risk management and other safeguarding procedures; noise and dust controls; energy and resource efficiency; the specification temporary lighting; pollution prevention measures, spillage containment; drainage and waste management procedures; all of which adhere to International and UK standards including the EA's Pollution Prevention Guidelines and other 'Best Practicable Means' (BPM) guidance.

5.34 In addition to the CEMP, STAL will formulate a Code of Construction Practice (CoCP) which will be agreed with the Main Contractor and any Sub-contractors involved in the works. This Code will be based on the airport's extensive experience of managing construction projects at Stansted, and at the other MAG owned airports: Manchester and East Midlands. It will incorporate the principles and standards contained in an existing document titled 'Control of Construction Projects at Stansted Airport – Environmental Information for Contractors (September 2015)', which will be updated, as necessary, prior to the commencement of works.

5.35 It is envisaged that, should planning permission be granted for the proposed development, a planning condition will be attached requiring the submission of the CEMP for the approval of UDC prior to commencement of construction activities, including the enabling works.

Responsibility of the Main Contractor

5.36 The Main Contractor will be responsible for the dissemination of the CEMP and CoCP to all workers/site-based employees and Sub-contractors and for undertaking specific 'Toolbox' talks on the environmental procedures they contain. Thereafter, the Main Contractor will ensure that the processes and procedures detailed within these documents are adhered to throughout the works through regular auditing and monitoring. In particular, the Main Contractor will be required to carry out daily audits that will be formally documented monthly, in order to identify any non-compliance or areas for improvement, and to provide a clear process and timeline for addressing these.

5.37 The Main Contractor will keep aware of any predicted extreme weather events (e.g. storms and heat waves) during the construction period, using the short to medium range weather forecasting from the Met Office. They will adjust their programme management, environmental controls and impact mitigation measures as appropriate. This will ensure the flexibility of the proposed mitigation to impacts during extreme weather events and, where necessary, method statements shall be drawn up to account for any risks/ hazards that are identified.

Overview of Potential Construction Effects

5.38 Construction environmental effects (e.g. noise, traffic, dust etc.) are temporary in nature, although the future physical existence of the new airfield infrastructure is permanent once the works are completed. As such, the associated 'operational effects' of the new airfield infrastructure, including the increased drainage requirements and changes to the ground noise due to the movement and positioning of aircraft on stands and taxiways, are considered in subsequent chapters of this ES.

5.39 The construction details and assumptions developed by STAL (described above) have been used to determine the potential construction environmental effects. Topic-specific assessments have been carried out and are presented in the relevant chapters of this ES in relation to:

- Surface Access and Transport;
- Ground Noise;
- Air Quality;
- Socio-Economic Effects;
- Carbon;
- Public Health and Wellbeing;
- Water Resources and Flood Risk; and
- Ecology and Biodiversity (summarised in the ES Chapter 16).

5.40 The impact of the construction works on other environmental receptors including archaeology, ground conditions and landscape are unlikely to be significant due to the location of the works within the existing airfield and the relatively minor scale and extent of proposed excavations. As explained further in ES Chapter 16 (Non-Significant Topics) and also in ES Chapter 2 (EIA Methodology), these topics were scoped out of the EIA in agreement with UDC through its Scoping Opinion.

5.41 As outlined below, no significant construction impacts are anticipated as a result of construction works. More detailed assessments of construction effects are provided within the relevant chapters.

Surface Access

5.42 In ES Chapter 6 (Surface Access and Traffic), construction phase effects have been assessed for surrounding road networks, road users and on pedestrians.

5.43 A total of around 27,700 construction vehicles movements both to and from the site (two-way) are estimated across the entire 12 month construction programme. The average and peak daily construction traffic flows (two-way) would be of the order of 100 movements and 200 movements respectively. Construction traffic would access the airport via the M11 motorway and A120 roads and are therefore unlikely to adversely affect local roads, especially as these movements would largely occur outside of peak hours. Construction traffic on Church Lane will be avoided due to the traffic restrictions that are in place there; Parsonage Lane and Hall Road will also be avoided, and there is no intention to seek temporary access from these; this is also the case along Coopers End Road, because of a weight restricted bridge. Access via the A120 on to Long Boarder Road has been determined to be the best access route to the airport for construction vehicles.

5.44 HGV traffic would be highly unlikely to exceed a peak of 20 two-way movements per hour at any point of the day or night, as a worst case. Moreover, traffic flows to/from the airport are currently in the order of 30,000 vehicles a day, and so the impact on traffic from an estimated peak of 200 construction vehicles per day is expected to be of negligible significance.

5.45 Given the low number of construction vehicles associated with the construction works, a negligible effect is also expected on pedestrians, cyclists and public transport during the construction phase. To that end, no closures would be required to pedestrian or cycle routes as a result of the construction works.

5.46 As outlined in Chapter 6, the CEMP and the accompanying CTMP will set out 'best practice' construction traffic mitigation measures, including the following:

- Traffic safety and environmental standards and programmes;
- Adherence to designated routes;
- Implement a Staff Travel Plan;
- Scheduling of off peak deliveries;
- Collaboration with other major construction sites in the area to avoid any risk of congestion or HGV traffic conflicts (where practicable);
- Re-use of material on site;
- Regular vehicle maintenance;
- Wheel washing; and
- Efficient material handling.

5.47 Further details of these measures will be provided within the CEMP and/or CTMP where relevant.

Ground Noise

5.48 Construction works undertaken during the day would not be expected to result in any significant disturbance to nearby residential communities. All construction activities within 105m of the runway, which are associated with the RAT and RET, will need to be undertaken when the runway is closed at night. Whilst there is the potential for night-time works to give rise to some slight increases in noise levels from the use of machinery including a roller, track excavators, dumper trucks and a sweeper, it is envisaged potential impacts can be controlled through the implementation of the CEMP and the CoCP and adherence to best practice. A negligible increase in night noise during the construction works is therefore predicted. Additional details and an assessment of ground noise from construction are provided in ES Appendix 8.2.

Air Quality

5.49 With the implementation of effective mitigation measures, it is not anticipated that this scale and type of activity will generate any significant air quality effects from vehicle exhaust gases and construction generated dusts. Any potential effect would largely be contained within the airport boundary and there would be no breaches of the air quality objectives at any location. An array of dust suppression measures would also be implemented to prevent fugitive dust episodes.

5.50 Dust from construction activities will be effectively managed in accordance with procedures set out in the CEMP both to avoid any harmful environmental effects but also to ensure aircraft safety. As such, dust would not be expected to cause any operational difficulties on the airfield or result in any off-site complaints.

Socio-Economic Impacts

5.51 The construction of the new stands and taxiway links to the runway will cost around £48 million. In total, the construction of the new airfield infrastructure to support the proposed development will create a total of almost 300 construction jobs and support Gross Value Added (GVA) of £23.4 million over the 12 month construction period between 2021 and 2022. Given the scale of forecast construction employment, the construction employment generated by the proposed development is predicted to be positive, albeit of negligible significance when assessed at a regional scale.

Carbon Emissions

5.52 The construction of the proposed development will contribute an estimated 0.021 Million Tonnes of Carbon Dioxide Equivalent (MtCO2e). This includes carbon emissions associated with the production of concrete and steel used in the foundations of the stands, and fuel use by construction plant equipment on site.

5.53 The construction of the nine new aircraft parking stands and taxiways is equivalent to 0.5% of Stansted's projected total annual emissions and 0.09% of all UK annual construction emissions, reinforcing the small carbon contribution of the proposed scheme. This would fall comfortably within the UK's third carbon budget (2018-2022) of 2,544 MtCO2e proposed by the Committee on Climate Change (CCC), accounting for a negligible contribution of approximately 0.001% of the total allocated budget.

Public Health and Wellbeing

5.54 Given the minor scale of construction works and the distance to the nearest sensitive off-site receptors, as detailed in ES Chapter 14 (Public Health and Wellbeing), no potential for significant construction environmental effects related to public health and wellbeing has been identified.

5.55 Health pathways, such as changes to air pollution or noise levels, at the construction stage have been considered in Chapter 14 and none are predicted to give rise to any likely significant health or wellbeing effects.

Onsite Ecology

5.56 As described in the Preliminary Ecological Appraisal (PEA) report contained at ES Appendix 16.1, recent surveys of the airfield have identified very limited ecological value for most of the hardstanding and airfield grassland areas where construction works are proposed to take place. However, low numbers of both Common Lizard and (a single) Great Crested Newt (both protected species) were recorded in a small area of rough grassland in the north-eastern part of the proposed Echo Stands, which falls within the area to be developed. The presence of Great Crested Newts means that the works to create the Yankee Remote Stands are likely to need to be completed under the appropriate licence from Natural England. STAL have already created a receptor site and mitigation habitat for these species in anticipation that they may be recorded, which will be used to ensure that there is an overall net benefit for these species post development. These spaces, the Habitat Creation Area and Monks' Wood, will be used to support the licence application. Both of these spaces are under STAL ownership.

5.57 The two areas of habitat set aside by STAL will be sufficiently mature prior to works commencing in 2021. Mitigation measures will be put in place prior to the commencement of construction of the additional stands in order to avoid harming these species. These measures will comprise:

- The completion of update reptile /Great Crested Newt surveys, during the survey period prior to the commencement of construction works; i.e. during 2020 with construction currently anticipated to begin in 2021; and
- If reptiles/Great Crested Newts are recorded, these will be captured and relocated to the receptor site in accordance with established translocation methods (including exclusion fencing and pitfall trapping) and the terms of the licence and NE approval.

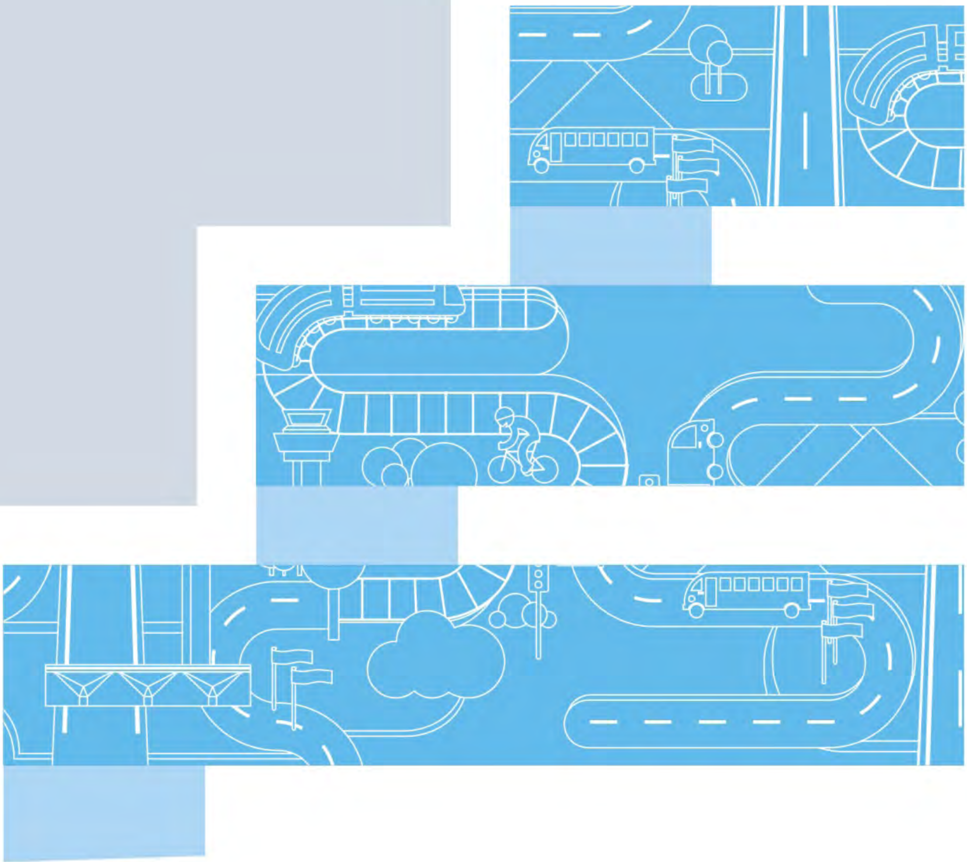
5.58 Following the adoption of the above mitigation strategy (which is further detailed in ES Appendix 16.2), it is anticipated that there will be no adverse effect on reptiles or any other species due to the construction work.

5.59 Furthermore, as described in the Assessment of Impacts on Ecological Receptors section of ES Chapter 10 (Air Quality) and within ES Chapter 16, the proposed development is not predicted to have any adverse effects on off-site ecology sites such as Hatfield Forrest National Nature Reserve (NNR) and Sites of Special Scientific Interest (SSSI). Therefore, the wider topic of 'Ecology and Biodiversity' was scoped out the EIA, with the agreement of both UDC and Natural England.

TRANSFORMING LONDON STANSTED AIRPORT

35+ PLANNING APPLICATION

Chapter 6 Surface Access and Transport



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MAG London Stansted Airport

6 SURFACE ACCESS

Introduction

6.1 This chapter presents the assessment of the potential effects arising from the proposed development on the airport's surface access network and surrounding environment. The proposed development seeks to make the 'more efficient use' of the existing runway up to 2028 to support the forecast growth in passenger numbers, and strengthen operational performance and resilience.

6.2 Specifically, it describes the methodology used to assess the impacts of the proposed development in respect to surface access. It describes the current transport baseline and access conditions at Stansted Airport and the surrounding area as well as those projected under the Do Minimum (35mppa) scenario; the potential effects of the proposed development, the Development Case (43mppa), on all relevant modes of transport; the evaluation of the significance of such effects; the scope for mitigation; and, the likely residual effects. The assessment also considers other likely development in the area to ensure cumulative effects are understood.

6.3 Where applicable, the assessment follows the methodology set out in the Institute of Environmental Management and Assessment (IEMA) Guidelines[1] for investigating highway impact. Otherwise, the methodology adopted has been clearly identified and reflects best practice and approaches adopted elsewhere for similar types of development.

6.4 The impacts have been assessed for all relevant modes of transport during the construction of the new airfield infrastructure required to facilitate the incremental growth in operations (expected to occur in the period 2021-2022) as well as the Development Case when the uplifted annual passenger numbers are reached in 2028.

6.5 The Transport Assessment (TA) sets out in detail the methodologies adopted for the assessment of anticipated changes associated with the proposed development for all transport modes. The TA is included in ES Volume 3.

Planning Policy Context and Guidance

6.6 ES Appendix 3.1 and the Planning Statement provide a summary of the relevant 'cross cutting' national and aviation policy, which are not repeated here in detail to avoid the chapter becoming unduly long or repetitive of other parts of the ES. This section sets out the most relevant regional and local transport policies. It outlines the transport objectives that are relevant in terms of accessibility, transport effects, sustainability measures and design. A more detailed policy review is provided as part of the TA (see ES Volume 3).

Regional Policy

Essex Local Transport Plan, 2011

6.7 The Essex Local Transport Plan[2] (2011-2026) (LTP3) summarises the Highway Authority's transport strategy, outlining its approach to all travel modes for the period of 2011-2026. The LTP3 divides Essex into four areas, for which specific priorities will be identified via dedicated area plans. The transport priorities for West Essex, that encompasses Stansted Airport, are identified as:

- "*Improving access to and from the M11 corridor;*
- *Tackling congestion and improving the management of traffic in Harlow town centre;*
- *Providing the transport improvements needed to support housing and employment growth;*
- *Improving the attractiveness of bus services;*
- *Improving cycling networks and walking routes end encouraging their greater use;*
- *Improving the attractiveness of public spaces and their ease of use;*
- *Working with Transport for London to Improve the journey experience of Essex residents using the Central Line underground services; and*
- *Improving access to Stansted Airport by low carbon forms of transport*."

6.8 The LTP3 outlines 15 transport policies, many of which are relevant to the airport site and proposed development. These policies cover key issues such as integrating land-use and transport planning, public transport, connectivity, carbon reduction, promoting sustainable travel choices, the historic built environment, access to services, and cycling and walking.

Hertfordshire's Local Transport Plan (2011 – 2031)

6.9 Hertfordshire's Local Transport Plan[3] (2011 – 2031) (LTP3) sets out the county council's vision and strategy for the long-term development of transport in Hertfordshire. The vision for transport in the County is set out as follows:

"To provide a safe, efficient and resilient transport system that serves the needs of business and residents across Hertfordshire and minimises its impact on the environment."

6.10 To support the vision, the transport strategy will:

- *"Support economic development and planned dwelling growth;*

- *Improve transport opportunities for all and achieve behavioural change in mode choice;*

- *Enhance quality of life, health and the natural, built and historic environment for all Hertfordshire residents;*

- *Improve the safety and security of residents and other road users; and*

- *Reduce transport's contribution to greenhouse gas emissions and improve its resilience."*

Local Policy

Uttlesford Adopted Local Plan, 2005

6.11 The current Uttlesford Local Plan[4] was adopted in January 2005 and is the adopted Development Plan for the district. Two policies of relevance to the transport elements of the proposed development proposal were saved in December 2007 (along with other policies), Policy GEN1 (Access) and Policy GEN6 (Infrastructure Provision to Support Development).

6.12 Policy GEN1 states that development will only be permitted if it meets the following criteria:

- "*Access to the main road network must be capable of carrying the traffic generated by the development safely;*

- *The traffic generated by the development must be capable of being accommodated on the surrounding transport network;*

- *The design of the site must not compromise road safety and must take account of the needs of cyclists, pedestrians, public transport users, horse riders and people whose mobility is impaired; and*

- *The development encourages movement by means other than driving a car*."

6.13 Policy GEN6 states that development must make appropriate provision for the required supporting infrastructure, including transport provision. Where the cumulative impact of developments necessitates infrastructure provision, developers may be required to provide a financial contribution towards such provision.

6.14 In relation to vehicle parking standards, policy GEN8 seeks to discourage the provision of unlimited parking spaces in line with guidance contained within PPG13, but seeks to ensure parking provision is adequate for the proposed use. It states that development will not be permitted:

"unless the number, design and layout of vehicle parking places proposed is appropriate for the location, as set out in Supplementary Planning Guidance (SPG) 'Vehicle Parking Standards'."

6.15 Chapter 9 of the Local Plan, Transport and Telecommunications, sets out UDC's position regarding airport parking. Policy T3 (Car Parking Associated with Development at Stansted Airport) states that proposals for car parking associated with any use at Stansted Airport:

"will be refused beyond the Airport boundaries, as defined in the Stansted Airport Inset Map."

6.16 The supporting text to Policy T3 stipulates that adequate space exists inside the boundary of Stansted Airport for air passengers to park. The policy protects the character of villages and countryside around Stansted to ensure that residential amenities are not damaged by car parking compounds. It continues by saying that the scale and management of car parking needs to be carefully controlled to maximise the number of passengers using public transport to get to or from the airport.

Uttlesford Emerging Local Plan, 2017 (Regulation 18 Local Plan)

6.17 The following policies of the new Uttlesford Local Plan[5] are particularly relevant in terms of transport and surface access. Policy SP2 (The Spatial Strategy 2011-2033) states that:

"The growth of London Stansted Airport will be supported subject to conformity with the environmental and transport framework set out in Policy SP11."

6.18 In terms of transport, Policy SP11 (London Stansted Airport) states:

"Access to London Stansted Airport's role as a national, regional and local transport interchange will be maintained. The necessary public transport infrastructure and service capacity to serve the airport and meet permitted passenger numbers must be maintained and improved to accommodate passenger movements. An integrated approach must be demonstrated within the framework of a surface access strategy."

6.19 Policy SP11 also states that any proposals for new development need to meet the following criteria:

- "*Incorporate sustainable transportation and surface access measures in particular which minimise use of the private car, maximise the use of sustainable transport modes and seek to meet modal shift targets, all in accordance with the London Stansted Sustainable Development Plan; and*
- *Incorporate suitable road access for vehicles including any necessary improvements required as a result of the development.*"

6.20 In terms of airport related car parking, SP11 states:

"Proposals for airport related car parking should be located within the Airport Strategic Allocation, as shown on the Policies Map (excluding North Stansted Employment Area) and will need to demonstrate that the proposals do not adversely affect the adjoining highway network; and will not lead to detriment to the amenity of the area and neighbouring occupiers. Appropriate mechanisms will be sought to make sure that all on airport car parking is integrated into and contributes to funding of the airport surface access strategy."

6.21 Policies TA1 (Accessible Development) and TA2 (Sustainable Transport) set out the need for development to come forward with travel patterns encouraged by the ability to access development by sustainable modes of transport.

6.22 Policy TA5 (New Transport Infrastructure or Measures) supports the principle of working with transport providers, including amongst other schemes for West Anglia Mainline-Cambridge to Stansted Improvements and working with Essex County Council (ECC) in conjunction with Highways England (HE) produced a short to medium term improvement to increase traffic capacity at Junction 8 of the M11 motorway.

Other Relevant Guidance

Uttlesford Local Plan Transport Study, 2016

6.23 WYG Transport Planning published a Transport Study[6] in December 2016 to assist UDC in the preparation of the new Local Plan. The study examines the likely transport implications of different spatial distribution options for future Local Plan development within the district. It examines potential development locations and presents a high level comparative appraisal of the transport implications of a range of possible development scenarios.

6.24 The study identifies a series of transport mitigation requirements to address the cumulative effects of all Local Plan development. These include improvements to the M11 motorway, A120, Junction 8 of the M11 motorway and A120/Round Coppice Road, particularly in the light of proposed substantial residential development in the south of the District and along the A120 corridor.

Stansted Airport Sustainable Development Plan (SDP), 2015

6.25 As described in ES Appendix 3.1, the 2015 SDP sets out how the airport will grow in a responsible and sustainable way. The 2015 SDP seeks to develop and improve surface access links, maintain a high level of public transport use and strengthen the community engagement programme while at the same time being mindful of the environmental impacts, ensuring a balance is struck between growth and impacts.

6.26 The 2015 SDP includes an Economy and Surface Access Plan, which identifies how the airport can support sustainable growth of the local, regional and national economy and how Stansted can capitalise on and enhance the increasing economic strength of the local area. It also sets out a commitment to improve the connectivity of the airport ensuring that it is fully accessible for the catchment it serves.

6.27 Further information regarding the Stansted Area Transport Forum (SATF), Airport Travel Plan (ATP) and the 2015 SDP aims and targets are described in Chapter 2 of the TA (see ES Volume 3).

Assessment Methodology

Assessment Scope

TA and EIA Scoping

6.28 The scope and baseline/future trip modelling for this assessment has been discussed with UDC, ECC, Hertfordshire County Council (HCC) and HE, through the TA and EIA scoping exercises. A separate TA Scoping Note (June 2017) was prepared by SDG to inform this exercise and is included in Appendix A of the TA (see ES Volume 3).

6.29 The combined set of responses received from these authorities and further commentary from SDG are included in Appendix B of the TA (see ES Volume 3). Where applicable, the comments received have been taken on board in the approach which has informed the TA traffic modelling and this chapter.

Study Area

6.30 The core assessment area, as shown in Figure 6.1, has been informed by an understanding of the current distribution of trips to and from the airport, the travel modes available and where these have the potential to give rise to significant effects, as follows:

- Travel by public transport – the focus is on access to public transport nodes within the range of travel by foot and those services and destinations which are currently known to attract public transport travel to and from the airport;
- Travel by foot – the focus is on designated walk routes providing safe, direct and convenient access to and from the airport;
- Travel by cycle – the focus is on designated cycle routes providing safe, direct and convenient access to and from the airport; and
- Traffic flows – A methodical approach has been adopted as set out below to define the geographical extent of the assessment of traffic flows.

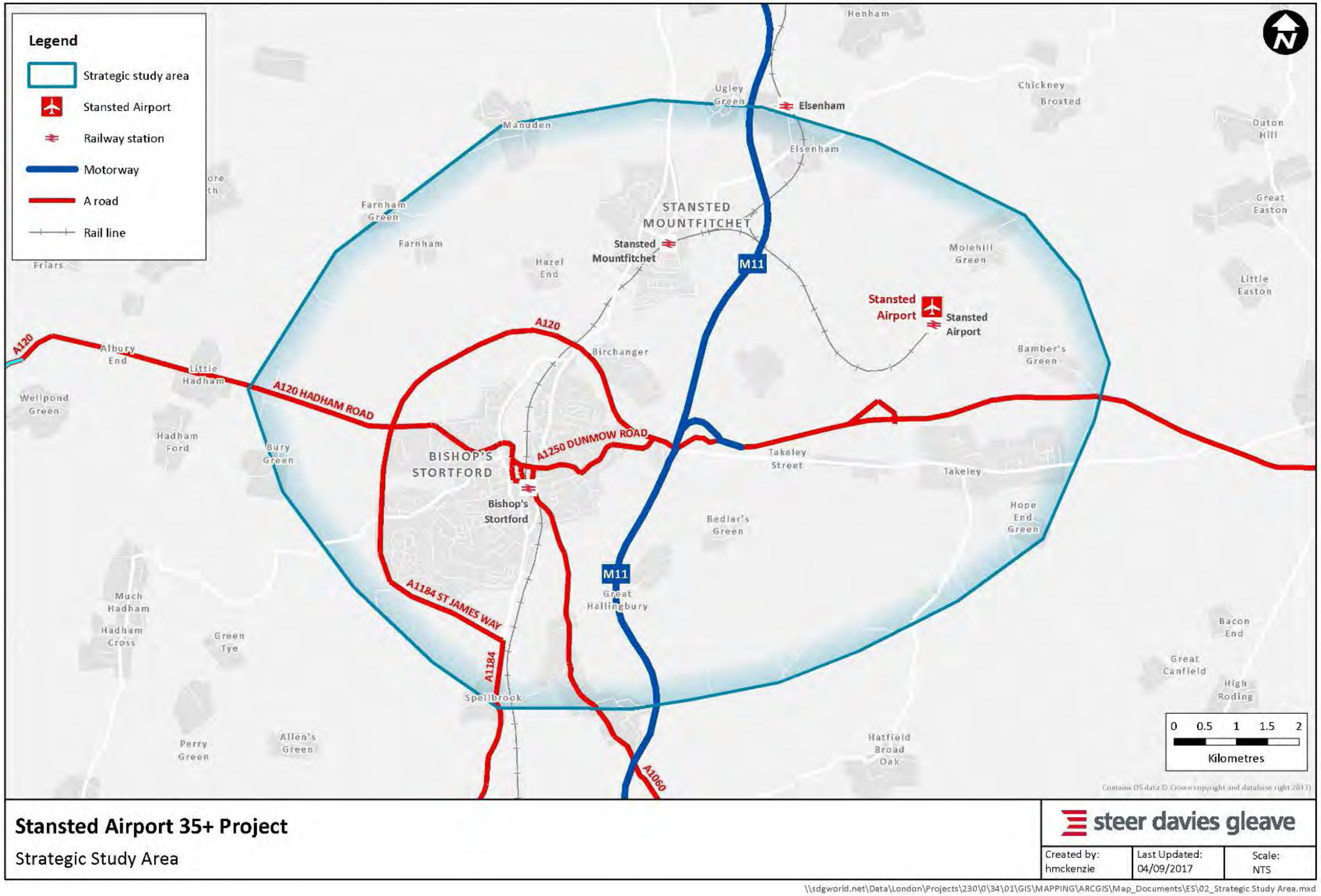

Figure 6.1: Surface Access study area

Highway Impact Assessment

6.31 In terms of the key environmental effects arising from changes in road traffic, the scale and extent of the assessment has been considered in accordance with the IEMA guidelines for assessing highway impacts. The assessment has involved identifying the affected parties or locations which may be sensitive to changes in traffic conditions and identifying the scale of potential impact.

6.32 The IEMA guidelines set out a range of potential additional environmental effects relating to road traffic that should be considered within an EIA, if such effects are deemed applicable to the project and/or likely to be significant, as set out in detail later in this section. Of these impacts, road traffic noise and vibration and air quality are most relevant to the proposed development and these are considered in ES Chapters 9 (Surface Access Noise) and 10 (Air Quality) respectively. ES Chapter 10 also considers the effects of increased road traffic emissions on Hatfield Forest Site of Special Scientific Interest (SSSI) and National Nature Reserves (NNR) and Elsenham Woods SSSI.

6.33 Drainage, heritage and visual impacts from traffic are also referred to in the IEMA guidance but such secondary effects are not deemed to be significant in this instance, for the reasons given in the Scoping Report (see ES Appendix 2.1) and ES Chapter 16 (Non-Significant Topics). With respect to road traffic, the IEMA guidelines suggest an EIA should normally consider the impacts of the traffic changes associated with proposed development on the highway where traffic flows are predicted to change by more than 30%, or, in sensitive areas local to the application site, where traffic flows have increased by 10% as a result of the proposed development. The IEMA guidelines provide guidance on the categorisation of receptors sensitive to traffic flow. Those with the greatest sensitivity to traffic flow are typically determined as: schools, colleges, playgrounds, hospitals, accident clusters and roads without footways that are used by pedestrians.

6.34 The guidance suggests traffic volume changes of less than 30% on all local and strategic roads that are deemed non-sensitive could be reasonably considered as not significant. However, given the acknowledged potential for concern over the proposed development, a more robust approach has been adopted in this assessment whereby consideration has been given to potential environmental impact on all roads that experience a 10% or greater rise in traffic flows when comparing the 2028 Do Minimum (35mppa) scenario with the 2028 Development Case (43mppa).

6.35 The predicted traffic generation from the proposed development has been assigned to the local highway network based on an understanding of trip origins and destinations for passengers and staff. Then, in the first instance, predicted change in traffic volume of less than 10% between the future baseline (Do Minimum scenario) and the proposed development have been considered not to be significant and therefore screened out of any further analysis in the EIA.

6.36 For those highway links where, predicted traffic flow increases exceed the 10% threshold, seven assessment criteria have then been examined in accordance with the IEMA guidelines, as described in Table 6.2 below.

Table 6.2: IEMA Guidelines assessment criteria

Effect	Description
Changes in Traffic Flows	Increase or decrease in road traffic flows resulting from the development, compared to baseline conditions.
Severance	The perceived division that can occur within a community when it becomes separated by a major traffic artery.
Driver Delay	Valuation of the delay (or benefit) to drivers resulting from a new development.
Pedestrian Delay	The change in the ability of pedestrians to cross a given highway link due to changes in traffic flow, speed, composition, highway design.
Pedestrian Amenity	Influenced by traffic flow but also including consideration of the overall relationship between pedestrian and traffic (e.g. air quality and noise).
Fear and Intimidation	Linked to pedestrian amenity and influenced by factors including traffic flow, composition and pavement conditions.
Accidents and Safety	Increase or decrease in risk of road traffic collisions resulting from changes in traffic flows and highway layout.

Baseline Characterisation

6.37 This assessment uses 2016 as the baseline year, drawing on the most up to date and validated full calendar year data. Baseline conditions around the airport have been established by means of desktop research, site visits and a range of traffic surveys and publicly available data. A summary of the tasks that have been undertaken to assess the baseline conditions are provided below and described in more detail in subsequent paragraphs:

- The existing local highway network within the immediate vicinity of the airport has been analysed;
- Existing traffic survey data has been obtained for a range of roads throughout the study area;
- Historical accident data for the latest five-year period for all roads within the vicinity of the airport has been analysed;
- Existing public transport services and associated capacity for rail, coach and bus travel has been assessed where feasible by reference to the operator’s published data;
- The ease of access to public transport facilities has been reviewed; and
- Existing travel patterns and mode share data for passengers and employees obtained from published CAA and Stansted employee surveys respectively, has been reviewed.

Baseline Traffic Data

6.38 Baseline traffic data was derived from traffic surveys obtained from the following sources and dates:

- A range of Automated Traffic Counts (ATCs) supplied from ECC (2013-2017);

- Manual Classified Counts (MCCs) conducted by Intelligent Data Collection in 2015;
- HE TRIS data traffic counts (2016) Annual Average Daily Traffic Flows (AADT); and
- ATC and MCC conducted by Nation Wide Data Collection in 2017.

6.39 The traffic data has been adjusted to a 2016 Baseline Year utilising TEMPro v7.2[7]. This reflects the latest full year of data for passenger numbers and travel patterns.

6.40 TEMPro v7.2 is a tool for viewing National Trip End Model forecasts published by the Department of Transport (DfT). It allows the users to estimate traffic growth forecasts for local areas on an annual basis. Uttlesford specific TEMPro v7.2 growth rates have hence been applied to surveyed traffic to establish equivalent 2016 baseline flows and provide a proxy for capturing additional local trip ends created by new housing and employment together with general national traffic growth.

6.41 To determine future year traffic flows growth rates TEMPro v7.2 growth rates have been applied to the disaggregated background traffic (i.e. baseline traffic with baseline airport tips removed) and then predicted future year passenger and employee trips re-assigned to the road network to produce aggregated traffic flows.

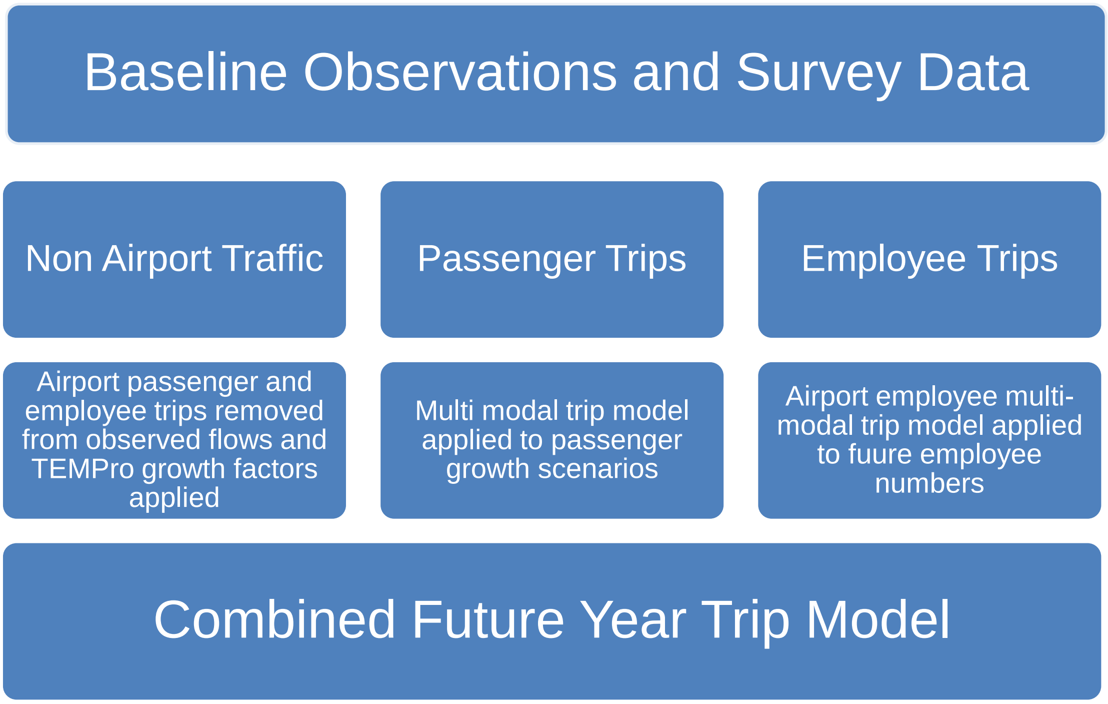

Figure 6.2: Future year traffic modelling process

Baseline Pedestrian, Cycle and Public Transport Data

6.42 For travel on foot and on cycle, desktop studies have been undertaken to review accessibility to and from the airport using existing infrastructure. For travel by public transport modes, information on service capacities and frequencies has been obtained from a range of sources as follows:

- Stansted Airport Sustainable Development Plan 2015[8];

- Stansted Airport Employee Survey 2015[9];
- Stansted Airport Corporate and Social Responsibility Report 2015-16[10];
- Stansted Airport Bus and Coach Strategy 2016[11];
- Stansted Airport Cycling and Walking Strategy 2016[12];
- Stansted Airport Travel Plan 2014-2019[13];
- Civil Aviation Authority (CAA) Annual Passenger Survey 2016 (Detailed Data)[14];
- ICF Stansted Airport (Air) Traffic Forecasts 2017[15];
- CAA Data: London Stansted Airport Passenger Origin and Destination 2016[16];
- Rail loadings from train operators – CrossCountry and Abellio Greater Anglia (AGA) Autumn 2016;
- Network Rail London and South East Market Study, 2013[17];
- Network Rail East Midlands Route Study, 2016[18]
- Local bus services 2017; and
- Coach services and loadings from Airport Bus Express and National Express, 2017.

Assessment Timeframes

6.43 All baseline data has been collated for both the external transport network peak period and the future airport operational peak period, as set out below.

- Stansted Airport Future Operational Peak Hours:

  AM 05:00-06:00 (peak hour of passenger arrival to the airport)

  PM 16:00-17:00 (peak hour for passenger departures from the airport)

- Surrounding Transport Network Peak Hours:

  AM Peak 07:00-08:00

  PM Peak 17:00-18:00

6.44 Additionally, 16 hour (hr), 18hr and 24hr traffic flows have been provided to support the noise and air quality assessments.

6.45 The peak hour analysis has been used for capacity assessments of the highway network and is reported in the TA (see ES Volume 3). The environmental impact from transport has been assessed on the basis of the 24hr (daily) period, whilst the 16hr and 18hr periods are referred to within ES Chapter 9 (Surface Access Noise).

Method of Assessment

Assessment and Baseline Scenarios

6.46 The following scenarios have been considered within the assessment:

- 2016 Baseline Year;
- 2021/22 12-month construction period;
- 2028 Do Minimum (35mppa) scenario; and
- 2028 Development Case (43mppa).

6.47 Transport impact will increase as passenger numbers grow and hence the greatest impact arises when the airport reaches its operational limit. The likely significant operational effects of the proposed development have been assessed against the future 2028 Do Minimum (35mppa) scenario as this is the anticipated year that 43mppa would be reached, based on forecast growth projections.

6.48 Allowance for traffic growth from 2016 to 2028 has been assessed using Uttlesford specific factors derived from TEMPro v7.2. The model forecasts growth in trips up to 2051 for use in transport modelling and accounts for national projections of population, employment, housing, car ownership and trip rates. It also provides a suitable basis for assessing additional trips that will arise from housing and employment growth in and around Uttlesford based on assumed future allocations. Full details of the TEMPro calculations are provided at Appendix E of the TA (see ES Volume 3).

6.49 In addition, the cumulative assessment has considered additional traffic that would be expected to arise from potential non-airport employment development at the north side of the airport, as identified in the emerging UDC Local Plan, albeit that this has yet to gain planning permission. These cumulative schemes are identified in ES Chapters 2 (EIA Methodology) and 17 (Cumulative Effects).

Rail Services

6.50 Baseline rail loading data has been provided by the Train Operating Companies (TOCs) as follows:

- AGA – Autumn 2016 weekday Stansted Express train loadings, seating and standing capacities between Stansted Airport and London Liverpool Street, including the intermediate stations of Bishop's Stortford, Harlow Town, Broxbourne and Tottenham Hale.
- AGA – Autumn 2016 weekday train loadings, seating and standing capacities on services between Stansted Airport and Cambridge.
- CrossCountry – Spring 2016 weekday train loadings, seating and standing capacities on services arriving at and departing from Cambridge from and to Stansted Airport.

6.51 Background growth in rail passenger demand has been increased in line with published studies which take account of anticipated demands along the West Anglia Main Line (WAML) corridor. This accounts for commuter growth on train services as well as demand generated by the planned growth of the airport to 35mppa.

6.52 Planned improvements to rail services, such as the provision of a new Stansted Express train fleet with more capacity, have been factored into the future baseline train loading analysis.

6.53 To assess the impact of the proposed development on the rail network serving Stansted Airport, the forecast increase in air passenger and employee rail demand between the 2028 Do Minimum (35mppa) scenario and the 2028 Development Case (43mppa) has been added to the 2028 future baseline.

Construction Trip Generation

6.54 Construction activity will be limited to a small amount of new airfield infrastructure, comprising two new taxiway links to the runway, six additional stands on the mid airfield (Yankee Remote Stands) and three additional stands at the north-eastern end of the airport (Echo Stands).

6.55 An assessment of the potential effects of construction traffic from the proposed development has been undertaken by considering the nature of the works, the volume of materials and associated Heavy Goods Vehicle (HGV) movements. Information on the construction activities and traffic movements for the proposed development is set out within ES Chapter 5 (Development Programme and Construction Environmental Management).

Development Operational Trip Generation

6.56 Trips have been derived for the 2016 Baseline Year and future 2028 Do Minimum (35mppa) scenario and the 2028 Development Case (43mppa) for all potential modes of travel. Trips have been broken down into passenger trips and employee trips, with the latter covering all airport related employment. Further details regarding the trip generation methodology are provided in the TA (see ES Volume 3). A summary of the methodology is provided below.

6.57 Passenger trips and mode of travel have been derived from the 2016 UK CAA Passenger Survey and applied to each future assessment year for robustness. Passenger mode shares are distinctive and dependent on passenger types, which are broken down into four distinct categories: UK Leisure, UK Business, Foreign Leisure and Foreign Business. The future year models consider any predicted change in passenger types, as established by the ICF forecasting work.

6.58 Due to the unknown destination of foreign trips, all foreign passenger trips have been distributed based on the UK residences provided by STAL, in order to determine a representative total passenger Origin and Destination profile for the baseline and future surface access assignments.

6.59 Vehicle trips have been derived from Car Driver and Car Passenger (including taxis and rental cars) trips. They have been derived from the general passenger trip model using an occupancy rate of 1 person per car driver trip and 1.6 persons per car passenger trip based on data recorded within the 2016 UK CAA Passenger Survey.

6.60 Vehicle trips have been assigned to the highway network based on the “Passenger Place of Origin”. They have been derived from the London Stansted Airport Passenger Origin and Destination data supplied by STAL for 2015/16. Each Origin is assigned a direction (north, west, south or east) and distributed onto the corresponding road links surrounding Stansted Airport.

6.61 The Employee Mode Share and Place of Origin have both been derived from the Stansted Airport Employee Survey 2015 as this is the most recent and validated survey. The mode share for employees varies according to assessment year to reflect the travel planning targets set out in the 2015 SDP. The survey data shows that there has been a continuing decrease in observed employee car driver trips (23% reduction between 2002 and 2015) over the last 13 years. A 10% decrease in car driver trips between 2016 and 2028 has been applied and reallocated to public transport modes in line with observed trends and to adhere with the aims and objectives of the 2015 SDP.

6.62 The 2016 Baseline Year place of origin for both employees and passengers has been applied to all assessment years, as any future changes to person Origin are unknown. Therefore, a consistent and uniform growth within the existing place of origin has been assumed.

6.63 Passenger and employee travel data has been analysed to reflect predicted future daily and peak period trends.

Assessment of Impact

6.64 The approach to assessing the future year trip modelling has been discussed and agreed with UDC, ECC, HCC and HE. Where applicable SDG has incorporated the comments received and updated the methodology for assessment especially relating to traffic modelling. This has informed the TA traffic modelling (see ES Volume 3) and this chapter.

6.65 Based on the trip generation from the proposed development, the magnitude of the potential impacts has been identified for each mode of transport and assessed in accordance with the significance criteria described below. In most instances, both quantitative and qualitative assessments have been undertaken.

6.66 Following this, any proposed additional mitigation and enhancement measures to be implemented as part of the proposed development have been considered and the cumulative residual effects assessed and set out in accordance with the significance criteria.

Types of Effects and Significance Criteria

6.67 Guidance provided by IEMA and DfT[19] has been followed where applicable to identify significance criteria applicable to assess walking, cycling and public transport and vehicle trips associated with the proposed development.

6.68 As further described below, for several effects there are no commonly adopted thresholds of significance, and hence interpretation and professional judgement has been applied based on precedents or quantitative data where available.

Highway Effects

6.69 The principles of the highway impact assessment were discussed at the start of this chapter under the Assessment Methodology sub-section. For those highway links where predicted increases in flows exceed the 10% threshold (a more robust assessment), the following assessment criteria have then been examined in accordance with the IEMA guidelines.

Pedestrian Severance

6.70 Pedestrian severance can be described as the perceived divisions that can occur within a community when it becomes separated by a traffic route. Thresholds for assessing severance are based on changes in traffic flows as set out in the Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 8[20]. This document suggests changes in traffic flow of 30%, 60% and 90% are considered equivalent to 'minor', 'moderate' and 'major' changes in severance respectively.

Pedestrian Delay

6.71 Increases in traffic flows can lead to increases in delay to pedestrians seeking to cross roads. The IEMA guidelines do not prescribe any quantitative significance criteria for the assessment of pedestrian delay. Instead, professional judgement has been used to determine whether pedestrian delays on the local footpaths, if any, would be significant.

Pedestrian Amenity

6.72 The IEMA guidelines describe pedestrian amenity as the relative pleasantness of a journey. It is affected by traffic flow, traffic composition, footway width and separation from traffic. The guidelines suggest that the threshold for judging the significance of changes in pedestrian amenity would be where the traffic flow is doubled. Significance of such an increase beyond that is based on professional judgement.

Pedestrian Fear and Intimidation

6.73 Pedestrian fear and intimidation is caused by a number of factors, including a combination of the volume of traffic, its HGV composition, its proximity to people and the lack of protection caused by such factors as narrow footway widths. The criteria for assessing fear and intimidation in the IEMA guidelines are presented in Table 6.3. The significance is determined from the change of the classification of the degree of hazard for a particular road.

Table 6.3: IEMA thresholds for pedestrian fear and intimidation

Degree of Hazard	Average Traffic Flow over 18 Hour Day (vehicles/hour)	Total 18 Hour Goods Vehicle Flow	Average Speed over 18 Hour Day (miles/hour)
Extreme	1,800+	3,000+	20+
Great	1,200 – 1,800	2,000 – 3,000	15 – 20
Moderate	600 – 1,200	1,000 – 2,000	10 – 15

Accidents and Safety

6.74 The significance of the change to accidents and safety likely to be introduced by the proposed development was assessed by means of professional judgement based on the projected changes to daily vehicle flows and proposed development trips.

Sustainable Travel Mode Effects

Public Transport

6.75 Where data is available, the effects on the capacity of public transport services have been assessed based on the increase in trips in relation to the capacity of the services as predicted for 2028 and the significance criteria set out in Table 6.4 applied.

Walking and Cycling

6.76 In addition to the effects of traffic flows on pedestrians, the effects of the proposed development, including increased walking and cycling trips and the provision of pedestrian and cycle facilities, have also been assessed using the significance criteria set out in Table 6.4.

Construction Related Effects

6.77 The construction related effects have been assessed based on the temporary changes in traffic flows during the construction period which, as described in ES Chapter 5 (Development Programme and Construction Environmental Management), is expected to take place over 12 months from mid-2021 to 2022.

Characterisation of Effects

6.78 All effects have been characterised as being either:

- **Positive**: meaning that the changes produce positive benefits in terms of surface access and transport (such as reduction of traffic, travel time or patronage, or provision of a new service, access or facility); or

- **Negative**: meaning that changes produce adverse effects in terms of surface access and transport (such as increase of traffic, travel time, patronage or loss of service or facility).

6.79 Positive and negative effects have been further characterised as:

- **Negligible**: meaning that the change is too small to cause a noticeable effect and/or to measure meaningfully;

- **Minor**: slight, very short or highly localised effect of no significant consequence;

- **Moderate:** limited effect (by extent, duration or magnitude) which may be considered significant.

- **Major**: considerable effect (by extent, duration or magnitude) of more than local significance or breach of recognised acceptability, legislation, policy or standards.

6.80 Table 6.4 shows the thresholds of significance used to determine the level of significance for various impacts between the 2028 Do Minimum (35mppa) scenario and the 2028 Development Case (43mppa), assessed in accordance with the adopted criteria.

Table 6.4: Significance criteria for Surface Access and Transport

Impact	Magnitude of Impact			
	Negligible	Minor	Moderate	Major
Changes in daily vehicle flows on local roads (links)	Increase or decrease of less than 10% on future baseline traffic flows	Increase or decrease of 10% to 30% on future baseline traffic flows	Increase or decrease of 30% to 60% on future baseline traffic flows	Increase or decrease of over 60% on future baseline traffic flows
Severance	Change in total traffic of less than 10%	Change in total traffic up to 30%	Change in total traffic up to 60%	Change in total traffic of more than 60%
Driver Delay	No change in driver delay	Slight improvement or worsening in driver delay- 30% increase in peak hour delays for congested junctions/links	Moderate improvement or worsening in driver delay between 30% - 60% increase in peak hour delays for congested junctions/links	Substantial improvement or worsening in driver delay between 60 -90% increase in peak hour delays for congested junctions/links

Impact	Magnitude of Impact			
	Negligible	Minor	Moderate	Major
Pedestrian Delay	A judgement based on the routes with two-way traffic flow exceeding 1,400 vehicles per hour in context of individual characteristics and pedestrian activity			
Pedestrian Amenity	Change in total traffic of less than 100%		A judgement based on any links with change in total traffic of over 100% in the context of individual characteristics	
Accidents and Safety	A judgement based on existing accident patterns and the change in collision risk for links and junctions where traffic growth exceeds the 10% threshold			
Fear and Intimidation	Average daily traffic flow of less than 600 vehicles per hour and 18hr HGV flow of less than 1,000 vehicles	Average daily traffic flow of 600 to 1,200 vehicles per hour and 18hr HGV flow 1,000 to 2,000 vehicles	Average daily traffic flow of 1,200 to 1,800 vehicles per hour and 18hr HGV flow 2,000 to 3,000 vehicles	Average daily traffic flow of more than 1,800 vehicles per hour and 18hr HGV flow of more than 3,000 vehicles
Change in Rail Demand to Capacity Ratio (based on total capacity including standing passengers)	No change in the demand to capacity ratio	Increase or decrease of the demand to capacity ratio on services below capacity	Increase or decrease of the demand to capacity ratio on services close to capacity	Increase or decrease of the demand to capacity ratio on services above capacity
Change in Bus/Coach Demand	No change in passenger demand	Increase or decrease in passenger demand on services below capacity	Increase or decrease in passenger demand on services close to capacity	Increase or decrease in passenger demand on services above capacity
Walking and Cycling	No change in convenience or quality of routes	Slight improvement or reduction in convenience or quality of routes	Moderate improvement or reduction in convenience or quality of routes	Significant improvement or reduction in convenience or quality of routes
Construction Traffic	No change in operation of construction routes	Slight increase in delay to other traffic on construction routes	Moderate delays to other traffic on construction routes	Construction traffic causes congestion on construction routes

Assumptions and Limitations

6.81 The key assumptions and assessment limitations are:

General Assumptions

- **Airport Passenger Internal Transfers**: These are passengers that transfer within the airport between arriving and departing flights and do not leave the airport. There is no predicted model of how the proportion of internal transfer trips may change in the future and as such, these have not been accounted for in analysis. Therefore, future external passenger trips included in this assessment are likely to be in the order of 2-3% higher than what will actually occur. The analysis represents a robust and worst-case representation of highway and public transport impacts.

- **Foreign Trips**: A proportion of the trips made by foreign passengers include origin/destinations outside of the UK. 'Place of residence' information for all UK based passengers has been factored to account for all passengers in the absence of foreign residency information.

- **Employee Growth**: Current and forecast airport employee totals are provided in ES Chapter 11 (Socio-Economic Impacts).

- **Stansted Northside Local Plan Allocation:** The likely employee totals to be generated by the Northside development based on the Uttlesford Local Plan allocation has been considered as 'committed development' to understand potential cumulative impact, although no planning application has been submitted to date.

- **Rail Line Loads and Capacity Data**: Due to the commercially sensitive nature of rail passenger data, the TOCs have stipulated limitations on the level of information and analysis that can be presented within the TA (see ES Volume 3) and this ES chapter. The analysis and presentation of the baseline and future rail capacity data contained within this assessment has been reviewed and agreed in principle by the TOCs.

Future Mode of Travel Share Assumptions

- **Passengers**: The 2016 mode share for passengers has been applied to the future assessment years (2023 and 2028). It is expected that public transport share would continue to grow in accordance with historic passenger trends. Nonetheless the assessment is predicted on current modal shares remaining constant, which provides the most robust test for highway traffic.

- **Employees**: The mode share for employees includes a shift of 10% of car driver trips to public transport to align with the targets set out in the 2015 SDP and observed trends.

- **Future Place of Origin**: Any shift in future passenger and employee origins has not been included in the future year passenger modelling, as this cannot be predicted with any degree of accuracy. It has therefore been assumed that existing travel distributions remain valid for future years.

- **Car Occupancy**: To determine the number of vehicle trips per scenario, a car occupancy factor was applied to car passenger, taxi and rental vehicles. This was obtained from the 2016 UK CAA Passenger Survey, through the analysis of car/taxi/hire vehicle trips and group size. A factor of 1.6 persons per vehicle was derived.

Direction of Travel Assumptions

- **Passengers**: Dependent on origin location, each origin subgroup has been assigned a proportional direction of travel to Stansted Airport derived from UK CAA passenger travel surveys. Traffic has been assigned to the highway network by examining quickest highway routes for aggregated areas of trip origin and destination. The areas being more refined when closer to the airport. For example, each district is identified within Essex whilst Kent is considered as a single zone.

- **Employees**: The direction of travel is based on detailed analysis of the current distribution of employee trips derived from the Stansted Airport Employee Survey 2015, which is the most recent and validated survey.

- **Local Roads**: The highway assignment model adopted provides a robust test of the impact of additional traffic on the main access roads to the airport. However, it does not take account of local traffic movements that are known to exist such as those between local service businesses and the airport and other trips from north Essex that may choose to avoid using the major access roads. Accordingly, for the purposes of identifying potential impacts on local highways, a sensitivity test has been adopted that considers the observed use of local roads for access to the airport as this is not fully recognised in the strategic trip distribution and assignment modelling approach set out above.

- **Peak Period Trips**: Passenger vehicle trips are based on observed hourly car park profiles (arrivals/departures); employee public transport and vehicle trips have been derived by hourly increments supplied in the Stansted Airport Employee Survey 2015.

Baseline Conditions

Current Baseline

6.82 To assess the potential effects of the proposed development, it is necessary to determine the environmental conditions and sensitive receptors that currently exist at the airport and in the surrounding vicinity and, where feasible, to consider these under the Do Minimum scenario for both for the construction year (2021/2022) and the Principal Assessment Year (2028).

Highway Network

Strategic Highway Network

6.83 Stansted is well served with direct connections to the trunk road network. Traffic to and from the M11 motorway south have access via the A120 directly from slip roads that access the airport. Traffic from M11 motorway north and A120 west access the airport from the A120 via Junction 8 of the M11 motorway. Traffic from the east has direct access to and from airport roads via a grade separated junction on the A120.

Airport Road Network

6.84 Stansted is served by approximately 37km (23 miles) of on-site roads within the airport boundary, for which STAL is the designated Highway Authority.

Local Roads

6.85 In addition to the main road access points that feed the airport from the Strategic Road Network, there are two access points from local roads. The first is a small connector road that links from Parsonage Road to Coopers End Roundabout, immediately to the west of the terminal and its associated carparks and drop-off zone.

6.86 Parsonage Road is an unclassified Road that leads to Takeley and the B1256 to the south and to Molehill Green and onwards towards Elsenham to the north. A 2017 traffic survey at the mini roundabout and the Parsonage Road entry to the Coopers End Roundabout junction suggests around 34% of the total traffic on the two sections of Parsonage Road east and west of the mini roundabout is associated with the current airport operations, with a similar proportion of traffic using the link from Parsonage Road onto the airport roads at Coopers End Roundabout to continue through to the strategic road network.

6.87 The second connection of airport roads with local highway network is via Bury Lodge Lane to the north west of the airport. This road continues northwards indirectly to Elsenham and provides a connection to Church Road which passes over the M11 motorway and connects through to Stansted Mountfitchet and the B1383.

6.88 Traffic flows on Bury Lodge Lane are of the order of 5,000 vehicles per day (vpd) immediately north of the airport car parks. Church Road carries around 6,000 vpd as it crosses the M11 motorway. The route is used as a convenient means of access to the M11 motorway and A120 from Stansted Mountfitchet direction as well as a means of accessing the airport.

Baseline Traffic Flows

6.89 The baseline daily traffic flows for the external road network are presented in Figure 6.3.

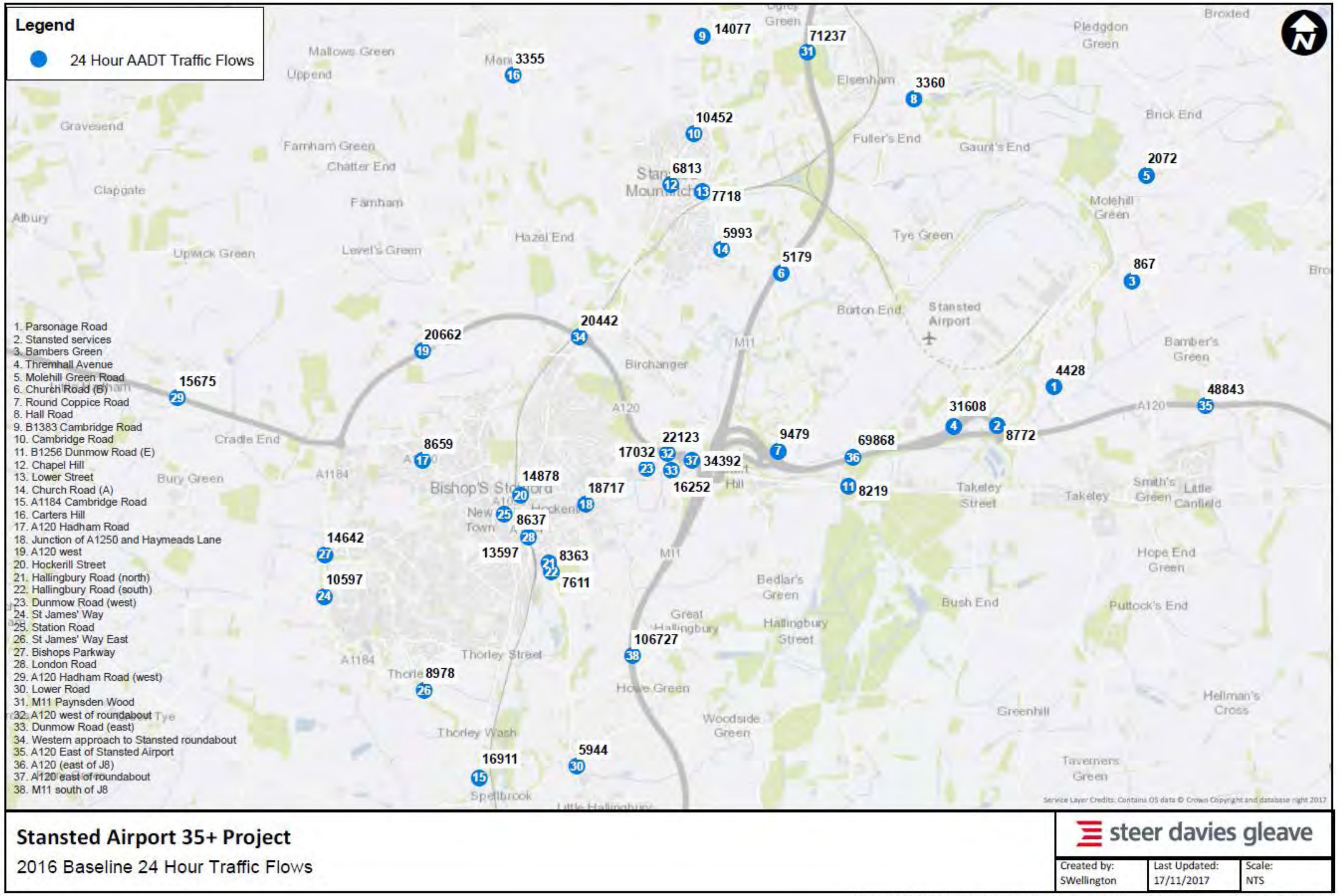

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Figure 6.3: Baseline (2016) network traffic flows

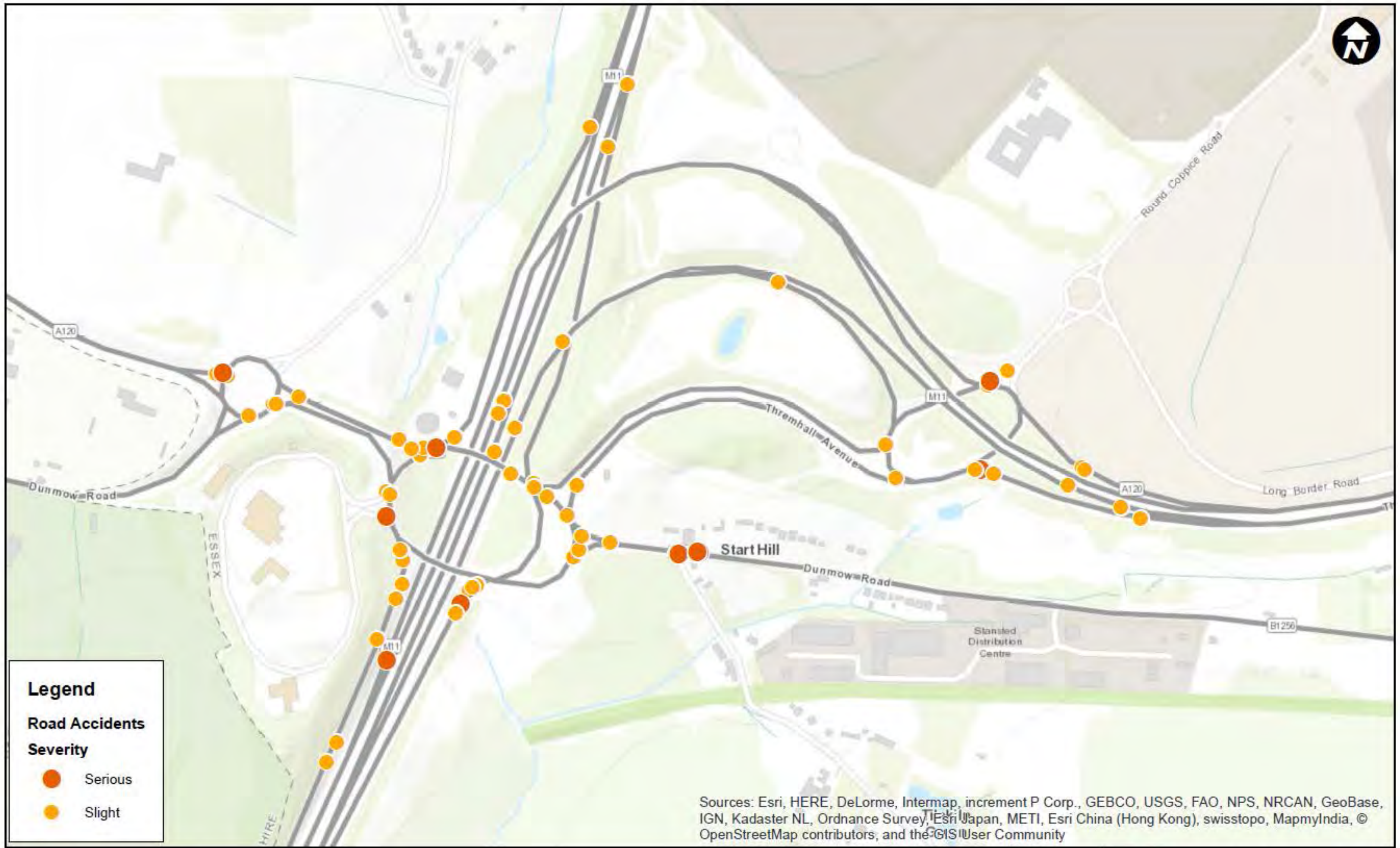
6.90 Table 6.5 sets out the peak traffic flows for both the airport operational peak and highway operational peak hours for the road network immediately surrounding Stansted. The airport PM Peak hour (16:00 – 17:00) represented the overall peak hour for air passenger and employee two-way trips and has been selected as the most robust time period to analyse, in conjunction with the network peaks.

Table 6.5: Baseline peak period traffic flows (2016)

Link and Figure 6.3 Reference Number	Network Peaks		Airport Peak
	AM (07:00 – 08:00)	PM (17:00 – 18:00)	PM (16:00 – 17:00)
Parsonage Road (Ref: 1)	233	368	310
Stansted Services (Ref: 2)	458	623	556
Bamber's Green (Ref: 3)	47	93	73
Thremhall Avenue (Ref: 4)	1,273	2,509	1,707
Molehill Green Road (Ref: 5)	139	212	159
Church Road (B) (Ref: 6)	332	637	368
Round Coppice Road (Ref: 7)	533	1,172	591
Hall Road (Ref: 8)	202	355	254
A120 East of Stansted Airport (Ref: 36)	2,916	4,379	3,774
A120 East of M11 J8 (Ref: 37)	4,171	5,818	5,398

Accident Data

6.91 Personal Injury Accident (PIA) data from July 2012 to June 2017 has been obtained from ECC for the roads in the immediate vicinity of the airport where traffic flow changes are likely to be greatest. Figure 6.4 shows the recorded five-year PIA data for the local road network.



Stansted Airport 35 + Project

Essex County Council Road Accident Locations and Severity (5 year period from 01/07/2012 to 30/06/2017)

steer davies gleave

Created by:	Last Updated:	Scale:
swellington	10/08/2017	NTS

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Figure 6.4: Recorded personal injury accidents on local road network

6.92 Analysis indicates that there have been a total of 73 personal injury accidents recorded near the airport between July 2012 and June 2017, of which 62 accidents have been recorded as slight and 11 as serious accidents. No accidents recorded have had a fatal outcome. None of the accidents recorded involved pedestrians and only three accidents over the five-year period involved cyclists.

6.93 Detailed analysis of all accidents recorded and causation within the study area are provided in Chapter 5 of the TA (see ES Volume 3).

6.94 The three most common road accident causations accounting for 47% of all road accidents in the study area were:

- Failed to look properly;
- Careless/reckless/in a hurry; and
- Failed to judge other persons' path or speed.

6.95 The statistics illustrate that all accidents recorded in the past five years are a result of driver/rider error. The statistics are not considered to have identified any particular accident pattern or safety problems.

Public Transport Network and Services

6.96 Stansted Airport is very well served by public transport services including bus, coach and rail services. The Public Transport Interchange (PTI) facility allows for easy and convenient access between the terminal building and all forms of public transport, and provides for persons with restricted mobility. Full details are provided in Chapter 5 of the TA (see ES Volume 3) and are summarised below.

Rail Services

6.97 The airport rail station is located beneath the main terminal building and forecourt, and has three platforms. Stansted Airport rail station is the terminus of a purpose-built spur off the WAML. There are currently train services which connect the airport directly to London, Birmingham and transport interchanges at Cambridge and Peterborough. Stansted rail station is managed by AGA on behalf of Network Rail.

Stansted Express Service

6.98 AGA supplied Stansted Express loading data for Autumn 2016 (representing a period with high commuter demand). Average weekday loadings at Stansted Airport for services towards London Liverpool Street was 10,011 rail passengers per day. From London Liverpool Street, average weekday loadings for services towards Stansted was 11,329 passengers per day.

6.99 Train loadings, expressed as a percentage of available seats and as a percentage of total capacity (including standing allowance) have been assessed for the following time periods:

- AM Peak – 07:00 – 10:00;
- PM Peak – 16:00 – 19:00; and
- Daily – 00:00 – 23:59.

6.100 Seating and standing capacities on each service are determined by the class of train used and the number of carriages. As the Stansted Express train formations vary across the day, capacities have been averaged to provide the mean peak hour and daily capacities. A summary of the various Stansted Express train formations provided in Table 6.7.

Table 6.7: Stansted Express train formations and capacities

Stock Type	Carriages	Seating Capacity	Standing Capacity	Total Capacity
Class 379 (2011)	4	209	136	345
	8	418	272	690
	12	627	408	1,035
Class 317/5	8	584	380	964

6.101 Table 6.8 provides the 2016 Baseline Stansted Express line loadings in each direction on the point of critical loading of the route which occurs between Tottenham Hale and Harlow and is dominated by commuters traffic to and from London.

Table 6.8: Stansted Express line loadings (2016 Baseline)

	Depart Liverpool Street – Stansted Airport			Depart Stansted Airport – Liverpool Street		
	AM Peak	PM Peak	Daily	AM Peak	PM Peak	Daily
Line loading (seating capacity only)	23%	94%	40%	75%	37%	39%
Line loading (total capacity, incl. standing)	14%	57%	24%	45%	22%	23%

6.102 The data indicates that there is generally spare capacity on Stansted Express services between the airport and London. Average line loadings are nearing average seating capacity during the PM peak on services departing from London Liverpool Street (94%) however spare seats are available and average demand is well below the total available capacity.

6.103 The operator has also provided train loading data for the Stansted to Cambridge service which runs during off-peak periods. Average weekday loadings at Stansted for services towards Cambridge was 286 rail passengers per day in 2016. From Cambridge, average weekday loadings for services towards Stansted was 149 passengers per day. Analysis of the data demonstrates that the AGA services between Stansted and Cambridge operate with significant spare seating capacity throughout the day.

West Anglia Main Line

Rail Infrastructure

6.104 The West Anglian Main Line is double track for most of its length, with small sections of single track on the Stansted branch and at Ware and quadruple track between Hackney Downs and Liverpool Street. At Stansted the spur from the main line passes under the runway as a single track.

6.105 Long term proposals include four-tracking between Coppermill Junction and Broxbourne junction but there is no current commitment to this upgrade. A third track is being introduced between Tottenham Hale and Angel Road Station (to be re-named Meridan Water) to enable additional services to be introduced at the London end of the line, without impacting on the longer distance services, including Stansted Express.

Service Patterns

6.106 The arrangement of tracks and platforms at Stansted Airport provides spare capacity above the current operation of train services. The timetable allows 3.5 minutes for trains to traverse the 2.9km (1.8 miles) between the Tye Green junction and the station, limiting the capacity of the tunnel to 14 movements per hour (seven per direction). In practice, to give Stansted Express a ‘clockface’ 15-minute headway, effective capacity of the rail line is six trains per hour (tph). While six tph at the airport is feasible, the current timetable allows for only four tph.

6.107 The Anglia Route Study[21] (March 2016) produced by Network Rail indicates that based on current rolling stock there is expected to be a capacity gap of approximately 1,000 passengers by 2023 and 2,100 by 2043 in the peak hour on Cambridge and Stansted services into London Liverpool Street.

6.108 The study concluded that lengthening two of the Cambridge and Stansted services from eight carriages to 12 carriages between 08:00 – 08:59 would meet the capacity gap by the end of Control Period 6 (CP6: 2019 – 2024).

6.109 The need for longer trains identified by the study also fed into the East Anglia Franchise process and was shared with the shortlisted bidders. AGA was awarded the franchise to operate the Stansted Express and other rail services between London, Stansted Airport and Cambridge from October 2016. The nine-year franchise will see over £1.4 billion invested into the railway which will include a new fleet of Stansted Express trains from 2019. These will all be 12 carriages long to address the capacity gap identified in the study.

CrossCountry Services

6.110 CrossCountry operate services to and from Stansted Airport to Birmingham New Street at a frequency of one train per hour. Between 07:00 – 09:59 there are three services in either direction which call at a number of stations, including Cambridge, Ely, Peterborough, Leicester and Nuneaton.

6.111 DfT supplied loading data for Autumn 2016 on behalf of CrossCountry. DfT does not hold data for passenger loadings at Stansted Airport, therefore the data show the average weekday passengers on each service and seating and standing capacities on trains arriving at and departing Cambridge to and from Stansted Airport.

6.112 A summary of the 2016 Baseline Year CrossCountry loadings in each direction is presented in Table 6.9.

Table 6.9: CrossCountry Line Loadings (2016 Baseline)

	Arrive at Cambridge – from Stansted Airport			Depart from Cambridge – to Stansted Airport		
	AM Peak	PM Peak	Daily	AM Peak	PM Peak	Daily
Line loading (seating capacity only)	39%	54%	29%	33%	77%	35%
Line loading (total capacity, incl. standing)	32%	43%	23%	27%	62%	28%

6.113 Analysis of the data shows that there is spare capacity on CrossCountry services between the airport and Cambridge. The busiest services are those departing Cambridge during the PM peak towards Stansted Airport with 77% of seats occupied.

Coach Services

6.114 Express coach services provide a high frequency ground transport option for air passengers (and with some employee use) to and from the airport. These provide good value travel options for passengers and for the growing employee base in North and East London.

6.115 There are currently two main operators: National Express and Airport Bus Express, serving London and providing 16 coaches per hour at peak times to London Liverpool Street, Victoria, Stratford, Golders Green, Paddington, Waterloo and Marble Arch. A summary of the services and their frequencies is provided in Table 6.10.

Table 6.10: Express coach services – London

Service	Destination	Frequency	Journey Time
National Express A6	Golders Green/ Paddington	Up to every 30 mins	90 mins
National Express A7	Waterloo/Victoria	Up to every 15 mins	100 mins
National Express A8	London Liverpool St	Up to every 20 mins	65-85 mins
National Express A9	Stratford	Up to every 30 mins	40-65 mins
Airport Bus Express A20	Victoria via Baker St	Up to every 30 mins	120 mins
Airport Bus Express A21	London Bridge & Stratford	Up to every 30 mins	110 mins

6.116 National Express coach services also operate between the airport and other UK towns and cities. Each service runs to and from the airport at a frequency of one bus every two hours. A summary of these coaches and the destinations served is presented in Table 6.11.

Table 6.11: Express coach services – Regional

Service	Destination	Frequency
National Express 727	Cambridge/Thetford/Norwich	Every two hours
National Express 727	Heathrow/Gatwick/Brighton	Every two hours
National Express 737	Luton/Oxford	Every two hours
National Express 250	Ipswich/Colchester/Heathrow	Every two hours
National Express 777	Luton/Coventry/Birmingham	Every two hours
National Express 349/50	Cambridge/Nottingham/Liverpool	Two per day

6.117 There are also three on-airport hotel shuttle services operating from the coach station for use by air passengers and employees. A Stansted Night Run shuttle serves Golders Green, Tottenham Hale, Edmonton Green and Enfield and provides Airport Travel Card holders with a free service that arrives at the airport at 03:40 in readiness for a 04:00 start. Shuttles are also provided from staff car parks to the terminal.

Coach Demand

6.118 Data showing the current demand for Stansted coach services has been provided by the two operators. The data shows the number of monthly passenger arrivals and departures from April 2016 to March 2017. The operators did not provide data on the existing and future capacity of services.

6.119 Passenger data for National Express services has been divided into two categories, 'A' services and 'regional' services to represent those coaches operating between the airport and London and those serving other regional destinations.

6.120 The passenger arrivals and departures by each operator are presented in Figures 6.5 and 6.6 respectively.

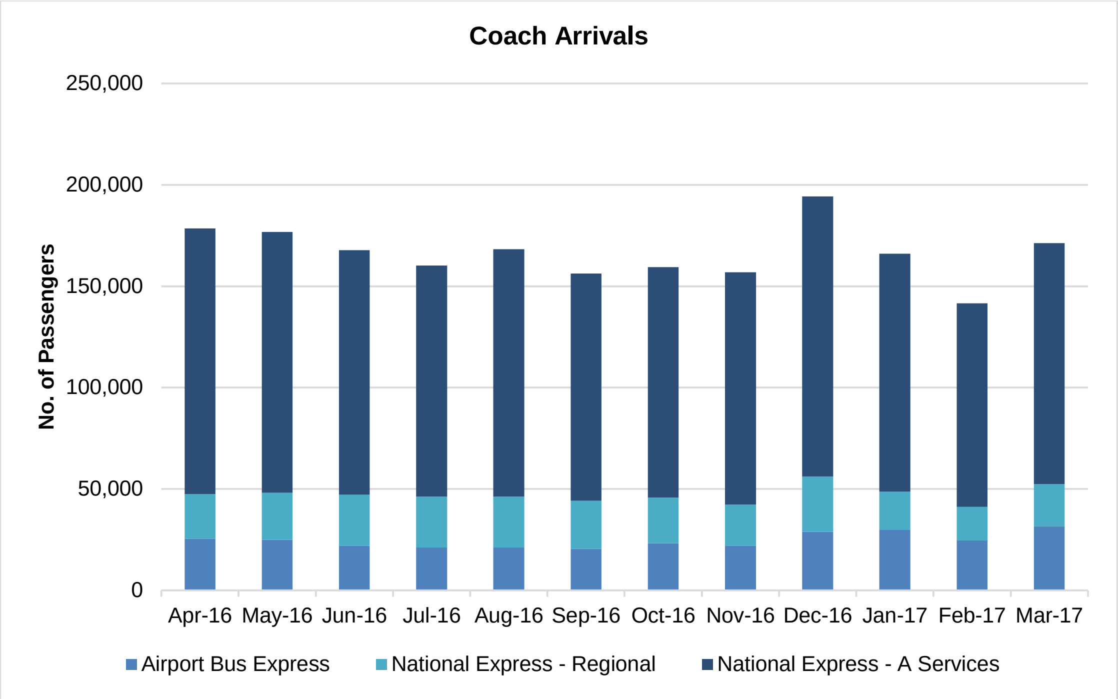

Figure 6.5: Stansted Airport coach passengers – Arrivals

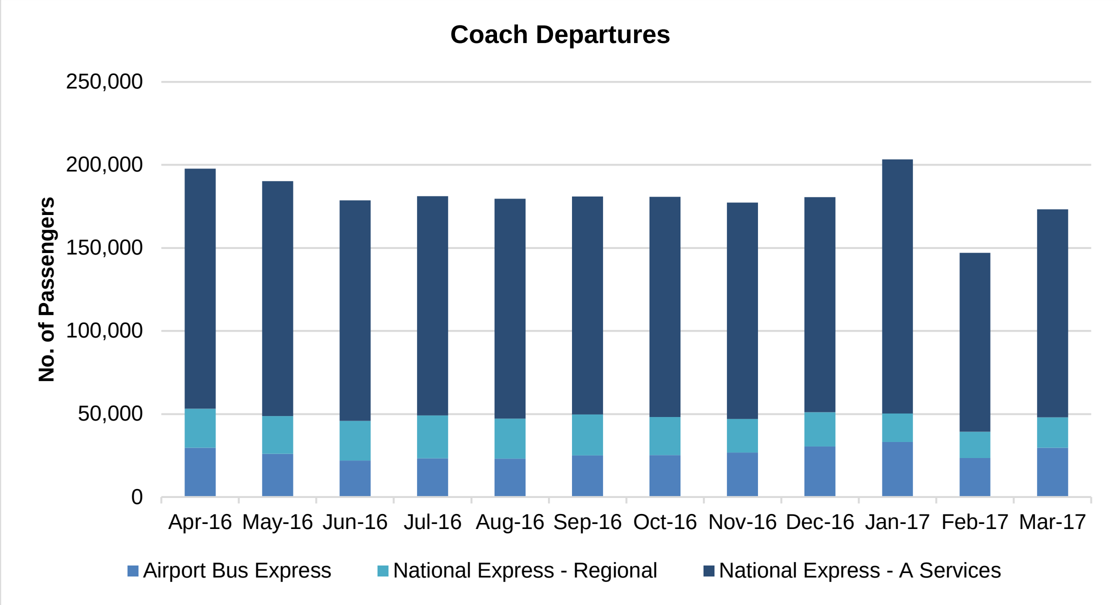

Figure 6.6: Stansted Airport coach passengers – Departures

6.121 Figures 6.5 and 6.6 show that coach services are a popular choice of travel to and from the airport throughout the year. The greatest number of passenger arrivals by coach occurred in December 2016 with 194,220 passengers and the greatest number of departures occurred in January 2017 with 203,294 passengers.

6.122 National Express 'A' services to London account for the greatest proportion of passenger trips by coach. The coach operators have increased services as demand has increased and the coach station has been reconfigured in recent years to best handle peak demands.

Local Bus Services

6.123 A total of 12 local bus services operate to and from the airport. These services and associated daily frequencies are shown in Table 6.12.

Table 6.12: Existing local bus services

Service	Destination	Frequency (Buses Per Day)		
		Monday – Friday	Saturday	Sunday
First X10	Basildon	18	18	18
First X30	Southend	22	22	22
First 42A	Chelmsford	14	13	7
Stephenson's 5	Bishop's Stortford	12	12	0
Stephenson's 6	Saffron Walden	14	13	0
Acme 7	Bishop's Stortford	7	7	0
Acme 7A	Bishop's Stortford	5	5	0
Arriva 133	Colchester	17	17	17
Arriva 309	Bishop's Stortford	10	10	22
Arriva 508	Harlow Town via Takeley	22	23	0
Arriva 509	Harlow Town via Heath Row	24	23	0
Arriva 510	Harlow Town via Forest Hall	39	36	32
	Total	**204**	**199**	**118**

6.124 As shown in Table 6.12, there are around 200 daily bus departures from the airport on weekdays and Saturdays, with 118 departures on Sundays.

Local Access – Walking and Cycling

6.125 Local access includes cycling and walking to and from the airport. Given its rural location, few passengers travel to Stansted via these modes, with some staff living locally able to walk and cycle to work. Pedestrian infrastructure within the terminal area includes footways and crossings to facilitate safe movement around the vehicle and taxi pick-up and drop-off areas. The main terminal is also connected to the PTI facility via escalators, ramps, walkways and lifts for access to coach, bus and rail services.

6.126 There are some demarcated cycle lanes on airport roads and routes serving the airport which provide connections to and from local towns and villages. To the south of the airport, there is a shared use footway/cycleway along the northern side of Long Border Road. This extends from Round Coppice Roundabout to the west to Diamond Hanger at its eastern extent where it then becomes an on-road cycle lane.

6.127 West of Round Coppice Roundabout, the cycleway passes over the M11 motorway and connects the airport with Birchanger and onwards to Bishop's Stortford, a potential key route with ample capacity for accommodating predicted future demands.

6.128 South of the airport, National Route 16 connects Stansted with Braintree via Great Dunmow. The route generally comprises a traffic-free railway path known as Flitch Way. To the east of the airport, regional route 50 provides an on-road cycle connection between the airport and local villages including Mole Hill Green, Henham, Takeley and High Roding. This route follows predominantly quiet rural roads.

6.129 Cycle parking shelters are located throughout the airport in 4 locations; Enterprise House, Cargo Area, Bus/Coach station and at the Short Stay Red car park.

6.130 Stansted Airport's Cycling and Walking Strategy (2016) is part of the wider Surface Access Strategy and a 'daughter document' to the 2015 SDP for the airport and sets out the target to increase the number of employees walking and cycling to and from work. Significant enhancements to improve walking and cycling links to and from local communities have been implemented since M.A.G. took ownership of the airport, together with improvements in facilities and campaigns to raise awareness. Employee cycling is currently at its highest proportion rising from 0% to 0.4% between 2002 and 2015. Equally, the proportion of employees walking to the airport has risen from 0.1% to 0.6% over the same period. STAL is aiming for a further 20% increase and to reach the target of 0.5% of employees cycling to work by 2020.

Incorporated Mitigation

6.131 This section accounts for any 'designed in' mitigation including those required under extant and/or relevant planning conditions, S106 Agreement obligations made under the 2015 SDP.

6.132 There is an overarching commitment to a comprehensive surface access strategy for passengers and staff with details set out in the 2015 SDP. This includes a wide range of initiatives to improve public transport services; secure increased use of sustainable travel modes and targeted improvements to the highway network. Some of these are contained in existing S106 Agreement commitments and planning conditions.

6.133 Financial contributions were provisioned as part of the Unilateral Undertakings associated with the 25+ Permission for mitigation on specific named parts of the HE maintained roads, for growth up to 35mppa. Since these contributions were defined some 10 years ago, it has become apparent to the Highway Authorities that the works originally envisaged are now no longer the most appropriate solutions. In line with commitments made in the 2015 SDP, STAL has therefore been in dialogue over how and where the capital sums could be better directed. There is now a scheme known as the 'Improvement Works' (described in detail in Chapter 5 of the TA, ES Volume 3) to which the airport will now commit the funds towards. This has been agreed as suitable mitigation for growth to 35mppa by the Highway Authorities and Local Planning Authority.

6.134 Improvements to Junction 8 of the M11 motorway have been identified as being necessary in the short to medium term due to the levels of existing traffic and predicted growth in airport operations. Policy TA5 of the emerging UDC Local Plan states:

"Essex County Council in conjunction with Highways England produced a short to medium term improvement to increase traffic capacity at M11 Junction 8. A scheme is planned for joint funding by Highways England's Growth & Housing Fund and the Local Economic Partnership. Preliminary scheme approved by Highways England for further detailed business case assessment. A longer term major improvement is also being developed by the Essex and Hertfordshire County Councils with Highways England for a Road Infrastructure Strategy bid."

6.135 For the purposes of this assessment it is assumed that the short to medium term improvements will be in place by the 2028 Principal Assessment Year.

6.136 Detailed analysis of traffic impact from the proposed development at this junction and other road links is provided in the TA (see ES Volume 3). Any transport contributions to be procured in association with the proposed development will accord with the following policy tests set out in paragraph 204 of the NPPF:

- Necessary to make the development acceptable in planning terms;
- Directly related to the development; and
- Fairly and reasonably related in scale and kind to the development.

6.137 Standard and 'best practice' construction mitigation will be adopted throughout the construction works as described in ES Chapter 5 (Development Programme and Construction Environmental Management). These include the following considerations, which will be set out more fully in the Construction Environmental Management Plan (CEMP):

- Safety and environmental standards and programmes;

- Adherence to designated construction vehicle routes;
- Delivery scheduling of equipment and materials;
- Collaboration with other work sites in the area;
- Implement a Construction Workers travel plan;
- Re-scheduling for out of peak deliveries;
- Use of holding and vehicle call off areas;
- Re-use of material on site;
- Efficient 'SMART' procurement; and
- Materials handling.

Impact Assessment

6.138 This section identifies and assesses the potential effects that are predicted to occur during construction and on completion of the proposed development.

Construction Stage Effects

6.139 Information related to the construction works has been provided within ES Chapter 5 (Development Programme and Construction Environmental Management), which includes an indicative construction programme, predicted construction traffic flows, vehicle routing and the proposed hours of working.

Construction Vehicle Movements

6.140 Enabling works and construction will generate short to medium-term increases in vehicle movements on some airport roads and the strategic highway network. It should also be noted that these increases would not be constant throughout the construction period and consideration has only been given to the highest peak frequency of vehicle movements.

6.141 The number of construction vehicles has been derived based on the anticipated quantity and type of materials required for the construction of the airfield infrastructure and an assessment of the anticipated potential effects of construction traffic has been undertaken.

6.142 A total of around 27,700 construction vehicles movements (two-way) are estimated across the entire 12-month construction programme (2021/22). The average and peak daily construction traffic flows (two-way) would be of the order of 100 and 200 respectively. As such, the HGV traffic would be highly unlikely to exceed a peak of around 20 two-way movements per hour at any point of the day. This represents a worst-case assessment as it considers only the peak operational periods; at other times, construction traffic movements would be less.

Construction Vehicle Distribution

6.143 All construction vehicles would enter and exit the airport via Long Border Road and Bassingbourn Roundabout directly from the A120 and the strategic highway network. Heavy vehicles will be prohibited from using from local roads where the impact of construction vehicle movements would be more noticeable. ES Chapter 5 provides a plan showing the location of the proposed construction compound.

Impact of Construction Vehicles

6.144 Construction traffic volumes are minimal compared with traffic forecasts for the operational phase and compared to existing airport activity. To that end, detailed analysis of the construction phase has not been undertaken for this assessment.

6.145 As set out above any impact during construction in the study area is limited to the strategic road network and the volumes of construction traffic will similarly be minimal compared with background traffic levels on these roads. The existing access currently accommodates HGV movements and would therefore be a suitable access point for construction traffic related to this development.

6.146 When considering the existing (2016) traffic flows to and from the airport, which is approximately 30,000 vehicles per day, the projected overall daily increase in vehicle movements (0.7%) generated by the construction of the proposed development on the wider road network is expected to be of **negligible** significance in terms of total vehicles or HGV traffic and would be within the normal daily variation of traffic.

Pedestrian Movement, Capacity, Severance, Delay, Fear and Intimidation, Amenity

6.147 Potential traffic and transportation related effects could arise causing temporary disruption to road users and pedestrians from vehicles (particularly HGVs) entering and leaving the works site. These could include temporary footway closures and diversion of pedestrian and cyclist movements. However, no such road closures or diversions are anticipated. If required, the associated effects would be local to the airport, of a temporary nature and of **negligible** significance in the absence of mitigation, based on professional judgement and the traffic flow changes predicted.

6.148 Given the low number of construction vehicles associated with the construction works, the effects on pedestrian movement would be of **negligible** significance.

Cycling

6.149 Given the low number of construction vehicles associated with the proposed development and the access routing via the strategic road network, the effects on cycling as a result of construction activities would be **negligible**.

Public Transport

6.150 During the construction period there would be a small increase in the number of workers in the local area, who would generally use the public transport network to access the site. The main Contractor appointed for the work, will be responsible for producing a Construction Transport Management Plan. Based on the proposed working hours stated in ES Chapter 5, the majority of the construction workers would be travelling outside of the airport and network peak periods. Therefore, the significance of effects on the bus and rail network would be **negligible**.

Operational Stage Effects

Proposed Development Trips

6.151 Under the 25+ Permission, the current prediction is that the airport will reach the 35mppa annual cap by 2023, and remain constant at 35mppa for the following future years.

6.152 It is predicted that the maximum use of the single runway based on the ICF passenger growth forecast would continue after 2023 and that the maximum 43mppa will be reached by 2028.

6.153 Therefore, a consistent future baseline of 2028 has been used in order to robustly assess the impact of the Development Case (43mppa) against the Do Minimum (35mppa) scenario.

Air Passenger Growth

6.154 Baseline passenger numbers have been derived from the 2016 ICF Passenger Outputs as discussed in ES Chapter 4 (Aviation Forecasts). The baseline passenger numbers incorporate an uplift to represent future year assessment scenarios as presented in Table 6.13.

Table 6.13: Total passengers per assessment year

Scenario	Number of Passengers per annum
2016 Baseline Year	24,273,000
2028 Do Minimum Scenario (35mppa)	35,000,000
2028 Development Case (43mppa)	43,000,000

6.155 The baseline passenger numbers used are based on a total of 24,273,000 annual passengers in 2016 compared to the 24,317,000 passengers reported in the ICF Stansted Outputs supplied by STAL (2017). As 2016 was a leap year an allowance for this including an extra day in February has been included (assumed as being 0.66 of an average day to take into account this being a quiet time of the year). The Transport Assessment has hence been based on a 2016 annual passenger total of 24,273,000 rather than the reported 24,317,000.

6.156 The forecast air passenger travel demand methodology is presented in full at Chapter 6 of the TA (see ES Volume 3).

Air Passenger Trips

6.157 To forecast the quantum of passenger trips generated by each mode of transport in the 2028 Do Minimum (35mppa) scenario and the 2028 Development Case (43mppa), the forecast number of passengers per annum has been applied to the passenger mode split.

6.158 The following peak hours have been used which will inform the assessment of the impact of the passenger capacity increase on surrounding transport networks:

- Highway AM Peak: 07:00 – 08:00
- Highway PM Peak: 17:00 – 18:00
- Airport AM Peak Arrivals: 05:00 – 06:00
- Airport PM Peak Departures: 16:00 – 17:00

6.159 The peak hours selected are representative of both the peak hours on the highway network and the airport future peak passenger arrivals and departures. In order to account for this, daily passenger profiles were produced for an ‘average’ day at the airport per assessment year. The profile illustrates that the peak arrival time at the airport for passengers is 05:00 – 06:00.

6.160 The PM peak departure period selected was 16:00-17:00 to account for the growth in passengers and predicted uplift in flights.

6.161 The peak hour demand profiles for all modes of transport are presented in Tables 6.14-6.16 for the 2016 Baseline Year, 2028 Do Minimum (35mppa) scenario and the 2028 Development Case (43mppa) respectively.

Table 6.14 2016 Baseline year air passenger travel demand

Passenger Travel Mode	0700-0800		1700-1800		0500-0600		1600-1700	
	Inbound (Air Depart)	Outbound (Air Arrival)	Inbound (Air Depart)	Outbound (Air Arrival)	Inbound (Air Depart)	Outbound (Air Arrival)	Inbound (Air Depart)	Outbound (Air Arrival)
Car Driver	179	63	417	388	525	0	377	299
Car Passenger	265	93	618	574	778	0	559	442
Taxi	155	55	363	337	456	0	328	259
Bus / Coach	271	95	632	588	796	0	572	453
Rail	318	112	741	689	933	0	670	530
Other	2	1	5	5	7	0	5	4
Total	**1,190**	**419**	**2,776**	**2,581**	**3,495**	**0**	**2,511**	**1,987**

Table 6.15: 2028 Do Minimum (35mppa) air passenger travel demand

Passenger Travel Mode	0700-0800		1700-1800		0500-0600		1600-1700	
	Inbound (Air Depart)	Outbound (Air Arrival)	Inbound (Air Depart)	Outbound (Air Arrival)	Inbound (Air Depart)	Outbound (Air Arrival)	Inbound (Air Depart)	Outbound (Air Arrival)
Car Driver	303	184	408	359	667	21	465	527
Car Passenger	448	272	604	531	988	31	688	780
Taxi	263	159	354	311	580	18	404	458
Bus / Coach	459	278	618	543	1,012	32	704	799
Rail	538	326	724	637	1,186	37	825	937
Other	4	2	5	5	9	0	6	7
Total	**2,015**	**1,222**	**2,713**	**2,386**	**4,441**	**139**	**3,091**	**3,508**

Table 6.16: 2028 Development Case (43mppa) air passenger travel demand

Passenger Travel Mode	0700-0800		1700-1800		0500-0600		1600-1700	
	Inbound (Air Depart)	Outbound (Air Arrival)	Inbound (Air Depart)	Outbound (Air Arrival)	Inbound (Air Depart)	Outbound (Air Arrival)	Inbound (Air Depart)	Outbound (Air Arrival)
Car Driver	454	131	532	468	761	20	572	662
Car Passenger	671	194	787	692	1,126	30	846	980
Taxi	394	114	462	406	661	18	497	575
Bus / Coach	687	199	806	709	1,153	31	867	1,004
Rail	806	233	945	831	1,352	36	1,016	1,177
Other	6	2	7	6	10	0	7	9
Total	**3,018**	**872**	**3,539**	**3,111**	**5,064**	**136**	**3,804**	**4,407**

Airport Employee Growth

6.162 Optimal Economics has supplied the current and forecast airport employee totals as outlined in Table 6.17. These employee totals have been used as part of the surface access assessment.

Table 6.17: Employee Population Forecasts for Stansted Airport (Optimal Economics)

Year	Number of Employees
2016 Baseline Year	11,600
2028 Do Minimum Scenario (35mppa)	13,200
2028 Development Case (43mppa)	16,200

6.163 The forecast employee travel demand methodology is presented in full at Chapter 6 of the TA (see ES Volume 3).

Airport Employee Trips

6.164 To forecast the quantum of employee trips generated by each mode of transport in the 2028 Do Minimum (35mppa) scenario and the 2028 Development Case (43mppa), the employee population forecasts have been applied to the employee mode split.

6.165 The network and airport peak hour demand profiles for all modes of transport are presented in Tables 6.18-6.20 for the 2016 Baseline Year, 2028 Do Minimum (35mppa) scenario and the 2028 Development Case (43mppa) respectively.

Table 6.18: 2016 Baseline year employee travel demand

Employee Travel Mode	0700-0800		1700-1800		0500-0600		1600-1700	
	Inbound (Air Depart)	Outbound (Air Arrival)	Inbound (Air Depart)	Outbound (Air Arrival)	Inbound (Air Depart)	Outbound (Air Arrival)	Inbound (Air Depart)	Outbound (Air Arrival)
Car Driver	495	28	33	575	279	16	68	487
Car Passenger	34	2	9	42	50	0	3	35
Bus / Coach	37	6	12	60	170	0	19	44
Rail	71	2	14	63	21	0	35	35
Other	0	0	0	0	0	0	0	0
Total	637	38	68	740	520	0	126	602

Table 6.19: 2028 Do Minimum (35mppa) employee travel demand

Employee Travel Mode	0700-0800		1700-1800		0500-0600		1600-1700	
	Inbound (Air Depart)	Outbound (Air Arrival)	Inbound (Air Depart)	Outbound (Air Arrival)	Inbound (Air Depart)	Outbound (Air Arrival)	Inbound (Air Depart)	Outbound (Air Arrival)
Car Driver	491	28	33	570	277	16	67	483
Car Passenger	58	3	15	71	84	0	6	59
Bus / Coach	52	8	16	85	242	0	27	63
Rail	82	2	17	73	24	0	41	41
Other	0	0	0	0	0	0	0	0
Total	684	41	81	799	627	16	142	646

Table 6.20: 2028 Development Case (43mppa) employee travel demand

Employee Travel Mode	0700-0800		1700-1800		0500-0600		1600-1700	
	Inbound (Air Depart)	Outbound (Air Arrival)	Inbound (Air Depart)	Outbound (Air Arrival)	Inbound (Air Depart)	Outbound (Air Arrival)	Inbound (Air Depart)	Outbound (Air Arrival)
Car Driver	602	35	40	700	340	19	82	593
Car Passenger	71	4	18	87	104	0	7	72
Bus / Coach	64	10	20	105	297	0	34	78
Rail	101	2	21	90	30	0	51	51
Other	0	0	0	0	0	0	0	0
Total	839	51	99	981	770	19	174	793

Impact of Proposed Development

Highway Impact

6.166 The future year baseline traffic conditions under the 2028 Do Minimum (35mppa) scenario consists of background growth of traffic from TEMPro v7.2 and assumed development on the wider highway network and from additional airport activity arising from the currently permitted development at the airport. Figure 6.8 shows the percentage increase in traffic growth on the highway network between the 2016 Baseline Year and the 2028 Do Minimum (35mppa) scenario. This indicates a moderate increase in traffic from the 2016 Baseline Year across the study area, predominantly because of background growth in traffic. Traffic flow increases are noticeably higher close to the airport; which is due to growth up to the currently permitted annual passenger cap and associated employment growth, together with the inclusion of potential traffic associated with employment development at Northside, a local plan allocated site, located to the north of the airport, that has been included as cumulative development in addition to the TEMPro growth factors.

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Figure 6.8: Traffic Growth between 2016 Baseline Year and 2028 Do Minimum (35mppa)

6.167 By comparison with the traffic growth detailed above, predicted traffic increases arising from the increase from the current cap of 35mmpa to the proposed uplifted cap of 43mppa are modest, as illustrated in Figure 6.9. This shows the impact of the proposed development to be limited to less than 3% on most local roads; to be no more than 9% on the trunk roads; and, greater than 10% only on Thremhall Avenue and the short link between Thremhall Avenue to the A120 East.

6.168 In addition, the proposed development will have a minor impact on the operation of Junction 8 of the M11 motorway when compared against the 2028 Do Minimum (35mppa) scenario. This junction is recognised as being subject to peak hour congestion, and hence a lower impact criterion is appropriate. Detailed analysis of the impact of the proposed development on Junction 8 is set out within the TA (see ES Volume 3).

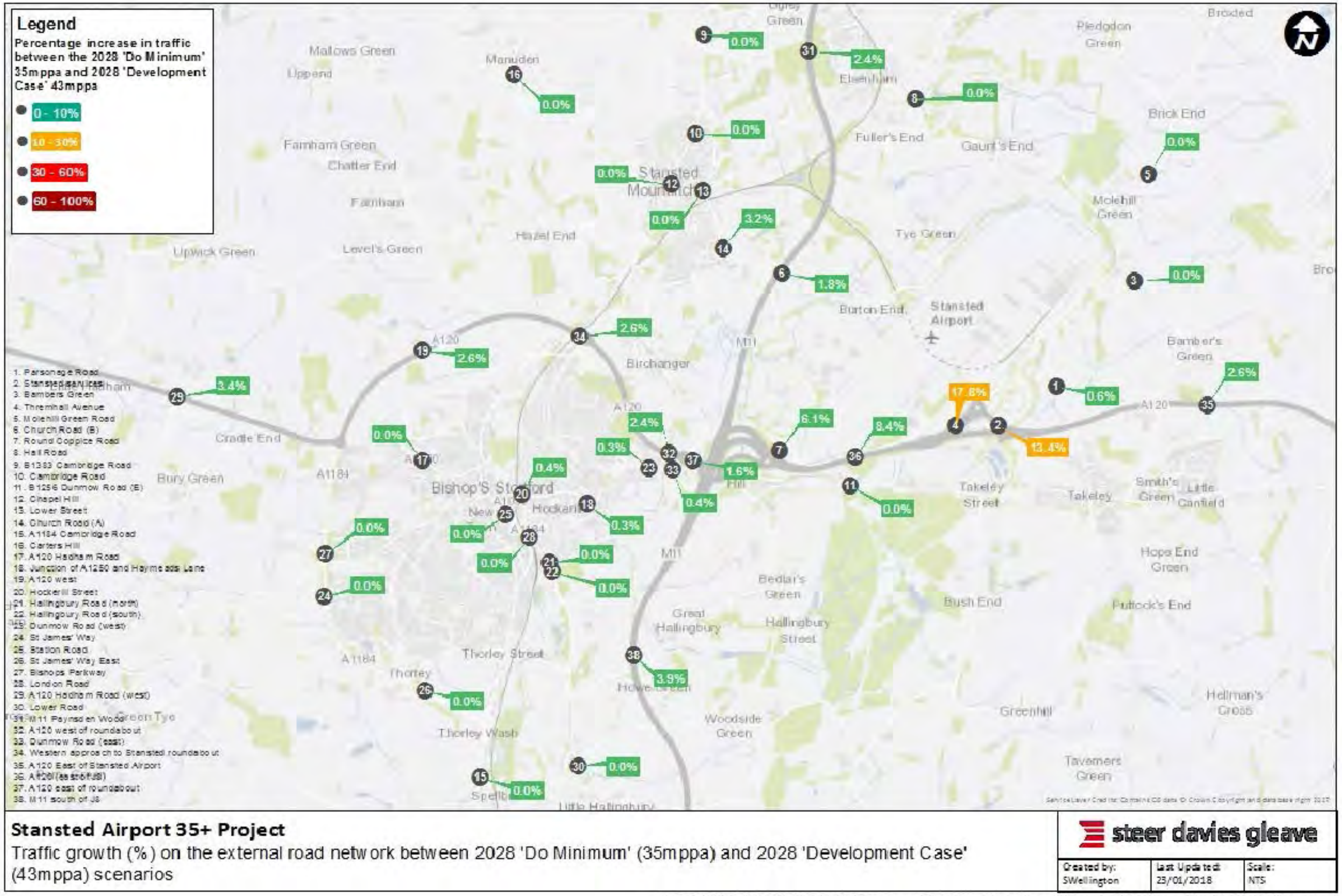


Figure 6.9: Traffic growth between 2028 Do Minimum (35mppa) and 2028 Development Case (43mppa)

Local Road Impact Assessment

6.169 It appears reasonable to assume that the volume of airport related traffic on the local roads may increase in the same proportions as the strategic road network traffic flows. On this basis the airport related traffic on Parsonage Road is forecast to grow from 3,900 vpd to around 5,500 vpd (2028/35mppa) or 6,700 vpd (2028/43mppa) for the two assessed scenarios. Non-airport related traffic would be expected to grow by a factor of 1.17 in the same period. Future total traffic in 2028 would hence be expected to be of the order of 14,300 vpd (35mppa) or 15,600 vpd (43mppa).

6.170 The impact of airport growth is hence an increase in future traffic of around 1,300 vpd or 9%. Airport traffic on Bury Lodge Lane is a lower proportion than on Parsonage Road and hence impact from growth will be lower.

6.171 In summary, it is acknowledged that a notable proportion of traffic on some local roads is associated with the airport and the expansion of airport operations will be expected to increase traffic on these local roads. However, the total volume of traffic will remain low and well within capacity, and the degree of increase is below the 10% impact threshold previously identified.

Consideration of Impact

6.172 Consideration of the impacts on the roads and one junction above the adopted 10% threshold against the seven highway impact criteria detailed in Table 6.4 is set out in Table 6.21 below.

Table 6.21: Assessment of environmental impact – Highway criteria applied to assessed links/junction above the 10% threshold

Criteria	Assessed Links/Junction		
	Link Bassingbourn Roundabout to A120E (Figure 6.9 Ref: 2)	Thremhall Avenue (Figure 6.9 Ref: 4)	M11 Junction 8
Changes in daily vehicle flows on local roads (links)	Minor Negative (increase of 10.3% on future baseline traffic flows)	Minor Negative (increase of less than 17.8% on peak hour operations)	Minor Negative (increase of less than 10% on peak hour operations)
Severance	Not Applicable (no communities affected)		
Driver Delay	Negligible (No change in driver delay)	Negligible (No change in driver delay)	Minor Negative (increase in driver delay)
Pedestrian Delay	Not Applicable (no pedestrian crossings or footways on these links / junctions)		
Pedestrian Amenity	Not Applicable (no pedestrian crossings or footways on these links /junctions)		
Accidents and Safety	Negligible (minimal change in collision risk for links / junctions)	Negligible (minimal change in collision risk for link / junctions)	Negligible (minimal change in collision risk for links / junctions)
Fear and Intimidation	Not Applicable (no pedestrians at risk of fear and intimidation on these links / junctions)		

Epping Forest SSSI Sensitivity Test

6.173 At the request of Natural England, a specific assessment of the potential impact on Epping Forest SSSI associated with 35+ Project (additional 8 million passengers) and the increase in vehicular traffic on the M25, Junction 26-27 link has been undertaken. Further details are provided in the Preliminary Ecological Appraisal included in ES Appendix 16.1, and the traffic analysis is provided at Appendix I of the TA (see ES Volume 3). It is anticipated that a small number of vehicle trips originating in and around north-east London may be expected to access the airport using local and non-trunk roads that pass through Epping Forest. However, it is reasonable to assume that the same local roads would be used for access to the strategic road network even if these trips were diverted to other airports. Any such impact on these local road is therefore considered to be neutral.

Other Transport Related Impacts

6.174 Consideration of the impacts of the proposed development in terms of the project wide criteria is discussed below. The detailed analysis of the public transport impact assessment is included in Chapter 8 of the TA (see ES Volume 3) and summarised below.

Rail Services

6.175 Airport rail demand in the 2016 Baseline Year and 2028 Do Minimum (35mppa) scenario is presented in Chapter 8 of the TA (see ES Volume 3). To assess the impact of 35+ Project on future rail capacity, the 3-hour AM and PM peak and daily rail demand has been used.

Stansted Express

6.176 To determine the impact of the proposed development on Stansted Express rail capacity, the 2028 Development Case (43mppa) (with 8mppa additional airport passenger and related employee rail demand) has been assigned in accordance with the rail distribution assumptions presented in Chapter 8 of the TA (see ES Volume 3).

6.177 The 2028 Development Case (43mppa) train loadings for Stansted Express services, shown as a percentage of seating capacity and as a percentage of total capacity (including standing passengers), are presented in Tables 6.22-6.23 respectively.

Table 6.22: Forecast Stansted Express line loadings (2028 Development Case 43mppa) – seating capacity

	Depart Liverpool Street – Stansted Airport			Depart Stansted Airport – Liverpool Street		
	AM Peak	PM Peak	Daily	AM Peak	PM Peak	Daily
2028 (35mppa)	16%	68%	29%	56%	26%	28%
2028 (43mppa)	23%	73%	34%	56%	32%	32%
% Increase	**7%**	**5%**	**5%**	**0%**	**6%**	**4%**

Table 6.23: Forecast Stansted Express line loadings (2028 Development Case 43mppa) – total capacity (incl. standing)

	Depart Liverpool Street – Stansted Airport			Depart Stansted Airport – Liverpool Street		
	AM Peak	PM Peak	Daily	AM Peak	PM Peak	Daily
2028 (35mppa)	11%	48%	20%	39%	18%	19%
2028 (43mppa)	16%	51%	24%	39%	23%	22%
% Increase	**5%**	**3%**	**4%**	**0%**	**5%**	**3%**

6.178 The line loading forecasts presented in Table 6.28 indicate that there will be spare seating capacity on peak hour and daily Stansted Express services in both directions in the 2028 Development Case (43mppa).

6.179 The increase in seating demand to capacity ratio between the 2028 Do Minimum (35mppa) scenario and the 2028 Development Case (43mppa) is below 8% in both directions for all time periods. Given both lines operate within capacity and show less than an 8% increase in demand to capacity ratio, the effects of the proposed development on Stansted Express rail services would be of **minor negative** significance.

6.180 Detailed analysis of future capacity on AGA services between Stansted and Cambridge has not been conducted. These services operate hourly outside of the peak periods and, therefore, do not attract commuters like the London Liverpool Street services.

6.181 The 2016 Baseline Year daily line loadings accounted for 14% of available seats on services departing from Stansted and 7% of available seats departing from Cambridge. In accordance with the service distribution assumptions, just 4% of all air passengers travelling by rail and 12% of all employees travelling by rail are expected to use this service. This equates to an additional 177 inbound daily passengers and 177 outbound daily passengers at the airport in the 2028 Development Case (43mppa) which will have a **negligible** effect on this line.

CrossCountry

6.182 To determine the impact of 35+ Project on CrossCountry rail capacity, the 2028 Development Case (43mppa) (with 8mppa additional airport passenger and related employee rail demand) has been assigned in accordance with the rail service distribution assumptions presented in Chapter 9 of the TA (see ES Volume 3).

6.183 The 2028 Development Case (43mppa) train loadings for CrossCountry services, shown as a percentage of seating capacity and as a percentage of total capacity (including standing passengers), are presented in Tables 6.24 and 6.25 respectively.

Table 6.24: Forecast CrossCountry line loadings (2028 Development Case 43mppa) – seating capacity

	Arrive at Cambridge – from Stansted Airport			Depart from Cambridge – to Stansted Airport		
	AM Peak	PM Peak	Daily	AM Peak	PM Peak	Daily
2028 (35mppa)	46%	63%	34%	39%	91%	41%
2028 (43mppa)	46%	77%	42%	53%	105%	50%
% Increase	**0%**	**14%**	**8%**	**14%**	**14%**	**9%**

Table 6.25: Forecast CrossCountry line loadings (2028 Development Case 43mppa) – total capacity (incl. standing)

	Arrive at Cambridge – from Stansted Airport			Depart from Cambridge – to Stansted Airport		
	AM Peak	PM Peak	Daily	AM Peak	PM Peak	Daily
2028 (35mppa)	38%	51%	27%	31%	74%	33%
2028 (43mppa)	38%	62%	34%	43%	85%	40%
% Increase	**0%**	**11%**	**7%**	**12%**	**11%**	**7%**

6.184 The line loading forecasts presented above indicate that there will be spare seating capacity on most CrossCountry services during peak periods by 2028 despite the increased passenger throughput of 43mppa. However, some services during the PM peak are likely to operate above seating capacity, at 105%.

6.185 The increase in demand to seating capacity ratio between the 2028 Do Minimum (35mppa) scenario and the 2028 Development Case (43mppa) is between 0% and 14% on lines in both directions for all time periods assessed. Services are forecast to operate with spare standing capacity, including during the PM peak where 15% spare standing capacity is likely to be available on services departing Cambridge to Stansted Airport.

6.186 To address current and forecast capacity issues across their network, CrossCountry consulted on the development of a timetable change between November 2016 and January 2017. The consultation document set out CrossCountry's vision for shaping passenger services to meet increasing demand. This includes providing an extra 1,800 extra seats per day into/out of Birmingham New Street.

6.187 The continued growth of the airport to 43mppa by 2028 is likely to drive further capacity increases on CrossCountry services to accommodate future demand pressure.

6.188 By applying the criteria set out in Table 6.4 the effects of the proposed development on CrossCountry rail services would be of **minor negative** significance.

Coach and Bus Services

6.189 Forecast increases in total bus and coach travel demand between the 2028 Do Minimum (35mppa) scenario and the 2028 Development Case (43mppa) are presented in Table 6.26.

Table 6.26: Forecast 2028 bus and coach demand

	0700-0800		1700-1800		0500-0600		1600-1700	
	Inbound (Air Depart)	Outbound (Air Arrival)	Inbound (Air Depart)	Outbound (Air Arrival)	Inbound (Air Depart)	Outbound (Air Arrival)	Inbound (Air Depart)	Outbound (Air Arrival)
2028 35mppa	509	285	632	627	1,250	32	729	862
2028 43mppa	749	208	823	811	1,446	31	897	1,078
Change	**240**	**-77**	**191**	**184**	**198**	**-1**	**168**	**219**
% Change	**47.2%**	**-27.0%**	**30.2%**	**29.3%**	**15.8%**	**-3.1%**	**23.0%**	**25.4%**

6.190 Table 6.26 shows that the greatest increase in bus and coach demand is likely to occur between 16:00 – 17:00.

6.191 Bus and Coach patronage/loading data is not readily available and therefore an assessment of capacity has not been completed. However, increases in demand from 35mppa to 43mppa will not adversely affect airport bus and coach services. Conversely, this is likely to provide the catalyst for the public transport improvements. This follows the established pattern of the last few years where services have increased to meet demand.

6.192 Local bus and coach service operators can respond quickly to new and potential demand to provide a range of new and improved services to meet demand as it arises. The location of the bus and coach station directly adjacent to the terminal building will not change. However, its capacity will need to increase to accommodate future demand and new services. Options for this are being considered by STAL, and will be delivered as demand requires.

6.193 As the bus loading and capacity data is not readily available, the assessment criteria cannot be directly applied. However, given the level of service currently provided by bus and coach operators, and commitments to continue to meet passenger demand, it is concluded that the change in demand between the 2028 Do Minimum (35mppa) scenario and the 2028 Development Case (43mppa) will have a **minor negative** significance on bus and coach services.

Walking and Cycling

6.194 As mentioned previously, due to the rural location of the airport, few employees or passengers travel to Stansted Airport via these modes. Influencing travel behaviour to encourage more walking and cycling is challenging, especially for walk trips as at present barriers exist to pedestrian movement, most notably, high traffic links including the M11 motorway and A120.

6.195 However, STAL is committed to promoting walking and cycling as a viable means of travel to the airport by local employees. Stansted Airport's Cycling and Walking Strategy (2016) forms part of the overarching 2015 SDP for the airport and sets out the vision to increase the number of employees walking and cycling to and from work. Employee cycling is currently at its highest proportion, rising from 0% to 0.4% between 2002 and 2015. Equally, the proportion of employees walking to the airport has risen from 0.1% to 0.6% over the same period. STAL is aiming to reach the target of 0.5% of employees cycling to work by 2020.

6.196 Significant enhancements to improve walking and cycling links to and from local communities have been implemented since M.A.G. took ownership of the airport in 2013, together with improved facilities and raising awareness.

6.197 The 2015 SDP also identifies the potential for significant future increases in the proportion of employees who cycle to work, as 35% of employees (4,070 people) live within 10km of Stansted Airport. Transport initiatives have been put in place to try and increase the number of sustainable trips, predominantly with employees. Stansted Airport's cycling strategy includes the following measures:

- Improve cycle access from the west and north to Bishop's Stortford, Birchanger, Stansted Mountfitchet and Elsenham;
- Cycle crossing facilities on J8 of the M11 motorway;
- Extend the Sawbridgeworth – Bishop's Stortford link; and
- Storage, shower and secure parking at key locations on site, including Northside.

6.198 In addition, Stansted Airport joined the Government's 'Ride2Work' initiative in 2007 to allow and encourage employees to purchase new cycles from Halfords stores at a 15% discounted rate as an incentive to travel more sustainably to work.

6.199 STAL is committed to sustainable transport and is working jointly with the SATF to support the delivery of national/local policy to encourage travel by sustainable modes. The SATF has been integral in shaping the Surface Access strategy within the 2015 SDP and has been recognised nationally and internationally for the successful way in which it has delivered new transport initiatives, forged strong partnerships and changed the way that people travel to and from Stansted Airport. This has led to Stansted enjoying the highest public transport mode share of any UK airport.

6.200 Given the relatively low walk and cycle mode share, the forecast increases in these trips between the 2028 Do Minimum Baseline (35mppa) scenario and the 2028 Development Case (43mppa) are considered **negligible** and any improvements to infrastructure and quality of access will occur gradually over time through the implementation of the walking and cycling strategy measures.

Table 6.27: Assessment of environmental impact – project wide transport considerations

Criteria	Impact Assessment
Change in Public Transport Demand to Capacity Ratio	Stansted Express Rail Services – **Minor Negative** (increase in demand to capacity ratio on services below capacity). CrossCountry Rail Services – **Minor Negative** (increase in demand to capacity ratio on services below capacity). Coach – **Minor Negative** (minor increase in demand on services).
Walking and Cycling	**Negligible** (no change in convenience or quality of routes).

Further Mitigation

6.201 The cumulative impact of additional traffic arising from the airport and other development in the area along with background traffic growth is predicted to require further enhancement to Junction 8 of the M11 motorway. This enhancement will be necessary to minimise delays caused by road traffic congestion, particularly during the peak commuter hours. Potential works that would offset the impact of the expanded airport operation have been identified. However, it is likely that a more comprehensive scheme may come forward before 2028 and a contribution towards such an approach, procured through a S106 Agreement is likely to be the appropriate way to address this issue.

Table 6.28: Summary of proposed mitigation measures

Receptor	Potential Effects Identified	Proposed Mitigation Measures
Construction		
Highway Network	Minor Negative – short term (slight increase in delay to other traffic on construction routes)	Construction Environment Management Plan (including a Construction Transport Management Plan)
Pedestrians	Negligible / Short Term	None
Cyclists	Negligible / Short Term	None
Public Transport	Negligible / Short Term	None
Completed Development		
Highway Network	Minor Negative impacts due to increased traffic	Contributions to offsite highway improvements to include M11, Junction 8
Pedestrians	Negligible	None
Cyclists	Negligible	None
Public Transport – Rail	Minor Negative impact due to reduced capacity/demand ratio	No infrastructure mitigation required Continued commitment to Travel Plan initiatives, improved wayfinding and working with TOCs through the SATF
Public Transport – Bus/Coach	Minor Negative impact due to reduced capacity/demand ratio	Increased coach capacity-potential additional routes introduced to reflect demand

Residual Effects

6.202 The residual effect from all of the proposed mitigation measures being implemented is set out in Table 6.29. The table shows that all the minor negative impacts associated with the proposed development can be sufficiently offset by further mitigation with all remaining effects being of negligible significance.

Table 6.29: Summary of Residual Effects

Receptor	Description of Residual Effect	Nature of Residual Effect*				
		Significance**	+ _	D I	P T	St Mt Lt
Construction						
Highway Network	Minor Negative short-term highway delays	Negligible	-	D	T	St
Completed Development						
Highway Network	Minor Negative impacts due to increased traffic	Negligible	-	D	P	LT
Public Transport – Rail	Minor Negative impact due to reduced capacity/demand ratio	Negligible	+	D	P	LT
Public Transport – Bus/Coach	Minor Negative impact due to reduced capacity/demand ratio	Negligible	+	D	P	LT

Notes:
* - = Negative / + = Positive
D = Direct / I = Indirect
P = Permanent / T = Temporary
St = Short term / Mt = Medium term / Lt = Long term
**Negligible/Minor/Moderate/Major

Cumulative Effects

6.203 The only significant cumulative effect identified is the potential for increased delay and congestion on Junction 8 of the M11 motorway, as a result of additional traffic arising from growth to 43mppa, along with other development in the area and background traffic growth. This junction has been the subject to detailed consideration by ECC and HE and potential works that would offset any adverse impacts have been identified. However, it is likely that a more comprehensive scheme may come forward, promoted by ECC and HE, before 2028, that would negate the need for the suggested mitigation. As a result, a direct contribution towards such an approach, committed via a Section 106 agreement may be appropriate as an alternative mitigation solution.

6.204 It is clear that there will be some increases in traffic on local roads, albeit not to levels that would create unacceptable traffic volumes or congestion. To mitigate any impact, STAL propose to establish a Local Road Fund to contribute towards local infrastructure schemes. The allocation of these funds will be determined by the Highways Working Group of the STAF, in conjunction with ECC and HCC (as local highway authorities).

References

1 Institute of Environmental Management and Assessment (1993) Guideline for the Environmental Assessment of Road Traffic

2 Essex County Council (2011) Essex Local Transport Plan (2011-2016)

3 Hertfordshire County Council (2011) Hertfordshire Local Transport Plan (2011-2031)

4 Uttlesford District Council (2005) Uttlesford Local Plan

5 Uttlesford District Council (2017) Regulation 18 Local Plan

6 Uttlesford District Council (2016) Local Plan Transport Study

7 Department for Transport Trip End Model Presentation Programme (TEMPro) (2016)

8 Stansted Airport Sustainable Development Plan 2015

9 Stansted Airport Employee Survey 2015

10 Stansted Airport Corporate and Social Responsibility Report 2015-16

11 Stansted Airport Bus and Coach Strategy 2016

12 Stansted Airport Cycling and Walking Strategy 2016

13 Stansted Airport Travel Plan 2014-2019

14 Civil Aviation Authority Annual Passenger Survey 2016

15 ICF Stansted Airport (Air) Traffic Forecasts, 2017

16 London Stansted Airport Passenger Origin and Destination 2015/2016

17 Network Rail London and South East Market Study, 2013

18 Network Rail East Midlands Route Study, 2016

19 Department for Transport (2007): Guidance on Transport Assessment

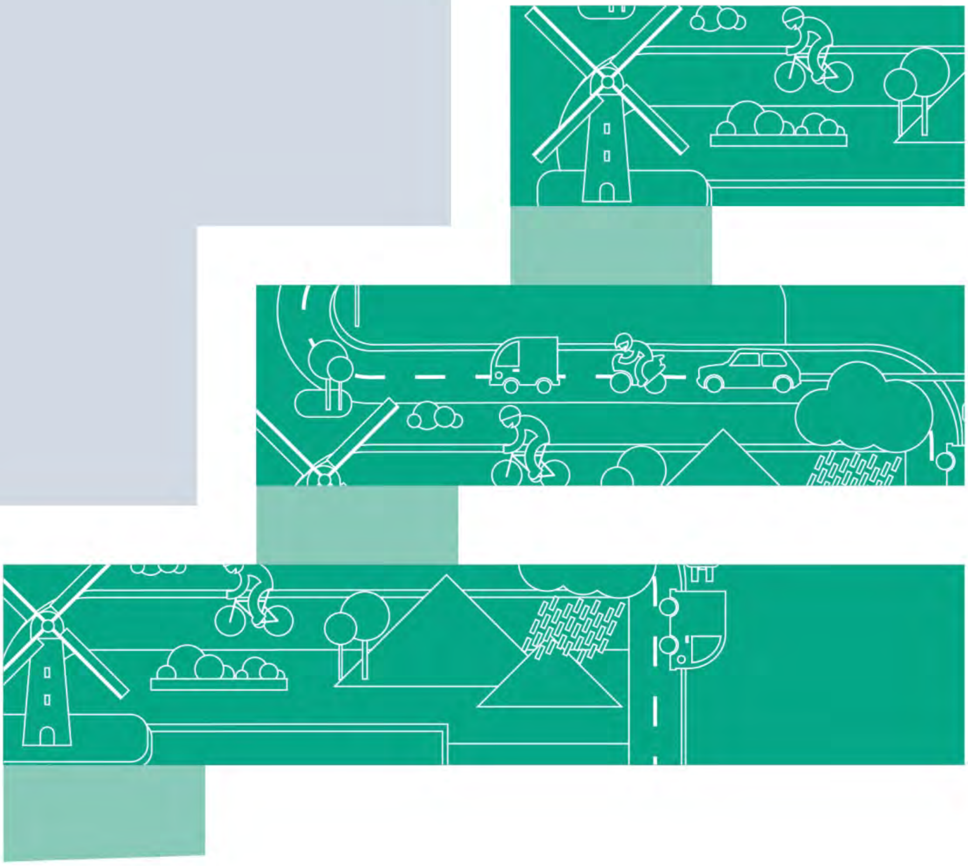
20 Department for Transport (1993) Design Manual for Roads and Bridges – Volume 11, Section 3, Part 8: Pedestrians, Cyclists, Equestrians and Community Effects

21 Network Rail Anglia Route Study 2016

TRANSFORMING LONDON STANSTED AIRPORT

35+ PLANNING APPLICATION

Chapter 7
Air Noise



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7 AIR NOISE

Introduction

7.1 This chapter of the ES has been prepared by Cole Jarman Associates. It considers the impact of air noise associated with the proposed development. The assessment quantifies existing air noise levels (for the 2016 Baseline Year) and those projected to occur in the future, both with the proposed development (Development Case – DC) and without the proposed development (Do Minimum – DM) scenarios. The assessment focuses on the difference in air noise effects between these two scenarios in the Principal Assessment Year of 2028, but also considers intervening years in order to account for changes in air noise over time.

7.2 Air noise is that produced by aircraft during departure and arrival at the airport. It includes the noise generated:

On departure:

- from the point at which an aircraft commences its take-off roll;
- proceeds along the runway to the point of leaving the ground; and
- climbs into the air and departs the vicinity of the airport.

On arrival:

- from the point at which an aircraft approaches the vicinity of the airport;
- descends to the runway;
- touches down;
- slows down along the runway to the point of departure onto a taxiway; and
- includes reverse thrust, if that is required to slow the aircraft down on the runway.

7.3 The application is for minor airfield infrastructure works, as described in ES Chapter 3 (Description of Site, Proposed Development, Policy Context and Alternatives). Through increased airfield efficiency and stand capacity, these works would enable a higher passenger throughput to 43mppa. As this would in turn, require a larger balance of passenger aircraft movements than currently permitted, a combined aircraft movement cap (for PATM, CATM and 'Other' flights) of 274,000 movements is sought.

7.4 The noise assessments are based on detailed air traffic forecasts for the relevant year. These described in ES Chapter 4 (Aviation Forecasts) of this ES. How they have been applied is explained in the following sections.

7.5 This chapter describes:

- Legislation, guidance and planning policy as it affects the assessment of air noise;
- The assessment methodology, including assumptions and limitations, and significance criteria;

- Baseline noise conditions, including an analysis of noise complaints;
- Mitigation incorporated into the current and proposed operations, including operational controls applied at the airport;
- Impact assessment;
- Further mitigation required or desirable to reduce assessed impacts; and
- An assessment of cumulative and residual effects.

7.6 Noise from aircraft operations is considered at the local level to be among the most, if not the single most, significant environmental impact associated with airports. Airborne aircraft noise is described in a number of ways and several metrics are used in this chapter to quantify the existing and forecast noise levels in the local community. These are:

7.7 **$L_{Aeq,T}$**, the average noise level generated by all aircraft overflights in a given time period (T), is the primary metric for quantifying community effects. When averaged over a 16-hour day (07:00 to 23:00) and aggregated over the busy 3-month summer period (92 days between mid-June and mid-September), this measure of aircraft noise has been found in the UK to offer the best correlation with community annoyance. Consistent with the findings of the Civil Aviation Authority's report CAP 1506, Survey of noise attitudes 2014: aircraft[1], this chapter gives it, and the corresponding average over the 8-hour night-time period (23:00 to 07:00), most weight in assessing the scale of impacts arising from the proposed development.

7.8 **L_{den}**, the average over a 24-hour period which incorporates weightings to reflect evening (19:00 to 23:00) and night-time (23:00 to 07:00) operations is used more commonly in Europe and in conformance with EU directives on strategic noise maps and Noise Action Plans. L_{den}, and L_{night} (pertaining only to operations between 23:00 and 07:00) are derived based on operations aggregated over a full calendar year. Their use in this assessment is primarily to determine the scale of health impacts.

7.9 **N65** and **N60** are recently adopted metrics that identify the number of overflights, aggregated over the busy 3-month summer period (mid-June to mid-September), experienced at locations in the community that meet or exceed 65 dB L_{Amax} during the daytime (07:00 to 23:00) or 60 dB L_{Amax} during the night-time (23:00 to 07:00). These metrics are employed because they are believed to be more descriptive and transparent to a non-technical audience and because they are considered to represent an aspect of noise not entirely reflected by the $L_{Aeq,T}$ metric. It is reported in CAP 1506 that this measure has been found in the UK to have inferior correlation with community annoyance than $L_{Aeq,T}$ and for this reason is considered a supplementary indicator and given less weight in assessing the scale of impacts arising from the proposals.

7.10 CAP 1506 therefore advises that while there is merit in considering greater use of Nx metrics as supplemental indictors of noise exposure, evidence based decisions should continue to use $L_{Aeq,16h}$.

7.11 To avoid over complication, the aim has been to keep this chapter focussed and as short as possible. A more detailed analysis of airborne aircraft noise is set out in ES Appendix 7.3 (Air Noise). Tables and figures referred to, but not explicitly contained in, this chapter can be found in that document.

7.12 A full list of the appendices dealing with specific noise issues contained in ES Volume 2 is:

- 7.1 Glossary of Acoustic Terms;
- 7.2 Planning and Assessment Framework;
- 7.3 Air Noise;
- 7.4 Background Noise Measurements;
- 7.5 Complaints Analysis;
- 8.1 Ground Noise;
- 9.1 Surface Access Noise.

Legislation, Guidance and Planning Policy Context

7.13 ES Appendix 7.2 (Planning and Assessment Framework), sets out relevant details of current National and Local Policy as they apply to noise at Stansted Airport, and establishes the basis on which the assessment criteria are derived. ES Appendix 7.3 (Air Noise) then uses the relevant guidance and policy to explain the basis on which noise from aircraft in flight is analysed and assessed in terms of its impact on the local community.

Legal Framework

International Guidance

7.14 A UN body, the International Civil Aviation Organisation (ICAO) is responsible for establishing technical standards and recommended practices (SARPs). After a standard is agreed and adopted, it is put into national effect by each ICAO member state, the UK being one of these. ICAO has established a number of aircraft operating standards, aircraft noise certification and guidelines for a balanced approach to aircraft noise management.

7.15 The ICAO guidance material covered by the Balanced Approach provides Contracting States with an internationally agreed but flexible approach to address aircraft noise problems at individual airports. This balanced approach consists of four key pillars, as described in detail in Sections 1.7 and 1.8 of ES Appendix 7.2. These are:

1. Reducing aircraft noise at source;
2. Land use planning;
3. Changes to operational procedures; and
4. Restrictions on the use of the noisiest aircraft.

7.16 With regard to controlling noise at source, environmental certification standards for aircraft have been adopted by the Council of ICAO. These are contained in Annex 16 (Environmental Protection)[2] to the Convention on International Civil Aviation. This Annex at present consists of three volumes: Volume I (Aircraft Noise), Volume II (Aircraft Engine Emissions) and Volume III (CO_2 Emissions). As explained in Section 1 of ES Appendix 7.2, progressively more stringent standards for noise emissions from new civil aircraft are identified in various *chapters* of Annex 16. Each relevant chapter sets maximum permissible noise levels for different aircraft during landing (approach noise level) and take-off (flyover and side line noise levels). The permissible levels depend on the operating weight of the aircraft and the number of engines it has.

7.17 As explained in section 1 of ES Appendix 7.2, the most recently adopted standards, Chapter 14, apply to all new aircraft entering service after 31st December 2017 (or 31st December 2022 for aircraft less than 55 tonnes in mass). These are set at 7dB lower in aggregate than Chapter 4 limits which apply to all new aircraft entering service after 2006. Chapter 4 limits are in turn 10dB lower than Chapter 3 limits in aggregate. Cumulatively, these changes represent significant improvements in noise emission; as each new generation of aircraft is introduced into operation, people living near airports will experience perceptible and beneficial reductions in aircraft noise.

UK and European Legislation

7.18 The ICAO guidance, contained in the form of SARPs, has been given effect in the form of Directives and Regulations; which have in turn been adopted by the UK.

7.19 The following regulations in relation to aircraft noise are currently in force:

The Aerodromes (Noise Restrictions) (Rules and Procedures) Regulations 2003[3]

7.20 Under the terms of these Regulations, Stansted Airport is designated for the purposes of section 78 of the Civil Aviation Act 1982(c) and the Secretary of State shall be the competent authority in respect of all matters provided for by notice under the section and the airport operator (STAL) shall be the competent authority in respect of all other matters for the purposes of these Regulations. Under Regulation 6, STAL is required to produce strategic noise maps and to adopt a Noise Action Plan (NAP), both which are to be updated every five years.

The Environmental Noise (England) Regulations 2006[4]

7.21 These Regulations transposed the European Noise Directive (END)[5] into UK law, requiring the production of maps from all transportation sources in urban areas by 2007 and the adoption of NAPs to manage noise by 2008.

Night flight restrictions at Heathrow, Gatwick and Stansted[6]

7.22 Under section 78 of the 1982 Civil Aviation Act the Secretary of State for Transport has the power to impose a range of measures to control noise from designated airports, including setting night flight restrictions. Stansted has been designated, along with Heathrow and Gatwick since 1971. The current night noise regime for these airports was set in July 2017 and runs from October 2017 to October 2022. The controls are set out at paragraphs 7.107 to 7.111.

7.23 It is important to note that the restrictions apply over the 6.5-hour period between 23:30 and 06:00, commonly referred to as the night quota period. This is distinct from the 8-hour night period from 23:00 to 07:00 that is used in this chapter to assess the scale of night-time noise impacts.

Policy Framework

National Policy

7.24 The elements of the planning framework that apply to noise emitted by operations at Stansted are described in Sections 4 to 7 of ES Appendix 7.2. They include:

- National Planning Policy Framework (NPPF)[7];
- Noise Policy Statement for England (NPSE)[8];
- National Planning Practice Guidance (NPPG)[9];
- Aviation Policy Framework[10].

7.25 National aviation policy is currently under review and on 2nd February 2017 the Government published a number of policy consultation documents. Those directly relevant to noise are:

- UK airspace policy consultation: executive summary[11];
- UK airspace policy consultation: a framework for balanced decisions on the design and use of airspace[12]; and
- Air navigation guidance on airspace and noise management and environmental objectives[13]

7.26 Also published on 2nd February 2017 were the findings of a study by the CAA to obtain new and updated evidence on attitudes to aviation noise around airports in England. The findings are contained in CAA 'CAP 1506, Survey of noise attitudes 2014: aircraft'**.** A summary of the key findings is set out in Section 5 of ES Appendix 7.2 and Section 10.4 of ES Appendix 7.3.

7.27 On 20th October 2017, the Government published a Consultation Response on UK Airspace Policy[14]. At the same time it published Air Navigation Guidance 2017[15]. The policies set out within the Consultation Response document should be viewed as current Government policy for airspace change[i].

7.28 The Government is required to appointment a competent body to ensure the rules set out in Regulation (EU) 598/2014[16] are followed when operating restrictions are being considered at major airports. The consultation document sets out the Government position, namely that the body in question should be that responsible for making decisions under the planning system. That would be the Local Planning Authority save for all consent applications that fall to be determined by the Secretary of State. As Stansted is a designated airport the Secretary of State will remain the authority responsible for approving noise control changes.

7.29 In July 2017 the Government published the first stage of a consultation process on the future of UK Aviation[17]. The call for evidence document asks for views on the approach the Government is proposing to take and the issues it wants identified as part of a new Aviation Strategy, which sets out a long term vision for the sector to 2050 and beyond.

[i] Paragraph 9 of the Executive Summary

Local Planning Policy

Adopted Local Plan

7.30 In relation to noise, there are a number of policies in 2005 Local Plan adopted by UDC which are described in paragraphs 2.3.11 and 2.3.12 of ES Appendix 7.3.

Regulation 18 Local Plan

7.31 The new Uttlesford Local Plan will be the statutory local planning framework for the District to 2033. When it is adopted it will replace all the remaining saved policies from the Uttlesford District Plan adopted in 2005.

7.32 In relation to noise, and specifically noise associated with operations at Stansted Airport, there are a number of key policies which are identified in Section 14 of ES Appendix 7.2. Key points to be made in relation to aircraft noise are set out in Section 2.3 of ES Appendix 7.3, summarised below as:

<u>*Policy SP11 – London Stansted Airport*</u>

"The growth of London Stansted Airport will be supported and it is designated as Strategic Allocation in the Local Plan.

Proposals for expansion and development will only be supported where all of the following criteria are met:

- *Do not result in a significant increase in Air Transport Movements that would adversely affect the amenities of surrounding occupiers or the local environment (in terms of noise);*
- *Achieve further noise reduction or no increase in day or night-time noise or otherwise cause excessive noise including ground noise at any time of the day or night;*
- *Include an effective noise control, monitoring and management scheme;*
- *Include proposals which will over time result in a significant diminution and betterment of the effects of aircraft operations on the amenity of local residents."*

Assessment Methodology and Significance Criteria

Assessment Methodology

Noise Metrics

7.33 It must be appreciated that the current application is not for an airspace change, as no increase in the number of permitted operations and no changes to aircraft routes are proposed. Nevertheless, the analysis of noise effects has been undertaken having due regard to the recommended methodology and metrics set out in the following CAA guidance documents, where these are considered relevant to the application.

7.34 A comprehensive range of noise metrics have been analysed by reference to CAP 725:2016[18], CAP 1616a:2017[19] and taking account of CAP 1520:2017[20]. These include those recommended by current UK policy and EU Directives as well as emerging metrics. referred to in the recent Policy Consultation Documents, and are set out in Table 7.1.

Table 7.1: Air noise assessment metrics

Metric	Description	Note
$L_{Aeq,16h}$:	16-hour daytime L_{Aeq} value for the period 07:00 to 23:00 based on summer operations during the 92 day period from mid-June to mid-September; plotted from 51 to 72 dB in 3 dB increments	Primary metric for assessing community effects
$L_{Aeq,8h}$	the 8-hour night-time L_{Aeq} value for the period 23:00 to 07:00 based on summer operations during the 92 day period from mid-June to mid-September; plotted from 45 to 66 dB in 3 dB increments	Primary metric for assessing community effects
L_{den}	24 hour L_{Aeq} value with 5dB penalty applied to evening operation (19:00 – 23:00) and 10dB penalty applied to night operations (23:00 – 07:00) based on annual operations; plotted from 55 to 70 dB in 5 dB increments	Health impact assessment metric
L_{night}	8-hour night-time L_{Aeq} value for the period 23:00 to 07:00 based on annual operations; plotted from 45 to 60 dB in 5 dB increments	Health impact assessment metric
N65	number of aircraft noise events exceeding 65dB during the period 07:00 – 23:00 based on summer operations during the 92 day period from mid-June to mid-September; plotted at aircraft movement values of 25, 50, 100 and 200	Supplementary metric for assessing community effects
N60	number of aircraft noise events exceeding 60dB during the period 23:00 – 07:00 based on summer operations during the 92 day period from mid-June to mid-September; plotted at aircraft movement values of 25, 50, 100 and 200	Supplementary metric for assessing community effects
SEL footprints (80dBA and 90dBA)	single event noise exposure for the most frequent aircraft types operating in the night-time period(s)	Additional metric for assessing community effects

Metric	Description	Note
Number of 'Highly Annoyed' People	using the percentage highly annoyed set out in Table 25 of SoNA 2014: Aircraft (CAP 1506)	Additional metric for assessing community effects
Difference Contours	plotted over the range -3 dB ≤ Δ ≤+3 dB, in increments of 1dB	Additional metric for differentiating between assessment cases
Diurnal Variation	change in operations and implications for noise levels throughout the day	Additional metric for assessing community effects

7.35 As noted in paragraphs 7.7 to 7.10, these metrics are accorded different weights in assessing the likely scale of noise impacts forecast to arise as a result of the proposed development.

Assessment Model

7.36 All of the modelling and outputs used in this chapter (and ES Appendix 7.3) have been produced by the CAA's Environmental Research and Consultancy Department (ERCD), using their Aircraft Noise Contour (ANCON) model (current version 2.3). The ERCD is a specialist body within the CAA with national and international expertise on the assessment of aircraft noise. They produce noise contours for the designated London airports, and they generated the noise contours used by the Airports Commission. Their work is robust, authoritative and impartial.

7.37 The ANCON noise modelling package has been the subject of continual development for more than 40 years and conforms to international recommended practices by three major international organisations: ICAO, ECAC (European Civil Aviation Conference) and the SAE (Society of Automotive Engineers). It has been used as the basis for all current and past noise reporting and modelling at Stansted, and all conditions and commitments involving noise metrics are informed by the results of this modelling. This approach is consistent with CAA guidance[ii].

7.38 Aircraft noise modelling in the UK conventionally takes the total number of aircraft movements over a given period, either a full year or the busy 92-day summer period between 16th June and 15th September, and then uses this to develop a typical day of operations. The number of movements by each aircraft type is identified, separated into departures and arrivals and also allocated to different time periods; daytime 07:00 to 23:00, night-time 23:00 to 07:00 and quota night period 23:30 to 06:00, for instance. For historic and baseline contours, actual recorded movements are used: for future year contours forecasts of the likely numbers and mix of aircraft are used.

7.39 The actual aircraft types and numbers used for the average summer day airborne aircraft noise modelling are set out in Schedules A7.3/SCH3 to SCH8 in ES Appendix 7.3.

7.40 Each aircraft type has specific noise characteristics for take-off and landing, which are based on the manufacturers' noise certification data. The noise model uses actual departure and arrival profiles, drawn from air traffic control data. For average noise contours, the effect of each individual movement is aggregated to determine a period average (daytime or night-

[ii] CAP 725: 2016, CAP 1616a: 2017 and CAP 1520:2017

time) noise level for the typical day, allowing for the fact that in aggregate over the full analysis period, both departures and arrivals occur on each runway, the split or operations mode being determined by historic data on the runway use.

Operations Mode

7.41 Stansted's runway is designated Runway 04 or Runway 22 depending on whether aircraft are arriving and departing in a north easterly direction or south westerly direction respectively. Weather determines the runway in use at any given time as aircraft generally land and take off into the prevailing wind. The proportion of movements in each direction is known as the *modal split*. Year on year the modal split can vary, because of variable weather conditions.

7.42 Up to 2016, the 20-year average modal split of operations on Runway 04 – 22 is 73% south westerly (runway 22) and 27% north easterly (runway 04). This is the standard modal split that has been used for the noise assessment in all cases except the re-assessed '2008 25+ planning permission case', described later in this chapter. This is because the modal split used for the 25+ planning application was 76% SW and 24% NE, reflecting the 20-year average modal split at that time (June 2006).

7.43 There are three Noise Preferential Routes (NPRs) or Standard Instrument Departure Routes (SIDS) for each runway direction. Each route is designed to minimise the population overflown. These are termed: BUZAD (BUZ/BKY/CPT), CLACTION (CLN) and DETLING (DET/LAM/LYD), and are shown in the UK AIP for Stansted Airport[21] and in Figure 7.1.

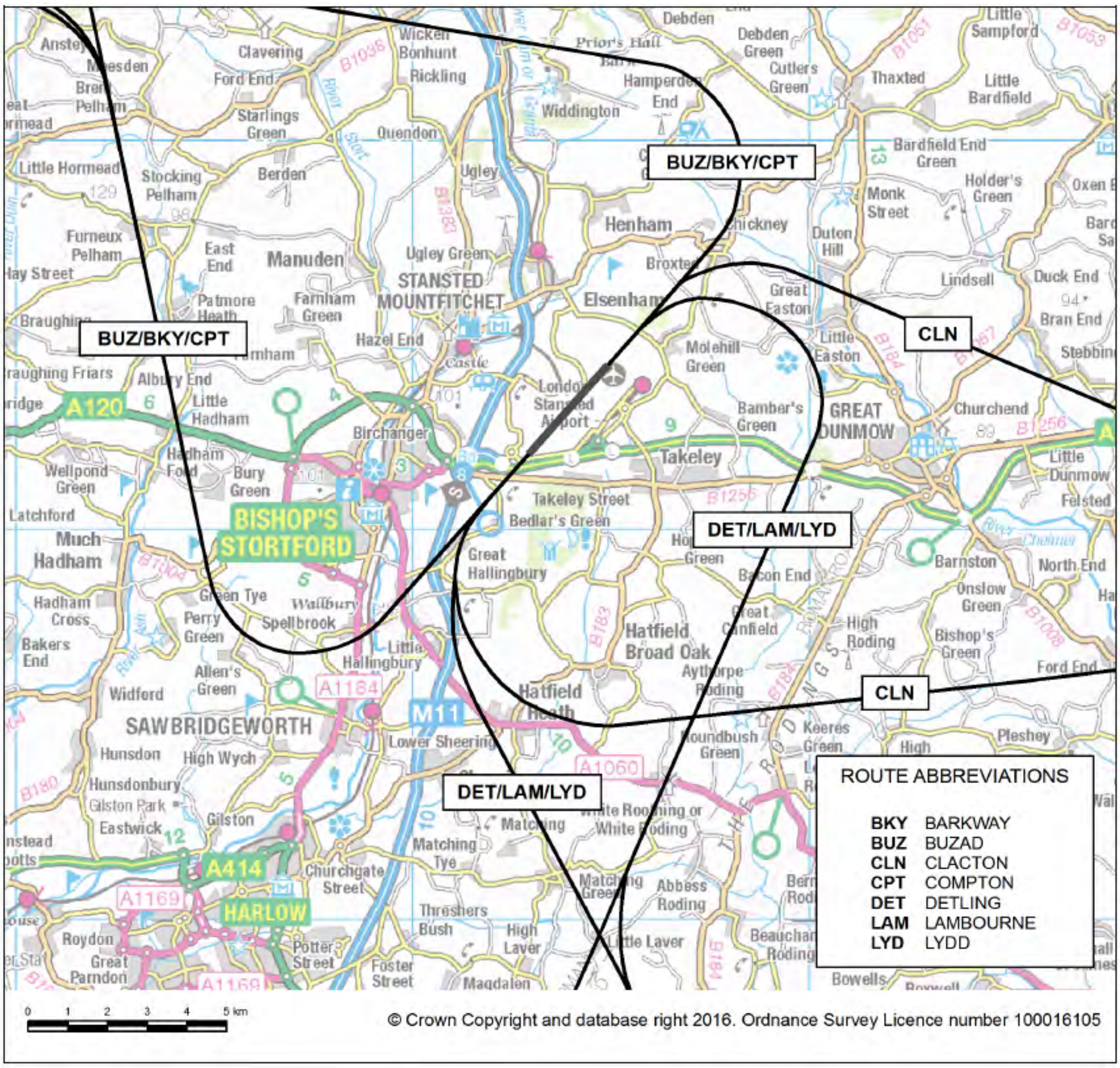


Figure 7.1: Stansted Noise Preferential Routes

7.44 The proportion of departures flying on each route is summarised in Table 7.2.

Table 7.2: Standard apportionment of SID Use for the noise assessment

Runway	Period	BUZ/BKY/CPT	CLN	DET/LAM/LYD
04	Daytime	45%	54%	1%
	Night-time	49%	39%	12%
22	Daytime	45%	54%	1%
	Night-time	52%	36%	12%

Track Dispersion

Existing Procedures

7.45 Departing aircraft should follow the specified route within a swathe either side of the centreline. This varies with distance from the runway up to 3km, (i.e. 1.5km either side of the track centreline). If aircraft are flying within this swathe below a height of 4,000 ft. amsl (above mean sea level), they are deemed to be ‘on track[iii]’. The width of the swathe is designed to give departing aircraft the tolerances they require when flying a particular route given varying wind and climatic conditions.

7.46 On reaching 4,000 ft. amsl at any point along the route, aircraft may be directed by ATC onto more direct headings to their destinations, and are no longer constrained by the noise abatement procedures referred to above.

7.47 The ANCON model uses departure and arrival tracks based on actual radar data for Stansted. Figure F4 in Section 13 of ES Appendix 7.3 shows the departure NPRs along with the permitted dispersion limits and the actual 2016 departure (in green) and arrival (in red) tracks.

Assessment Cases

7.48 Airborne noise modelling has been undertaken for the following operating cases:

- 2008 25+ planning permission, 35mppa
- 2016 Baseline Year;
- 2023 Do Minimum (DM) full capacity, 35mppa;
- 2023 Development Case (DC), 36mppa;
- 2028 Do Minimum full capacity (DM), 35mppa; and
- 2028 Development Case (DC), 43mppa.

7.49 The last of these replicates fully the operating conditions assessed in the 2006 planning application to grow beyond 25mppa. These are the basis of condition AN1 attached to that planning permission, namely that the 57dB $L_{Aeq,16h}$ contour shall not exceed 33.9km^2. (Ancon 2.3 or later.)

7.50 For the reasons set out later in this chapter (paragraphs 7.190 to 7.201), limited noise modelling has also been undertaken for the year 2024. $L_{Aeq,16h}$ summers day contours have been prepared for the 2024 Development Case (DC), 38mppa.

[iii] Explanatory note 7 of EGSS AD 2.21: Noise Abatement Procedures of the UK AIP

Significance Criteria

Range of Observed Adverse Effect Levels

7.51 The Noise Policy Statement for England (NPSE) sets the principles for the effective management of noise. It includes some established World Health Organisation (WHO) concepts for the evaluation of noise. These are; No Observed Effect Level (NOEL), Lowest Observed Adverse Effect level (LOAEL), and Significant Observed Adverse Effect Level (SOAEL). In addition, the concept of an Unacceptable Adverse Effect Level (UEAL) was introduced in the 2014 Planning Practice Guidance. UAEL represents a situation where noise is ‘noticeable’, ‘very disruptive’ and should be ‘prevented’. This contrasts with the SOAEL, which represents a situation where noise is ‘noticeable’ and ‘disruptive’ and should be ‘avoided’.

7.52 Table 7.3 sets out the airborne aircraft noise levels corresponding to the NPSE descriptions used for this assessment. Information on their derivation can be found in Section 11.1 of ES Appendix 7.3.

Table 7.3 Airborne aircraft noise effect levels

Effect level	Noise Level (dB)		Typical Action
	Daytime	Night-time	
NOEL	$L_{Aeq,16h} \leq 51$	$L_{Aeq,8h} \leq 45$	None required
LOAEL	$51 < L_{Aeq,16h} \leq 63$	$45 < L_{Aeq,8h} \leq 54$	Identify, mitigate and reduce to a minimum
SOAEL	$63 < L_{Aeq,16h} < 69$	$54 < L_{Aeq,8h} < 63$	Avoid
UAEL	$L_{Aeq,16h} \geq 69$	$L_{Aeq,8h} \geq 63$	Prevent

Study Area

7.53 The air noise study area is approximately 25 x 30km centred on the midpoint of the runway – the Aerodrome Reference Point (ARP) as defined in the Stansted AIP[22]. It is an appropriate area as it contains all dwellings and other noise sensitive properties forecast to be exposed to noise levels at or above the LOAEL for all assessment cases. The area is shown in Figure 7.2.

Noise Impact

7.54 Any noise impact is focused on the degree to which the noise will change as a result of proposed development. The normal test is to consider the noise levels expected with the development in place and operating at capacity compared to the levels that would exist without the development having taken place but with all existing facilities operating at capacity.

7.55 Section 10.5 of ES Appendix 7.3 correlates specific community responses to changes in noise levels for a number of environmental sources, including aircraft. With regard to human response and the perceptibility of noise level changes, Section 10.6 summarises as follows:

- Noise level changes of less than 3 dB are generally not perceptible and therefore give rise to effects that are negligible;

- Noise level changes of between 3 and 6 dB are perceptible and would generally be equated with a minor perceived difference in the noise climate. They can give rise to effects that are minor;
- Noise level changes of between 6 and 9 dB are clearly perceptible and would generally be equated with a moderate perceived difference in the noise climate. They give rise to effects that are moderate;
- Noise level changes of more than 9 dB are perceptible and would generally be equated with a significant perceived difference in the noise climate. For reference, a 10 dB increase or decrease in noise levels equates to a subjective doubling or halving of perceived loudness. Noise level changes of this magnitude can give rise to effects that are major and significant.

7.56 Change alone does not determine an adverse effect if noise levels are below the LOAEL. The noise level changes used to assess the scale of impact are therefore subject to appropriate threshold tests.

7.57 Taking these factors together, the range of significance criteria used in this assessment is set out in Table 7.4.

Table 7.4: Air noise impact significance criteria

Receptor	Significance criteria	Value of Δ* denoting significance			
		Negligible	Minor	Moderate	Major
Dwellings and other residential buildings Healthcare facilities	Day (07:00 – 23:00) Change in $L_{Aeq,16h}$ ≥ΔdB where outdoor $L_{Aeq,16h}$ > 51dB Night (23:00 – 07:00) Change in $L_{Aeq,8h}$ ≥ΔdB where outdoor $L_{Aeq,8h}$ > 45dB and SEL > 90dBA	<3 dB	≥3 dB	≥ 6dB	≥ 9dB
Education facilities	Day (07:00 – 23:00) Change in $L_{Aeq,16h}$ ≥ΔdB where outdoor $L_{Aeq,16h}$ > 51dB or outdoor L_{Amax} > 75dB	<3 dB	≥3 dB	≥ 6dB	≥ 9dB
Places of worship Community facilities	Day (07:00 – 23:00) Change in $L_{Aeq,16h}$ ≥ΔdB where outdoor $L_{Aeq,16h}$ > 51dB	<3 dB	≥3 dB	≥ 6dB	≥ 9dB

* Δ (delta) represents the change in noise level

7.58 Subject to noise level changes being perceptible, where air noise levels are forecast to increase, the resulting impact is adverse: where they are forecast to reduce, the resulting impact is beneficial. The scale of significance is applied in either a negative or a positive sense

7.59 When assessing changes in aircraft noise levels against the criteria set out in Table 7.4, the modelling results for the busiest 92-day summer period from 16th June to 15th September are considered. This is a long established approach that has been used across the UK aviation industry to reflect the fact that studies of the community response to noise from aircraft in flight have found that levels of annoyance experienced by affected people correlate most closely with the aggregate daily noise levels ($L_{Aeq,16h}$) experienced over this busy summer period.

7.60 This approach has been recently reinforced by the findings of SoNA 2014: Aircraft Noise, a key conclusion of which is that evidence based decisions about aircraft noise should be based on the use the $L_{Aeq,16h}$ metric for a typical summer's day operations.

Supplementary Indicator of Noise Exposure

7.61 It is recognised that people do not all experience noise in an averaged manner and some residents do not intuitively embrace the concept of a time averaged metric such as $L_{Aeq,16h}$ which is reported on a logarithmic scale. On that scale 3dB represents a doubling or halving of noise energy, and this is the minimum change perceptible to the human ear. Therefore, while it is the commonly used metric, this assessment has not solely relied on L_{Aeq} measures. It also includes the use of 'number above (Nx)' contours, specifically N65 average summer daytime (07:00 – 23:00) contours and N60 average summer night-time (23:00 – 07:00) contours.

7.62 'Number above' contours have been plotted at values of 25, 50, 100 and 200. These indicate the number of times that the threshold noise level (65 dB(A) for daytime and 60 dB(A) for night-time) are exceeded at given locations on a typical summer day. This reflects the approach taken in CAP 1506 'Survey of noise attitudes 2014: Aircraft'.

7.63 Importantly, unlike using $L_{Aeq,16h}$ as a daytime average or SEL for individual flyovers, the N65 value gives no indication as to the total noise to which people are exposed nor the actual level of the individual overflights. The metric merely notes the number of time that 65 dB L_{Amax} is reached or exceeded.

7.64 For example, at a particular location where the N65 value is, say, 100 this reflects the number of overflights meeting or exceeding the value on a typical summer's day. However, what cannot be known is whether each overflight is exactly 65 dB L_{Amax} or some substantially higher number. There is a significant difference in noise effect of 100 overflights all at 65 dB L_{Amax} compared to 100 flights all at 85 dB L_{Amax}.

7.65 Another matter for consideration is that a given location might be exposed to a number of overflights that generate L_{Amax} noise levels virtually indistinguishable from 65 dB but not quite at that threshold. The overflight noise effects at this location would not be captured by the N65 contours.

7.66 It is also important to note that 65 dB L_{Amax} as an overflight noise level is linked to a resident experiencing speech interference indoors, rather than being correlated with a community annoyance threshold. In Australia, where the Nx metric was conceived and has been used since the late 1990's, 70 dB L_{Amax} has been used in this context. CAP 1506 also studied the correlation between N70 daytime contours and community response, reflecting previous CAA advice in CAP 725 that N70 contours would constitute a useful supplementary indicator of aircraft noise effects. However, N65 is preferred as a supplementary indicator of overflight effects because, as set out in paragraph 8.10 of CAP 1506, noise events in many areas are already beginning to occur at levels below 70 dB L_{Amax} and are forecast to reduce over time.

7.67 The use of N65 and N60 contours provide useful supplementary information on the effects of aircraft noise on a community, but current UK practice gives them subsidiary status in relation to $L_{Aeq,T}$. CAP 1506 states that evidence based decisions shall continue to use $L_{Aeq,16h}$.

Noise Sensitive Receptors

7.68 Different sensitivity criteria have been used for different receptors. These are summarised below, and Section 12 of ES Appendix 7.3 provides more detail.

Dwellings

7.69 All the major UK noise studies have been based on surveys of people living in houses affected by aircraft noise. The adverse effects most likely to be experienced are annoyance and, for night-time operations, sleep disturbance.

7.70 Consideration is given not only to existing dwellings in the vicinity of the airport but also those that can reasonably be expected to be constructed as a result of committed development plans. The development sites that are considered relevant for assessment are identified in Schedule 7.3/SCH2 of ES Appendix 7.3. Further details on these committed developments are provided in ES Chapter 17 (Cumulative Effects).

Education

7.71 51 dB $L_{Aeq,16h}$ has been adopted as representing the LOAEL for aircraft noise in the community given the sensitivity of the learning environment to aircraft noise. This indicates a significance criterion of noise level increases of ≥ 3 dB when the value of $L_{Aeq,16h}$ is greater than 51 dB.

Healthcare

7.72 Given that healthcare facilities catering for in-patients are sensitive to aircraft noise in a similar manner and over the same time periods as dwellings, the same significance criteria have been applied.

Places of Worship

7.73 For churches and other places of worship, speech intelligibility and freedom from excessive disturbance are important. These are similar to the daytime objectives in dwellings and so the same criteria have been used.

Community Facilities

7.74 For community facilities such as village halls, the similarity in use and desirable acoustic environment to those described above for places of worship mean that the same significance criteria can be applied.

Schedule of Identified Receptors

7.75 Table 7.5 lists the noise sensitive receptors, other than dwellings, that have been identified within the air noise study area. At each of these locations an assessment of air noise effects has been undertaken using the appropriate significance criteria. They are shown on a plan of the study area in Figure 7.2.

Table 7.5: Noise sensitive receptors that are not dwellings

	Receptor	Postcode	Easting	Northing
	SCHOOLS			
1	Howe Green School	CM22 7UF	550890	220250
2	Spellbrook Primary School	CM23 4BA	548610	217260
3	Little Hallingbury C of E Primary school	CM22 7RE	550130	217530
4	North and West Essex Adult Community College	CM20 1NW	544050	210640
5	Thaxted Primary School	CM6 2LH	563090	230930
6	The Leventhorpe School	CM21 9BY	548160	215810
7	Great Sampford Primary School	CB10 2RL	564330	235460
8	Thorn Grove Primary School	CM23 5LD	549670	220690
9	Mandeville Primary School	CM21 0BL	547860	215430
10	The Bishops Stortford High School	CM23 3LU	548950	219770
11	Birchwood High School	CM23 5BD	550400	212840
12	High Wych C of E Primary School	CM21 0JB	546210	214120
13	Summercroft Primary School	CM23 5BJ	550150	221590
14	Hatfield Heath Primary School	CM22 7EA	548630	221170
15	Thorley Hill Primary School	CM23 3NH	548860	219760
16	Herts and Essex High School	CM23 5NJ	549530	220520
17	Reedings Junior School	CM21 9DD	548380	215300
18	Hockerill Anglo European College	CM23 5HX	549500	221530
19	Richard Whittington Primary School	CM23 3NP	548300	219780
20	All Saints C of E Primary School	CM23 5BE	549760	221840
	HEALTHCARE			
21	Falcon House Little Hallingbury	CM22 7PP	549850	217940
22	Humfrey Lodge, Thaxted	CM6 2PX	561000	231420
23	Herts and Essex Hospital	CM23 5JH	549790	220870
24	Lyne Driscoll, High Wych	CM21 0HN	546450	214460
25	Saint Elizabeth's Centre, Much Hadham	SG10 6EW	543870	216880
	PLACES OF WORSHIP			
26	St Giles Church, Great Hallingbury	CM22 7TZ	550980	219660
27	St Mary the Virgin Church Broxted	CM6 2BU	557730	227410
28	Ebenezer Chapel Molehill Green	CM22 6PH	556340	224960
29	St Mary the Virgin Church Chickney	CM6 2BY	557310	228080
30	Thaxted Baptist Church	CM6 2ND	561100	230850
31	St Mary the Virgin Church Little Hallingbury	CM22 7RE	550200	217530
32	Thaxted Church (St. John the Baptist) Thaxted	CM6 2QY	560920	231060
33	Thaxted URC Church	CM6 2PY	560720	230930
	COMMUNITY FACILITIES			
34	Thaxted Anglican Church Hall	CM6 2PY	560720	230930
35	Little Hallingbury Village Hall	CM22 7RD	550170	217360
36	Thaxted Baptist Church Hall	CM6 2ND	561100	230850
37	The Barn Theatre Little Easton Major	CM6 2JN	560300	223570

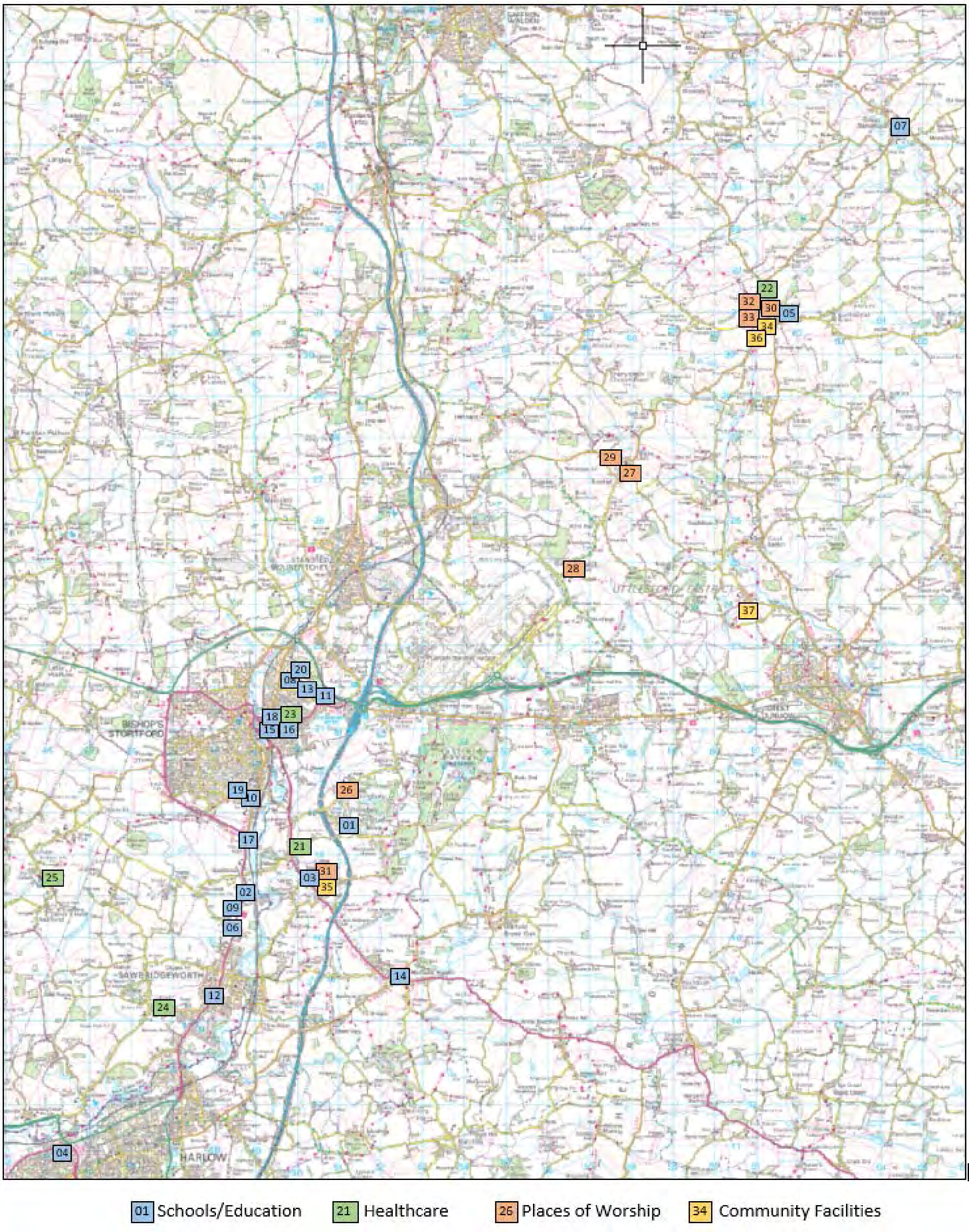


Figure 7.2: Plan of study area showing noise sensitive receptors that are not dwellings

Assumptions and Limitations

Operations

7.76 Forecasts of the different aircraft types and numbers flying on each of the departure and arrival routes underpin the noise study and related conclusions. The data used for this study are summarised in ES Chapter 4 (Aviation Forecasts) with additional information on aircraft types and number supplied by ICF, ACL and STAL's own forecasters.

Accuracy

7.77 ERCD has conducted a study of the long-term noise measurements at 16 monitors around Heathrow Airport[23] and how they compare to the ANCON noise model predictions. Table 4.4.1 of that report identifies that the majority of differences between measurements and modelled data were within ± 1 dB, and the average noise level difference was 0.1 dB. This level of accuracy is considered to apply to the current modelling of noise levels around Stansted. The ANCON model is regarded as technically robust, accords with international standards and is used for the preparation of noise contours for the other major airports in the UK.

7.78 The calculation of population and number of households is based on a 2016 update of the 2011 Census supplied by CACI Ltd. A value of 2.4 people per household is used, and all numbers, of households and population counts, are rounded to the nearest 50.

Aircraft Noise Levels

Current Aircraft

7.79 Noise performance data for existing aircraft types are held in the ANCON noise model database.

Future Aircraft

7.80 New generation aircraft types, conforming to the new ICAO Chapter 14 certification standard, which are starting to enter into service, include the Airbus A319, A320 and A321 NEO (New Engine Option) and the Boeing B737-MAX family (often referred to as Generation 1). Their noise performance has been assessed by reference to:

- ICAO certification data where relevant; and
- the ERCD database (also used for the work of the Airports Commission).

7.81 The largest operator at Stansted, Ryanair, currently operates Boeing B737-800 aircraft on an almost exclusive basis. The replacement aircraft that it has ordered from Boeing is the B737-MAX200[iv]. It is a Ryanair specific variant of the 737-MAX8 with a seating capacity of 197.

7.82 The noise level adjustments used by ERCD for Generation 1 narrow body jets compared to today's fleet are set out in Table 7.6.

Table 7.6: Adjustments to current aircraft noise levels for new generation variants

Aircraft Type	Departure	Arrival
Airbus A319 neo	-5.2 dB	-2.6 dB
Airbus A320 neo	-5.2 dB	-2.6 dB
Airbus A321 neo	-6.3 dB	-1.8 dB
Boeing 737-MAX8	-3.0 dB	-2.2 dB

[iv] http://corporate.ryanair.com/news/ryanair-buys-another-10-boeing-737-max-200s-bringing-firm-orders-to-110-with-100-options-outstanding/

Baseline Conditions

7.83 The preceding sections of this chapter describe that policy background to aircraft noise assessments as well as the basis on which the analyses are undertaken, which receptors are most sensitive to noise and the key operating parameters that need to be taken into account. This section describes the environmental conditions in the 2016 Baseline Year. It is an important precursor to the remainder of the chapter, which considers the noise effects arising from the proposed development, as it provides context on the degree and type of change that might be expected.

Character of the Area

7.84 Reaction to aircraft noise depends on a wide range of factors such as the general noise environment including the background noise. At Stansted, the existing noise environment is mostly dominated by road traffic which is audible at all locations studied and is a combination of very busy roads such as M11 and A120 and lightly trafficked local roads. The closer to a busy road a receptor point is located, the louder and steadier will be the perceived traffic noise.

7.85 Some properties to the west and south of the airport are located sufficiently close to the West Anglia railway line that train noise will also be a feature of the noise environment.

7.86 Otherwise the noise experienced will depend on the locality, which can vary from ‘busy urban’ in large towns, such as Bishops Stortford and Harlow, to ‘semi urban’ in smaller towns, such as Stansted Mountfitchett, Sawbridgeworth and Great Dunmow, to relatively rural in the large number of smaller villages across the study area.

7.87 Aircraft noise is audible at many locations, the level and frequency of which depends on the proximity of receptors to the flight paths and the airport itself. Close to the airport boundary, noise from ground operations is audible as a relatively steady background noise. At greater distances, only noise from aircraft in flight is audible. The actual level experienced at any given receptor will depend on its location relative to the departure or arrival route.

Noise Levels

Measurements

7.88 Baseline noise levels were taken from various surveys. These comprised:

- Attended measurements, carried out over relatively short time intervals between April and August 2017; and
- Unattended measurements carried out over matters of days, between December 2016 and August 2017.

7.89 ES Appendix 7.4 sets out more details, along with the locations, procedures, methodology and instrumentation used.

7.90 The measurement locations were chosen to reflect the density of population and flight paths. Figure 7.4/F1 of ES Appendix 7.4. also shows the locations of the Stansted permanent noise monitors which provide continuous long-term noise measurements of aircraft and background noise.

Results

Short Term Attended Measurements

7.91 The daytime noise levels and contributing noise sources are set out in Table 7.7.

Table 7.7: Short term attended daytime noise survey results

	Measurement Position	Range		Typical Noise Sources
		L_{Aeq}	L_{A90}	
1	Bishops Stortford	54-57	48-50	Frequent traffic along Dunmow Road, distant aircraft flyovers, wildlife audible.
2	Great Hallingbury	60	48-49	M11 motorway noise, local vehicle pass-bys, aircraft flyovers (landing on Rwy 04, departures on Rwy 22)
3	Little Hallingbury	56-60	46-47	M11 motorway noise, regular local vehicle pass-bys, aircraft flyovers (landing on Rwy 04, departures on Rwy 22)
4	Hatfield Forest	48-53	41-44	Distant traffic on A120, local traffic, aircraft movements.
5	Takeley	51-55	45-46	Local traffic, aircraft movements at some times, no movements at others.
6	Elsenham	67-68	45-46	Frequent traffic along Henham Road, aircraft departures some distance away.
7	Tye Green	56-58	45-46	Aircraft movements, very occasional traffic along Claypitt Hill, cockerel/chickens, neighbourhood noise, aircraft ground movements.
8	Stansted Mountfitchet	54-58	43-50	Frequent traffic along Church Road: cars, vans, HGVs.
9	Broxted	63-66	39-42	Regular road traffic, aircraft arrivals (Rwy 22 in use), aircraft departures (Rwy 04 in use).
10	Plegdon Green	55-62	36-40	Occasional vehicle pass-by, aircraft arrivals (Rwy 22 in use), aircraft departures (Rwy 04 in use).
11	Brick End	57-63	42-45	Light and heavy vehicle pass- bys a regular occurrence, aircraft flyovers, birdsong
12	Thaxted North	57-58	39-40	Intermittent traffic on Wedow Road and nearby roads, landing aircraft (Rwy 22 in use), distant departing aircraft (Rwy 04 in use).

	Measurement Position	Range		Typical Noise Sources
		L_{Aeq}	L_{A90}	
13	Thaxted South	67-69	53-55	Frequent light and heavy vehicle traffic on B1842, aircraft departure just audible (Rwy 22 in use), aircraft departure more audible (Rwy 04 in use).
14	Hatfield Heath	56	49	General traffic, HGVs, aircraft flyovers
15	Great Easton	66	39	B182 traffic, vehicle pass-bys at junction, aircraft flyovers
16	Bran End/Stebbing	58	41	Vehicle pass-bys, distant road traffic, aircraft flyovers, neighbourhood noise, some construction activity

7.92 The night-time noise levels and contributing noise sources are set out in Table 7.8.

Table 7.8: Short term attended night-time noise survey results

	Measurement Position	Range		Typical Noise Sources
		L_{Aeq}	L_{A90}	
1	Bishops Stortford	44	34	Intermittent traffic along Dunmow Road, occasional distant aircraft flyovers, wildlife audible.
2	Great Hallingbury	52	43	M11 motorway noise, local vehicle pass-bys, occasional aircraft flyovers (landing on Rwy 04, departures on Rwy 22), cockerel and birdsong in daylight hours
3	Little Hallingbury	48	40	M11 motorway noise, local vehicle pass-bys, occasional aircraft flyovers (landing on Rwy 04, departures on Rwy 22)
4	Hatfield Forest	41	38	Distant traffic on A120, occasional aircraft movements.
5	Takeley	48	46	Distant road traffic, occasional aircraft departures and flyovers, local traffic, birdsong during daylight hours.
6	Elsenham	59	44	M11 motorway noise, infrequent car pass-bys, occasional aircraft flyovers.
7	Tye Green*	50	46	M11 motorway noise, aircraft departing and arriving, aircraft ground movements, vehicle pass-bys.
8	Stansted Mountfitchet	51	46	M11 motorway noise, local traffic, occasional distant aircraft flyovers.
9	Broxted*	45	29	Wind in trees, M11 traffic, birdsong in daylight hours, occasional vehicle pass-by, occasional aircraft flyover.
10	Plegdon Green	55	34	Wind in trees, M11 traffic, birdsong in daylight hours, occasional vehicle pass-by, occasional aircraft flyover.
11	Brick End	48	31	Wind in trees, M11 traffic, birdsong in daylight hours, occasional vehicle pass-by, occasional aircraft flyover.
12	Thaxted North	41	31	Distant road traffic noise, birdsong
13	Thaxted South	56	40	Plant from PFS; local traffic on B1842 is consistent through the night; single cargo aircraft departure
14	Hatfield Heath	60	44	M11 traffic, local traffic car and HGV pass-bys, aircraft flyovers
15	Great Easton*+	30-50	28	Occasional vehicle pass-by, wind in trees and birdsong in daylight hours, aircraft flyovers in daylight hours
16	Bran End/Stebbing	43	25	Distant road traffic, wind in trees and birdsong in daylight hours, occasional vehicle pass-by.

* These values apply to the night-time period prior to commencement of the early morning peak operations at Stansted Airport.

+ Short term levels significantly affected by incidence of cars passing by, so range given

7.93 The noise data above indicate:

- There is significant variation in the ambient and background noise levels across the selected measurement locations. This is reflective of the wide range of noise environments that exist;
- Road traffic noise is audible and a feature of the noise environment at all locations at all times;
- Aircraft flyovers, which range from almost overhead to distant, are audible at all locations at least some of the time, but there are periods when no aircraft activity is apparent;
- In areas containing a reasonably large number of dwellings, daytime noise is characterised by typical domestic activities such as the use of garden machinery (lawn mowers, leaf blowers and the like), cars departing and arriving at houses, people walking and talking etc.;
- In more sparsely populated areas, daytime noise is characterised by more rural activities such as livestock or wild animals and agricultural activities involving the use of farm equipment and machinery; and
- Local noise sources such as road traffic or even individual vehicle pass-bys typically dominate the noise climate at all locations.

Unattended Measurements

7.94 The long term noise levels and contributing noise sources are set out in Table 7.9.

Table 7.9: Unattended noise survey results

	Measurement Position	Daytime		Night-time		Typical Noise Sources
		L_{Aeq}	L_{A90}	L_{Aeq}	L_{A90}	
A	**Gaunts End**	66	47	61	39	Aircraft flyovers, aircraft ground noise, road traffic, birdsong
B	**Burton End**					
	Monks Farm	59	47	53	43	Aircraft departures, aircraft taxiing and engine running noise, road traffic, some construction activity (temporary)
	Ash Tree Pub	55	46	50	42	Aircraft flyovers, aircraft ground noise, road traffic,
	Warmans Farm	54	50	51	46	M11 road traffic noise, contribution from aircraft and helicopter operations, birdsong
	Warmans Farm (a)	53	48	50	45	M11 road traffic noise, contribution from aircraft and helicopter operations, birdsong
	Bury Lodge	58	52	54	48	Aircraft departures, aircraft taxiing and engine running noise, road traffic, some construction activity (temporary)
C	**Molehill Green**	57	50	54	44	M11 road traffic noise, road traffic on Hall Road, aircraft landing on Rwy 22
D	**Thaxted**	58	44	54	32	Aircraft arrivals on Rwy 22 dominant feature, distant road traffic on Vicarage Lane and Margaret Street.

7.95 The noise data above indicate:

- Noise levels at locations close to the airport are higher in areas clustered around each end of the runway than they are to the side. This is as expected given the contribution to overall levels from aircraft flying (more or less) directly overhead;

- Road traffic noise is audible and a feature of the noise environment at all locations at all times;

- Aircraft flyovers, which range from almost overhead to distant, are audible at all locations at least some of the time, but there are periods when there appears to be very little airborne aircraft activity; and

- Noise levels at locations in Burton End are influenced by two large scale and significant steady noise sources, road traffic on the M11 motorway and ground activity at the airport. Noise levels from location to location do not vary significantly. Similarly, the difference between the ambient levels (L_{Aeq}) and background levels (L_{A90}) is consistently moderate across all locations.

Incorporated Mitigation

7.96 STAL implement a number of measures and apply a variety of policies that are aimed at controlling and managing the noise generated by operations at the airport. These are described in this section of the chapter as, notwithstanding any changes that may arise from the current application, they are an important means of controlling the effects of these operations in the community around the airport.

Current Planning Permission

7.97 In 2016 Stansted handled approximately 24.3mppa, which is around 30% lower than the current cap on annual passenger numbers (35mppa) permitted by the 2008 25+ planning permission (UTT/0717/06/FUL). Aircraft movements in the year amounted to just less than 181,000 compared to the 25+ consented limit for all aircraft of 274,000.

7.98 The conditions of the 25+ permission are described in ES Chapter 3 (Description of Site, Proposed Development, Policy Context and Alternatives) and the full wording of conditions and obligations relating to noise are set out in paragraphs 2.4.1 and 2.4.2 of ES Appendix 7.3.

Existing Controls at the Airport

7.99 There are a number of operating procedures that have been put in place by STAL with the express intention of controlling, and where possible reducing, noise.

Departure and Arrival Procedures

7.100 The Noise Abatement Procedures (NAP) adopted by all aircraft operating at the airport have been developed over the years by STAL and are described in paragraphs 7.41 to 7.44 and are clearly set out in Section 2.21 of the UK AIP.

Departures

7.101 Six Noise Preferential Routes (NPRs) are in place at the airport, three diverging from the end of each runway (04 and 22). The centre line of each NPR routes aircraft away from areas of concentrated population in line with Government advice and require aircraft to fly these corridors until a minimum altitude of 4,000 ft. amsl is reached. Additionally, aircraft are required to reach at least 1,000 ft. amsl at a range of 6.5km from start of roll point on the runway. Required Navigational Performance (RNP1) was formally introduced for the two trialled RNP1 SIDs, CLN1E and DET1D in 2017.

7.102 The (SIDs) instructions, which shall be followed unless otherwise instructed by ATC, include the following key local elements:

- Avoid flying over the centre of Bishops Stortford;
- Avoid flying over Sawbridgeworth and Stansted Mountfitchet at heights below 2,500ft amsl: and
- Aircraft must be higher than 4,000ft amsl before they can fly over St. Elizabeth's Centre at Much Hadham.

Arrivals

7.103 Continuous Descent Approach (CDA) flight procedures are in place on Runway 22 (landing from the NE, occurring on average ~73% of the time) which are adopted by almost 90% of aircraft arriving on this runway. CDA is not used on Runway 04 (landing from the SW, occurring on average ~27% of the time) due to current London airspace restrictions which prevent aircraft to the south and west of Stansted from flying at altitudes over 4,000 ft. amsl.

7.104 Aircraft using the Instrument Landing System (ILS) shall not descend below 2,000 ft. amsl before intercepting the glidepath and shall not fly below the glidepath thereafter. During the night quota period (23:30 – 06:00) no arriving aircraft shall descend below 3,000 ft. amsl until it is established on final approach and is less than 10nm from touchdown.

Noise Penalty Limits

7.105 L_{Amax} noise limits have been set by the DfT at a location 6.5km from the start of roll (commencement of an aircraft's departure on the runway) for different times of the day, as set out in Table 7.10:

Table 7.10: Stansted Airport Noise Penalty Limits

When	Times	Noise Limit: dB(A)
Day	07:00 to 23:00	94
Day Shoulder Period	06:00 to 07:00	89
Night Shoulder period	23:00 to 23:30	89
Night	23:30 to 06:00	87

7.106 Aircraft violating these limits incur a financial penalty, imposed by STAL. All money collected from infringements is allocated to local community, environmental and school projects through the Stansted Community Trust Fund.

Night Noise Controls

7.107 In July 2017 the Government announced the new night flight restrictions at Heathrow, Gatwick and Stansted for a five-year period commencing in October 2017. The modified controls on noise during the night quota period (23:30 to 06:00), are shown in Table 7.11:

Table 7.11: Night Noise limits at Stansted

Season	Movements Limit	Quota Count
Summer	8,100	4,560
Winter	5,600	3,310
TOTAL	13,700	7,870

7.108 The Quota Count (QC) system assigns a specific value to an aircraft depending on the noise levels it generates: there is one value for departures and another value for arrivals. The QC value ranges from 0 (an aircraft operation generating levels that are low enough to be considered exempt from an overall noise budget) up to 16. Table T3 in section 3 of ES Appendix 7.3 gives details of the noise levels associated with each QC category. There are no aircraft in common use in the UK that have QC values of 8 or 16 on either departure or arrival. A halving or doubling of the QC value represents a 3dB decrease or increase in noise level.

7.109 The Quota Count referred to in Table 7.11 above is the sum of the individual QC values for all departures and arrivals over the relevant season. The Summer season covers the seven months from May to October; the Winter season covers the remaining five months from November to March.

7.110 From October 2017:

- All aircraft movements will now count towards an airport's movement limit. No aircraft will be exempt from the movements limit but aircraft that currently fall below the QC/0.25 threshold will remain QC/0 (i.e. exempt from the noise quota limits).

7.111 From October 2018:

- A new QC/0.125 category will be introduced for aircraft from 81 to 83.9 EPNdB. Their contribution to the noise quota limit will be counted.
- Aircraft quieter than this will continue to count towards the airport's movement limits and remain QC/0.

Noise Management at Stansted

Noise Monitoring and Track Keeping

7.112 Stansted operates a Noise Monitoring and Track Keeping System (NMTKS), based on ANOMS (Airport Noise Monitoring and Management System) which is produced, calibrated and hosted by Brüel and Kjær of Denmark, a recognised and internationally renowned manufacturer of all type of noise measurement and monitoring systems. An in-built feature of ANOMS allows members of the public to access a flight track replay service called WebTrak[v].

Noise Monitoring

7.113 There are eight permanent fixed noise monitors; four located at the end of Runway 04 and four located at the end of Runway 22 as illustrated by Figure F1 and paragraph 4.1.2 of ES Appendix 7.3. The noise generated by all aircraft overflying the monitors is recorded and correlated with the operating schedule and ATC radar data, enabling the noise levels by all aircraft operations to be continuously monitored.

7.114 The data recorded at each fixed noise monitor are used to check the flight performance of all departing aircraft against the published noise limits, set out in Table 7.10 above so that fines can be levied for infringements as required. The data are also used as input into the annual noise contour generation process undertaken and reported by the CAA. Regular monitoring and reporting against the noise limits set out in planning conditions uses this data.

7.115 The airport also has two mobile monitors which are regularly deployed to assess noise levels at locations within the surrounding communities. Details of this monitoring, together with noise level results and analysis can be found on the Stansted Airport website[vi].

Track Keeping

7.116 By means of a radar feed into the ANOMS system, all aircraft movements are monitored for adherence to the NPRs published in the UK AIP. Departure track keeping is assessed against the published track(s) with an allowance made for the 3km wide swathe permitted about the track centreline as described in paragraphs 7.45 to 7.47 above.

Reporting

7.117 The results of all noise monitoring and track keeping are reported at least annually in a Noise Abatement Summary report[vii]. Aircraft noise reports are also presented to the Airport's Consultative Committee (STACC).

Complaints Collection

7.118 ES Appendix 7.5 Complaints Analysis: Noise, provides information on STAL's complaints handling policy and the annual Complaints Analysis reports. In summary, the key findings are:

- Complaints are a poor indicator of the degree of noise exposure experienced by people;

[v] http://webtrak5.bksv.com/stn3
[vi] http://www.stanstedairport.com/community/local-environmental-impacts/noise/noise-in-your-area/noise-monitoring-reports/
[vii] http://mag-umbraco-media-live.s3.amazonaws.com/1001/noise-abatement-2016-2017.pdf

- The vast majority of complaints are responses to levels of aircraft noise and whether aircraft are flying at heights or locations that accord with the complainant's expectations;
- People's propensity to complain varies significantly: a small number of complainants generate a high number of complaints;
- Where noise levels change gradually over time, there is poor correlation between the number of complaints and the number of movements or levels of aircraft noise; and
- Noise level changes that occur quickly or unexpectedly can be seen to lead to a surge in complaints.

Sustainable Development Plan

7.119 As described in ES Chapter 3, in 2015 STAL published a Sustainable Development Plan (SDP)[viii]. The 2015 SDP sets out how Stansted will make best use of its existing single runway along with an assessment of the associated benefits and impacts. The published plan was produced following a comprehensive consultation with key stakeholders and the public between June and November 2014.

Noise Action Plan

7.120 Stansted is covered by a formal Noise Action Plan[ix] as required under the Environmental Noise (England) Regulations 2006 and is approved by Defra. The plan sets out the airport's strategy for minimising and controlling noise and includes a detailed list of actions. It includes noise contour maps and details of the airport's noise controls. Stansted's current NAP was published in 2013 and a new version is scheduled to be adopted by January 2019.

Sound Insulation Grant Scheme

7.121 The airport has a Sound Insulation Grant Scheme (SIGS) available to home owners in those areas exposed to aircraft noise levels above certain limits. The key elements of the scheme are described below.

Relocation

7.122 Offer eligible households exposed to noise levels of 69dB $L_{Aeq,16h}$ or above assistance with the cost of moving,

Insulation

7.123 Offer to pay 50% of the total cost of acoustic insulation to residences exposed to noise levels in excess of:

- 63dB LAeq,16h;
- 57dB LAeq,8h (night-time); and
- 90dB(A) SEL departure footprint for the noisiest aircraft (QC/2) operating at night (23:30 to 06:00).

[viii] http://www.stanstedairport.com/about-us/developmentplan/
[ix] http://www.stanstedairport.com/community/local-environmental-impacts/noise/future-plans/

7.124 The same offer is made to properties located within 600m of the airport boundary to reflect their exposure to noise generated by ground based activities at Stansted.

7.125 Acoustic insulation is also offered to other noise sensitive properties such as hospitals and schools subject to medium to high levels of noise (63dB $L_{Aeq,16h}$ or more).

Impact Assessment

7.126 This section of the noise chapter looks at the noise effects arising from the proposed development. It briefly describes the alterations that are expected to take place, i.e. the extent of physical works and the changes in numbers and types of aircraft and goes on to set out the forecast noise levels using appropriate metrics.

7.127 Reference is made to noise contours prepared by ERCD for each assessment case. These are contained in ES Appendix 7.3. The effects of the operational changes are then quantified by reference to:

- Changes in noise levels directly attributable to the proposed development, this being the key determinant of the overall impact of this application;
- Absolute noise levels for each assessment case and what these mean in terms of community response;
- Likely changes in the pattern of movements throughout the day and night periods; and
- The sensitivity of the forecast noise levels to changes in the aircraft mix.

Operations

Proposed Works

7.128 This application relates to various airfield infrastructure works, as described in ES Chapter 3 (Description of Site, Proposed Development, Policy Context and Alternatives). It includes two new rapid access and rapid exit taxiways and nine new aircraft stands to help meet the increased level of runway throughput and the additional peak period overnight parking needs of more based aircraft.

7.129 The proposed new infrastructure is considered in more detail in ES Chapter 8 (Ground Noise) as, unlike for air noise, the physical location and extent of the works influences the expected changes in ground noise at different locations around the airport.

Aircraft Movements

7.130 The main assessment is based on future noise levels, with the development in place and operating in 2028 at the level of 43mppa and 274,000 aircraft movements. Referred to as the 2028 Development Case (DC), this is compared to:

- The noise impact with the airport operating at the current limit of 35mppa in 2028 referred to as the Do Minimum (DM) scenario;
- The noise impacts of the Development Case and Do Minimum at an intermediate year of 2023;
- The current noise impact in 2016 representing the baseline conditions; and
- The noise impact of 35mppa assessed in 2008 as part of the previous planning permission.

7.131 Aircraft movement data have been provided by ICF, the forecasters appointed by STAL, and the forecasts are described in ES Chapter 4 (Aviation Forecasts). The key inputs to the noise modelling (rounded to the nearest 1,000) are set out in Table 7.12:

Table 7.12: Key operating considerations for air noise assessment

Condition	Year	Mppa	PATMs	CATMs	Other (inc. GA)	Total
Baseline	2016	24.3	152,400	13,700	14,500	180,600
Do Minimum	2023	35	213,000	14,000	19,000	247,000
Development Case	2023	36	219,000	14,000	20,000	253,000
Development Case	2024	38	227,000	15,000	20,000	263,000
Do Minimum	2028	35	212,000	17,000	20,000	249,000
Development Case	2028	43	253,000	16,000	5,000	274,000
25+ Permission	N/A	35	243,500	20,500	10,000	274,000

7.132 The modal split of operations used in the assessment as well as the apportionment of daytime and night-time departures on each of the SIDs are as defined in paragraphs 7.41 to 7.44 and Table 7.2 of this chapter. The selection of a particular SID for any given aircraft operation depends on its final destination and, at present, there is approximately a 50:50 split of aircraft making a first turn to the left or the right after take-off. On runway 04 the actual split is 55%

day and 51% night turning right (CLN and DET/LAM/LYD) with 45% day and 49% night turning left (BUZ/BKY/CPT). On runway 22 the actual split is 45% day and 52% night turning right (BUZ/BKY/CPT) with 55% day and 48% night turning left (CLN and DET/LAM/LYD).

7.133 It is notable that for departures turning right from Runway 04 or left from Runway 22, there are fewer operations on DET/LAM/LYD than on CLN. In the daytime this is particularly marked and reflects a change that took place in 2016 (trial) and 2017 (formal), namely the migration of significant number of departures onto CLN from DET/LAM/LYD.

7.134 There are no further changes to departure or arrival procedures which would be necessary to accommodate the proposed development. That is not to say that these procedures will not naturally evolve over the timeline of this assessment as departing aircraft adhere to narrower swathe Performance Based Navigation routes (PBNs) on all SIDs. At the present time, PBN procedures have been adopted on 22-CLN and 04-DET all noise assessment cases take this into account.

7.135 This change, which was trialled in 2016 and adopted in 2017, has brought environmental benefits and significantly reduced the degree to which a large number of houses are overflown, which is evident when looking at the change over time of the departure flight paths on 22-CLN.

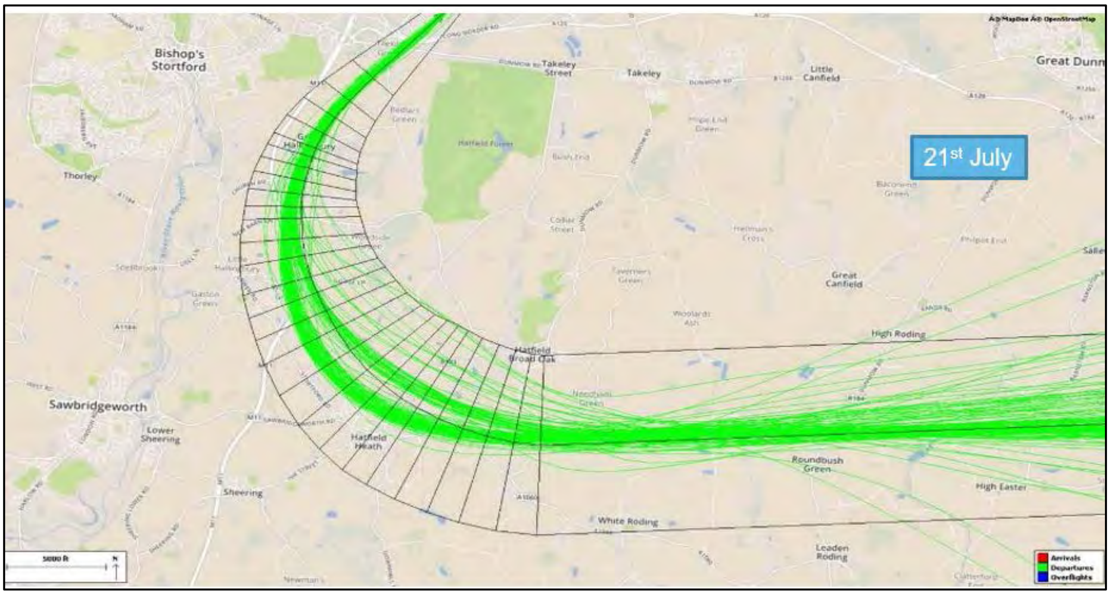


Figure 7.3: PBN flight paths by Ryanair on 22-CLN in July 2017

7.136 At the start of the Performance Based Navigation operations on Clacton (CLN), Figure 7.3 indicates that departures on Runway 22 occupied considerably more of the permitted dispersion swathe, with a number of turns bringing aircraft south of the track centre line just to the north of Hatfield Heath.

7.137 Two months later, a review of the radar data as shown in Figure 7.4 indicates that aircraft are now flying along much better defined tracks and using less of the permitted dispersion swathe. The benefits in terms of keeping aircraft further from Hatfield Heath can clearly be seen.

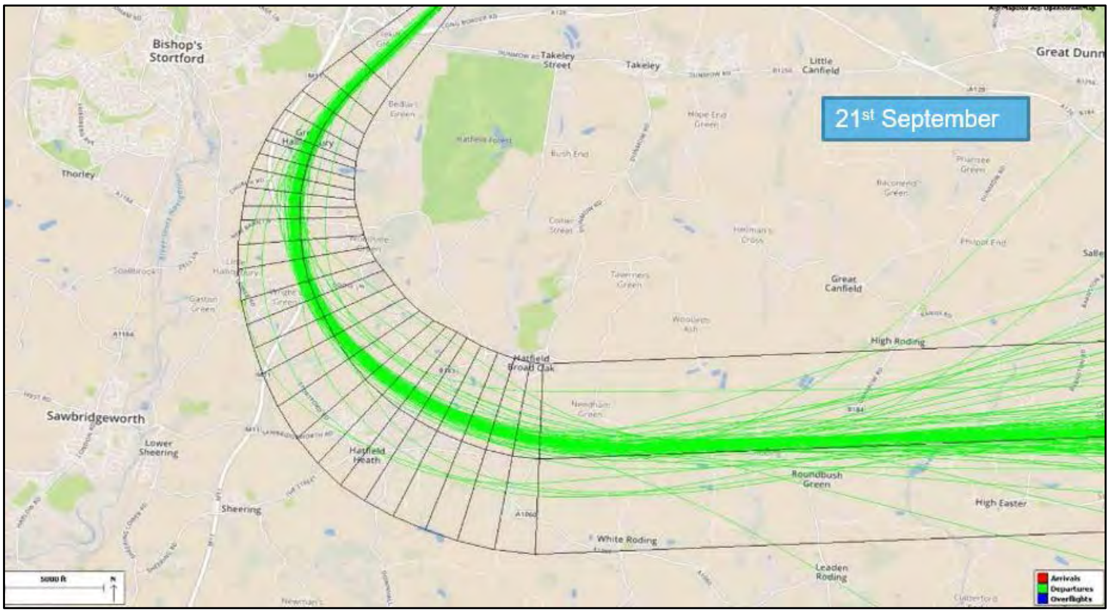


Figure 7.4: PBN flight paths by Ryanair on 22-CLN in September 2017

7.138 The ANCON noise modelling uses departure and arrival tracks based on actual radar data. These are summarised in Figure 7.5: the narrower dispersion swathes for the CLN PNB tracks is clearly evident.

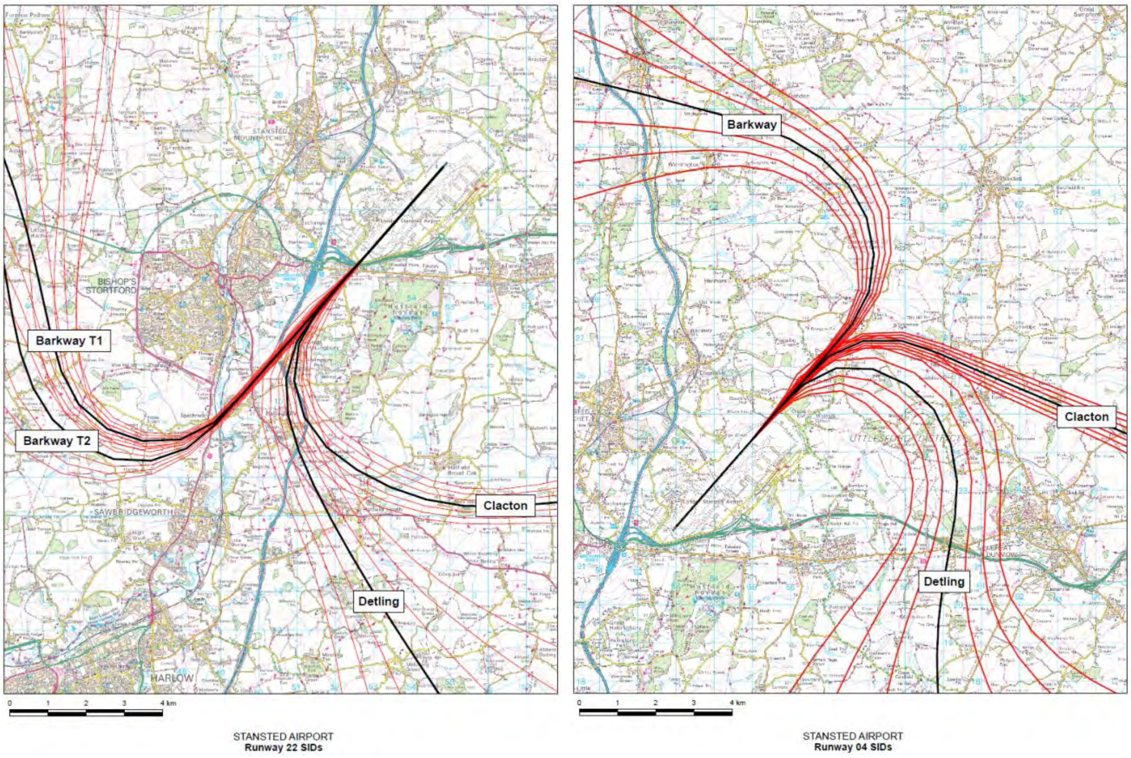


Figure 7.5: SID dispersion used for the ANCON noise modelling

Forecast Operations

7.139 The number and types of aircraft used for the noise modelling are summarised in schedules contained in ES Appendix 7.3, as follows:

- Schedule 7.3/SCH3: 2016 Baseline Year;
- Schedule 7.3/SCH4: 2023 Do Minimum (DM) 35mppa;
- Schedule 7.3/SCH5: 2023 Development Case (DC), 36mppa;
- Schedule 7.3/SCH6: 2024 Development Case (DC), 38mppa
- Schedule 7.3/SCH7: 2028 Do Minimum (DM) 35mppa;
- Schedule 7.3/SCH8: 2028 Development Case (DC) 43mppa full capacity.

Noise Modelling Results

7.140 This section sets out the results of the noise modelling which is contained in a large number of tables and contour figures corresponding to the different assessment scenarios at the different dates. A guide to all the individual tables and figures is provided below, which is then followed by a summary description of the key assessment findings.

7.141 The full output from the ERCD ANCON modelling exercise, covering all the assessment metrics and operational scenarios summarised above are contained in ES Appendix 7.3. For ease of reference, Table 7.13 identifies the Figure and Table (e.g. T26) references within ES Appendix 7.3 for each of the noise scenarios.

Table 7.13: References for air noise modelling results

Case	Summers Day		Annual		Number Above	
	$L_{Aeq,16h}$	$L_{Aeq,8h}$	L_{den}	L_{night}	N65	N60
25+ Permission						
Contours	25+/L_{Aeq}/Day	25+/L_{Aeq}/Night	-	-	25+/N65/Day	25+/N60/Night
Area, households, population	T26	T27	-	-	T28	T29
2016 Baseline Year						
Contours	2016/L_{Aeq}/Day	2016/L_{Aeq}/Night	2016/L_{den}	2016/L_{night}	2016/N65/Day	2016/N60/Night
Area, households, population	T30	T31	T32	T33	T34	T35
2023 Do Minimum						
Contours	2023DM/L_{Aeq}/Day	2023DM/L_{Aeq}/Night	2023DM/L_{den}	2023DM/L_{night}	2023DM/N65/Day	2023DM/N60/Night
Area, households, population	T36	T37	T38	T39	T40	T41
2023 Development Case						
Contours	2023DC/L_{Aeq}/Day	2023DC/L_{Aeq}/Night	2023DC/L_{den}	2023DC/L_{night}	2023DC/N65/Day	2023DC/N60/Night
Area, households, population	T42	T43	T44	T45	T46	T47
2024 Development Case						
Contours	2024DC/L_{Aeq}/Day					
Area, households, population	T61					
2028 Do Minimum						
Contours	2028DM/L_{Aeq}/Day	2028DM/L_{Aeq}/Night	2028DM/L_{den}	2028DM/L_{night}	2028DM/N65/Day	2028DM/N60/Night
Area, households, population	T48	T49	T50	T51	T52	T53
2028 Development Case						
Contours	2028DC/L_{Aeq}/Day	2028DC/L_{Aeq}/Night	2028DC/L_{den}	2028DC/L_{night}	2028DC/N65/Day	2028DC/N60/Night
Area, households, population	T54	T55	T56	T57	T58	T59

7.142 The noise metrics applicable at each of the noise sensitive receptors that are not dwellings are set out in Table 7.5 are summarised in Schedule 7.3/SCH9 for daytime and Schedule 7.3/SCH10 for night-time of ES Appendix 7.3 (Air Noise).

7.143 It should be noted that there are a number of assessment cases for which N60 night-time values at 100 and 200 cannot be plotted as there are simply not that number of overflights at or above 60 dB L_{Amax} expected at locations anywhere around the airport.

7.144 The annual operations results L_{den} and L_{night} are interpreted as part of the Health Impact Assessment (HIA) (ES Appendix 14.1) which is summarised in ES Chapter 14 (Public Health and Wellbeing).

25+ Permission 35mppa Re-stated

7.145 The current 2008 25+ Permission sets, in Condition AN1, a limit to the area of the 57dB $L_{Aeq,16h}$ contour of 33.9km^2. The condition applies today and can be taken as an acceptable and proportionate means of controlling noise generated by aircraft operations at Stansted.

7.146 Therefore, it is a helpful starting point to assess the noise impact arising from the current proposals against this planning condition limit, but viewed in the light of the methodology and assumptions used today.

7.147 For example, current CAA guidance is to produce noise level contours at lower levels than the 57 dB $L_{Aeq,16h}$ value, which was the CAA recommended lower limit when the analysis was carried out for the for the 25+ application ES. Other new metrics are also now recommended as best practice.

7.148 Accordingly, the noise contours that were originally prepared for the 25+ application ES have been re-plotted in a way that reflects current guidance in order to aid comparison with the contours for this application.

7.149 This requires:

- Extending the $L_{Aeq,16h}$ analysis down to values of 54 and 51 dB(A);
- Preparing night-time $L_{Aeq,8h}$ contours, which were not calculated previously in the 2006 ES; and
- Preparing ‘number above’ contours for the daytime (N65) and night-time (N60).

7.150 As noted previously, for accurate comparison with existing Condition AN1, the contour analysis has been undertaken using precisely the same aircraft types, operating numbers, tracks and flight profiles as used in the original analysis.

***L_{Aeq}* Noise Contours**

7.151 Only daytime L_{Aeq} contours were produced as part of the 25+ Permission ES, and these were only plotted down to a value of 57 dB. Re-plotting these contours as well as providing night-time contours down to the values set out in CAP 1616a and CAP 1520 identifies the entire area around the airport within which aircraft noise would be expected to have an adverse effect based on the most recent survey of noise attitudes. Noise levels have not changed from those assessed in 2006; the difference here is that they are restated in terms consistent with those used to assess the current application with an increased passenger cap of 43mppa.

Number Above Contours

7.152 N65 and N60 contours were not prepared for the 25+ planning case as such metrics were not in use at the time. However, they do not represent any new or different noise conditions; merely they simply restate what is already consented in terms of number of flyovers above the defined noise levels.

2016 Baseline Year

L_{Aeq} Noise Contours

7.153 2016 daytime and night-time L_{Aeq} contours are contained in ERCD Report 1703[24], although as part of this noise assessment they are restated in terms consistent with those used to assess the increase of the passenger cap to 43mppa.

Number Above Contours

7.154 N65 and N60 contours for the 2016 Baseline Year have not previously been published; ERCD Report 1703 contains only N70 daytime contours. Again, they do not represent a new condition and instead simply restate the 2016 noise conditions in terms of number of flyovers above the defined noise levels.

2023 Do Minimum

L_{Aeq} Noise Contours

7.155 The 2023 Do Minimum 57 dB $L_{Aeq,16h}$ contour extends to an area of 30.3 km^2, below the permitted level of 33.9km^2. This is expected to be the worst case year for daytime noise impacts as the permissible throughput of 35mppa is achieved in 2023. The proportion of operations undertaken by new generation, aircraft is substantially lower than in the 2028 Principal Assessment Year (which benefits from an additional five years of uptake), meaning that, in effect, the average noise level per aircraft movement will be higher in 2023 than in 2028.

7.156 The same observation applies to all the 2023 Do Minimum $L_{Aeq,8h}$ contours.

Number Above Contours

7.157 The shape and extent of the 2023 Do Minimum N65 and N60 contours is similarly influenced by the fact that the average noise level per aircraft movement is higher in 2023 than in 2028. With no change to the passenger cap, these contours represent the most wide ranging overflight effects between now and any point in the future.

2023 Development Case

L_{Aeq} Noise Contours

7.158 The 2023 Development Case 57 dB $L_{Aeq,16h}$ contour extends to an area of 31.2 km^2, which is also below the consented envelope limit of 33.9km^2. The contour area is larger than the 2023 Do Minimum case, due to the additional albeit small number of aircraft movements handling the larger forecast passenger throughput of 36mppa, if the passenger cap is increased. As a result, the total number of aircraft operations increases by 6,000 from 247,000 to 253,000, and it is this relatively modest change in movements that gives rise to relatively modest increases in noise levels and contour areas compared to the 2023 Do Minimum scenario.

7.159 The same observation applies to all the 2023 Development Case $L_{Aeq,8h}$ contours.

Number Above Contours

7.160 As for the 2023 Do Minimum scenario, the shape and extent of the 2023 Development Case N65 and N60 contours is influenced by the fact that the average noise level per aircraft movement is higher in 2023 than in 2028.

2024 Development Case

L_{Aeq} Noise Contours

7.161 The year in which the 57 dB $L_{Aeq,16h}$ Development Case contour is forecast to reach its maximum extent is 2024, for which an area of 32.0 km^2 is predicted, still below the consented envelope limit of 33.9km^2.

2028 Do Minimum

7.162 2028 is the Principal Assessment year, being the point at which the Development Case reaches full capacity (43mppa and 274,000 aircraft movements). Comparing the noise conditions in 2028 with (DC) and without (DM) the development in place is the primary test of the noise impact associated with this application.

L_{Aeq} Noise Contours

7.163 By 2028, with 35mppa and without the development, noise levels are expected to fall from the 2023 levels due to the higher percentage of operations by new generation, low noise aircraft. Compared to the 2016 Baseline Year, noise levels are expected to be marginally higher, with the various noise contours covering slightly larger areas.

7.164 The scale of noise level changes from one assessment case to another are discussed in the section **Air Noise Effects** from paragraph 7.202 onwards. In all cases, noise levels changes are small and would not be expected to give rise to conditions that are perceptibly different from one assessment case to the next.

Number Above Contours

7.165 In the case of the N65 index, the lower value contours (50 and 20) cover a larger area in 2016 than in 2028. The reason for this is the relatively high percentage of operations forecast to be undertaken by new generation, low noise aircraft in 2028 whereas in 2016 there are none.

2028 Development Case

L_{Aeq} Noise Contours

7.166 In 2028, with 274,000 aircraft movements and 43mppa due to development having taken place, noise levels and contour areas are expected to reduce from 2023 (36mppa and 253,000 aircraft movements). Despite there being 16% more movements, there will be a higher percentage of operations by new generation, low noise aircraft, which are between 3 dB and 5 dB quieter than current aircraft (see Table 7.6).

7.167 This is the key reason why noise levels in the 2028 Development Case (43mppa) are lower than those for the 2023 Do Minimum (35mppa, 247,000 aircraft movements) and 2023 Development Case (36mppa, 253,000 aircraft movements). Thus the 2028 Development Case 57 dB $L_{Aeq,16h}$ contour covers an area of 28.7 km^2, 15% smaller than the current consented envelope limit of 33.9km^2.

7.168 Compared to the 2016 Baseline conditions, noise levels are expected to be marginally higher, that is to say the various noise contours cover slightly larger areas.

Number Above Contours

7.169 Similar to the 2028 Do Minimum scenario the N65 index lower value contours (50 and 20) cover a larger area in 2016 than in 2028 Development Case, even with the development having taken place. Again, the reason for this is the relatively high percentage of operations forecast to be undertaken by new generation, low noise aircraft in 2028 whereas in 2016 there are none.

Difference Contours: 2028

7.170 This section compares the noise levels forecast in 2028 with the development having taken place to what they would be with no development.

Daytime $L_{Aeq,16h}$ Noise Levels

7.171 The difference in daytime $L_{Aeq,16h}$ noise levels in 2028 with and without the development are shown in ES Appendix 7.3 Figure, 2028 DC vs. DM/L_{Aeq}/Day. The contours extend to the 2028 Development Case (43mppa) 51 dB $L_{Aeq,16h}$ contour, as beyond this boundary average noise levels would be expected to have no adverse effects within the community.

7.172 The uniform appearance of the contours reflects the fact that the noise changes resulting from the development are expected to be very small and consistent across the study area. Imperceptible noise level increases of between 0.5 and 0.6 dB are expected.

Night-time $L_{Aeq,8h}$ Noise Levels

7.173 The difference in night-time $L_{Aeq,8h}$ noise levels in 2028 with and without the development are shown in ES Appendix 7.3 Figure 2028 DC vs. DM/L_{Aeq}/Night. The contours extend to the 45 dB $L_{Aeq,8h}$ contour, as that is the relevant night-time range for adverse effects.

7.174 The contours indicate noise level increases are within the range -1 to +1 dB, although examination of the forecast noise levels at the noise sensitive receptors set out in Schedule A7.3/SCH1 of ES Appendix 7.3 indicates actual changes of between -0.2 and +0.4 dB forecast. These very small changes are not within a range that is normally perceptible.

7.175 In contrast to the predicted daytime noise level changes, some areas are forecast to experience small reductions in noise levels while others will experience small increases. The reason for this is the displacement of night-time general aviation operations by scheduled passenger operations and an attendant shift in the use of the various SIDs.

Pattern of Movements

Busy Summer Day

7.176 The noise analysis focuses on the aggregate daytime and night-time noise levels, consistent with the findings of the most recent survey of attitudes to aircraft noise (SoNA 2014: Aircraft). This approach has been adopted by the Government in current and emerging aviation policy and is the accepted approach to assessing airport development and meets the CAA's requirements in CAP 1616a.

7.177 Nevertheless, it is recognised that people's sensitivity to noise is not necessarily uniform over the assessment periods and airport operations can fluctuate throughout the day. Therefore, an additional assessment has been made using the concept of a 'busy summer day'. Section 29 of ES Appendix 7.3 describes the results for the Baseline Year 2016 and also the Principal Assessment Year of 2028, with and without the proposed development.

7.178 A busy summer day represents operations that are close to the highest daily number of movements, and is therefore indicative of a peak day of activity. That is not the same as the aggregate summer's day, which averages operations over the 92-day busy summer period between mid-June and mid-September, and which for the reasons set out in paragraph 7.59 is used for the creation of noise contours and the noise impact analysis.

7.179 Comparing movements on the busy summer day to those taking place on an aggregate summer day suggests the following:

- For daytime movements between 07:00 and 23:00, the busy summer day does not handle substantially larger numbers of movements than the aggregate summer day. This implies that the pattern of daytime movements through the busy summer season is relatively steady;
- For night-time movements between 23:00 and 07:00, the busy summer night is 16% to 17% busier than the aggregate summer night. Given that the less busy summer nights will handle fewer movements in order to balance out the aggregate, this suggests that there is some fluctuation in the pattern of night-time movements during the busy summer season; and
- By 2028, night-time movements will be operating at or close to the night-time movements limits imposed by the Government, whether or not the proposed passenger cap is lifted. As can be seen in Table T60 of ES Appendix 7.3, the number of movements forecast for a busy summer night is hardly affected by whether the proposed development is implemented or not.

Hourly Movements

7.180 To better understand the activity that is represented by the noise contours, and especially the nature of over-flying experienced in local communities, this section describes the pattern of aircraft movements throughout the day. It complements the 'Number' above contour analyses described earlier.

7.181 Section 29 of ES Appendix 7.3 includes graphs showing the number of departures and the number of arrivals occurring during every hour of the full 24 hour period of a busy summer day.

2016 Baseline

7.182 The pattern of movements over a 24-hour period in 2016 Baseline Year can be summarised as:

- During the dead of night, i.e. midnight to 06:00, there is very little activity at the airport;
- In the hour beginning 06:00, there is a surge in departures which continues for the next two hours, with an increasing number of arrivals between 07:00 and 09:00; This reflects the large number of based, overnight parked aircraft leaving for their first wave of flights;
- Between 09:00 and 12:00, there is a relative lull in activity;
- From 12:00 to 16:00 the activity fluctuates hour on hour at a moderate level;
- From 16:00 to 21:00, the level of activity picks up and is reasonably steady hour on hour; and
- The hour commencing 21:00 is relatively quiet, but thereafter and up to midnight, activity is dominated by significant numbers of arriving aircraft each hour, returning to their home base at Stansted.

2028 Do Minimum

7.183 For the 2028 Do Minimum scenario, the forecast pattern of movements shows a similar pattern to the 2016 baseline:

- During the dead of night, i.e. midnight to 06:00, there is relatively little activity at the airport;
- In the hour beginning 06:00, there is a surge in departures which continues through the next two hours, with an increasing number of arrivals between 07:00 and 09:00; and
- After 21:00 and up to midnight, there are a significant number of arrivals in each hour.

7.184 With no development and natural growth up to the currently permitted capacity, by 2028 the extra number of movements on a busy summers day leads to more intense use of the ‘off peak’ hours between 09:00 to 21:00. Unlike in 2016, where there are some periods of relative inactivity, by 2028 the airport will be reasonably and uniformly active throughout this period.

2028 Development Case

7.185 For the Development Case, the pattern of movements in 2028 is broadly similar to the Do Minimum scenario. The key difference is that for the Development Case, with the higher passenger cap of 43mppa, there will be an increase in the number of movements which is relatively uniform across the daytime hours.

Changes in Hourly Movements

<u>2028: Development Case vs. Do Minimum</u>

7.186 A comparison of the forecast hourly movements for these two conditions indicates that the increase in the number of movements associated with the proposed development will take place across the daytime hours and will be relatively uniform. The increase will be slightly greater between 09:00 and 11:00 and again between 20:00 and 22:00, but the differences compared to the bulk of the daytime hours is not great.

7.187 For the night-time period, the forecasts indicate hardly any change in the number of movements. In fact, fewer movements are forecast between the hours of 03:00 and 05:00 due to the displacement of ‘Other’ traffic by PATM in the night-time.

<u>2028: Development Case vs. 2016 Baseline</u>

7.188 A comparison of the forecast hourly movements for these two conditions indicates that the relatively greater increase in the number of flights associated with the proposed development compared to the baseline conditions will again take place across the daytime hours. In this situation, the increase is not so uniform, with some periods of relatively large increases in aircraft movements being observed between 09:00 and 12:00 and again between 20:00 and 22:00.

7.189 For the night-time period, the forecasts indicate only small changes during the dead of night (03:00 to 05:00), with some hours showing reduction due to the loss of ‘Other’ traffic for the 2028 Development Case. There are more significant changes at each end of the night with more arrivals expected between 00:00 and 03:00 and more departures between 06:00 and 07:00. The changes are a direct consequence of the controls on night flights imposed by the Government which, according to the most recent policy consultation on airspace change, are expected to continue through to the 2028 Principal Assessment Year.

Fleet Mix Sensitivity

7.190 The modelling and assessments described above use a current and forecast mix of aircraft which is believed to be reasonable and appropriate. It takes account of past trends, the nature of Stansted's activity, the current known intentions and fleet orders of airlines, and wider assumptions within the industry. Nevertheless, some sensitivity tests have been carried out, using the 57 dB $L_{Aeq,16h}$ noise contour and the impact of a ±10% change in the rate at which existing aircraft are replaced by new generation, low noise aircraft. Section 30 of ES Appendix 7.3 sets out the results.

7.191 This sensitivity test responds to UDC's request, as set out in its Scoping Opinion of 21st December 2017 (ES Appendix 2.4). Although these alternative rates of fleet replacement are plausible, they are not considered likely. ICF take a balanced and reasonable view on the rate of uptake of new generation, low noise aircraft in their forecasts as described in ES Chapter 4 (Aviation Forecasts).

Indicative Noise Level Changes

7.192 Rather than producing a suite of noise contours for each assessment year that separately identify the effect of a 10% quicker or slower uptake in new generation, lower noise aircraft, the analysis makes use of an 'indicative community noise level' that can be computed for every year of operations between 2016 and 2028. The meaning of 'indicative community noise level' and how it is used in this assessment is described in ES Appendix 7.3. The results of the analysis are shown graphically in Figure F14 of ES Appendix 7.3.

Sensitivity Study

7.193 By altering the rate at which the new generation, low noise aircraft are adopted into the mix by ±10%, the effect on the annual noise levels is shown in Figure F15 of ES Appendix 7.3. The overall conclusion from this analysis is that changes in the rate of uptake of new variant, low noise aircraft of up to 10% either way are unlikely to have material practical consequences for levels of airborne aircraft noise experienced in the local community. Of note:

- In the early years, 2017 to 2019, the uptake of new variant, low noise aircraft is low, and changing the rate of uptake therefore has no effect on the predicted noise levels;
- By 2020 some noise benefits are starting to become apparent. A 10% quicker year on year uptake could give rise to a noise benefit of around 0.1 dB. A 10% slower year on year uptake makes no discernible difference;
- The same conclusion can be drawn for the peak noise year of 2024;
- By the year of full capacity, 2028, a 10% quicker year on year uptake could give rise to a noise benefit of around 0.1 dB, while a 10% slower year on year uptake could give rise to a noise dis-benefit of around 0.1 dB. This is of no material consequence;

7.194 The overall conclusion from this analysis is that changes in the rate of uptake of new variant, low noise aircraft of up to 10% either way are unlikely to have material practical consequences for levels of airborne aircraft noise experienced in the local community.

Effect on the Extent of the Noise Contours

7.195 The relationship between the 'indicative community noise level' and the extent of the corresponding noise contours is complex and cannot be accurately derived without detailed ANCON noise modelling. However, for the purposes of assessing how the contour area might be expected to appear between 2016 and 2028 a simple analysis of the relevant data for those years which have been modelled has been undertaken. The analysis method is in Section 30 of ES Appendix 7.3, gives rise to the reasonably foreseeable changes set out in Figure 7.6.

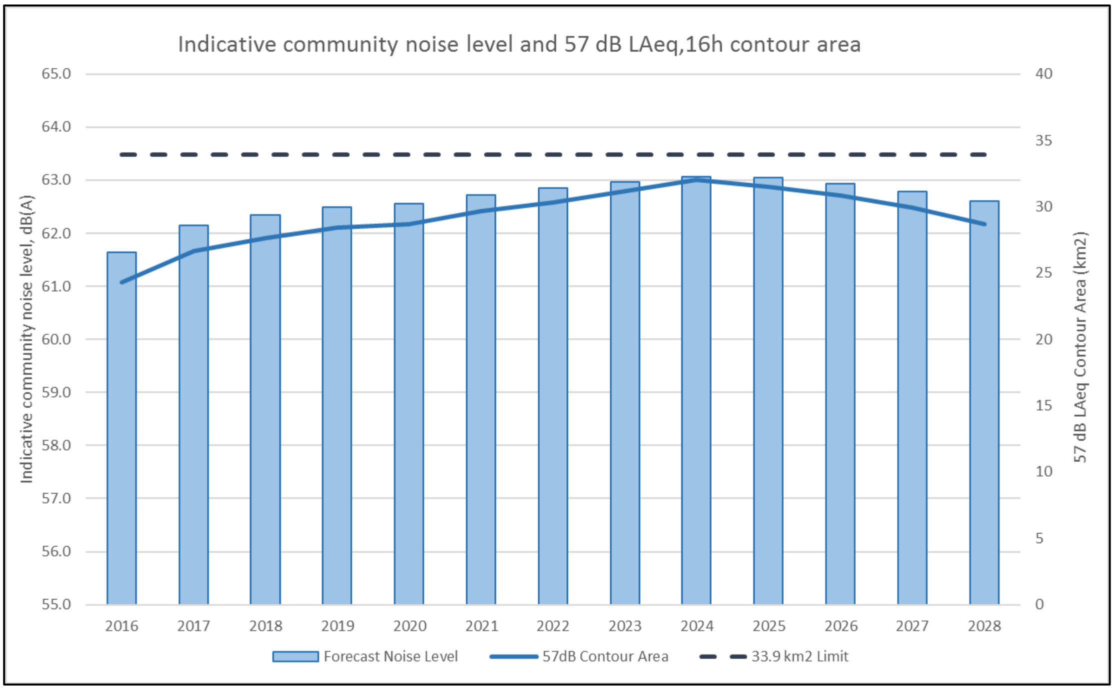


Figure 7.6: Forecast indicative community noise level and 57 dB $L_{Aeq,16h}$ contour area

7.196 The first point of note is that the changes in noise level over the entire forecast period from 2016 to 2028 are very small. By 2028 they are predicted to be less than 1 dB higher than in 2016: in 2024, the year forecast to have the highest aircraft noise, the increase over 2016 is less than 1.5 dB. Both of these noise level increases would be rated as **imperceptible**.

7.197 As is to be expected, the shape of the 57 dB contour area follows the general trend of the 'indicative community noise level', with the peak forecast to be reached in 2024. Thereafter, the contour area reduces in line with the community noise level as the benefits of the new generation, lower noise aircraft become more apparent.

7.198 Notably, the 25+ Permission noise contour limit (AN1) of 33.9 km^2, shown as a dotted grey horizontal line, is never forecast to be breached. After reaching a peak of 32.0 km^2 in 2024, the contour area is forecast to drop to 28.7 km^2 in the 2028 Development Case.

7.199 If the rate of uptake of new generation, low noise aircraft is not as forecast but varies by 10% either way, the likely effect on the extent of the 57 dB $L_{Aeq,16h}$ contour is indicated in Figure 7.7. It is clear that the differences are marginal and always well below the permitted limit of 33.9km^2.

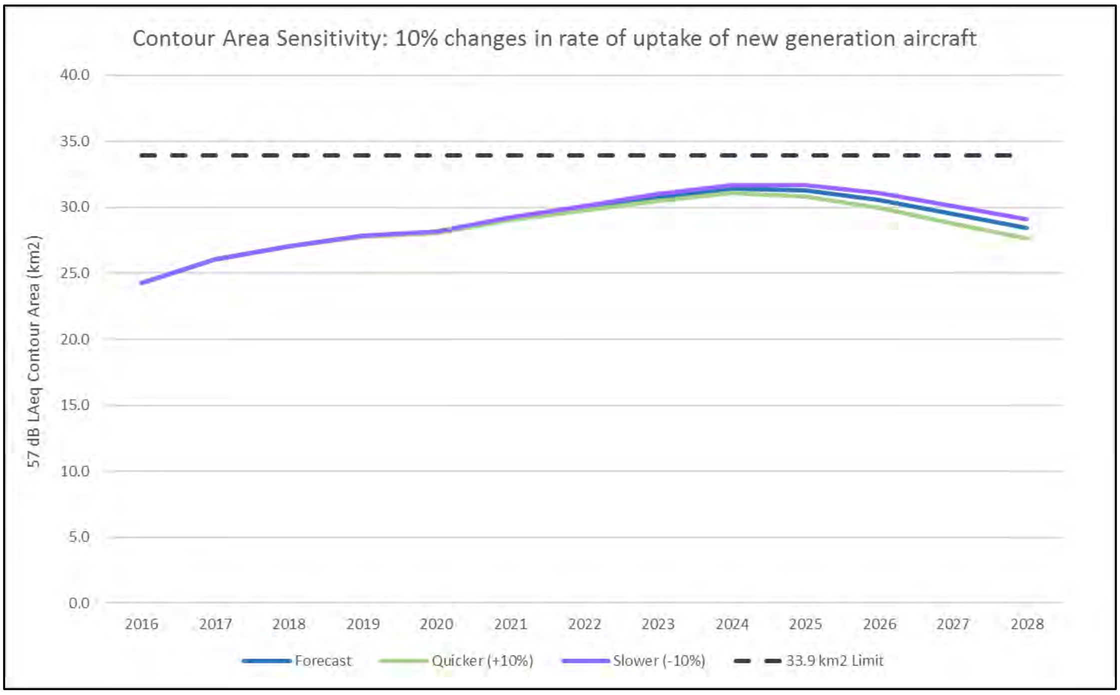


Figure 7.7: Forecast 57 dB $L_{Aeq,16h}$ contour area: ±10% change in rate of uptake of new aircraft

7.200 A 10% slower uptake in new generation, low noise aircraft still gives rise to a ‘peak’ contour year of 2024, and although the contour area is slightly higher than if the forecast rate of uptake actually occurs, it is still comfortably below the current limit. The relatively small differences are consistent with the very small changes in overall noise level described previously in this chapter.

7.201 In conclusion, future airborne aircraft noise levels would only be higher in the community than was foreseen when the 25+ Planning Permission was granted if there is virtually no uptake of new generation, low noise aircraft. This is not a realistic proposition given known commercial commitments of the airport’s airlines to acquire new generation aircraft, the continued commitments from STAL and the wider airline industry approach to noise management (i.e. the ICAO balanced approach).

Air Noise Effects

7.202 This section draws together the different results from the various modelled scenarios. Its primary objective is to assess them against the objective criteria that are set out in Table 7.4 earlier in the chapter to describe the significance of any changes.

7.203 The assessment methodology is summarised in the flow chart at Figure 7.8 below.

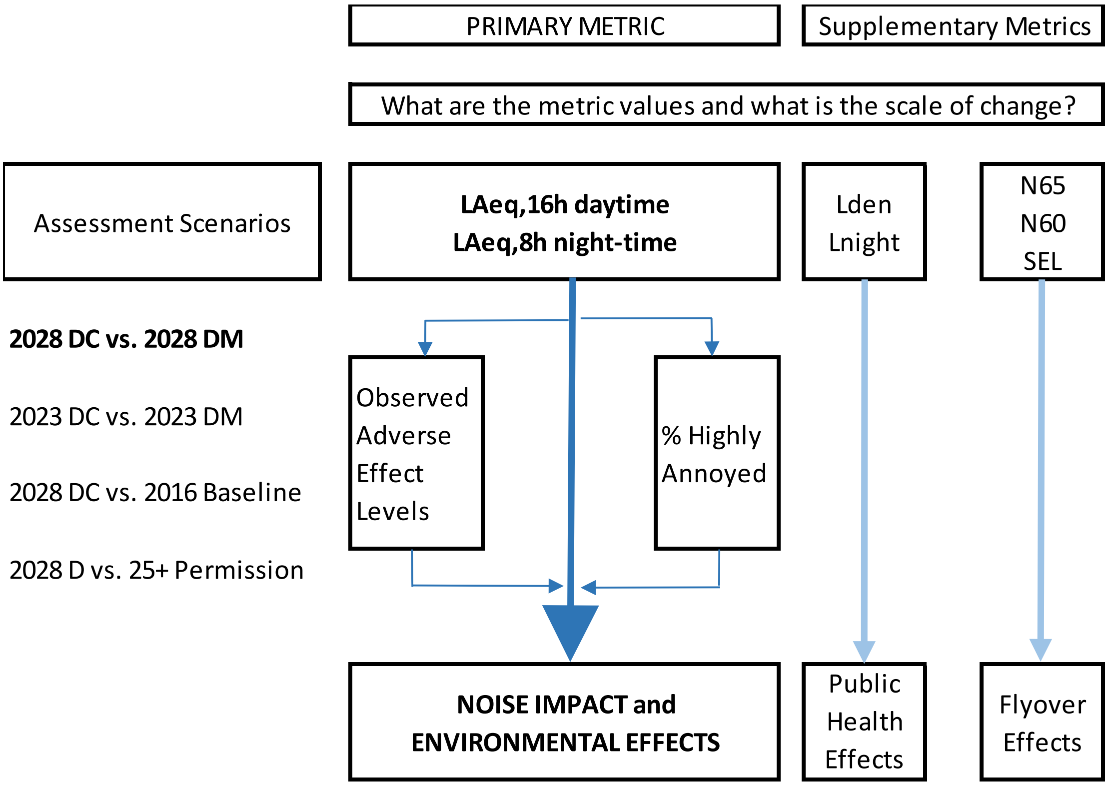


Figure 7.8: Air noise assessment methodology

7.204 What the flow chart demonstrates is that changes in noise level resulting from the application constitute the core of the noise impact assessment. Those changes are assessed by reference to the L_{Aeq} noise levels for the typical summer daytime and night-time periods, which has been confirmed by SoNA 2014 as being the primary assessment metric on which reliance should be placed whenever evidence based decisions are to be made.

7.205 The chart indicates how changes to the number of people who are exposed to the NPSE Observed Adverse Effect Levels or who are likely to be 'highly annoyed' by aircraft noise are factored into the assessment of noise level change. While the analysis is able to identify quite precise numbers in each case, the significance of those numbers is ultimately governed by the change in noise level with which they are associated.

7.206 It is extremely important to view the predicted changes in the number of people exposed to noise above the NPSE thresholds or who are 'highly annoyed' by noise in the context of the levels they currently experience and the degree to which those levels are forecast to change. The analysis that follows shows that even when comparing forecast noise levels in 2028, with the development, to those existing in 2016, increases of not more than 0.8 dB daytime and

1.2 dB night-time are indicated. Such a change in noise is, by all relevant measures, **imperceptible**.

7.207 Therefore, any predicted increase in the number of people exposed to noise levels above the LOAEL or SOAEL or who are ‘highly annoyed’ must be weighed against the practical consideration of this being due to an increase in noise levels that is not discernible. It is therefore very important in the circumstances of this application to consider all the relevant noise factors together so that each strand of assessment can be seen in its proper context.

7.208 The assessment of supplementary metrics provides important information on public health effects (dealt with in ES Chapter 14) and flyover effects, specifically the changes that people in different areas around the airport might experience and what these changes might mean. They are, however, supplementary and not the basis on which the noise impact and the associated environmental effects are determined.

7.209 There are four assessment scenarios for which all of the above effects are assessed. Of these, the most significant is the comparison of conditions arising for **2028 DC vs. 2028 DM**, i.e. the difference forecast to occur for full capacity operating conditions with and without the development having gone ahead. For this reason, difference contours have been prepared for the daytime and night-time periods for the **2028 DC vs. 2028 DM** comparison scenario. They have not been prepared for the remaining scenarios, for which reference is made to the noise levels predicted at the noise sensitive receptors that are not dwellings in order to determine the scale of change in noise level.

Noise Level Changes

<u>2028 Development Case vs. 2028 Do Minimum</u>

Daytime

7.210 The daytime difference contours shown in ES Appendix 7.3 Figure 2028 DC vs. DM/L_{Aeq}/Day indicate noise level increases attributable to the proposed development of not more than 1dB.

7.211 ES Appendix 7.3 Schedule 7.3/SCH9 indicates that at noise sensitive receptors that are not dwellings within the study area identified in ES Appendix 7.3 Schedule 7.3/SCH1 daytime noise level increases of 0.5 to 0.6 dB are forecast, with an overall aggregate across all assessment locations of 0.5 dB.

7.212 As Figure 7.2 shows, these receptors are wide spread across the study area and are exposed a range of aircraft noise levels. Therefore, a change in $L_{Aeq,16h}$ value of between 0.5 and 0.6 dB is indicative of the noise level change across the entire study area: this is consistent with the 1 dB range expressed in the difference contours but can be considered a more accurate reflection of that range.

7.213 The change represents a **negligible** effect.

Night-time

7.214 The night-time difference contours shown in ES Appendix 7.3 Figure 2028 DC vs. DM/L_{Aeq}/Night indicate noise level increases attributable to the development of -1 to +1 dB.

7.215 ES Appendix 7.3 Schedule 7.3/SCH10 indicates that at the same non-residential noise sensitive receptors, night-time noise level increases of -0.2 to +0.4 dB are forecast. For the reasons set out in paragraphs 7.211 and 7.212, this change in $L_{Aeq,8h}$ value is considered to be a more accurate reflection of the range indicated in the night-time difference contours referred to above. The aggregate change across all receptors is +0.2 dB.

7.216 The change represents a **negligible** effect.

<u>2023 Development Case vs. 2023 Do Minimum</u>

Daytime

7.217 ES Appendix 7.3 *Schedule 7.3/SCH9* indicates that at the non-residential noise sensitive receptors, daytime noise level increases of 0.1 to 0.2 dB are forecast, with an overall aggregate across all assessment locations of 0.1 dB.

7.218 The change represents a **negligible** effect.

Night-time

7.219 ES Appendix 7.3 Schedule 7.3/SCH10 indicates that at the non-residential noise sensitive receptors, night-time noise level increases of 0.1 to 0.3 dB are forecast, with an overall aggregate across all assessment locations of 0.2 dB.

7.220 The change represents a **negligible** effect.

2028 Development Case vs. 2016 Baseline

Daytime

7.221 ES Appendix 7.3 Schedule 7.3/SCH9 indicates that at all assessed sensitive receptors that are not dwellings, noise level increases of 0.2 to 1.0 dB are forecast. The aggregate change across all receptors is +0.8 dB.

7.222 The change represents a **negligible** effect.

Night-time

7.223 ES Appendix 7.3 Schedule 7.3/SCH10 indicates that at all assessed sensitive receptors that are not dwellings, night-time noise level increases of 1.0 to 1.4 dB are forecast. The aggregate change across all receptors is +1.3 dB.

7.224 The change represents a **negligible** effect.

2028 Development Case vs. 25+ Planning Permission

Daytime

7.225 ES Appendix 7.3 Schedule 7.3/SCH9 indicates that at all scheduled non-residential noise sensitive receptors, daytime noise level differences of between –2.0 and 0.5 dB are forecast.

7.226 The aggregate difference across all non-residential receptors is -0.9 dB, indicating that the overall noise level position for the 2028 Development Case is marginally lower than the 25+ Permission case.

7.227 The difference represents a **negligible** effect in a positive sense.

Night-time

7.228 Schedule 7.3/SCH10 indicates that at all scheduled non-residential noise sensitive receptors, night-time noise level differences of between 0 and 1.7 dB are forecast. The aggregate difference across all non-residential receptors is 0.9 dB, indicating that the overall noise level position for the 2028 Development Case is marginally higher than the 25+ Permission case.

7.229 The difference represents a **negligible** effect.

Observed Adverse Effect Levels

7.230 This section describes the assessments using the significance criteria from Noise Policy Statement for England described at para 7.52.

Daytime

7.231 Table 7.14 shows cumulative numbers of population located within the daytime Observed Adverse Effect Level noise contours for the assessment years. The population estimates for all future years include an allowance for cumulative consented dwellings as follows:

- 35 dwellings to be built and occupied in Great Hallingbury under application UTT 16 3669 OP. All 35 dwellings, equivalent to an additional 84 people are located with the daytime SOAEL value of 63 dB $L_{Aeq,16h}$;
- 20 dwellings to be built and occupied in Takeley Street under application UTT 17 1852 FUL. None of these dwellings are located within the daytime SOAEL value of 63 dB $L_{Aeq,16h}$. Within the LOAEL value of 51 dB $L_{Aeq,16h}$ the numbers of dwellings (and population) are: 2023DM 4 (10), 2023DC 4 (10), 2028 DM 0 (0), 2028 DC 1 (2) and 25+ Permission 19 (46).

Table 7.14: Population within Daytime Observed Adverse Effect Level contours*

Year	dB $L_{Aeq,\ 16h}$		
	LOAEL: 51	SOAEL: 63	UAEL: 69
2016 Baseline	12,600	200	0
2023 Do Minimum	16,944	384	0
2023 Development Case	17,634	384	0
2028 Do Minimum	11,884	284	0
2028 Development Case	15,336	334	0
25+ Permission	15,480	484	0

*All changes in numbers of people within LOAEL and SOAEL categories to be viewed in the context of noise level changes between cases being **imperceptible.**

<u>Full Capacity Year 2028 DC vs. 2028 DM</u>

- *LOAEL:* moderate increases in the population exposed to levels ≥ LOAEL, <30% (11,884 to 15,334): but because the noise level changes are not perceptible (negligible effect) this change in population exposed to LOAEL is a **negligible** effect.
- *SOAEL:* the increase in the population exposed to levels ≥ SOAEL is indicated as increasing by <18% (284 to 334); but because the noise level changes are not perceptible (negligible effect) this change in population exposed to SOAEL is a **minor** effect.
- *UAEL:* no increases in the population exposed to levels ≥ UAEL: this is a **nil** effect.

<u>Transitional Year 2023 DC vs. 2023 DM</u>

- *LOAEL:* small increases in the population exposed to levels ≥ LOAEL, <3%: taken on its own, this increase is a **negligible** effect. This is reinforced by the fact that the noise level changes are not perceptible (**negligible** effect).

- *SOAEL:* no indicated increase in the population exposed to levels ≥ SOAEL: this is a **nil** effect.
- *UAEL:* no increases in the population exposed to levels ≥ UAEL: this is a **nil** effect.

Full Capacity Year 2028 DC vs. Baseline 2016

- *LOAEL:* moderate increases in the population exposed to levels ≥ LOAEL, >20%: but because the noise level changes are not perceptible (negligible effect) this change in population exposed to LOAEL is a **negligible** effect.
- *SOAEL:* the increase in the population exposed to levels ≥ SOAEL is indicated as increasing by <70% (200 to 334, mainly attributable to the permission for 35 new houses Great Hallingbury); but because the noise level changes are not perceptible (negligible effect) this change in population exposed to SOAEL is a **minor** effect.
- It is noted above that the greater part of this increase is due to the presence of 35 additional dwellings in Great Hallingbury which are scheduled to be built in a location forecast to be subject to noise levels above the SOAEL. If these dwellings are not built, the increase in the population exposed to levels ≥ SOAEL is indicated as increasing by 25% (200 to 250). This would be a lesser, albeit still **minor,** effect.
- *UAEL:* no increases in the population exposed to levels ≥ UAEL: this is a **nil** effect.

Full Capacity Year 2028 DC vs. 25+ Permission

- *LOAEL:* modest reduction in the population exposed to levels ≥ LOAEL, <1%: this is a **negligible** effect.
- *SOAEL:* moderate reduction in the population exposed to levels ≥ SOAEL, >25%: this is a **negligible** effect, but in a **positive** sense.
- *UAEL:* no increases in the population exposed to levels ≥ UAEL: this is a **nil** effect.

Night-time

7.232 Table 7.15 shows the cumulative numbers of population located within the night-time Observed Adverse Effect Level noise contours for the assessment years. The population estimates for all future years include an allowance for the cumulative consented dwellings referred to above, the effect of these being:

- Great Hallingbury, UTT 16 3669 OP. All 35 dwellings, equivalent to an additional 84 people are located with the night-time time SOAEL value of 54 dB $L_{Aeq,8h}$;
- Takeley Street, UTT 17 1852 FUL. None of these dwellings are located within the night-time LOAEL value of 54 dB $L_{Aeq,8h}$. Within the LOAEL value of 45 dB $L_{Aeq,8h}$ the numbers of dwellings (and population) are: 2023DM 10 (24), 2023DC 10 (24), 2028 DM 19 (46), 2028 DC 19 (46) and 25+ Permission 19 (46).

Table 7.15: Population within Night-time Observed Adverse Effect Level contours*

Year	dB $L_{Aeq,\ 8h}$		
	LOAEL: 45	SOAEL: 54	UAEL: 63
2016 Baseline	17,800	1,050	0
2023 Do Minimum	24,830	2,334	<50
2023 Development Case	25,430	2,834	<50
2028 Do Minimum	22,630	2,084	<50
2028 Development Case	21,980	2,734	0
25+ permission	15,980	1,384	0

*All changes in numbers of people within LOAEL and SOAEL categories to be viewed in the context of noise level changes between cases being **imperceptible.**

Full Capacity Year 2028 DC vs. 2028 DM

- *LOAEL:* minor reduction in the population exposed to levels ≥ LOAEL, <3%: this is a **negligible** effect in a **positive** sense.
- *SOAEL:* moderate increase in the population exposed to levels ≥ SOAEL, <33%: but because the noise level changes are not perceptible (negligible effect) this change in population exposed to SOAEL is a **minor** effect.
- *UAEL:* there is a reduction in the population exposed to levels ≥ UAEL: the reduction is from a value less than 50 down to 0. This is a relatively small change, but since the net result is to eliminate an Unacceptable Adverse Impact at any receptor, this is determined to be a **moderate** effect in a **positive** sense.

7.233 An important point needs to be made about the forecast increase in the population exposed to noise levels at SOAEL or above. With an increase from 2,084 to 2,734, the assessed figure is 650 (or marginally less than 33% as indicated above). This seemingly large number appears incongruous given that for a typical summer night, the total number of movements in 2028 is 104 for the Do Minimum scenario increasing to only 107 for the Development Case. Furthermore, the projected increase in noise levels within the community is only between 0.5 and 0.6dB, an imperceptible change.

7.234 Comparing and contrasting the extent of the 54 dB $L_{Aeq,8h}$ summer night contours reveals that these very small increases in number of additional flights and overall noise levels leads to an extension in the contour in a north easterly direction which gives rise to a disproportionate geographical effect at Thaxted. This is indicated in Figure 7.9.

Figure 7.9: Extent of 2028 54 dB $L_{Aeq,8h}$ summer night contour over Thaxted: DC = blue, DM = black

7.235 The majority of the additional 650 dwellings encapsulated within the 2028 DC contour compared to the 2028 DM contour occur due to of the change in its extent over Thaxted. This a very local effect, and its significance needs to be understood in the context of there also being imperceptible changes in the overall level of aircraft noise and aircraft overflights. As can be seen in Schedule A7.3/SCH10, by reference to the changes forecast at Humfrey Lodge, night-time noise level difference between 2028 DC and 2028 DM are 0.4 dB. This is an **imperceptible** difference.

7.236 This is an important example of why changes in the number of people affected at particular noise levels can only be judged within the context of the changes in noise level they are likely to experience.

Transitional Year 2023 DC vs. 2023 DM

- *LOAEL:* small increases in the population exposed to levels ≥ LOAEL, <3%: this is a **negligible** effect.
- *SOAEL:* moderate increase in the population exposed to levels ≥ SOAEL, <25%: but because the noise level changes are not perceptible (negligible effect) this change in population exposed to SOAEL is a **minor** effect.
- *UAEL:* no increases in the population exposed to levels ≥ UAEL: this is a **nil** effect.

Full Capacity Year 2028 DC vs. Baseline 2016

- *LOAEL:* moderate increases in the population exposed to levels ≥ LOAEL, <25%: but because the noise level changes are not perceptible (negligible effect) this change in population exposed to LOAEL is a **negligible** effect.

- *SOAEL:* large increase in the population exposed to levels ≥ SOAEL, 160%: but because the noise level changes are not perceptible (negligible effect) this change in population exposed to SOAEL is a **minor** effect.
- Some of this increase is due to the presence of 35 additional dwellings in Great Hallingbury forecast to be subject to noise levels above the SOAEL. If these dwellings are not built, the increase in the population exposed to levels ≥ SOAEL is indicated as increasing by 150%. This is still a **minor** effect
- *UAEL:* no increases in the population exposed to levels ≥ UAEL: this is a **nil** effect.

Full Capacity Year 2028 DC vs. 25+ Permission

- *LOAEL:* moderate increases in the population exposed to levels ≥ LOAEL, <40%: but because the noise level changes are not perceptible (negligible effect) this change in population exposed to LOAEL is a **negligible** effect.
- *SOAEL:* large increase in the population exposed to levels ≥ SOAEL, <100%: but because the noise level changes are not perceptible (negligible effect) this change in population exposed to SOAEL is a **minor** effect.
- *UAEL:* no increases in the population exposed to levels ≥ UAEL: this is a **nil** effect.

Number of People Highly Annoyed

7.237 This following analysis summarises the number of people within the different noise bands, and uses the 'highly annoyed' categorisation described in Section 33 of ES Appendix 7.3. A person is defined as highly annoyed if they score 72 or above on a 100-point scale of annoyance.

7.238 Using the estimated population figures within each of the daytime contours bands, as opposed to the cumulative numbers contained in the ES Appendix 7.3 tables referred to above, it is possible to derive upper and lower figures for the number of people expected to be 'highly annoyed' by aircraft noise for each assessment case.

7.239 A single figure cannot be determined in each case, as the % 'highly annoyed' information relates to noise exposure given as a specific figure, whereas the population counts relate to numbers of people living within a range of noise levels, i.e. the band 51-54, 54-57 etc.

7.240 Therefore, an upper and lower value for the number of people 'highly annoyed' is reported based on the assumption that all the people living within a certain location are actually exposed to noise at the upper limit or they are exposed to the lower limit. See Table T16. The actual number will fall between the two extremes, but within the limits of the information available this is the best form of assessment.

7.241 The population estimates for all future years include those expected to be living in the 35 dwellings consented in Great Hallingbury under application UTT 16 3669 OP and the 20 dwellings consented in Takeley Street under application UTT 17 1852 FUL, although these are not yet built (and therefore are not included in the 2016 figures).

Table 7.16: Number of people 'highly annoyed' (HA) for each assessment year*

$L_{Aeq,16h}$ (dB		51	54	57	60	63	66	69	TOTAL H A
25+permission	Population	8,046	3,800	2,300	850	250	234	0	
	HA: lower	563	342	299	145	58	73	0	**1,479**
	HA: upper	724	494	391	196	78	91	0	**1,973**
2016 Baseline	Population	6,900	3,950	1,150	400	150	50	0	
	HA: lower	483	356	150	68	35	16	0	**1,106**
	HA: upper	621	514	196	92	47	20	0	**1,488**
2023 DM	Population	10,210	3,300	2,450	600	300	84	0	
	HA: lower	715	297	319	102	29	26	0	**1,527**
	HA: upper	919	429	417	138	93	38	0	**2,025**
2023 DC	Population	10,710	3,350	2,550	698	238	98	0	
	HA: lower	750	302	332	119	55	30	0	**1,586**
	HA: upper	964	436	434	161	74	38	0	**2,109**
2028 DM	Population	6,250	3,800	1,100	450	234	50	0	
	HA: lower	438	342	143	77	54	16	0	**1,058**
	HA: upper	563	494	187	81	104	20	0	**1,447**
2028 DC	Population	9,102	3,350	2,000	550	277	57	0	
	HA: lower	637	302	260	94	94	18	0	**1,374**
	HA: upper	819	436	340	127	86	22	0	**1,829**

*All changes in numbers of people 'highly annoyed' to be viewed in the context of noise level changes between cases being **imperceptible.**

7.242 The ratio between the upper limit and the lower limit of total people 'highly annoyed' for each assessment case is virtually the same, falling consistently in the range 1.33 to 1.35. Therefore, although the absolute numbers are different, the text below applies in a consistent manner across the full range of values.

7.243 The number ‘Highly Annoyed’ is expected to increase for all assessment cases compared to the 2016 Baseline Year. In the 2023 Development Case this number is expected to peak while handling a similar number of aircraft movements to the 2028 Do Minimum scenario, and is expected to generate a higher impact because the full benefits of the introduction of new generation aircraft have not yet been seen.

7.244 In the 2028 Development Case, the number of people ‘highly annoyed’ is approximately 7% lower than that predicted for the 25+ Permission scenario. This is because noise levels and the extent of the overall impact are forecast to be less for the 2028 Development Case than for the 25+ Permission scenario.

7.245 In the 2028 Development Case, the number of people ‘highly annoyed’ is just less than 30% higher than that predicted for the 2028 Do Minimum. This reflects the greater extent of the contours at all levels.

7.246 It is extremely important to view the predicted changes in the number of people highly annoyed in the context of the noise levels they currently experience and how those are forecast to change. As set out in paragraphs 7.210 to 7.229 aircraft noise levels are forecast in aggregate to be only 0.5 dB higher in 2028 if the development is permitted compared to no development taking place. Such a change in noise is, by all relevant measures, imperceptible.

7.247 Therefore, the assessed case of 30% more people being exposed to noise levels that would render them highly annoyed must be weighed against the practical consideration of this being due to an increase in noise levels that is not discernible. It is therefore very important in the circumstances of this application to consider all the relevant noise factors together so that each strand of assessment can be seen in its proper context.

Night Quota Period

7.248 An assessment of noise effects arising during the night quota period does not form part of the noise assessment. The reason for this is that aircraft movements and the noise generated during this period are regulated by the Government as formulated in the 'Night flight restrictions at Heathrow, Gatwick and Stansted'. The 2017 Decision Document[25] sets out the current position with regard to quota period movement numbers and noise restrictions at Stansted and makes proposals for how this would be modified over the next five year period.

7.249 Stansted Airport will continue to operate within the restrictions set by the Government, and these, as reviewed from time to time, will set a constraint on operations within the night quota period which is not affected by the current planning application.

Overflight Analysis

7.250 This section deals with the noise environment as defined by the use of 'N' – number above – contours. This shows how many over flights exceeding threshold noise levels of 65 dB L_{Amax} during the day and 60 dB L_{Amax} during the night any particular area may experience. The assessment does not provide evidence as to the impact arising as, according to CAP 1506, that can strictly only be achieved using the $L_{Aeq,T}$ noise metric. Nevertheless, Nx contours are considered to be informative and useful indicators of some aspects of the noise environment generated by aircraft in flight not fully expressed using the $L_{Aeq,T}$ averaging metrics, and that is why they are presented as an important supplement to the core analysis.

Daytime: N65

7.251 65 dB(A) has been suggested by the CAA in CAP 1506 and adopted by the Government, as an appropriate threshold for the daytime level of noise generated by an overflying aircraft. That is not to say that overflights generating lower levels of noise will not be perceived, or may not be found annoying by some individuals, but 65 dB(A) is an important threshold in overall airport noise assessments.

7.252 The 'number above' contours can help in determining:

- The areas affected by aircraft overflights generating noise level of 65 dB(A) or above (at least once per hour in aggregate);
- The areas experiencing increasingly frequent overflights at this level or above; and
- How the different operating conditions compare with respect to location and frequency of overflights at this level or above.

7.253 In accordance with accepted practice, the contours are plotted at values of 25, 50, 100 and 200 movements per day exceeding 65 dB(A), equivalent to:

- 200: 13 overflights per hour, or one every 5 minutes;
- 100: 6 overflights per hour, or one every 10 minutes;
- 50: 3 overflights per hour, or one every 20 minutes;
- 25: 1.5 overflights per hour, or one every 40 minutes.

<u>2016 Baseline, 2023 Transitional Year and 2028 Principal Assessment Year</u>

7.254 The highest number of overflights, i.e. N65 200, is limited to a swathe centred on the extended runway centre line for all the assessed conditions. This is indicative of 65 dB(A) generally only being exceeded by aircraft in the early stages of departure, prior to turning onto any individual departure route, or within the later stages of approach on arrival.

7.255 For the 2016 Baseline Year, the same can be said for the N65 100 value. By 2028, with or without the development in place, the use of the CLN and BUZ SIDs can clearly be seen influencing the shape and extent of the contours. As the N65 contour value gets lower (e.g. 50 overflights an hour), the influence of each individual departure route becomes increasingly apparent until at N65 25 values, all of the routes are clearly defined.

7.256 The 2016 Baseline Year gives rise to contour areas for N65 25 and 50 values which are larger than those for either of the 2028 Development Case or Do Minimum scenarios. It is only at N65 values of 100 and 200 that the 2028 contours extend to greater areas than those of the 2016 Baseline Year. This is because those areas under the flight paths that are close to the airport will be the ones experiencing some increases in the number of overflights at 65 dB(A) or above. Other areas will not see the same level of increase.

7.257 It can be concluded from this assessment that the wider community around Stansted Airport will not be expected to experience significantly different conditions with respect to daytime noise from aircraft overflights than is currently the case.

<u>25+ Planning Permission</u>

7.258 N65 contours have been produced for the 25+ Permission condition. Both the inner (N65 200) and outer (N65 25) contours cover larger areas than either of the 2028 Development Case contours, while the middle value contours (N65 100 and 50) are marginally smaller. In terms of dwelling and population counts, the 2028 Development Case contours contain slightly higher numbers in most cases, apart from the N65 100 contour where the number reduces. The differences are generally small with increases of not more than 13% within any contour category.

7.259 It is also noticeable that the general shape of the contours differs from those for 2016 Baseline and the 2028 contours. This reflects a different runway split and different allocations to the departure routes considered when the 25+ Permission analysis was originally undertaken (2006). The recent shift of departures from DET onto CLN removes the 'twin lobe' shape of the N65 contours that are evident in the 25+ Permission case.

7.260 In particular, the fact that PBN procedures are used on all CLN departures leads to a concentration of aircraft departure routes over less sensitive areas. It focusses flyover noise over a ground area which is narrower but with fewer people, even though it extends slightly further from the airport.

Night-time: N60

7.261 Similar considerations apply to the N60 night-time values as are set out above for the N65 daytime values. In this case the contours are plotted, in line with convention, at values of 25, 50 and 100 movements. There are insufficient night flights at Stansted to plot the N200 60 dB(A) contour. These are equivalent to:

- 100: 12 overflights per hour, or one every 5 minutes;
- 50: 6 overflights per hour, or one every 10 minutes;
- 25: 3 overflights per hour, or one every 20 minutes.

7.262 The higher (N60 100) contour is not relevant, as in 2016 there are only 82 night-time movements, and for both the 2028 Development Case and Do Minimum scenario it only covers a small area within the airport boundary.

7.263 For 2016, the N60 50 contour barely extends beyond the airport boundaries. For each of the 2028 Principal Assessment year conditions it extends along a swathe around the centre line of the runway This is indicative of 60 dB(A) only being exceeded at this frequency by aircraft in the early stages of departure, prior to turning onto an individual departure route, or within the later stages of approach on arrival.

7.264 In all three cases, the N60 25 contour extends generally further out into the community, but is not concentrated in any particular route.

7.265 When measuring the overall size of the contour areas, there is a more notable change in the N60 50 value between 2016 and the 2023 and 2028 conditions, for both the Do Minimum scenario and Development Case. The reason for this is that in either case, the number of movements over the 8-hour night-time period is expected to increase by more than 25%. The 82 movements in a typical summer night in 2016 are likely to increase to 104 and 107 in 2028 for the Do Minimum and Development Case respectively.

7.266 Considering the N60 25 contour value, there is much less of change in area between 2016 Baseline and either of the 2028 Principal Assessment year conditions. Similar to the N65 daytime analysis, this shows that local communities will not experience significantly different numbers of night-time overflights than at present.

Difference Contours

7.267 Contours have also been plotted that show the differences in daytime N65 and night-time N60 contours between the various assessment scenarios. This section describes those differences.

Daytime N65

7.268 The difference in daytime N65 contours levels in 2028 between the Development Case and Do Minimum scenario are shown in ES Appendix 7.3 Figure 2028 DC vs. DM/N65/Day.

7.269 The forecasts for daytime operations in 2028 indicate that there will be 72 additional movements with the development in place (712 between 07:00 and 23:00) compared to the Do Minimum condition (640 between 07:00 and 23:00). Since there is an approximately equal split between departures and arrivals this indicates an additional 36 or so of each.

7.270 As most areas only experience noise from either departures or arrivals on any given day, for an area to see an increase in the N65 value it will only be if it is very close to the airport The difference contours confirm this, showing that changes to the N65 value of greater than 36 only occur within areas along the centre line of the runway affected by both departures and arrivals.

7.271 Thirty-six events occur within the N65 change category 25 to 50. This is expected to affect areas where the majority of aircraft generate maximum noise levels of 65 dB(A) or above. Given the normal modal split, areas to the south west of the runway are more regularly overflown by departures while to the north east they are more regularly overflown by arrivals. The N65 changes of less than 75 only affect those areas overflown by every departure, i.e. before aircraft turn on to their departure route. This is a small area, close to the airport.

7.272 In the N65 change category of 0 to 25, the effect of individual departure routes become apparent.

7.273 Overall, the N65 change contours are helpful in setting some context for the degree to which people may be affected by increasing numbers of flights. One of the concerns raised in the consultation process is that removing the 35mppa cap will give rise to large increases in the number of overflights people will experience. The headline figure of an additional 72 daily movements by 2028 if the proposed development is permitted could, on the face of it, raise fears that everyone in the community will suffer the full negative effects of this increase.

7.274 However, 72 movements equate to 36 departures and 36 arrivals, which affect different people, and are spread across the 16 hour day. In addition, the N65 change analysis indicates that large changes in the number of overflights above 65 dB(A) do not occur throughout the surrounding community. The combined noise effects of 72 additional daily movements is only seen within the airport boundary. At any location outside the airport boundary less than half of these additional movements generate overflight noise levels above 65 dB(A), and the further away from the airport a receptor is located then the lower the number of overflights becomes. With increasing distance, this number diminishes to the point where the vast majority of people living under the flight paths will experience increases in overflights generating noise above the 65 dB(A) threshold of less than 25 per day.

Night-time N60

7.275 The difference in night-time N60 contours levels between the 2028 Development Case and Do Minimum scenario are shown in ES Appendix 7.3 Figure 2028 DC vs. DM/N65/Night.

7.276 The forecast night-time operations for 2028 show 3 additional movements with the development in place (107 between 23:00 and 07:00) compared to the Do Minimum condition (104 between 23:00 and 07:00).

7.277 Given that the mix of aircraft does not materially change between the two conditions, 3 additional movements over a baseline of 104, over an 8-hour period, represents a barely discernible change. The change is so small that it cannot be considered to give rise to any material effects.

SEL Footprints

7.278 Sound Exposure Level (SEL) footprints provide a further means of assessing the changes arising from the development. They identify the noise footprint generated a single flyover of a given aircraft and are helpful in demonstrating the effect of changes in aircraft type.

7.279 For comparison purposes, Sound Exposure Level (SEL) footprints have been produced at values of 80 and 90 dB(A) SEL for the Boeing B737-800 and the Boeing B737-MAX8[x]. The results are presented in:

- Figure SEL/Rwy22: Runway 22 SIDs;
- Figure SEL/Rwy04: Runway 04 SIDs.

7.280 Visually it is clear that the planned replacement of current generation narrow bodied jet aircraft by the new generation models will lead to lower noise levels. Quantitatively, this can be demonstrated by comparing the areas under the various footprints for the two aircraft types as set out in Tables 7.17 to 7.20:

Table 7.17: Runway 04 SIDs comparison of 80 dB(A) SEL footprint

Rwy 04 SID	Aircraft	Area (km^2)	Households	Population	reduction
Buzad	B737-800	23.0	350	950	
	B737-MAX8	13.0	200	600	39%
Clacton	B737-800	22.4	600	1,500	
	B737-MAX8	12.4	250	650	57%
Detling	B737-800	22.5	550	1,400	
	B737-MAX8	12.7	150	450	61%

Table 7.18: Runway 04 SIDs comparison of 90 dB(A) SEL footprint

Rwy 04 SID	Aircraft	Area (km^2)	Households	Population
Buzad	B737-800	2.8	0	0
	B737-MAX8	1.3	0	0
Clacton	B737-800	2.8	0	0
	B737-MAX8	1.3	0	0
Detling	B737-800	2.8	0	0
	B737-MAX8	1.3	0	0

[x] The B737-MAX200 proposed to be acquired and operated by Ryanair is a slightly modified version of the B737-MAX8 and differs from the standard B737-MAX8 in that it has an additional mid fuselage emergency exit on each side.

Table 7.19: Runway 22 SIDs comparison of 80 dB(A) SEL footprint

Rwy 04 SID	Aircraft	Area (km^2)	Households	Population	reduction
Buzad	B737-800	22.9	750	1,950	
	B737-MAX8	12.4	450	1,200	39%
Clacton	B737-800	22.4	550	1,450	
	B737-MAX8	12.5	300	750	48%
Detling	B737-800	22.3	1,350	3,600	
	B737-MAX8	12.4	400	1,050	71%

Table 7.20: Runway 22 SIDs comparison of 90 dB(A) SEL footprint

Rwy 04 SID	Aircraft	Area (km^2)	Households	Population
Buzad	B737-800	2.7	0	<50[xi]
	B737-MAX8	1.3	0	0
Clacton	B737-800	2.7	0	<50
	B737-MAX8	1.3	0	0
Detling	B737-800	2.7	0	<50
	B737-MAX8	1.3	0	0

7.281 As is clearly shown above, the lower noise B737-MAX8 replacing the B737-800 will lead to much lower numbers of people being affected by high levels of noise on departure. With the B737-MAX8 fleet replacement there are forecast to be no people living within the 90 dB(A) SEL footprint on departure on either runway. This is significant in that it leaves no local residents in areas exposed to a risk of sleep disturbance from B737-MAX8 aircraft taking off[26]. Furthermore, this reduction in noise by each movement, more than outweighs the modest increase in the number of movements per day.

7.282 The B737-MAX8 departure 90 dB(A) SEL footprints are all contained within the boundaries of the airport.

7.283 It should be noted that SEL footprints for the noisiest aircraft operating in the night-time periods are associated with cargo movements. Future cargo movements are forecast to be undertaken by the same types of aircraft as currently operate as typically cargo operators do not renew their fleet as regularly as passenger airlines. This therefore represents a worst-case scenario as some fleet replacement to newer and quieter variants will occur at some stage before 2028. What is clear is that future cargo movements will not be undertaken by noisier aircraft as a result of this application. As the extent of these footprints is already quantified and is a factor used to determine the extent of the existing Sound Insulation Grant Scheme qualification area, further analysis of these footprints is not contained in this ES.

[xi] The apparent anomaly of footprints containing 0 houses but having <50 people living in them is explained by the fact that ERCD only report these figures from the CACI census dated rounded to the nearest 50.

Summary of Effects

7.284 A wide range of assessments, using different criteria, have been made. This includes individual aircraft noise levels, the number of overflights, and various noise contours. All of these have been combined to produce an over-arching conclusion on noise effects.

7.285 Using the significance criteria set out in Table 7.4, noise effects are summarised in Table 7.21.

Table 7.21: Summary of Noise Effects

Year	Daytime (07:00 to 23:00)		Night-time (23:00 to 07:00)	
	Level difference	Impact	Level difference	Impact
2028	0.5 to 0.6 dB	**NEGLIGIBLE**	-0.2 to 0.4 dB	**NEGLIGIBLE**
2023	0.1 to 0.2 dB	**NEGLIGIBLE**	0.1 to 0.3 dB	**NEGLIGIBLE**

Further Mitigation

7.286 Paragraphs 7.96 to 7.125 of this chapter and Section 3 of ES Appendix 7.3 identifies the controls that are currently imposed at the airport as part of the overall noise management strategy. Section 4 gives details of the measures applied to minimise the impact of aircraft noise in the local community.

7.287 These measures will be retained and implemented in a manner which ensures that future noise levels do not exceed the limits indicated in the air noise assessment presented in this chapter and its associated appendices.

Proposed Enhanced Mitigation

Approach

7.288 No significant noise impacts are predicted as a result of the proposed development and, therefore, the view could be taken that no further mitigation is required. This section sets out some of the ways STAL manages the noise impacts that arise from its operations. This includes existing planning obligations and SDP commitments. In addition to summarising the current control and mitigation measures, the following sets out how they may be enhanced.

Night Noise Surcharges

7.289 Around 30% of air transport movements during the night quota period are by cargo operators, and these can be the noisier aircraft. At present, operational charges levied by STAL do not distinguish between daytime and night-time operations. However, a scheme is to be introduced which will impose surcharges to operations taking place at any time during the night quota period (23:30 to 06:00). The objectives of the scheme are to:

- Ensure that those movements generating the highest noise levels during the most sensitive hours pay the highest price, responding to the 'polluter pays' principle;
- Encourage the displacement of non-essential night-time movements to less sensitive daytime hours; and
- Raise additional monies that can be used to fund an enhanced sound insulation scheme, again ensuring that those creating the greatest disturbance make the largest contribution.

7.290 At present, QC4 aircraft movements are not permitted to be scheduled during the night-quota period. However, such movements can be operated on a delayed basis due to extenuating circumstances. It is proposed that a significant surcharge be applied in these circumstances.

7.291 Recently STAL implemented a local rule through the Scheduling Committee, that no additional QC2 movements, other than those that already hold historic rights, are permitted to be scheduled during the night quota period. As with QC4 movements, it is proposed that any late running QC2 movements would be subject to a surcharge.

7.292 The night noise surcharge scheme would be dependent on consultations taking place between STAL and the airlines affected. STAL aims to agree a scheme that is fair and proportionate, while addressing the key objectives of minimising the impact of noise at night and, consistent with the 'polluter pays' principle ensuring that operators of the noisier aircraft make the largest contribution to the costs of compensation or mitigation.

Noise Penalty Limits

7.293 In order to incentivise the best operational practices, STAL operates a noise penalty scheme. The limits are current set by central Government (DfT) as part of the 'designation' of Stansted under the Civil Aviation Act. Subject to consultation with stakeholders, STAL proposes to tighten the noise limits for different times of the day as shown in Table 7.22:

Table 7.22: Existing and proposed departure noise limits

When	Times	Noise Limit: (dB(A)	
		Current	Proposed
Day	07:00 to 23:00	94	89
Day Shoulder Period	06:00 to 07:00	89	84
Night Shoulder period	23:00 to 23:30	89	84
Night	23:30 to 06:00	87	84

7.294 However, as a designated airport, STAL will need to ensure that such changes are agreed with the DfT and have been subject to consultation with the airlines. The practical effect of these proposed changes is to set a single limit for the entirety of an 8 hour night period, which would encompass the existing night quota period and 'shoulders'.

7.295 The fining structure is proposed to remain in line with current practice and is summarised in Table 7.23.

Table 7.23: Noise penalty limit violation fines

Period	Tim	Noise Limit	Fine ≤3 dB above limit	Additional fine > 3 dB, per dB(A) or part
Daytime	07:00-23:00	89 dB(A)	£1,000	£250
Night-time	23:00-07:00	84 dB(A)	£1,000	£1,000

7.296 All monies collected through noise infringement fines will continue to be given over to local community projects through the Stansted Airport Community Trust Fund.

7.297 Subject to approval from the DfT, the new noise limits would apply on receipt of consent for the planning application.

Sound Insulation Grant Scheme (SIGS)

Existing Scheme

7.298 The terms of the existing SIGS are described in paragraphs 7.121 to 7.125 above.

7.299 Under the terms of this scheme, 1,088 properties are eligible for support, of which 648 have taken up the option and have benefitted from insulation.

7.300 The rate of uptake of the scheme has reached ~60% of qualifying properties. It would appear, therefore, that just under half of those residents who are eligible to benefit from the SIGS declined to do so. This is consistent with the rate of uptake at other airports in the UK.

Enhanced Scheme

7.301 STAL proposes an enhanced SIGS. There are three key elements that differentiate the proposed scheme from the current SIGS. They are the removal of the requirement for the householder to contribute financially to the cost of insulation works; a three-tiered offer, to target greatest support to those who are most impacted and increased grant payments.

Cost of the Works

7.302 Under the terms of the new scheme, qualifying properties could receive a grant, up to a maximum award, that would cover up to 100% of the cost of the works. There would no longer be a requirement for a householder to contribute financially.

7.303 The rationale for this approach is that residents of any property identified as being eligible for a sound insulation upgrade, by virtue of the levels of aircraft noise to which they are exposed, should not have to pay to achieve satisfactory internal living conditions. This removes the risk that the scheme prejudices those who cannot afford to make a contribution to the cost of works.

Qualification Criteria

7.304 It is proposed to offer three tiers of support under the new scheme. The objective is to ensure that those that are subject to the highest noise levels receive greatest support. The approach is summarised in Table 7.24. If a property is eligible, a home survey would be offered and completed to ensure the householder receives professional advice and can choose the most appropriate insulation works.

Table 7.24: Qualification criteria for the enhanced noise mitigation and sound insulation scheme

Noise Impact	Noise Contour	Grant Maximum
Upper	69 and 66 dB $_{LAeq,16h}$	£10,000
Middle	63 and 60 dB $_{LAeq,16h}$	£8,000
Lower	57 dB $_{LAeq,16h}$ / N65 200 / 90 dBA SEL* 600m distance / 55 dB $L_{Aeq,16h}$ ground noise	£5,000

* 90 dB(A) SEL footprint for the noisiest aircraft operating at night (23:00 to 06:00)

Residual Effects

7.305 The air noise assessment concludes that effects arising as a result of the application are negligible. In practical terms this is entirely expected as, although the application seeks to increaser the annual passenger cap, it does not seek to increase the permitted number of annual ATMs. In addition, an increasing proportion of future PATMs, which make up the bulk of daytime and night-time movements, will be undertaken by new generation, low noise variants of the aircraft already operating.

7.306 As a consequence, specific mitigation to control or limit significant air noise effects are not required. Nonetheless, it is proposed to enhance various controls and compensation schemes implemented by the airport, including the SIGS.

7.307 The net result is that there will be no residual adverse air noise effects of significance arising as a result of this application.

Cumulative Effects

7.308 There are no other developments proposed in the vicinity of the airport which could generate noise levels requiring consideration in conjunction with aircraft air noise to derive a cumulative effect.

7.309 There arises the question as to whether air noise effects should be considered in conjunction with other noise effects arising as a result of the proposed development, namely ground noise and surface access noise. By convention, it should not.

7.310 Each of the main noise sources associated with operations at an airport is assessed according to its character, with specific methodologies and assessment criteria applied.

7.311 Air noise at any given location is characterised by a series of individual noise events interspersed with periods of relative quiet: its effect can extend quite far into the community. Ground activity generates a steady underlying noise which can vary slightly over time according to how busy the airport is: its effects are much more localised and only audible to small numbers of people close to the airport boundary. Surface access noise, particularly road traffic noise, is a feature of the underlying noise climate in many parts of the UK irrespective of whether they are located near an airport or not. Its effect can extend quite far into the community and may be unrelated to proximity to the airport.

7.312 It is for these reasons that each of the noise sources are dealt with separately and it is not feasible to derive a 'cumulative noise impact'. This is the approach that has been used for the noise assessment at recent airport planning applications; the Heathrow Cranford Agreement application (determined on appeal in February 2017), and the London City Airport application (determined on appeal in July 2016). It is the approach adopted for this application.

References

1 CAP 1506, Survey of noise attitudes 2014: aircraft

2 ICAO International Standards and Recommended Practices, Annex 16 to the Convention on International Civil Aviation: Environmental Protection

3 The Aerodromes (Noise Restrictions) (Rules and Procedures) Regulations 2003

4 The Environmental Noise (England) Regulations 2006

5 European Noise Directive 2002/49/EC, published June 2002

6 Night flight restrictions at Heathrow, Gatwick and Stanstead Decision Document: Department for Transport, 2017

7 National Planning Policy Framework (NPPF): March 2012

8 Noise Policy Statement for England (NPSE): March 2010

9 National Planning Practice Guidance (NPPG): Noise, March 2014

10 Aviation Policy Framework: March 2013

11 UK airspace policy consultation: executive summary

12 UK airspace policy consultation: a framework for balanced decisions on the design and use of airspace

13 Air navigation guidance on airspace and noise management and environmental objectives

14 Consultation Response on UK Airspace Policy: A framework for balanced decisions on the design and use of airspace: Cm 9520, DfT, October 2017

15 Air Navigation Guidance 2017: Guidance to the CAA on its environmental objectives when carrying out its air navigation functions, and to the CAA and wider industry on airspace and noise management: DfT, October 2017

16 EU Regulation 598/2014 on the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Union airports within a Balanced Approach and repealing Directive 2002/30/EC

17 Beyond the horizon. The future of UK Aviation. A call for evidence on a new strategy. DfT July 2017

18 CAP 725: CAA Guidance on the Application of the Airspace Change Process March 2016

19 CAP 1616a: Airspace Design: Environmental requirements technical annex

20 CAP 1520: CAA Draft airspace design guidance, draft for consultation: March 2015

21 UK AIP: AD 2-EGSS-3-1

22 UK AIP: EG_AD_2_EGSS_en_2016-10-13

[23] ERCD Report 0306 Noise Mapping – Aircraft Traffic Noise, a research study on aircraft noise mapping at Heathrow Airport conducted on behalf of Defra: February 2004.

[24] Noise Exposure Contours for Stanstead Airport 2016, ERCD Report 1703: CAA ERCD April 2017

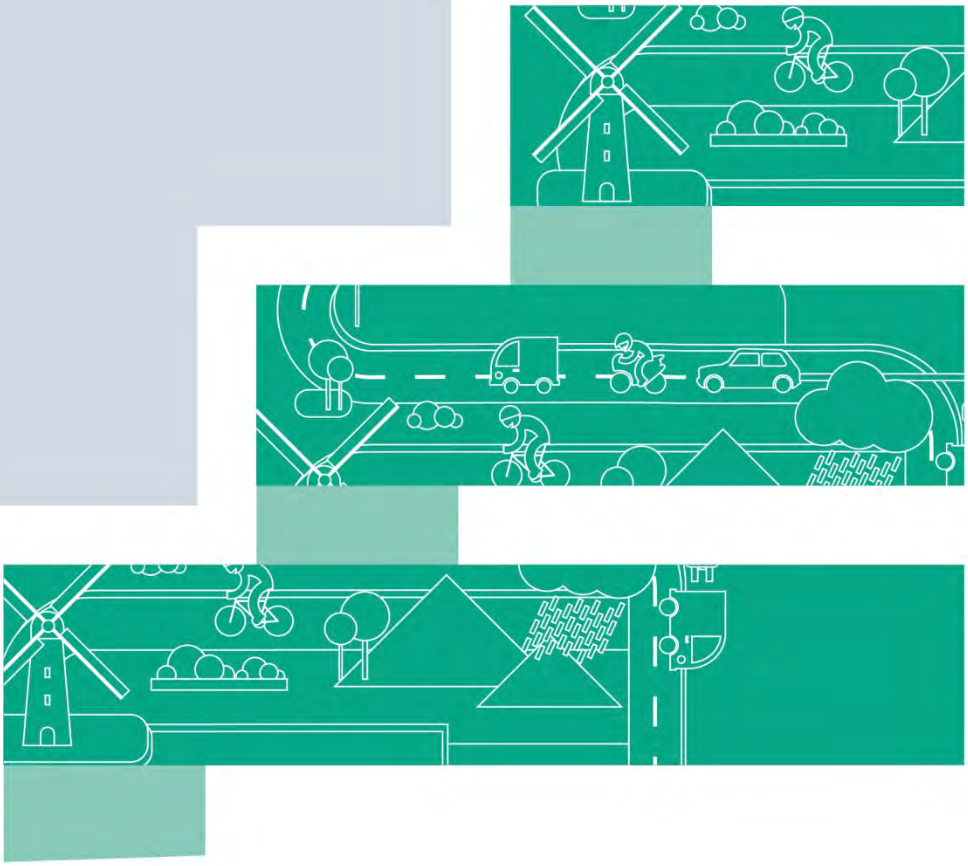
[25] Night flight restrictions at Heathrow, Gatwick and Stansted. Decision Document, DfT 2017

[26] DfT Field study of sleep disturbance

TRANSFORMING LONDON STANSTED AIRPORT

35+ PLANNING APPLICATION

Chapter 8
Ground Noise



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8 GROUND NOISE

Introduction

8.1 This chapter considers the impact of ground noise associated with the proposed development and quantifies the levels experienced in the 2016 Baseline Year and those expected in the future, with the proposed development (the 2028 Development Case (DC) 43mppa scenario) and without it (the 2028 Do Minimum (DM) 35mppa scenario).

8.2 It also considers the noise generated on a temporary basis by activities associated with the construction of the new airfield infrastructure associated with the proposed development.

8.3 The principal sources of ground noise are:

- Aircraft taxiing or holding with main engines in operation at any point between the parking stand and the point at which an aircraft commences its departure roll (start of roll) or exits the runway on arrival. This includes engine start-up and shut down when parked on the stand and all holding on the taxiways and aprons;
- Aircraft auxiliary power units (APUs) for supplying cabin air and electrical power, and other aircraft services mainly when the main engines are not operating;
- Mobile ground power units (GPUs) which supply the required electrical power to the aircraft and other equipment such as PCA units that supply pre conditioned air during turnarounds when fixed electrical ground power (FEGP) is not available;
- Aircraft engine ground run (EGR) tests; and
- Fixed plant and equipment.

8.4 The assessment does not include noise generated by aircraft when airborne, or when accelerating or decelerating along the runway after it commences its departure roll or prior to leaving the runway on arrival. These elements are covered in ES Chapter 7 (Air Noise), and the air noise contours include these particular elements including reverse thrust where it is used. Noise generated by road vehicles travelling to and from the airport is considered in ES Chapter 9 (Surface Access Noise).

8.5 A detailed description of the ground noise assessment and findings is contained in ES Appendix 8.1. It covers the topic in greater depth than is set out in this chapter, which summarises the approach taken and presents the key findings.

8.6 As further discussed below, the use of GPUs is limited at this airport, with noise and other elements being controlled by Directors Note DN62/12. On account of the significantly lower noise levels they generate, the noise impact of GPU use is therefore minimal in comparison to aircraft taxiing and APU use. Due to its infrequency of occurrence and short duration when taking place, testing of aircraft engines is similarly nominal in impact when compared to aircraft taxiing and APU use, as explained in Section 11.4 of ES Appendix 8.1. Also nominal in impact is noise from fixed plant and equipment at the airport which is subject to noise attenuation where required. For these reasons, these sources are not considered as part of calculations of the overall ground noise impact at this site.

8.7 While the application is for the development of new airfield infrastructure to cater for the predicted increase in passenger numbers and to allow more efficient use of single runway capacity, it is the changes to the number and type of aircraft movements, plus the knock on effects on related ground activity, that affect the assessment of ground noise levels. Therefore, detailed reference is made to the forecast aircraft movements associated with the different levels of passenger throughput in the relevant assessment years, now and in the future. These forecasts are set out in detail in ES Chapter 4 (Aviation Forecasts) and the manner in which they have been incorporated into the ground noise assessment, including any relevant assumptions, is clearly described in this chapter.

8.8 Specifically, this chapter describes:

- The airfield infrastructure works associated with the proposed development and the implication for aircraft operations;
- The assessment methodology and significance criteria;
- Key assumptions and limitations;
- Baseline ground noise conditions;
- Incorporated mitigation and impact assessment (including during construction);
- Further mitigation required or desirable to reduce assessed impacts of sufficient magnitude; and
- An assessment of residual effects.

8.9 Discussion of cumulative effects, and how air noise, ground noise and surface access noise resulting from the proposed development interact, forms part of ES Chapter 7.

8.10 A Glossary of Acoustic Terminology, as used throughout this and ES Chapters 7 and 9 is provided in ES Appendix 7.1.

Legislation, Guidance and Planning Policy Context

8.11 ES Appendix 7.2 (Planning and Assessment Framework) contains detailed background information and relevant details of the legislation, planning policy, international guidance and British Standards that need to be properly taken into account in the assessment of air noise at airports. A summary of the key issues as they apply to noise generated by aircraft operations is set out in ES Appendix 7.3 (Air Noise) and is not repeated below; although much of legislation and policy that is applicable to airport operations can be considered to apply to ground noise equally as well as air noise.

8.12 Similarly, national and local planning policy that seeks to protect people from excessive noise does not specifically differentiate between air noise and ground noise. Insofar as the 2008 25+ planning permission (35mppa) conditions ATM1 and ATM2 which limit the total number of aircraft movements to 274,000 will have the effect of limiting the air noise generated at the airport. This premise will also apply to ground noise too.

8.13 Relevant points of legislation and policy framework are set out in Section 2 of ES Appendix 8.1.

8.14 There is no specific assessment guidance, standard or recommended analysis methodology for the calculation and assessment of aircraft ground noise, unlike noise from road traffic or air traffic. A bespoke methodology has therefore been developed for assessing the noise from aircraft ground noise. The assessment methodology, which reflects that used in other recent airport ground noise assessments in the UK, is described in detail in Sections 11 and 12 of ES Appendix 8.1.

Assessment Methodology and Significance Criteria

Noise Metrics

8.15 The noise metrics to be analysed with respect to ground noise are set out below:

- $\boldsymbol{L}_{\mathbf{Aeq,16h}}$**:** the16-hour daytime L_{Aeq} value for the period 07:00 to 23:00 based on 92-day average summer operations; plotted from 50 to 60 dB in 5 dB increments.

- $\boldsymbol{L}_{\mathbf{Aeq,8h}}$**:** the 8-hour night-time L_{Aeq} value for the period 23:00 to 07:00 based on 92-day average summer operations; plotted from 40 to 55 dB in 5 dB increments.

Assessment Cases

8.16 Similar to airborne aircraft noise, ground noise modelling considers the total number of aircraft movements over a given period, in this case the 92-day summer period between June and September, and then aggregates the information to develop a typical day of operations. The number of movements by each aircraft type is identified, separated into departures and arrivals and also allocated to different times of the day; daytime 07:00 to 23:00 and night-time 23:00 to 07:00, for instance. For the 2016 Baseline Year contours, actual recorded movements are used; for calculated contours in future years, carefully developed forecasts of the likely numbers and mix of aircraft are used. This is the same aircraft movement data that is used in the air noise assessment.

8.17 Each aircraft type has allocated ground noise characteristics for various operations such as manoeuvres, taxing, at stand etc., which are based on noise measurements taken for such activities. To generate the average noise contours, the effect of each individual movement is aggregated to determine a period average (daytime or night-time) noise level for the typical day. This allows for the fact that, on aggregate over the full analysis period, both departures and arrivals take place in both runway directions. It also takes into account the historic modal split of operations on the runway which, aggregated over the last 20 years, is 73% SW and 27% NE. This is determined to be the standard modal split.

8.18 Ground noise modelling has been carried out for the following operating cases:

- 2016 Baseline Year;
- 2023 Development Case (DC) (36mppa);
- 2023 Do Minimum (DM) (35mppa);
- 2028 Development Case (DC) (43mppa);
- 2028 Do Minimum (DM) (35mppa); and
- 25+ planning permission (35mppa).

8.19 Sections 12 and 13 of ES Appendix 8.1 provide information on the derivation of the assessment methodology and criteria applied to the various classes of noise sensitive receptor assessed in this study.

8.20 The assessment is undertaken over the two standard time periods referred to in planning and aviation policy; daytime (07:00 to 23:00 local time), and night-time (23:00 to 07:00 local time).

Criteria Overview

8.21 As noted above, no standard methodology or guidance exists for the assessment of aircraft ground noise. Therefore, an assessment methodology has been derived based on professional judgement and assessments previously undertaken for airport developments in the UK.

8.22 The primary consideration in respect of determining the scale of ground noise impacts involves assessing how much higher, or lower, the ground noise levels are forecast to be with the development in place compared to the condition where no development has occurred. This comparison is made for 2028, the year of full capacity. It is also made for the interim year 2023, when the airport will be operating at less than full capacity but the combination of aircraft numbers and aircraft types are expected to give rise to the highest ground noise levels.

8.23 However, the change in noise level needs to be considered in the context of the absolute levels of aircraft noise in order to properly define the expected effects. For this reason, the forecast ground noise levels are also compared to:

- The background noise levels prevailing at any assessment position in the absence of noise due to ground activities at the airport;
- Threshold levels that reflect the onset of community annoyance to aircraft ground noise; the derivation of these levels is explained below.

Comparison to Prevailing Background Level

8.24 For each assessment scenario forecast ground noise levels are compared to the prevailing background noise levels occurring during the daytime and night-time periods. The background levels are described by the L_{A90} index, which is the A-weighted sound level exceeded for 90% of the time, as standard.

8.25 Once the level at each receptor has been calculated, reference is made to commentary in BS 4142:2014[1] in relation to assessing the impact based on the difference between the rating level of the noise source and the pre-existing background sound level.

8.26 The assessment of ground noise varies in part from the methods set out in BS4142:2014. Daytime noise levels have been evaluated over the full 16-hour period and night-time levels have been evaluated over the full 8-hour period, as opposed to the 1 hour and 15 minute periods respectively set out in the standard.

8.27 This assessment step is described in greater detail in Section 13.2 of ES Appendix 8.1.

Comparison to Threshold

8.28 As described in ES Appendix 8.1, Section 13.3, the World Health Organisation (WHO) Guidelines for Community Noise[2] and BS8233:2014[3] indicate that 55 dB $L_{Aeq,16h}$ and 45 dB $L_{Aeq,8h}$ are suitable thresholds applicable to community annoyance as a whole. Therefore, these thresholds, which reflect those applied in other such assessments of aircraft ground noise, have been applied in this assessment.

8.29 The assessment compares the calculated noise level under each case with the relevant threshold in order to help establish whether an impact of significance is expected due to ground noise.

8.30 This assessment step is described in greater detail in Section 13.3 of ES Appendix 8.1.

Change in Level

8.31 In order to quantitatively evaluate the potential effects of noise from the proposed development, it is appropriate to undertake a comparative assessment. As noted above, the key test of impact will depend on what the ground noise levels are forecast to be, with the development in place, compared to the condition where no development has occurred. The primary test of impact is undertaken for the principal assessment year of 2028, with a secondary test undertaken for the interim assessment year of 2023.

8.32 This is done by comparing L_{Aeq} ambient noise levels under the Do Minimum (35mppa) scenario with the L_{Aeq} ambient noise levels in the Development Case (43mppa) scenario. A fuller appreciation of the effects of the proposed development can also be gained by comparing the noise levels under the Development Case (43mppa) scenario with those associated with other reference cases such as the 2016 Baseline Year and the 25+ planning permission.

8.33 The first step is to consider the change in noise level due to the variation in operations. Once a noise level change has been identified an examination must also be made of other factors, which may not be adequately taken into consideration by assessing noise level changes alone.

8.34 This assessment step is described in greater detail in Section 13.4 of Appendix 8.1.

Determination of Impact

8.35 Significance criteria are set out in this section, which are specific to this ground noise assessment alone, and should be differentiated from other references to ‘minor’, ‘moderate’ and ‘major’ adverse impacts elsewhere in this ES.

8.36 To determine the significance of ground noise due to the proposed development, the following step-wise procedure is adopted:

Step 1: calculate the ground noise levels generated in each of the cases set out in paragraph 8.18;

Step 2: compare the calculated noise levels for all considered scenarios to the measured baseline noise levels.

Step 3: compare the calculated noise levels for all considered scenarios to the threshold values of 55 dB $L_{Aeq,16h}$ daytime and 45 dB $L_{Aeq,8h}$ night-time;

Step 4: compute the change in noise levels forecast with the development to those forecast in the event that no development has occurred. The primary test is for the assessment year 2028. A secondary test is for the interim year 2023; and

Step 5: compute the change in noise levels between the application case - 2028 DC (43mppa) and the other two cases, 2016 Baseline Year and 25+ planning permission (35mppa).

8.37 The criteria used to assess the ground noise effects arising from the proposed development are described in detail in ES Appendix 8.1, Section 13.5. The criteria are summarised in the following Table 8.1:

Table 8.1: Assessment criteria

Change comparison to reference case	Comparison to baseline background L_{A90} levels	Threshold not exceeded	Threshold exceeded by up to 10 dB	Threshold exceeded by more than 10 dB
0 to 0.9 dB	N/A	No impact	No impact	No impact
1 to 3 dB	No exceedance	No impact	No impact	No impact
1 to 3 dB	0 to 10 dB	No impact	**Moderate impact**	**Major impact**
1 to 3 dB	More than 10 dB	**Minor Impact**	**Moderate impact**	**Major impact**
3 to 10 dB	No exceedance	No impact	No impact	No impact
3 to 10 dB	0 to 5 dB	No impact	**Moderate impact**	**Major impact**
3 to 10 dB	More than 5 dB	**Minor impact**	**Moderate impact**	**Major impact**
More than 10 dB	No exceedance	No impact	No impact	No impact
More than 10 dB	Any exceedance	**Minor impact**	**Moderate impact**	**Major impact**

Assessment Methodology

8.38 The calculation methodology takes, in the first instance, source levels for various aircraft as published by the manufacturers or utilised in recent assessments at other airports in the London airports system. The source levels are taken from the standard data which are presented in terms of a sound pressure level at 152m, or as a sound power level for the aircraft in question. The following studies have been utilised in establishing the relevant source levels:

- Heathrow Airport Heathrow's North-West Runway Air and Ground Noise Assessment, AMEC (2014);
- London City Airport Appendix C.2.1 Ground Noise Survey, Bickerdike Allen Partners (2010); and
- Luton Airport London's Local Airport Planning Application Appendix N6, Bickerdike Allen Partners (2012).

8.39 The source levels utilised are set out in terms of a $L_{Aeq,1s}$ reference level at 152m from the source. The source level is used to establish a Single Event Noise Exposure Level (SEL) for the various aircraft operations, allowing the equivalent continuous level ($L_{Aeq,T}$) to be calculated for all operations over the relevant time period as described in ES Appendix 8.1 Section 12.3.

8.40 The sound level calculated for each individual aircraft movement, encompassing taxiing, aircraft APU use, holding, and ground handling operations, are then aggregated according to the number of movements detailed in the forecast movement schedules formulated by ICF and ACL to find the equivalent continuous level as averaged over the relevant time period: an average summer 16-hour day and an 8-hour night.

8.41 The method of calculation is based on average source sound levels in relation to average, or typical, movements and related activities at the airport. The actual sound levels can therefore vary depending on various factors. The approach is, however, based on typical methodology used for such an assessment. It is also important to note that the same calculation method is used for both existing operations and predicted operations, meaning that such variation is inherently included in all scenarios, thereby lending further weight to the accuracy of comparison between these scenarios.

Key Assumptions and Limitations

8.42 Forecasts of the changes in aircraft types and numbers associated with the proposed development are key to the accuracy and applicability of this assessment. The data used for this assessment has been supplied by ICF and ACL. These independently produced forecasts have been used for all of the technical assessments in this ES.

8.43 2016 Baseline Year movements have been apportioned to each apron area in line with the historic usage for that year. The 25+ planning permission apron usage ratios are included as set out in the ground noise assessment report for the application. 2023 and 2028 movements have been apportioned to apron areas in line with advice from STAL.

8.44 In line with the current layout, it is assumed that Apron E utilises the three existing stands during 2016 Baseline Year movements. It is also assumed that all of the permitted 15 stands at Apron E will be operational in 2023, under both the 2023 DC and DM scenarios, as well as the 2028 DM scenario. The 2028 DC scenario includes the additional three stands proposed, giving a total of 18 stands at Apron E in this scenario.

8.45 It is understood that the six stands proposed at Apron Y (Yankee) will be used for parking only, typically overnight parking. Aircraft would be towed to and from these locations. Passengers would not embark or disembark at these stands, negating the need for APU use. Therefore, the use of these stands under the proposed development would have a negligible effect on the overall ground noise levels.

8.46 The locations of the aforementioned Aprons, and the ratios used in the assessment, are shown in Section 14 of ES Appendix 8.1, with proposed airfield development locations shown in Figure 8.2 below.

Aircraft Noise Levels

Current Aircraft

8.47 Noise performance data for existing aircraft types was obtained as described in Section 12.2 of ES Appendix 8.1. The results of the noise monitoring process have been used to validate the noise model used for the production of contours around the airport.

Future Aircraft

8.48 A description of the new generation aircraft types, conforming to the new ICAO Chapter 14 certification standard, which are starting to enter service but not yet operating at Stansted Airport is set out in paragraphs 7.80 to 7.82 of ES Chapter 7 (Air Noise). The noise level characteristics that are applied to the air noise study have been based on the most up to date certification data for the new generation aircraft.

8.49 It should be noted that noise certification levels relate to airborne aircraft. However, noise generated by aircraft when moving along the ground is also dominated by main engine noise (as the APU is no longer operating). Therefore, it is considered appropriate to apply the same reduction to the on ground main engine and manoeuvre levels as is applied to the aircraft during departure, where engine noise typically dominates the aircraft noise profile.

8.50 In the absence of any evidence to the contrary and since noise levels during ground operations are not measured for certification purposes, this approach has been confirmed as being suitable by the Environmental Research and Consultancy Department (ERCD) of the UK Civil Aviation Authority (CAA). It is not expected that new low noise APU turbines will be fitted to the new generation, low noise aircraft and therefore the noise levels attributed to this element remain unchanged.

8.51 The noise level adjustments used in this study for the forthcoming generation of narrow body jets compared to those currently operating at airport are set out in Table 8.2 below. These adjustments have been agreed with the ERCD based on the most up-to-date noise certification data currently available for the different aircraft types.

Table 8.2: Adjustments to current aircraft noise levels for new generation variants

Aircraft Type	Engine, Taxiing Manoeuvring	APU
Airbus A319/A320/A321 NEO Variations	-5.0dB	-
Boeing B737-MAX200	-3.0dB	-

Construction Noise

8.52 Details of the construction noise assessment criteria and methodology are set out in ES Appendix 8.2.

8.53 The basis of the assessment is BS5228:2009+A1:2014[4].

8.54 Construction noise is assessed by reference to the expected change in baseline noise levels at affected noise sensitive receptors. As some construction activity is planned to take place at night, this is the key sensitive period and is the focus of the assessment.

8.55 Details of the proposed activities to be undertaken and equipment to be used are set out based on advice from STAL.

Baseline Conditions

8.56 This section describes the environmental conditions that currently exist on and immediately surrounding the airport.

Environment

8.57 The area around the airport is predominantly rural and the noise environment is typically dominated by road traffic noise.

8.58 Aircraft ground noise will be audible at locations close to the airport, the level and frequency of which will depend on the proximity of the receptors to the airport, and the level of screening in place due to the buildings and local terrain. The noise emanating from ground operations will typically be audible as a relatively steady background noise. At greater distances away from the airport, only noise from aircraft in flight will be audible.

8.59 For this reason, the study area for ground noise is approximately 8km x 8km, whereas the study area for airborne aircraft noise is approximately 25km x 30km. The ground noise study area is shown in Figure 8.1 below with assessment positions highlighted.

8.60 These assessment positions have been selected to be representative residential areas most exposed to ground noise from the airport, or to changes in the level of ground noise from the airport.

8.61 The assessment positions, and calculated levels, are all free-field locations at 1.5m above the local ground level. The reference numbers are used in the baseline condition and assessment discussions below to identify the various positions.

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Figure 8.1: Study area and discrete assessment positions

Noise Levels

Measurements

8.62 ES Appendix 7.4 sets out the results of noise measurements collected recently around Stansted. The procedures, methodology and instrumentation used are also described.

8.63 The noise survey work comprised:

- Attended measurements, carried out over relatively short time intervals between April and August 2017; and
- Unattended measurements carried out over matters of days, between December 2016 and August 2017.

8.64 The measurement locations were chosen to reflect the density of population around the airport and the flight paths used by aircraft departing and arriving. The selected positions are shown in Figure 8.1 above and in Figure 7.4/SP1 of ES Appendix 7.4.

8.65 Figure 7.4/SP1 of ES Appendix 7.4 also identifies the locations of the Stansted Airport noise monitors which are able to provide details of the long term noise levels at each location, together with a breakdown of the levels arising from non-aircraft activity in the community as well as those due to aircraft operations in combination or in isolation.

Results

Short-Term Attended Measurements

8.66 The daytime noise levels and contributing noise sources are set out in Table 8.4 below. Daytime levels are given in terms of a range as a number of visits were undertaken. Night-time levels are given as a single figure, this being the average measured during the single night-time visit undertaken at each position, as identified in Figure 8.1 above.

Table 8.4: Attended daytime noise survey results

	Measurement Position	Range		Typical Noise Sources
		L_{Aeq}	L_{A90}	
P7	Takeley	51-55	45-46	Road Traffic; aircraft audible under operations on both 04 and 22 runways
P8	Elsenham	67-68	45-46	Road traffic; aircraft under operations on both 04 and 22 runways just audible
P3	Tye Green	54-60	45-46	Intermittent road traffic; aircraft audible under operations on both 04 and 22 runways
P9	Brick End	57-63	41-45	Road traffic; aircraft audible under operations on both 04 and 22 runways

8.67 The night-time noise levels and contributing noise sources are set out in Table 8.5 below.

Table 8.5: Attended night-time noise survey results

	Measurement Position	L_{Aeq}	L_{A90}	Typical Noise Sources
P7	Takeley	49	46	Road Traffic; aircraft audible
P8	Elsenham	63	44	Road traffic; aircraft just audible
P3	Tye Green	63	46	Intermittent road traffic; aircraft audible
P9	Brick End	48	31	Road traffic; aircraft audible

8.68 In overall terms the general noise climate at Takeley, Elsenham and Tye Green is controlled by road traffic noise on the M11 motorway, with the A120 also contributing at Takeley. Noise from local road traffic dominates when present, while airborne aircraft noise is noticeable during flyovers. At Tye Green, ground noise is a notable contributor to the local noise climate.

8.69 At night the background levels at Takeley, Elsenham and Tye Green remain quite elevated due to the influence of road traffic on the M11 motorway, with ground noise at the airport also contributing at Tye Green resulting in a background level higher than that measured during the daytime. At Brick End the night-time background level drops notably, due to the greater distance of this position from the M11 motorway, the airport, and any other consistent noise source.

Unattended Measurements

8.70 The longer-term noise levels and contributing noise sources are set out in Tables 8.6 and 8.7 below.

Table 8.6: Unattended day time noise survey results

	Measurement Position	Range		Typical Noise Sources
		L_{Aeq}	L_{A90}	
P4	Ash Pub	55	46	M11 motorway traffic consistently contributing, aircraft taking off and landing intermittently, some ground noise noticeable at times
P6	Warmans Farm	53-54	48-50	M11 motorway traffic consistently contributing, aircraft taking off and landing intermittently
P2	Gaunts End	66	47	M11 motorway traffic consistently contributing, aircraft taking off and landing intermittently, particularly noticeable when landing on Runway 22 operations
P5	Bury Lodge	58	52	M11 motorway traffic consistently contributing, ground noise, aircraft departures particularly noticeable, some construction noise audible at times also
P1	Molehill Green	57	50	M11 motorway traffic consistently contributing at a low level, ground noise, aircraft landing particularly noticeable, local road traffic on the A120 notable when present

Table 8.7: Unattended night-time noise survey results

	Measurement Position	Range		Typical Noise Sources
		L_{Aeq}	L_{A90}	
P4	Ash Pub	50	42	Will be as per daytime sources
P6	Warmans Farm	50-51	45-46	Will be as per daytime sources
P2	Gaunts End	61	39	Will be as per daytime sources
P5	Bury Lodge	54	48	Will be as per daytime sources, with no construction noise
P1	Molehill Green	54	44	Will be as per daytime sources

8.71 Due to their proximity to the airport perimeter, the general noise climate at the positions in Tables 8.6 and 8.7 is affected by airport operations. Both aircraft ground noise and air noise was audible. At all these locations, M11 motorway noise controlled the background noise level, as well as the ambient noise in the absence of aircraft take-offs and arrivals. Local road traffic also contributes when present.

8.72 Attended night-time measurements were not undertaken at these positions, but it is expected that in general terms the controlling factors, these being the M11 motorway and the airport, would remain the same.

Incorporated Mitigation

Current Planning Permission

8.73 In 2016, the Baseline Year, Stansted Airport handled approximately 24.3 million passengers per annum (mppa). It operates under the terms and conditions of its 25+ planning permission (UTT/0717/06/FUL). These are described in full in ES Chapter 2 (Aviation Forecasts), but with respect to ground noise generation, the key conditions of approval are.

H5: 57dB $L_{Aeq,16h}$ contour shall not exceed 33.9km^2 (modelled using Ancon 2.3 or later).

ATM1: no more than 264,000 air transport movements (ATM); of which

- 243,500 are passenger air transport movements (PATM);
- 20,500 are cargo air transport movements (CATM); and

ATM2: Up to 10,000 GA movements are also permitted to operate, giving a total annual aircraft movement allocation of 274,000 in a calendar year.

8.74 It is noted that these conditions relate to the operation of aircraft in flight. However, the limitations in airborne movements, along with controls on the number and type of aircrafts have a direct effect on the associated ground noise. The levels of ground noise associated with the airport operation are therefore impacted upon by controls on airborne aircraft movements.

8.75 With specific regard to ground noise, the 25+ planning permission also contained a number of obligations relating to ground noise as follows:

1. From the Implementation Date to issue and maintain the continuance of Director's Notices to the effect that:

1.1 The use of Air Start units, Ground Power Units, Air Conditioning units or any other items of ground servicing equipment which does not conform to current EU standards for noise suppression (85 decibels dBA at 7 metres) is prohibited on any apron area at Stansted

1.2 Ground Power Units must not be used at Stansted when there is serviceable FEGP available on stand

1.3 To use all reasonable endeavours to have FEGP available for use at all times where it is installed

1.4 Except in the circumstances set out in this paragraph 1.4 APUs are not to be used where Fixed Electrical Ground Power (FEGP) is adequately provided and serviceable. The restrictions will be relaxed where:

1.4.1The outside air temperature is below +5°C or above +20°C, and FEGP is unserviceable or not installed on the stand

1.4.2 Systems that cannot be powered by FEGP require to be powered up for maintenance purposes, subject to prior permission being obtained from STAL

1.4.3 An aircraft has to be positioned on a stand equipped with FEGP, in such a manner as to make use of the FEGP system impractical (typically small cargo aircraft parked side-on or nose-out on stand)

1.4.4 An aircraft type is not compatible with the FEGP system at Stansted, or has a temporary technical fault preventing the use of FEGP

1.4.5 An aircraft has night-stopped at Stansted (minimum ground time of 2hrs) and is operating its first departure of the day and APUs can be run for a maximum of 45 minutes before departure subject to prior permission by STAL

1.4.6 Where the captain of an aircraft believes that genuine hardship to passengers will result unless the APU is run, then he/she may do so provided that STAL is contacted before starting

Existing Management at the Airport

8.76 The obligations have effect through a number of management controls applied to day to day operations at the airport.

Noise Action Plan

8.77 To meet its statutory requirements STAL implements a comprehensive Noise Action Plan[5] (NAP). The NAP sets out STAL's strategy to manage noise and includes a raft of measures and key actions to protect the community from the impacts of noise. Current proposals are for the plan to be updated in 2018 or 2019.

8.78 Included in the actions are specific measures dealing with noise from aircraft on the ground and other ground based activities. For example, the NAP makes specific reference to the ground noise obligations listed in paragraph 8.75 above and the Directors Notices listed below.

8.79 It should be noted that although noise associated with reverse thrust is modelled as part of the air noise assessment exercise, Section 5.3 of the NAP also identifies that commanders of aircraft are requested to avoid the excessive use of reverse thrust after landing, consistent with the safe operation of the aircraft, between 23:30 and 06:00 (local time).

8.80 Action 3 of the NAP sets out the key objectives and performance indicators with respect to the control of ground noise at Stansted Airport.

Sustainable Development Plan

8.81 As described in ES Chapter 3 (Description of Site, Proposed Development, Policy Context and Alternatives), in 2015 STAL published a Sustainable Development Plan (SDP)[6]. The 2015 SDP sets out how Stansted will grow to the capacity of its existing single runway along with an assessment of the associated benefits and impacts. The published plan was produced following a comprehensive consultation with key stakeholders and the public between June and November 2014. Measures proposed to be undertaken to continue to minimise noise from ground activities are set out on page 34 of the 2015 SDP.

Directors Notices

8.82 In line with existing S106 Agreement requirements, STAL issues Director's Notices (DN) with which all operators must comply. DN's are issued as part of the management of Airside Safety and Operations. Examples of such notices aimed at controlling or minimising noise emission from ground based activities are:

- DN62/12: Control of Auxiliary Power Units (APUs) and Ground Power Units (GPUs) at Stansted Airport, 20th September 2012;
- DN33/12: Control of Ground Noise for Fixed Wing Aircraft Engines, 25th April 2012;
- DN09/12: Control of Ground Noise for Rotary Wing Aircraft, 31st January 2012.

Sound Insulation Grant Scheme

8.83 The airport has a sound insulation grant scheme (SIGS) available to people in the community exposed to aircraft noise levels above certain limits, the provisions of which are described in detail in Section 37.4 of ES Appendix 7.3. The scheme includes a provision for an offer to be made to properties located within 600m of the airport boundary to reflect their exposure to noise generated by ground based activity.

Impact Assessment

Permanent Effects: Operations

8.84 The primary sources of the assessed ground noise and their characteristics are described in Section 11 of ES Appendix 8.1. Excluded from the assessment are Ground Power Units (GPU) and other mobile equipment, aircraft engine ground running and testing and helicopter movements for reason set out Sections 11.3 to 11.5 of ES Appendix 8.1.

8.85 The levels of noise generated by aircraft on the ground are substantially lower than those generated in flight. In fact, the highest levels of noise generated by a departing aircraft are when it is on the ground and the engines are operated at high power to accelerate along the runway and climb into the air, and on arrival when reverse thrust from the main engines if this is required to slow the aircraft at the required rate. These factors are included in the airborne aircraft noise analysis and they act to influence the shape of the air noise contours in the immediate vicinity of the airport.

8.86 Day to day aircraft ground noise is often only audible around the boundary of an airport or at receptor locations that are very local to it. It is normally perceived as a fluctuating, but otherwise continuous noise that has high frequency characteristics associated with jet engine inlet or turbine exhaust noise. Further from the airport boundary, typical levels of ambient noise in the vicinity of primary roads are usually high enough to mask airport ground noise to the point that it is not easy to distinguish it above the traffic noise.

8.87 However, as it is an intrinsic consequence of operations at an airport, and its levels will depend on the number and types of movements occurring during any period, it is important to quantify levels of noise generated by ground operations and whether they are expected to change as a result of the proposed development.

Proposed Works

8.88 The full extent of the physical works required as part of this application is described in ES Chapter 3 (Description of Site, Proposed Development, Policy Context and Alternatives).

8.89 So far as aircraft operations and the attendant ground noise effects are concerned, the key modifications proposed to the airfield are shown in Figure 8.2 below. These are described in detail in Section 5 of ES Appendix 8.1.

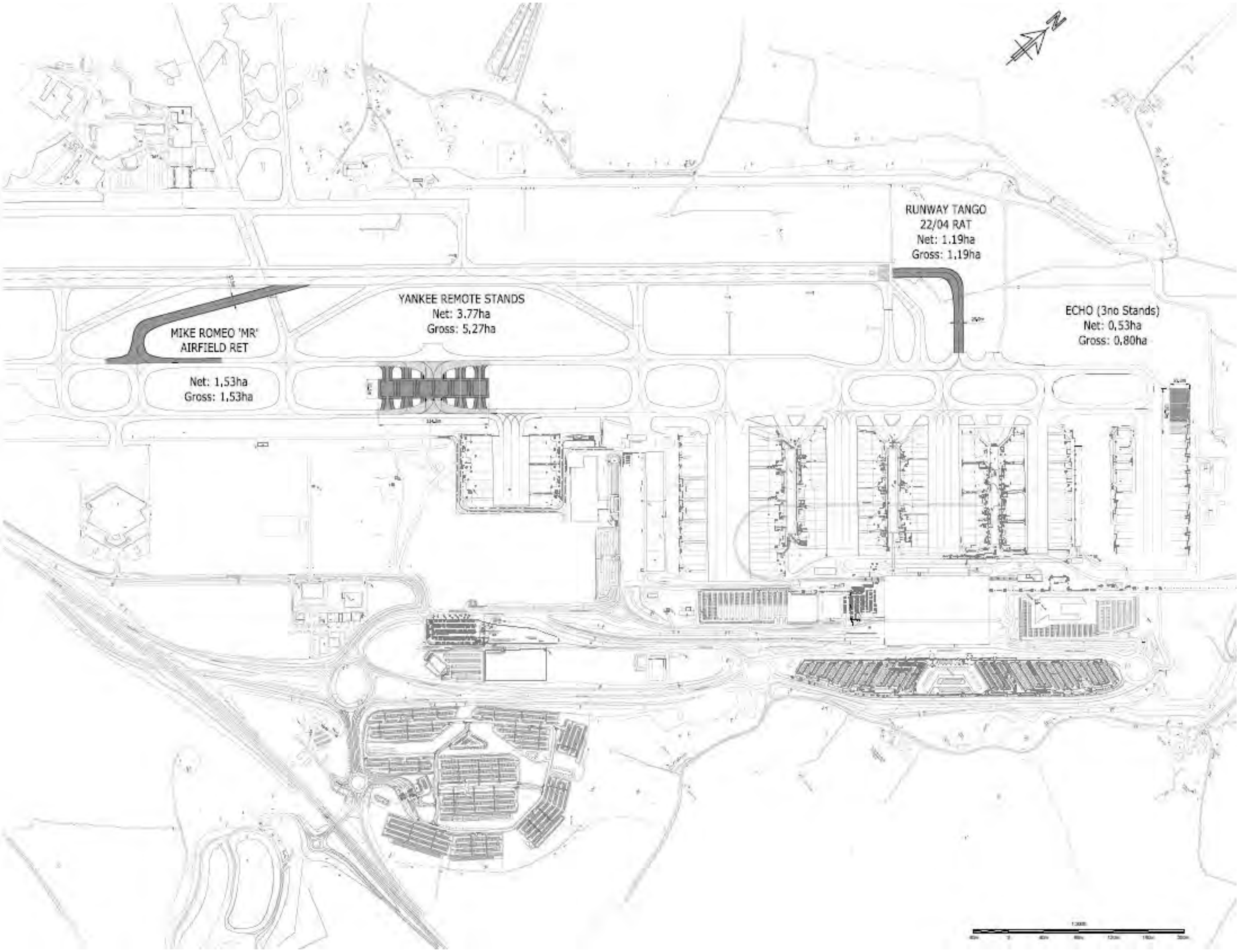

Figure 8.2: Proposed new airfield infrastructure works for 35+ Project

8.90 It should be noted that capacity for the operational throughput required to handle 43mppa will require the construction of 15 stands at Apron E (Echo), adding to the three stands already in operation there. 12 of these stands are, however, already consented under the terms of the 1980 permission (PH II Res Matters) UTT/1320/98/DFO and are scheduled to be constructed in 2018, resulting in 15 stands at Apron E being included in the 2023 DM scenario. In effect, therefore, this application requires only 3 additional stands to be built at Apron E.

Aircraft Movements

8.91 For the assessment of ground noise effects, it is necessary to consider what the noise levels are expected to be with the proposed development in place and operating at the foreseen capacity, the 2023 and 2028 DC (43mppa) scenarios and to compare them to:

- The noise levels that are expected to arise with the airport operating at its full capacity without the development in place, the 2023 and 2028 DM (35mppa) scenarios;
- The noise levels existing in 2016 representing the baseline conditions; and
- The noise levels arising from the 25+ permitted level of operations (35mppa).

8.92 Aircraft operations data has been provided by ICF, and forecast numbers are set out in ES Chapter 4 (Aviation Forecasts). So far as the overall ground noise position is concerned, the key operating numbers are set out in Table 8.8 below:

Table 8.8: Key operating considerations for ground noise assessment

Condition	Year	Mppa[1]	PATMs[2]	CATMs[3]	GA[4]	Total
Baseline	2016	24.3	152,400	13,700	14,500	180,600
DM	2023	35	213,000	15,000	20,000	247,000
DC	2023	36	219,000	14,000	20,000	253,000
DM	2028	35	212,000	17,000	20,000	249,000
DC	2028	43	253,000	16,000	5,000	274,000
25+ permission	N/A	35	243,500	20,500	10,000	274,000

[1] Million Passengers per Annum
[2] Passenger Air Traffic Movements
[3] Cargo Air Traffic Movements
[4] General Aviation

Operational Stage Effects

8.93 The results of the noise modelling are set out in the following contours, attached to ES Appendix 8.1:

- 8.1/GN1: 25+ planning permission, 35mppa vs 2028 DC (43mppa) day;
- 8.1/GN2: 2016 Baseline Year vs 2028 DC (43mppa) day;
- 8.1/GN3: 2028 DM (35mppa) vs 2028 DC (43mppa) day;
- 8.1/GN4: 25+ planning permission, 35mppa vs 2028 DC (43mppa) night;

- 8.1/GN5: 2016 Baseline Year operations vs 2028 DC (43mppa) night;
- 8.1/GN6: 2028 DM (35mppa) vs 2028 DC (43mppa) night;
- 8.1/GN7: 2023 DM (35mppa) operations vs 2023 DC (36mppa) day;
- 8.1/GN8: 2023 DM (35mppa) operations vs 2023 DC (36mppa) night;

8.94 The calculated noise level at discrete points and specific locations, 1.5m above local ground level, are set out in the following Tables 8.9 and 8.10:

Table 8.9: Calculated daytime levels at various positions

Receptor Location	Daytime, $L_{Aeq,16h}$					
	25+, Full Capacity	2016 Baseline	DM 2023	DC 2023	DM 2028	DC 2028
P1 - Molehill Green	56.7	53.4	55.7	55.8	55.4	56.4
P2 - Gaunts End	56.2	53.6	55.3	55.4	54.9	55.8
P3 - Tye Green	56.2	54.2	55.4	55.6	54.8	55.5
P4 - Ash Pub	54.8	54.1	55.1	55.3	54.5	52.1
P5 - Bury Lodge	53.5	53.6	54.5	54.7	54.0	48.7
P6 - Warmans Farm	49.9	48.9	50.0	50.2	49.4	47.9
P7 - Takeley	46.3	44.3	45.4	45.6	44.9	45.6
P8 - Elsenham	44.8	42.8	44.0	44.2	43.5	44.1
P9 - Brick End	44.8	42.3	43.8	44.0	43.4	44.3

Table 8.10: Calculated night-time levels at various positions

Receptor Location	Night-time, $L_{Aeq,8h}$					
	25+, Full Capacity	2016 Baseline	DM 2023	DC 2023	DM 2028	DC 2028
P1 - Molehill Green	51.5	49.9	52.1	52.3	52.3	52.5
P2 - Gaunts End	51.0	50.1	51.7	51.9	51.8	51.9
P3 - Tye Green	51.1	50.9	51.7	51.9	51.7	51.6
P4 - Ash Pub	49.6	50.4	51.1	51.4	51.1	48.2
P5 - Bury Lodge	48.3	49.7	50.5	50.7	50.5	44.8
P6 - Warmans Farm	44.8	45.4	46.1	46.3	46.1	44.0
P7 - Takeley	41.1	41.0	41.8	42.0	41.8	41.7
P8 - Elsenham	39.6	39.3	40.4	40.6	40.4	40.2
P9 - Brick End	39.5	38.8	40.3	40.5	40.4	40.4

Background and Threshold Level Comparisons

25+ Planning Permission

8.95 The following Table 8.11 sets out the assessment comparisons to existing background and ambient level threshold for daytime while Table 8.12 sets out the comparison for night-time levels.

Table 8.11: Daytime 25+ planning permission background and threshold level comparison

Receptor Location	Daytime Comparison			
	Calculated $L_{Aeq,16h}$ level	Existing L_{A90} Level	Background Comparison	Threshold Comparison
P1 - Molehill Green	57	50	+7	+2
P2 - Gaunts End	56	47	+9	+1
P3 - Tye Green	56	45	+11	+1
P4 - Ash Pub	55	46	+9	0
P5 - Bury Lodge	54	52	+2	-1
P6 - Warmans Farm	50	48	+2	-5
P7 - Takeley	46	45	+1	-9
P8 - Elsenham	45	45	0	-10
P9 - Brick End	45	41	+4	-10

Table 8.12: Night-time 25+ planning permission background and threshold level comparison

Receptor Location	Night-time Comparison			
	Calculated $L_{Aeq,8h}$ level	Existing L_{A90} Level	Background Comparison	Threshold Comparison
P1 - Molehill Green	51	44	+7	+6
P2 - Gaunts End	51	39	+12	+6
P3 - Tye Green	51	46	+5	+6
P4 - Ash Pub	50	42	+8	+5
P5 - Bury Lodge	48	48	0	+3
P6 - Warmans Farm	45	45	0	0
P7 - Takeley	41	46	-5	-4
P8 - Elsenham	40	44	-3	-5
P9 - Brick End	40	31	+9	-5

8.96 With reference to the proposed thresholds of 55 dB $L_{Aeq,16h}$ daytime and 45 dB $L_{Aeq,8h}$ night-time, these are exceeded at a number of locations in close proximity to the airport boundary.

8.97 With reference to the background noise levels, in all cases the calculated level is equal to or greater than the existing background noise level during the day. At night the calculated level is below the existing background level at two locations: Takeley and Elsenham.

2016 Baseline Year

8.98 The following Table 8.13 sets out the assessment comparisons to existing background and ambient level threshold for daytime while Table 8.14 sets out the comparison for night-time levels.

Table 8.13: Daytime 2016 Baseline Year background and threshold level comparison

Receptor Location	Daytime Comparison			
	Calculated $L_{Aeq,16h}$ level	Existing L_{A90} Level	Background Comparison	Threshold Comparison
P1 - Molehill Green	53	50	+3	-2
P2 - Gaunts End	54	47	+7	-1
P3 - Tye Green	54	45	+9	-1
P4 - Ash Pub	54	46	+8	-1
P5 - Bury Lodge	54	52	+2	-1
P6 - Warmans Farm	49	48	+1	-6
P7 - Takeley	44	45	-1	-11
P8 - Elsenham	43	45	-2	-12
P9 - Brick End	42	41	+1	-13

Table 8.14: Night-time 2016 Baseline Year background and threshold level comparison

Receptor Location	Night-time Comparison			
	Calculated $L_{Aeq,8h}$ level	Existing L_{A90} Level	Background Comparison	Threshold Comparison
P1 - Molehill Green	50	44	+6	+5
P2 - Gaunts End	50	39	+11	+5
P3 - Tye Green	51	46	+5	+6
P4 - Ash Pub	50	42	+8	+5
P5 - Bury Lodge	50	48	+2	+5
P6 - Warmans Farm	45	45	0	0
P7 - Takeley	41	46	-5	-4
P8 - Elsenham	39	44	-5	-6
P9 - Brick End	39	31	+8	-6

8.99 With reference to the proposed thresholds of 55 dB $L_{Aeq,16h}$ daytime and 45 dB $L_{Aeq,8h}$ night-time, these are exceeded at a number of locations close to the airport boundary.

8.100 With reference to the background noise levels, during the day and night-time the calculated level is below the existing background noise level at two locations: Takeley and Elsenham. In all other cases the calculated level is equal to or greater than the existing background noise level during the day.

2023 Do Minimum

8.101 The following Table 8.15 sets out the assessment comparisons to existing background and ambient level threshold for daytime while Table 8.16 sets out the comparison for night-time levels.

Table 8.15: Daytime 2023 DM background and threshold level comparison

Receptor Location	Daytime Comparison			
	Calculated $L_{Aeq,16h}$ level	Existing L_{A90} Level	Background Comparison	Threshold Comparison
P1 - Molehill Green	56	50	+6	+1
P2 - Gaunts End	55	47	+8	0
P3 - Tye Green	55	45	+10	0
P4 - Ash Pub	55	46	+9	0
P5 - Bury Lodge	54	52	+2	-1
P6 - Warmans Farm	50	48	+2	-5
P7 - Takeley	45	45	0	-10
P8 - Elsenham	44	45	-1	-11
P9 - Brick End	44	41	+3	-11

Table 8.16: Night-time 2023 DM background and threshold level comparison

Receptor Location	Night-time Comparison			
	Calculated $L_{Aeq,8h}$ level	Existing L_{A90} Level	Background Comparison	Threshold Comparison
P1 - Molehill Green	52	44	+8	+7
P2 - Gaunts End	52	39	+13	+7
P3 - Tye Green	52	46	+6	+7
P4 - Ash Pub	51	42	+9	+6
P5 - Bury Lodge	50	48	+2	+5
P6 - Warmans Farm	46	45	+1	+1
P7 - Takeley	42	46	-4	-3
P8 - Elsenham	40	44	-4	-5
P9 - Brick End	40	31	+9	-5

8.102 With reference to the proposed thresholds of 55 dB $L_{Aeq,16h}$ daytime and 45 dB $L_{Aeq,8h}$ night-time, these are exceeded at one location, Molehill Green, during the day time. The night-time threshold is exceeded at a number of locations close to the airport boundary.

8.103 With reference to the background noise levels, in all cases the calculated level is equal to or greater than the existing background noise level during the day except for at Elsenham. At night the calculated level is below the existing background level at two locations: Takeley and Elsenham.

2023 Development Case

8.104 The following Table 8.17 sets out the assessment comparisons to existing background and ambient level threshold for daytime while Table 8.18 sets out the comparison for night-time levels.

Table 8.17: Daytime 2023 DC background and threshold level comparison

Receptor Location	Daytime Comparison			
	Calculated $L_{Aeq,16h}$ level	Existing L_{A90} Level	Background Comparison	Threshold Comparison
P1 - Molehill Green	56	50	+6	+1
P2 - Gaunts End	55	47	+8	0
P3 - Tye Green	56	45	+11	+1
P4 - Ash Pub	55	46	+9	0
P5 - Bury Lodge	55	52	+3	0
P6 - Warmans Farm	50	48	+2	-5
P7 - Takeley	46	45	+1	-9
P8 - Elsenham	44	45	-1	-11
P9 - Brick End	44	41	+3	-11

Table 8.18: Night-time 2023 DC background and threshold level comparison

Receptor Location	Night-time Comparison			
	Calculated $L_{Aeq,8h}$ level	Existing L_{A90} Level	Background Comparison	Threshold Comparison
P1 - Molehill Green	52	44	+8	+7
P2 - Gaunts End	52	39	+13	+7
P3 - Tye Green	52	46	+6	+1
P4 - Ash Pub	51	42	+9	+6
P5 - Bury Lodge	51	48	+3	+6
P6 - Warmans Farm	46	45	+1	+1
P7 - Takeley	42	46	-4	-3
P8 - Elsenham	41	44	-3	-4
P9 - Brick End	40	31	+9	-5

8.105 With reference to the proposed thresholds of 55 dB $L_{Aeq,16h}$ daytime and 45 dB $L_{Aeq,8h}$ night-time, these are exceeded at two locations, Molehill Green and Tye Green, during the day time. The night-time threshold is exceeded at a number of locations near the airport boundary.

8.106 With reference to the background noise levels, in all cases the calculated level is equal to or greater than the existing background noise level during the day except for at Elsenham. At night the calculated level is below the existing background level at two locations: Takeley and Elsenham.

2028 Do Minimum

8.107 The following Table 8.19 sets out the assessment comparisons to existing background and ambient level threshold for daytime while Table 8.20 sets out the comparison for night-time levels.

Table 8.19: Daytime 2028 DM background and threshold level comparison

Receptor Location	Daytime Comparison			
	Calculated $L_{Aeq,16h}$ level	Existing L_{A90} Level	Background Comparison	Threshold Comparison
P1 - Molehill Green	55	50	+5	0
P2 - Gaunts End	55	47	+8	0
P3 - Tye Green	55	45	+10	0
P4 - Ash Pub	55	46	+9	0
P5 - Bury Lodge	54	52	+2	-1
P6 - Warmans Farm	49	48	+1	-6
P7 - Takeley	45	45	0	-10
P8 - Elsenham	43	45	-2	-12
P9 - Brick End	43	41	+2	-12

Table 8.20: Night-time 2028 DM background and threshold level comparison

Receptor Location	Night-time Comparison			
	Calculated $L_{Aeq,8h}$ level	Existing L_{A90} Level	Background Comparison	Threshold Comparison
P1 - Molehill Green	52	44	+8	+7
P2 - Gaunts End	52	39	+13	+7
P3 - Tye Green	52	46	+6	+7
P4 - Ash Pub	51	42	+9	+6
P5 - Bury Lodge	50	48	+2	+5
P6 - Warmans Farm	46	45	+1	+1
P7 - Takeley	42	46	-4	-3
P8 - Elsenham	40	44	-4	-5
P9 - Brick End	40	31	+9	-5

8.108 With reference to the proposed threshold of 55 dB $L_{Aeq,16h}$ daytime, this is not exceeded at any location. With reference to the 45 dB $L_{Aeq,8h}$ night-time threshold, this is exceeded at a number of locations near the airport boundary.

8.109 With reference to the background noise levels, in all cases except for Elsenham during the day time the calculated level is equal to or greater than the existing background noise level. At night the calculated level is below the existing background level at two locations: Takeley and Elsenham.

2028 Development Case

8.110 The following Table 8.20 sets out the assessment comparisons to existing background and ambient level threshold for daytime while Table 8.21 sets out the comparison for night-time levels.

Table 8.20: Daytime 2028 DC background and threshold level comparison

Receptor Location	Daytime Comparison			
	Calculated $L_{Aeq,16h}$ level	Existing L_{A90} Level	Background Comparison	Threshold Comparison
P1 - Molehill Green	56	50	+6	+1
P2 - Gaunts End	56	47	+9	+1
P3 - Tye Green	55	45	+10	0
P4 - Ash Pub	52	46	+8	-3
P5 - Bury Lodge	49	52	-3	-6
P6 - Warmans Farm	48	48	0	-7
P7 - Takeley	46	45	+1	-9
P8 - Elsenham	44	45	-1	-11
P9 - Brick End	44	41	+3	-11

Table 8.21: Night-time 2028 DC background and threshold level comparison

Receptor Location	Night-time Comparison			
	Calculated $L_{Aeq,8h}$ level	Existing L_{A90} Level	Background Comparison	Threshold Comparison
P1 - Molehill Green	52	44	+8	+7
P2 - Gaunts End	52	39	+13	+7
P3 - Tye Green	52	46	+6	+7
P4 - Ash Pub	48	42	+6	+3
P5 - Bury Lodge	45	48	-3	0
P6 - Warmans Farm	44	45	+1	-1
P7 - Takeley	42	46	-4	-3
P8 - Elsenham	40	44	-4	-5
P9 - Brick End	40	31	+9	-5

8.111 With reference to the proposed thresholds of 55 dB $L_{Aeq,16h}$ daytime and 45 dB $L_{Aeq,8h}$ night-time, these are exceeded at a number of locations near the airport boundary.

8.112 With reference to the background noise levels, in all cases the calculated level is equal to or greater than the existing background noise level during the day except for Elsenham, where the calculated level is below the existing background level. At night the calculated level is below the existing background level at three locations: Bury Lodge, Takeley and Elsenham.

Changes in Noise Level

2028 Development Case vs 25+ Planning Permission Calculated Levels

8.113 Contour 8.1/GN1 in ES Appendix 8.1 compares the calculated 2028 DC (43 mppa) ground noise levels to 25+ planning permission (35 mppa) ground noise levels for the daytime period. Contour 8.1/GN4 in ES Appendix 8.1 sets out a comparison of the calculated levels for the night-time period. Table 8.22 sets out the assessment comparisons for the daytime noise levels while Table 8.23 sets out the comparison for night-time noise levels.

Table 8.22: Daytime 2028 DC vs. 25+ planning permission $L_{Aeq,16\,h}$ calculated noise levels

Receptor Location	Daytime Comparison		
	2028 DC	25+ Permission	Change
P1 - Molehill Green	56.4	56.7	-0.3
P2 - Gaunts End	55.8	56.2	-0.4
P3 - Tye Green	55.5	56.2	-0.7
P4 - Ash Pub	52.1	54.8	-2.7
P5 - Bury Lodge	48.7	53.5	-4.8
P6 - Warmans Farm	47.9	49.9	-2.0
P7 - Takeley	45.6	46.3	-0.7
P8 - Elsenham	44.1	44.8	-0.7
P9 - Brick End	44.3	44.8	-0.5

Table 8.23: Night-time 2028 DC vs. 25+ planning permission $L_{Aeq,8\,h}$ calculated noise levels

Receptor Location	Night-time Comparison		
	2028 DC	25+ Permission	Change
P1 - Molehill Green	52.5	51.5	+1.0
P2 - Gaunts End	51.9	51.0	+0.9
P3 - Tye Green	51.6	51.1	+0.5
P4 - Ash Pub	48.2	49.6	-1.4
P5 - Bury Lodge	44.8	48.3	-3.5
P6 - Warmans Farm	44.0	44.8	-0.8
P7 - Takeley	41.7	41.1	+0.6
P8 - Elsenham	40.2	39.6	+0.6
P9 - Brick End	40.4	39.5	+0.9

8.114 At all positions, the 2028 DC shows a decrease in daytime noise levels, with decreases of -0.3 to -4.8 dB seen from the contours in 8.1/GN1 and Table 8.22. The total number of daytime operations is almost identical for the two cases, and the lower noise level in 2028 is due primarily to the utilisation of new generation aircraft with lower source levels in the 2028 DC.

8.115 Night-time noise levels show an increase of up to 1.0 dB to the north of the airport, with a decrease of up to -3.5 dB to the west, as can be seen from the contours in 8.1/GN4 and Table 8.23.

8.116 Compared to daytime operations, at night overall numbers of operations are relatively low in both cases due to the current Night Noise restrictions that apply between the hours of 23:30 and 06:00. For the 25+ Permission, the night-time ground movements amounted to 88 while for the 2028 DC the number of ground movements is 107. Based purely on number of operations with no change in mix, an overall noise increase of around 0.8 dB would be anticipated.

8.117 Setting aside local effects, such as the reduction in GA (General Aviation) activity affecting the northside noise levels and the increase in activity at Apron E affecting noise levels to the north east, such as at Molehill Green, 0.8 dB is representative of the forecast aggregate noise level increase.

8.118 Whether considering typical differences (+0.8 dB) or worst case differences (+1.0 dB at Molehill Green), the numbers are small. For noise that is essentially the same in character a difference of not more than 1 dB is effectively imperceptible. The reason for these small differences is that the changes in the mix of aircraft between the two cases do not significantly affect overall noise levels because freight operations make up a reasonable proportion of the total ground activity, at approximately 28% of night-time movements in the 2028 DC scenario. As freight is typically handled by older, noisier aircraft they limit the beneficial effects of the newer quieter passenger aircraft.

2028 Development Case vs 2016 Baseline Year Calculated Levels

8.119 Contour 8.1/GN2 in ES Appendix 8.1 sets out a comparison of the calculated 2028 DC and 2016 Baseline Year ground noise levels for the daytime period. Contour 8.1/GN5 in ES Appendix 8.1 sets out a comparison of the calculated levels for the night-time period. Table 8.24 sets out the assessment comparisons for the daytime noise levels while Table 8.25 sets out the comparison for night-time noise levels.

Table 8.24: Daytime 2028 DC vs. 2016 Baseline Year $L_{Aeq,16h}$ calculated noise levels

Receptor Location	Daytime Comparison		
	2028 DC	2016 Baseline	Change
P1 - Molehill Green	56.4	53.4	+3.0
P2 - Gaunts End	55.8	53.6	+2.2
P3 - Tye Green	55.5	54.2	+1.3
P4 - Ash Pub	52.1	54.1	-2.0
P5 - Bury Lodge	48.7	53.6	-4.9
P6 - Warmans Farm	47.9	48.9	-1.0
P7 - Takeley	45.6	44.3	+1.3
P8 - Elsenham	44.1	42.8	+1.3
P9 - Brick End	44.3	42.3	+2.0

Table 8.25: Night-time 2028 DC Case vs. 2016 Baseline Year $L_{Aeq,8h}$ calculated noise levels

Receptor Location	Night-time Comparison		
	2028 DC	2016 Baseline	Change
P1 - Molehill Green	52.5	49.9	+2.6
P2 - Gaunts End	51.9	50.1	+1.8
P3 - Tye Green	51.6	50.9	+0.7
P4 - Ash Pub	48.2	50.4	-2.2
P5 - Bury Lodge	44.8	49.7	-4.9
P6 - Warmans Farm	44.0	45.4	-1.4
P7 - Takeley	41.7	41.0	+0.7
P8 - Elsenham	40.2	39.3	+0.9
P9 - Brick End	40.4	38.8	+1.6

8.120 As can be seen from the contours in 8.1/GN2 and Table 8.24 above, the calculated levels show an increase of between 1.3 and 3.0 dB in the 2028 DC over the 2016 Baseline Year conditions during daytime hours, with a decrease of up to 4.9 dB to the west. Night-time noise levels show an increase of up to 2.6 dB, with a decrease of up to 4.9 dB to the west, as can be seen from the contour 8.1/GN5 and Table 8.25.

8.121 The reduction in noise levels to the west is directly due to the reduction of GA movements, with passenger and cargo comprising all movements. This results in the northside aprons not being used, with a notable positive impact on the noise levels to the west of the airport.

8.122 The increase of 3.0 dB at Molehill Green can be primarily explained due to only three of the 15 permitted stands being constructed and in operation at Apron E in the current baseline scenario.

2028 Development Case vs 2028 DM Calculated Levels

8.123 Contour 8.1/GN3 in ES Appendix 8.1 sets out the key comparison of the calculated 2028 DC and 2028 DM scenario ground noise levels for the daytime period. Contour 8.1/GN6 in ES Appendix 8.1 sets out a comparison of the calculated levels for the night-time period. Table 8.26 sets out the assessment comparisons for the daytime noise levels while Table 8.27 sets out the comparison for night-time noise levels.

Table 8.26: Daytime 2028 DC vs. 2028 DM $L_{Aeq,16\,h}$ calculated noise levels

Receptor Location	Daytime Comparison		
	2028 DC	2028 DM	Change
Molehill Green	56.4	55.4	+1.0
Gaunts End	55.8	54.9	+0.9
Tye Green	55.5	54.8	+0.7
Ash Pub	52.1	54.5	-2.4
Bury Lodge	48.7	54.0	-5.3
Warmans Farm	47.9	49.4	-1.5
Takeley	45.6	44.9	+0.7
Elsenham	44.1	43.5	+0.6
Brick End	44.3	43.4	+0.9

Table 8.27: Night-time 2028 DC vs. 2028 DM $L_{Aeq,8\,h}$ calculated noise levels

Receptor Location	Night-time Comparison		
	2028 DC	2028 DM	Change
Molehill Green	52.5	52.3	+0.2
Gaunts End	51.9	51.8	+0.1
Tye Green	51.6	51.7	-0.1
Ash Pub	48.2	51.1	-2.9
Bury Lodge	44.8	50.5	-5.7
Warmans Farm	44.0	46.1	-2.1
Takeley	41.7	41.8	-0.1
Elsenham	40.2	40.4	-0.2
Brick End	40.4	40.4	0

8.124 During daytime hours, the reduction in levels at the Ash Pub, Bury Lodge and Warmans Farm is directly due to the reduction in GA movements. The result of this is that with significant reduction in activity on the northside apron there are notable positive impacts on the noise levels to the west of the airport.

8.125 The reduction in levels in most locations during the night-time period arises because of:

- There being virtually no increase in the number of movements between the 2028 DC and the DM scenario operating conditions due to the overriding constraints imposed by the Government's Night Noise Regulations;
- The significant reduction of GA movements under the DC. This has the benefit of bringing into use a greater proportion of new generation lower noise aircraft, replacing small numbers of general aviation and corporate movements which are typically by older generation, noisier aircraft.

8.126 Under the first assessment test, as can be seen from the contours in 8.1/GN3 and Table 8.26 above, the calculated levels show an increase of between 0.6 and 1.0 dB DC over the DM scenario during daytime hours. A decrease of between -1.5 and -5.3 dB is seen to the west of the airport.

8.127 8.1/GN6 and Table 8.27 show that night-time levels decrease by as much as -5.7 dB at locations adjacent to the northside aprons, with minor increases of up to 0.2 dB at Molehill Green.

8.128 On balance, and considering the fact that there will be small increases in noise levels at some receptors and rather larger decreases at others, the ground noise climate in 2028 for the Development Case will not be materially worse than that generated for the Do Minimum scenario.

8.129 On this basis, and with reference to the background level and threshold level comparisons, then there is **no impact** assessed at any location during the night-time and **no impact** assessed at any location with the exception of Molehill Green during the daytime.

8.130 At Molehill Green during the daytime the forecast noise level increase due to the development is +1.0 dB, fractionally exceeding (i.e. by only 0.1dB) the no impact cut off. This, in combination with the background noise level being exceeded by 6 dB, would be rated as no impact except that the daytime threshold level of 55 dB $L_{Aeq,16h}$ is also exceeded but by a margin of only 1 dB.

8.131 At Molehill Green during the daytime, therefore, strict interpretation of the impact categories set out in Table 8.1 would suggest a moderate impact. However, taken together, the fractional increase in the forecast noise level together with the marginal exceedance of the threshold (<3 dB) indicate that a **minor** impact is assessed.

8.132 The fact that the forecast scale of impact is virtually negligible is due to the very small increase predicted for ground noise levels during the day and night-time when comparing the 2028 DC to the 2028 DM scenario. It is notable that where an improvement is seen, the magnitude of the improvement is more significant, running from -0.1 dB to -5.7 dB.

2023 DC vs 2023 DM Calculated Levels

8.133 Contour 8.1/GN7 in ES Appendix 8.1 sets out a comparison of the calculated 2023 DC and the 2023 DM scenario ground noise levels for the daytime period. Contour 8.1/GN8 in ES Appendix 8.1 sets out a comparison of the calculated levels for the night-time period. Table 8.28 sets out the assessment comparisons for the daytime noise levels while Table 8.29 sets out the comparison for night-time noise levels.

Table 8.28: Daytime 2023 DC vs. 2023 DM $L_{Aeq,16h}$ calculated noise levels

Receptor Location	Daytime Comparison		
	2023 DC	2023 DM	Change
P1 - Molehill Green	55.8	55.7	+0.1
P2 - Gaunts End	55.4	55.3	+0.1
P3 - Tye Green	55.6	55.4	+0.2
P4 - Ash Pub	55.3	55.1	+0.2
P5 - Bury Lodge	54.7	54.5	+0.2
P6 - Warmans Farm	50.2	50.0	+0.2
P7 - Takeley	45.6	45.4	+0.2
P8 - Elsenham	44.2	44.0	+0.1
P9 - Brick End	44.0	43.8	+0.2

Table 8.29: Night-time 2023 DC vs. 2023 DM $L_{Aeq,8h}$ calculated noise levels

Receptor Location	Night-time Comparison		
	2023 DC	2023 DM	Change
P1 - Molehill Green	52.3	52.1	+0.2
P2 - Gaunts End	51.9	51.7	+0.2
P3 - Tye Green	51.9	51.7	+0.2
P4 - Ash Pub	51.4	51.1	+0.3
P5 - Bury Lodge	50.7	50.5	+0.2
P6 - Warmans Farm	46.3	46.1	+0.2
P7 - Takeley	42.0	41.8	+0.2
P8 - Elsenham	40.6	40.4	+0.2
P9 - Brick End	40.5	40.3	+0.2

8.134 During daytime hours there is an increase of between 0.1 and 0.2 dB in the DC. This is primarily attributed to the increase in movements associated with the proposed development, from 628 average summers day movements in 2023 DM to 649 movements in 2023 DC. By 2023, take up of new generation aircraft will not be as great as it will be at 2028, therefore the impact of aircraft replacement is not fully experienced yet.

8.135 During night-time hours, an increase of 0.2 dB is experienced almost consistently across all assessed receptor positions, with the Ash Pub being the only exception at an increase of 0.3 dB.

8.136 On this basis and with reference to the background level and threshold level noise comparisons, the there is **no impact** assessed at any location during either the night-time or the daytime.

8.137 This is due to the small increase in noise levels in general during the day and night-time when comparing the 2028 DC to the 2028 DM scenario.

Summary of Adverse Effects

Daytime

8.138 At all assessed locations with the exception of Molehill Green the proposed development is forecast to give rise to **no adverse effects** in either of the future assessment years of 2023 or 2028.

8.139 At Molehill Green, the forecast increase in noise levels in 2028 exceeds the no impact threshold by the smallest of margins, 0.1 dB. Because ground noise at this location is forecast to exceed the background noise level and also the relevant threshold level, again by the very small margin of only 1 dB, a **minor adverse effect** is determined for this one location.

Night-time

8.140 At all assessed locations the proposed development is forecast to give rise to no adverse effects in either of the future assessment years of 2023 or 2028**.**

Temporary Effects: Construction

8.141 The results of the construction noise assessment at discrete receptor points are summarised in Table 8.25 below.

Table 8.25: Calculated construction noise levels

Receptor Location	Night-time noise level, $L_{Aeq,1h}$ (dB)			
	Baseline	Construction	Combined	Change
P1 - Molehill Green	41.0	43.1	45.2	+0.2*
P2 - Gaunts End	31.0	45.7	45.8	+0.8*
P3 - Tye Green	48.0	42.3	49.0	+1.0
P4 - Ash Pub	33.0	43.2	43.6	No Change*
P5 - Bury Lodge	47.0	42.3	48.3	+1.3
P6 - Warmans Farm	40.0	40.1	43.1	No Change*
P7 - Takeley	43.0	35.9	43.8	No Change*
P8 - Elsenham	48.0	35.1	48.2	+0.2
P9 - Brick End	35.0	31.5	36.6	No Change*

* Baseline level lower than 45 dB threshold

8.142 The modelled night-time construction noise levels are predicted give rise to effects of **negligible** significance.

8.143 In summary, the construction noise assessment identifies that there is a **negligible impact** in all assessment cases due to the absolute levels of ground noise assessed in the context of the prevailing background noise levels and by reference to appropriate threshold criteria.

Further Mitigation

Existing Mitigation

8.145 There is a significant amount of physical mitigation already in place due to topographical features, bunds and buildings, which controls the propagation of ground noise from the airport. As described in paragraphs 8.73 to 8.83, there is an array of noise management controls in place to limit the allowable generation of noise. These include the implementation of controls, such as time limits, on the operation of noise generating items and preferential use of low noise emission devices, such as FEGPs or GPUs (where permitted), instead of much noisier APUs.

8.146 In addition, the airport has a SIGS process in place, as described above in paragraph 8.83. The purpose of the scheme, so far as it applies to ground noise, is to provide enhanced sound insulation to dwellings located closest to the airport and therefore considered to be exposed to the highest noise levels.

Proposed Enhanced Mitigation

8.147 No noise impacts of significance are predicted as a result of the proposed development. Mitigation to reduce this level of impact is therefore not required.

8.148 However, paragraphs 7.287 to 7.310 of ES Chapter 7 (Air Noise) describes the various elements of an improved suite of controls and compensation measures proposed to be adopted at the airport in order to minimise the impact of noise. As described in ES Appendix 8.1, Section 21.2, the following of these will have a direct bearing on ground noise:

- Night Noise Surcharges;
- Noise Penalty Limits; and
- Sound Insulation Grant Scheme.

Temporary Effects Mitigation

8.149 As no impacts of significance are assessed, no specific mitigation beyond the application of the CEMP and the Code of Construction Practice is required. Together these will have the effect of using best practicable means to reduce construction noise levels, leading to the expectation that negligible noise impacts will arise.

Residual Effects

8.150 It is forecast that there will be no residual adverse effects of significance.

Cumulative Effects

8.151 There are no other proposed developments in the vicinity of the airport forecast to give rise to noise levels that would need to be considered in conjunction with aircraft ground noise to derive a cumulative effect.

References

1 BS 4142:2014 Methods for rating and assessing industrial and commercial sound. BSI 2014

2 World Health Organisation Guidelines for Community Noise

3 BS8233:2014 Guidance on sound insulation and noise reduction for buildings. BSI 2014

4 BS 5228-1:+A1:2014, Code of practice for noise and vibration control on construction and open site – Part 1: Noise

5 http://www.stanstedairport.com/community/local-environmental-impacts/noise/future-plans/

6 http://www.stanstedairport.com/about-us/developmentplan/

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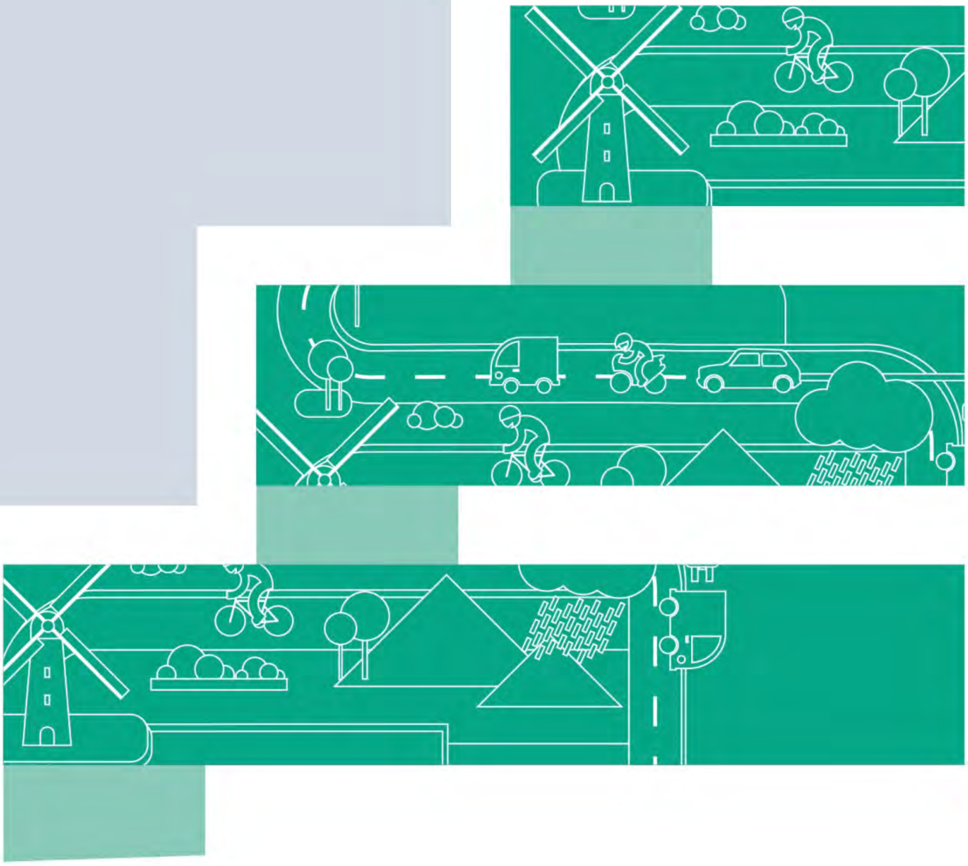
35+ PLANNING APPLICATION

Chapter 9 Surface Access Noise



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9 SURFACE ACCESS NOISE

Introduction

9.1 This chapter sets out the assessment of surface access noise (i.e. noise from traffic on public roads) associated with the proposed development, and quantifies the anticipated change in noise levels in future years in connection with the predicted annual increase in passenger throughput to 43mppa by 2028. This chapter also refers to ES Appendix 9.1, which contains the traffic data used as the basis of the surface access noise assessment, along with the numerical results of that assessment.

9.2 This chapter describes:

- The relevant legislation, guidance and planning policy in relation to surface access noise;
- The potential implications for road traffic flows;
- The assessment methodology and significance criteria;
- The key assumptions and limitations;
- The impact assessment findings; and
- Whether any mitigation is required or desirable to reduce any significant assessed impacts.

9.3 This assessment of has been informed by the predicted changes in airport traffic resulting from the proposed development, as described in ES Chapter 6 (Surface Access and Transport) and within the standalone Transport Assessment (TA) prepared by Steer Davies Gleave (SDG), included in ES Volume 3.

9.4 Rail noise has been scoped out of the assessment because the proposed capacity changes at the airport will not lead to any change to the activity on the railway, as described in ES Chapter 6. It is also noted that the train operating company separately proposes to introduce 12-car trains in 2019 but without any changes to the number of trains per day. This proposed change will take place regardless of and entirely separately to the Proposed Development to which this ES relates. Nevertheless, the separate implementation of the change to 12-car trains will ensure there is sufficient capacity for demand associated with 43mppa. It therefore remains appropriate for rail noise to have been scoped out of the assessment.

Legislation, Guidance and Planning Policy Context

Introduction

9.5 ES Appendix 7.2 (Planning and Assessment Framework) contains detailed background information and relevant details of the legislation, planning policy, international guidance and British Standards that need to be properly taken into account in the assessment of noise. A summary of the key issues in relation to surface access noise is set out below.

9.6 In addition, 'cross cutting' policies and plans which are relevant to the consideration of surface access noise and other effects are described in ES Appendix 3.1 (Planning and Aviation Policy) and the Planning Statement which accompanies the planning application. Such policies are not repeated here in detail to avoid the chapter becoming unduly long or repetitive of other parts of the ES. The section does highlight the specific legislation, guidance and policies that are most relevant to this topic.

National Policy

9.7 The elements of the planning framework that potentially apply to noise from road traffic related to operations at Stansted include:

- National Planning Policy Framework (NPPF)[1];
- Noise Policy Statement for England (NPSE)[2]; and
- National Planning Practice Guidance (NPPG): Noise[3].

9.8 Paragraph 123 of the NPPF states:

"Planning policies and decisions should aim to:

- *Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- *Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
- *Recognise that development will often create some noise and existing business wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established;*
- *Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

9.9 The NPSE sets out three aims, as follows:

"Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development."

9.10 The NPPG includes a section on noise, which states:

"Local planning authorities' plan-making and decision taking should take account of the acoustic environment and in doing so consider:

- *Whether or not a significant adverse effect is occurring or likely to occur;*
- *Whether or not an adverse effect is occurring or likely to occur; and*
- *Whether or not a good standard of amenity can be achieved."*

Local Policy

Adopted Local Plan

9.11 Section 5 of Uttlesford's adopted Local Plan deals with environmental matters, and one of the stated objectives is to:

"…avoid deterioration in the noise environment."

9.12 Policy ENV11 (Noise Generators and Exposure to Noise) states:

"Noise generating development will not be permitted if it would be liable to affect adversely the reasonable occupation of existing or proposed noise sensitive development nearby, unless the need for the development outweighs the degree of noise generated."

9.13 It is noted that to align with national planning policy, ENV11 would need to refer to *significant* adverse effects, rather than simply adverse effects.

Regulation 18 Local Plan

9.14 There are various policies in the draft plan that relate to noise; however, most of them relate specifically to airport noise, rather than noise from other sources such as traffic on the public road network. Those in the draft plan that are of relevance to the proposed development are as follows.

Policy SP9 – Development within Development Limits

9.15 Although not necessarily directly relevant, the policy does state that development will be permitted on land within development limits if certain criteria are met, including:

"It would not result in unreasonable noise and/ or disturbance to the occupiers of neighbouring properties by reason of vehicles or any other cause."

Policy EN18 – Noise Sensitive Development

9.16 Policy EN18 states that development will be permitted unless:

"The occupiers of surrounding land or the historic and natural environment is exposed to adverse levels of noise and/or vibration (as defined within UDCs Noise Impact Technical

Guidance). Potentially noisy developments will be located in areas where noise will not be of significant consideration or where its impact can be minimised by mitigation."

9.17 It also states that:

"[…]applicants, where reasonable and proportionate, according to the end-use and nature of the area and application, must demonstrate that:

- *Development has regard to current UDC Noise Assessment Technical Guidance and is assessed to the satisfaction of the Local Planning Authority; and*
- *Any sources of noise and vibration generated by the development are adequately mitigated to prevent loss of amenity for existing and future occupants and land uses."*

UDC Noise Assessment Technical Guidance

9.18 The UDC Noise Assessment Technical Guidance document was published in June 2017 and does not form part of either the adopted or draft Local Plan. The aim of the document is to help developments achieve the highest possible standards without compromising health and wellbeing, as well as to encourage good acoustic design. Although it contains potentially useful information when considering the design of proposed residential developments (for example) and references to various sources of guidance, it does not reference the Design Manual for Roads and Bridges. The UDC Noise Assessment Technical Guidance document is not directly relevant to the assessment of noise from traffic on public roads as set out in this chapter.

25+ (2008) Planning Permission

9.19 Stansted Airport handled 24.3 million passengers per annum (mppa) in 2016. The airport currently operates under the terms and conditions of the 25+ (2008) planning permission. Of the conditions that apply, none relate directly to surface access noise (from road vehicles or trains).

Stansted Sustainable Development Plan (SDP) 2015

9.20 The 2015 SDP is composed of an introductory summary document and four detailed plans, which set out in greater detail the airport's strategic objectives and actions to drive economic growth, enhance surface access and transport connectivity, develop land on and around the airport, and to balance increased operations in a way that reduces the airport's impact on the community and the environment.

9.21 One of these is the Economy & Surface Access Plan. It outlines how the airport can support the sustainable growth of the local, regional and national economy and how it can contribute to and enhance the economic strength of the local area. It also sets out plans for maximising the connectivity of the airport whilst ensuring that the airport is fully accessible for its catchment area.

9.22 It includes key principles, as well as targets for the 2015-2019 period, which are taken into account in the traffic data forming the basis of the noise assessment (although there are some small differences, in that the traffic data include a reduction in proportion of Kiss & Fly trips and a 10% reduction in car trips for employees).

Assessment Methodology and Significance Criteria

Proposed Development and Operations

9.23 A description of the new airfield infrastructure required as part of this application is provided in ES Chapter 3 (Description of Site, Proposed Development, Policy Context and Alternatives).

9.24 The Development Case (43mppa) requires further mitigation to J8 of the M11 (see ES Chapter 6). These works are in addition to those committed to as part of the Unilateral Undertaking attached to the 25+ (2008) planning permission (i.e. a financial contribution to upgrading Junction 8 of the M11 motorway). The proposed mitigation involves only minor changes to alignment at the junction itself; beyond that, the roads leading to the junction are not affected in any way. The minor changes to the junction have no effect at all on road traffic noise sources for the purpose of assessment. As a result, comparing the Development Case to the Do Minimum (35mppa) scenario does not give rise to any change in the physical relationship between road traffic noise sources and noise sensitive receptors, and any change in noise level at any location will arise purely as a result of changes in the volume of road traffic.

9.25 Predicted road traffic flows have been provided by SDG. Those used in the noise assessment are set out in Schedule 9.1/SCH1 within ES Appendix 9.1 (Surface Access Noise: Figure and Schedules). They take account of all traffic on each road presented, including traffic generated by the airport.

9.26 For future assessment years, the traffic data provided by SDG include committed developments, as accounted for in the Tempro traffic model which factors in growth of background traffic (refer to ES Chapter 6 for more details of the transport assessment).

9.27 A schematic diagram indicating the locations of the road links is attached as Figure 9.1/F1 within ES Appendix 9.1.

Scope of Assessment

9.28 As stated above and in ES Chapter 6 (Surface Access and Transport), all geographic considerations will remain constant and any change in noise level at any location will arise purely as a result of changes in the volume of road traffic.

9.29 As a result, road traffic noise has been assessed by reference to the overall change in noise levels expected along each section of road considered. This method effectively groups receptors according to which road they are located alongside. Should any significant effects arise in any group, more detailed assessment at specific receptors within that group could then be carried out if necessary.

9.30 The operating scenarios and impact assessment are consistent with what is set out for the Air Noise Assessment, presented in ES Chapter 7. Consequently, the assessment years considered are 2023 (the Transitional Year) and 2028 (the Principal Assessment Year). The assessment examines any changes in road traffic noise levels with the proposed development (the Development Case) compared with traffic associated with currently permitted operations under the 2028 Do Minimum (35mppa) scenario.

9.31 An additional assessment has also been conducted, examining any changes in traffic noise levels from the 2016 Baseline Year up to 2028 under the Development Case.

Assessment Methodology

9.32 When assessing potential noise effects due to changes in road traffic flows as a result of a development, it is appropriate to refer to the Design Manual for Roads and Bridges (DMRB)[4]. The Manual sets out noise assessment procedures to be followed when undertaking highway works such as building new roads.

9.33 DMRB provides thresholds at which potential impacts may start to become apparent, based on changes in 18-hour daytime noise levels (06:00-24:00h) over both short and long term scenarios. For the proposed development, the long-term changes are appropriate to assess as the forecast growth of the airport would lead to gradual increases in traffic flows to 2028. Specifically, the proposed development differs from the type of development that DMRB primarily relates to. In DMRB, there is a two-stage approach taken: firstly, it requires assessment of the impacts when a road opens (denoted 'short term' impacts in the document) and secondly, in a future year (denoted 'long term' impacts in DMRB). In this instance, there is no point at which a road scheme opens that would generate a step change in traffic flow.

9.34 Calculations are carried out of Basic Noise Levels for the various scenarios, using the methodology set out in the Department for Transport document, Calculation of Road Traffic Noise (CRTN)[5].

9.35 Specifically, these calculations are based on traffic flow data supplied by SDG, including the percentage made up of Heavy Goods Vehicles (HGVs) and vehicle speeds or speed limits. The traffic data also take account of general traffic growth unrelated to the airport. The traffic data used in the noise assessment is set out in schedule 9.1/SCH1, within ES Appendix 9.1.

9.36 In situations where 18-hour traffic flows are below 2,000 but above 1,000 vehicles for a particular road link, the appropriate low traffic flow corrections have been utilised according to the guidance within CRTN.

9.37 The resultant noise level figure is the $L_{A10,18h}$ in dB. The assessment has been undertaken in terms of changes in the calculated Basic Noise Level defined at 10m from the edge of the carriageway in CRTN. This does not relate directly to the noise exposure at individual residences; rather it is a reference noise level, comparison of which in various scenarios provides a good indication of the noise level changes that are expected to occur along an existing road link, where the road itself is the dominant road traffic noise source. Where other noise sources are dominant, e.g. at some locations in the vicinity of the airport or the M11 motorway, the actual changes in noise level will be less than the calculations indicate; however, the calculated changes have been used as a robust basis for the assessment.

9.38 It should be noted that ground borne vibration generated by road traffic has been scoped out of this assessment for the reason that, as advised in Annex 5 of DMRB, it would principally be perceptible in nearby buildings if heavy vehicles pass over irregularities in the road. As the current proposals include no changes to existing road surfaces and will not materially increase the number or proportion of HGVs using relevant road links, no material changes to traffic generated ground borne vibration are expected.

9.39 The scenarios which have been assessed are indicated below:

- 2028 Development Case (43mppa) vs. 2028 Do Minimum (35mppa)
- 2028 Development Case (43mppa) vs. 2016 Baseline Year

9.40 The proposed road network noise assessment criteria are summarised in Table 9.1 below.

Table 9.1: Surface Access Noise assessment criteria

Change in Noise Level (dB)	Impact Magnitude
0.0	No Change
0.1 to 2.9	Negligible
3.0 to 4.9	Minor
5.0 to 9.9	Moderate
10+	Major

9.41 The thresholds and descriptors shown in the table above are based upon guidance provided within DMRB and specifically Table 3.2 of that document. The presentation of changes in sound level in the table above to one decimal place serves only to provide a clear threshold between adjacent impact descriptions.

9.42 It is normally appropriate to include absolute noise level thresholds, below which impacts are limited to certain magnitudes (e.g. if daytime noise levels remain below 55 dB $L_{Aeq,16h}$ the impact is Negligible, even if the change in noise level is 3 dB or more). Such an approach is based on the premise that if absolute noise levels remain below certain guidelines, then any increases occurring below those thresholds are not significant. However, in this case the criteria have been simplified by omitting any absolute noise level thresholds and, as such, the assessment looks purely at changes in noise level to present a robust 'worst case' assessment. It is stressed that this represents a more pessimistic approach (i.e. more likely to yield significant impacts) than if the absolute thresholds had been used.

9.43 When considering the traffic noise impacts, Negligible or Minor Adverse impacts would be expected to be consistent with the requirements of the NPPF, specifically paragraph 123 (as referenced earlier in this chapter), to avoid significant adverse effects. It is important to note that where noise effects are concerned, those potentially identified to be of Moderate significance may not necessarily have effects beyond a local scale i.e. in close proximity to the source of noise.

Baseline Conditions

9.44 Traffic flows for the 2016 Baseline Year and the 2023 Transition Year are included in 9.1/SCH1 within ES Appendix 9.1.

Incorporated Mitigation

9.45 There is no incorporated noise mitigation, as the proposed development does not include any alterations to highways beyond improvements to Junction 8 of the M11 motorway (planned through both a financial contribution under the Unilateral Undertaking attached to the 25+ (2008) planning permission and through additional works proposed in connection with the Proposed Development).

Impact Assessment

9.46 The results of the assessment are set out in Schedule 9.1/SCH2 within ES Appendix 9.1. Reference can also be made to Figure 9.1/F1 within ES Appendix 9.1, which provides an indication of the relative locations of the assessed road links.

9.47 For the assessment of the 2028 Development Case (43mppa) scenario in comparison to the permitted 2028 Do Minimum (35mppa) scenario, all changes in noise level are either zero or less than 1 dBA. It is worth noting that these changes would not be perceptible. As such, all impacts are assessed as **negligible.**

9.48 For the additional assessment of the 2028 Development Case (43mppa) scenario in comparison with the 2016 Baseline Year, the great majority of changes in noise levels are less than 3 dBA and the corresponding impacts are **negligible**. Again, it is worth noting that over the long term assessed here, these gradual changes in road traffic noise would not be perceptible.

9.49 The only exception is at Round Coppice Road, where an increase of 3.8 dBA is assessed, which would correspond to a **minor** impact. However, it should be noted that this increase on Round Coppice Road is only just over the threshold between Negligible and Minor, and primarily occurs as a result of the permitted uplift of the baseline (2016) level of annual passenger throughput up to 35mppa under the 2028 Do Minimum scenario, coupled with the proposed employment allocation at Northside, rather than as a result of the additional uplift in annual passengers triggered by the proposed 43mppa development.

9.50 Furthermore, the only existing noise sensitive receptor along Round Coppice Road is a hotel (Novotel), which is more than 150m from the road, It is our expectation that the hotel will have been designed and built taking into account the pre-existing and anticipated noise levels resulting from its proximity to the runway. When all existing noise sources are taken into account (rather than just Round Coppice Road), the actual change in noise level at the hotel due specifically to changes in road traffic flows on Round Coppice Road is well below 3 dBA (since other existing noise sources already generate significantly higher noise levels at the hotel). There is also the Stansted Airport College building (under construction) which is located closer to Round Coppice Road. However, the design of the proposed building includes high performance glazing and mechanical ventilation, due to the building's proximity to the runway. Those features have been included on the all elevations, not just those facing the runway. Therefore, increases in Round Coppice Road traffic will not have any significant effect on teaching spaces.

9.51 Taking all the foregoing into account, the impact along Round Coppice Road is considered **negligible**.

Further Mitigation

9.52 As the predicted changes in road traffic noise levels are small and all impacts are **negligible**, there is no need for any mitigation.

Residual Effects

9.53 All residual surface access noise effects resulting from the proposed development are assessed as **negligible.**

Cumulative Effects

9.54 For future assessment years, the traffic data provided by SDG includes committed developments, as accounted for in Tempro mode which factors in growth of background traffic. Accordingly, all residual cumulative impacts are **negligible**.

9.55 The interaction of surface access noise with air noise and ground noise, and how or whether the effects should be considered cumulatively, are dealt with in ES Chapter 7 (Air Noise).

References

1 DCLG (2012): National Planning Policy Framework. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework-2

2 DEFRA (2010): Noise Policy Statement for England. Available at: https://www.gov.uk/government/publications/noise-policy-statement-for-england

3 DCLG (2014): Planning Practice Guidance: Noise. Available at: https://www.gov.uk/guidance/noise

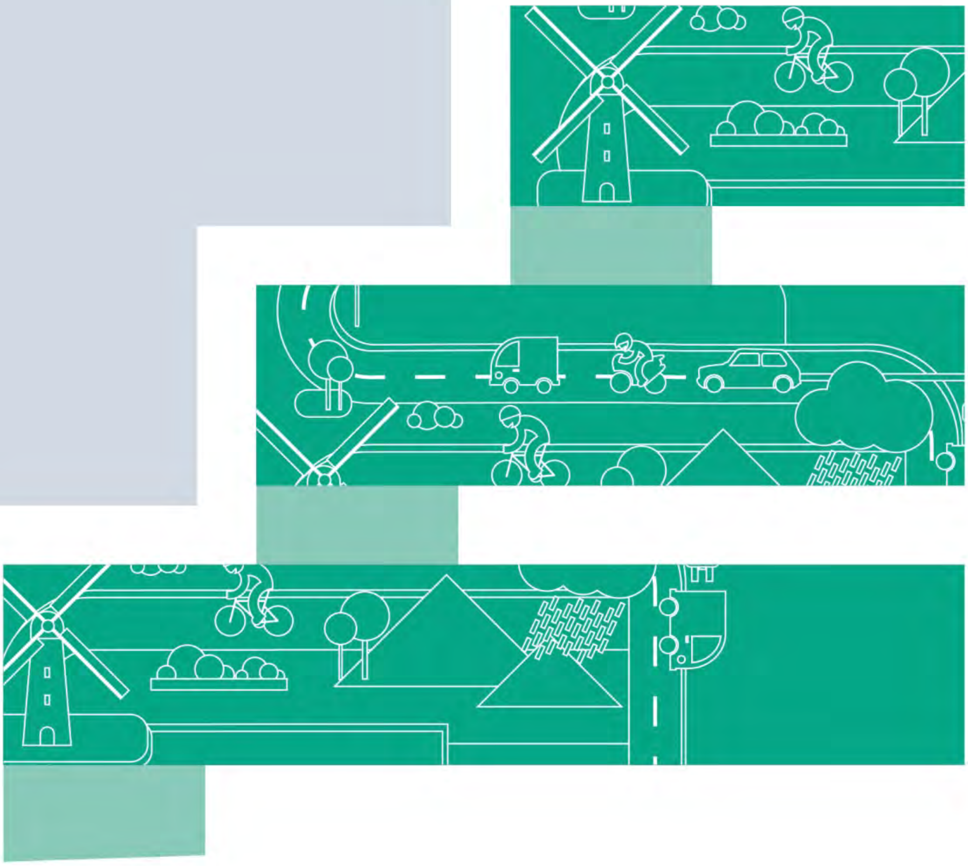
4 Highways England et al (2011): Design Manual for Roads and Bridges, Volume 11 (Environmental Assessment) Section 3 (Environmental Assessment Techniques) Part 7 HD 213/11 – Revision 1: Noise and Vibration. Available at: http://www.standardsforhighways.co.uk/ha/standards/dmrb/

5 Department for Transport (1988): Calculation of Road Traffic Noise. London: Her Majesty's Stationery Office.

TRANSFORMING LONDON STANSTED AIRPORT

35+ PLANNING APPLICATION

Chapter 10
Air Quality



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10 AIR QUALITY

Introduction

10.1 This chapter, prepared by Arup, presents the findings of an air quality assessment undertaken for the proposed development. Air quality studies are concerned with the presence of airborne pollutants in the atmosphere. The main pollutants of concern for local air quality are oxides of nitrogen (NOx), including nitrogen dioxide (NO_2), and particulate matter (PM_{10} and $PM_{2.5}$).

10.2 This chapter sets out the relevant air quality management policy and legislative context, and explains the methodology and significance criteria used in the assessment. It then describes the existing and predicted future air quality conditions at and near the airport, the likely effect of the proposed development on local air quality, and any mitigation required. It concludes with a description of the residual and cumulative effects with respect to local air quality.

10.3 This chapter should be read in conjunction with ES Appendices 10.1 to 10.5.

Legislation, Guidance and Planning Policy Context

Air Quality Legislation

European Air Quality Management

10.4 In 1996 the European Commission published the Air Quality Framework Directive on ambient air quality assessment and management (96/62/EC)[1]. This Directive defined the policy framework for 12 air pollutants known to have harmful effects on human health and the environment. Limit values (*pollutant concentrations not to be exceeded by a certain date*) for each specified pollutant were set through a series of Daughter Directives: Directive 1999/30/EC (the 1st Daughter Directive)[2] for NO_2 and PM_{10} (amongst other pollutants), Directive 2000/69/EC (the 2nd Daughter Directive)[3] for benzene and carbon mo$_{nox}$ide, Directive 2002/3/EC (the 3rd Daughter Directive)[4] for ozone, and Directive 2004/107/EC (the 4th Daughter Directive)[5] for certain toxic heavy metals and polycyclic aromatic hydrocarbons.

10.5 In May 2008 the Directive 2008/50/EC[6] on ambient air quality and cleaner air for Europe came into force. This Directive consolidates the Air Quality Framework Directive and Daughter Directives 1 to 3, and makes provision for extended compliance deadlines for NO_2 and PM_{10} and introduces standards for $PM_{2.5}$. The Directive was transposed into national legislation in England by the Air Quality Standards Regulations 2010[7]. The Secretary of State for the Environment has the duty of ensuring compliance with the air quality limit values.

Environment Act 1995

10.6 Part IV of the Environment Act 1995[8] places a duty on the Secretary of State for the Environment to develop, implement and maintain an Air Quality Strategy with the aim of reducing atmospheric emissions and improving air quality. The *Air Quality Strategy for England, Scotland, Wales and Northern Ireland*[9] provides the framework for ensuring compliance with the air quality limit values based on a combination of international, national and local measures to reduce emissions and improve air quality. This includes the statutory duty, also under Part IV of the Environment Act 1995, for local authorities to undergo a process of local air quality management and declare Air Quality Management Areas (AQMA) where necessary.

Air Quality Standards

10.7 The air quality limit values set by European legislation and transposed into national law (UK objectives) are quality standards for clean air[i]. Some pollutants have standards expressed as annual average concentrations due to the chronic way in which they affect health or the natural environment (i.e. effects occur after a prolonged period of exposure to elevated concentrations) and others have standards expressed as 24-hour, 1-hour or 15-minute average concentrations due to the acute way in which they affect human health or the natural environment (i.e. after a relatively short period of exposure). Some pollutants have standards expressed in terms of both long-term and short-term concentrations.

10.8 In this assessment, the term ‘air quality standard’ has been used to refer to both the UK objectives and European limit values. Table 10.1 sets out the air quality standards for the pollutants of most relevance to this assessment (NOx, NO_2, PM_{10} and $PM_{2.5}$). Other pollutants have been screened out of this air quality assessment, since they are not likely to cause exceedances of their respective standards. This judgement was endorsed by UDC Scoping Opinion dated 21st December 2017 (see ES Appendix 2.4; paragraph 51) which states:

[i] If the level is achieved, there are assumed to be no adverse effects on human health and the natural environment.

"*UDC concurs with the explanation in Section 11....and the scope, envisaged by paragraph 11.10 [of the Scoping Report] of the main issues and impacts predicted.*"

Table 10.1: Air quality standards

Pollutant	Averaging period	Air quality standard
Human health		
Nitrogen dioxide (NO_2)	Annual mean	40µg/m^3
	1-hour mean	200µg/m^3 [1]
Particulate matter (PM_{10})	Annual mean	40µg/m^3
	24-hour mean	50µg/m^3 [2]
Fine particulate matter ($PM_{2.5}$)	Annual mean	25µg/m^3
Natural environment		
Oxides of nitrogen (NOx)	Annual mean	30µg/m^3

[1] not to be exceeded more than 18 times a year (99.8th percentile)
[2] not to be exceeded more than 35 times a year (90.4th percentile)

Planning Policy and Guidance

10.9 The land-use planning process provides a key means of improving air quality, particularly in the long term, through the strategic location and design of new developments. Any air quality consideration that relates to land-use and its development can be a material planning consideration in the determination of planning applications, dependent upon the details of the proposed development.

Aviation Policy Framework

10.10 The Aviation Policy Framework[10] (APF) published in 2013 restated the Government's commitment to achieve full compliance with European air quality standards. It also stated that the policy in relation to air quality is to *"seek improved international standards to reduce emissions from aircraft and vehicles"*. It further identifies road transport as the main source of pollution around airports, as ground level pollutant concentrations from aircraft emissions fall off significantly as aircraft climb to a higher altitude.

10.11 The Government recently published a call for evidence on a new aviation strategy, Beyond the Horizon[11]. In relation to air quality, it states that the Government's policy is to *"seek improved international standards to reduce emissions from aircraft and to encourage the aviation industry to introduce measures to reduce those emissions for which it is responsible"*.

National Planning Policy Framework

10.12 The National Planning Policy Framework[12] (NPPF) was published in March 2012. The framework acts as guidance for local authorities and decision-makers, both in drawing up plans and making decisions about planning applications. Its purpose is to encourage the achievement of sustainable development. Paragraph 124 of the NPPF on air quality states that:

"Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan."

10.13 As part of the NPPF, planning practice guidance on various topics was also published[13]. In relation to air quality, the guidance refers to the importance of air quality assessments to determine the impacts of proposed developments in the area and describes the role of local and neighbourhood plans with regard to air quality. It also provides a flowchart method to assist local authorities to determine how consideration of air quality fits into the development management process.

Local Air Quality Management

10.14 Policy guidance note LAQM.PG(16)[14] provides additional guidance on the links between transport and air quality. LAQM.PG(16) describes how road transport contributes to local air pollution and how transport measures may bring about improvements in air quality. Key transport-related Government initiatives are set out, including regulatory measures and standards to reduce vehicle emissions and improve fuels, tax-based measures and the development of an integrated transport strategy.

10.15 LAQM.PG(16) also provides guidance on the links between air quality and the land-use planning system. The guidance advises that air quality considerations should be integrated within the planning process at the earliest stage and is intended to aid local authorities in developing action plans to deal with specific air quality problems and create strategies to improve air quality. It summarises the main ways in which land-use planning system can help deliver compliance with the air quality objectives. The policy guidance is supplemented by detailed technical guidance, LAQM.TG(16)[15].

Local Planning Guidance

10.16 'Cross cutting' policies and plans which are relevant to the consideration of air quality and other effects are described in ES Appendix 3.1 and in the Planning Statement submitted with this planning application. However, the sections below highlight some of the more pertinent local policies that are relevant to this topic.

Uttlesford Local Plan

10.17 UDC's adopted Local Plan[16] sets objectives to protect the natural environment and users of residential properties in particular from long term exposure to poor ground level air quality. There are two adopted policies in the Local Plan relevant to air quality, as detailed below.

10.18 Policy ENV13 (Exposure to poor air quality) states:

"Development that would involve users being exposed on an extended long-term basis to poor air quality outdoors near ground level will not be permitted. A zone 100 metres on either side of the central reservation of the M11 and a zone 35 metres either side of the centre of the new A120 have been identified on the proposals map as particular areas to which this policy applies."

10.19 Policy ENV7 (The protection of the natural environment – designated sites) states:

"Development proposals that adversely affect areas of nationally important nature conservation concern, such as Sites of Special Scientific Interest and National Nature Reserves, will not be permitted unless the need for the development outweighs the particular importance of the nature conservation value of site or reserve.

Development proposals likely to affect local areas of nature conservation significance, such as County Wildlife sites, ancient woodlands, wildlife habitats, sites of ecological interest and

Regionally Important Geological/ Geomorphological Sites, will not be permitted unless the need for the development outweighs the local significance of the site to the biodiversity of the District. Where development is permitted the authority will consider the use of conditions or planning obligations to ensure the protection and enhancement of the site's conservation interest."

10.20 As described in ES Chapter 3 (Description of Site, Proposed Development, Policy Context and Alternatives), UDC is currently preparing a new Local Plan for development in the Uttlesford administrative area. This Regulation 18 Draft Local Plan proposes to replace Policy ENV13 with:

<u>*Policy EN16 - Air Quality*</u>

"Development will be permitted where it can be demonstrated:

- *That is does not lead to significant adverse effects on health, the environment or amenity from polluting or malodorous emissions, or dust or smoke emissions to air; or*
- *Where a development is a sensitive end-use, that there will not be any significant adverse effects on health, the environment or amenity arising from existing poor air quality, as set by national objectives, targets and emission limits for pollutants, or sources of significant odour.*

Specifically applicants, where reasonable and proportionate, according to the end-use and nature of the area and application, must demonstrate that:

- *Development has regard to relevant UDC Air Quality Technical Guidance;*
- *Development within or affecting an Air Quality Management Area (AQMA) will also be expected to contribute to a reduction in levels of air pollutants within the AQMA;*
- *The development does not prevent compliance with national objectives, targets and standards for pollutants;*
- *Any sources of emissions to air, odours and fugitive dusts generated by the development are adequately mitigated to prevent loss of amenity for existing and future occupants and land uses; and*
- *Any impacts on the proposed use from existing poor air quality, odour and emissions are appropriately mitigated."*

East Herts District Council (EHDC)

10.21 The East Herts District Council (EHDC) adopted Local Plan[17] contains a list of policies to inform planning decisions and shape development across the district. Saved policy ENV27 (Air Quality) focuses on air quality and sets the requirement of assessing impacts on local air quality in the planning process:

"(I) The Council will have regard to the potential effects of a development on local air quality when determining planning applications. Consideration will be given to the impact caused by both the operational characteristics of the development (industrial, commercial, and domestic) and the traffic generated by it, and development which will significantly increase air pollution will not be permitted. Where development proposals are likely to involve emissions into the air,

submission of appropriate details will be required to enable a full judgement of the impact of the development to be made.

(II) Any development within designated Air Quality Management Areas must have regard to the strategy for reduction of pollutants in such areas and to guidelines for ensuring air quality is thereafter maintained at acceptable levels as set out in the national air quality strategy."

10.22 EHDC is currently revising their Local Plan and a draft District Plan was published in 2016 for consultation[18]. Policy EQ4 (Air Quality) of this document states:

"(I) Development and land uses should minimise potential impacts on local air quality both during construction and operation including the operation of heating, cooling and extraction units. Applications should be supported by Air Pollution Assessment in line with the Council's Air Quality Planning Guidance Document.

(II) Development within designated Air Quality Management Areas (AQMAs), or development which may have an impact on these areas, must have regard to the Council's latest strategy and action plan for the reduction of pollutants in the defined catchment, maintaining acceptable levels of air quality. Evidence of mitigation measures will be required.

(III) New developments should make provision for electric vehicle charging points in safe and accessible locations in accordance with Policy DES3 Design of Development.

(IV) In order to minimise the impact of travel on local air quality, where major developments involve the introduction of new bus routes or significant changes to existing routes, service providers will be required, in agreement with Hertfordshire County Council's Transport, Access and Safety Unit, to ensure that the vehicles serving these locations will either be of 'hybrid' type or meet the latest 'Euro' emissions regulations."

10.23 EHDC has also published air quality planning guidance[19] with the aim of facilitating sustainable development in the district by considering air quality impacts in relation to public health protection. The document also provides a framework for assessing planning applications in relation to air quality.

Assessment Methodology and Significance Criteria

10.24 Air quality impacts brought about by the proposed development are likely to result from increased volumes of road traffic associated with the additional 8mppa under the 2028 Development Case (DC) and also increased aircraft movements by comparison to the 2016 Baseline Year and Do Minimum (DM) scenario. The effects of increased aircraft and road traffic have been assessed using the ADMS-Airport (version 4.1) atmospheric dispersion model. This software is widely used for air quality assessments in the UK and was, for example, the software used for the assessments to inform the recommendations made by the Airports Commission on the short-listed options for expanded airport capacity at both Heathrow and Gatwick, as well as the previous air quality assessments for Stansted.

10.25 The overall approach to the air quality assessment comprises:

- A review of the existing (2016) local air quality conditions at and near the airport;
- An assessment of the potential changes in air quality arising from the construction of new airfield infrastructure;
- An assessment of the potential changes in air quality arising from future operations of the airport both in the Development Case (DC) and without development (DM); and
- The formulation of mitigation measures, where necessary, to ensure any potential adverse effects on air quality are minimised.

10.26 The main pollutants of concern are NO_2, PM_{10} and $PM_{2.5}$ for human health and NOx for the natural environment. Emissions of NOx, PM_{10} and $PM_{2.5}$ have been calculated using methods described in the following sections for each pollution source.

Assessment Years and Scenarios

10.27 The following assessment years and scenarios have been included in the air quality assessment:

- 2016 Baseline Year;
- 2023 Transitional Year DM (35mppa) scenario;
- 2023 Transitional Year DC (36mppa);
- 2028 DM (35mppa) scenario; and
- 2028 DC (43mppa).

10.28 As described in ES Chapter 2 (EIA Methodology), the DM scenarios refer to the future case of reaching the 35mppa capacity, as consented by the 25+ Planning Permission in 2008. This is anticipated to be achieved by 2023 whereupon the existing 35mppa cap would prevent any further increase to annual passenger numbers. In the DM scenarios the number of aircraft movements necessary to accommodate these passengers would remain below the existing annual ATM limit in future years due to the predicted increase in passenger load per aircraft, as described in ES Chapter 4 (Aviation Forecasts).

10.29 The DC would allow for marginally more passengers than the DM scenario in the 2023 Transitional Year (i.e. approximately 36mppa) and continuing growth up to the proposed new cap of 43mppa by 2028, whilst retaining the existing limit of 274,000 total aircraft movements. All assessment scenarios for the air quality assessment take into account both passenger and cargo air transport movements.

10.30 Table 10.2 presents the passenger numbers and aircraft movements for the assessment years and scenarios.

Table 10.2: Aircraft modelling categories

Scenario	mppa	Total Aircraft Movements*
2016 Baseline Year	24.3	181,000
2023 DM	35	247,000
2023 DC	36	253,000
2028 DM	35	249,000
2028 DC	43	274,000

* Note: Rounded to the nearest 1,000

Data Sources

10.31 The following data sources have been used to inform the assessment:

- UDC and EHDC review and assessment reports and local air quality monitoring data;
- STAL air quality monitoring data;
- The UK Air Information Resource website[20];
- Aircraft fleet and airside operational data from STAL (e.g. runway occupancy and line-up times, airside vehicles and fuel usage, engine testing records, fuel usage for the fire training ground and the boilers, and capacity of car parks);
- The International Civil Aviation Organization (ICAO) aircraft engine emissions databank[21];
- The ICAO airport air quality manual document no. 9889[22];
- The International Air Transport Association (IATA) long term traffic and emissions forecasts for Hong Kong International Airport[23];
- The Emissions and Dispersion Modelling System (EDMS) software[24];
- The Swedish Defence Research Agency (FOI) database for turboprop engine emissions (used with permission)[25];
- The Swiss Federal Office for Civil Association (FOCA) guidance on the determination of helicopter emissions[26];
- The European Environment Agency EMEP/EEA air pollutant emissions inventory guidebook[27];
- The Air Pollution Information System (APIS) website[28];
- The Emissions Inventory Toolkit[29]; and

- The National Atmospheric Emissions Inventory[30] (NAEI).

Study Area

10.32 The study area for this assessment has been defined as a 15km x 15km domain centred on the airport (Figure 10.1) to account for the potential impact of the proposed development on major roads and the main towns around the airport.

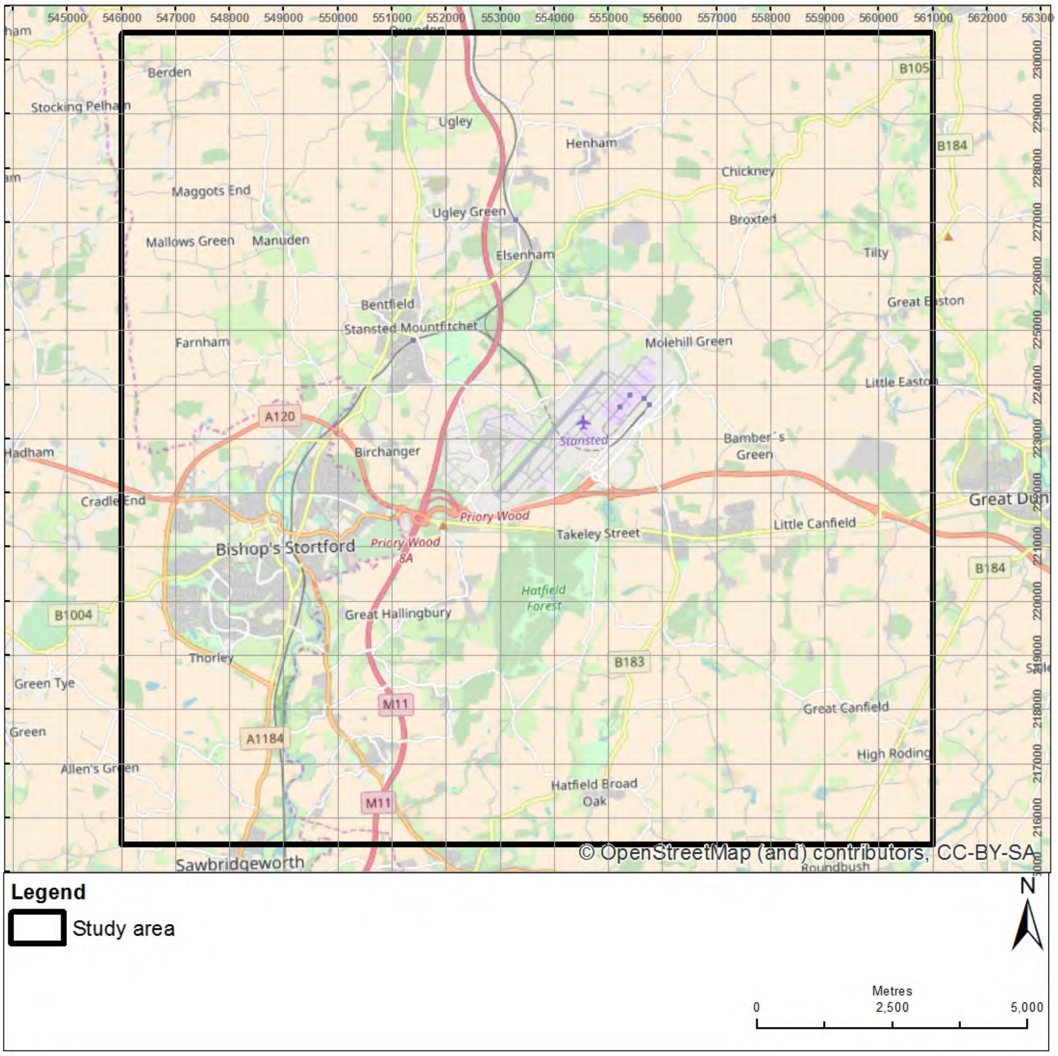

Figure 10.1: Extent of study area for air quality assessment

Identification of Sensitive Receptors

10.33 Sensitive human receptors are defined as those residential properties / schools / hospitals / care homes that are likely to experience a change in pollutant concentrations. A few clusters of human receptors in the form of villages and isolated residential properties are located around the airport, while the large town of Bishop's Stortford is located 3km (1.9 miles) to the south-west of the airport. Ordnance Survey (OS) Address Point[31] data was provided by STAL to assist in the identification of sensitive human receptors within the study area. This is a geospatial dataset that includes local authority and Royal Mail addresses and multi-occupancy addresses. A total of 244 representative receptors were selected for inclusion in the assessment (49 schools/nurseries, 7 hospitals/care homes and 188 residential dwellings), close to the airport and/or road junctions in the study area. Future committed developments in the study area, as listed in ES Chapter 17 (Cumulative Effects), have also been included as sensitive receptors in the assessment.

10.34 Sensitive ecological receptors are defined as those sites whose features have been designated as sensitive to air pollutants, either directly or indirectly. High levels of NOx can adversely affect vegetation, including leaf or needle damage and reduce plant growth. Deposition of pollutants derived from NOx emissions contribute to acidification and/or eutrophication of sensitive habitats leading to loss of biodiversity[32]. The likelihood of such effects occurring is determined by pollutant thresholds known as 'critical loads' which are defined by the United Nations Economic Commission for Europe (ENECE) as:

"*a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge.*"

10.35 It is important to distinguish between a critical load and the air quality standard (or critical level) for NOx, as defined in Table 10.1 above. The critical load relates to the quantity of pollutant (in this case nitrogen) deposited from air to the ground, whereas the critical level is the gaseous concentration of a pollutant in the air. Critical loads specific to a particular ecological receptor site or the particular habitats within them are provided by APIS[28], as described in the Ecological Receptors section of this chapter.

10.36 Six designated sites are within the study area and included in the air quality assessment. Two designated sites are close to the airport; these are Hatfield Forest National Nature Reserve (NNR) and Site of Special Scientific Interest (SSSI) to the south and Elsenham Woods SSSI to the northeast of the airport. Other ecological sites within the study area are: the Thorley Flood Pound SSSI, the Quendon Wood SSSI, the Little Hallingbury Marsh SSSI and the High Wood, Dunmow SSSI.

10.37 Further details on the designation of the ecological sites and their critical loads are presented in the Baseline Conditions section of this chapter and within the Preliminary Ecological Appraisal (PEA) at ES Appendix 16.1. Section 6 of the PEA also includes the consideration of Epping Forest Special Area of Conservation (SAC) and SSSI, which is located outside of the study area (being some 20km/12.4 miles to the south of the airport), in order to address Natural England's (NE) request that potential effects of the proposed development on this European designated site should be screened in accordance with the requirements of The Conservation of Habitats and Species Regulations 2017 (the 'Habitats Regulations 2017'). The conclusions of this assessment are summarised in the Biodiversity section of ES Chapter 16 (Non-Significant Topics).

10.38 ES Appendix 10.1 presents details of all other sensitive human and ecological receptors to air quality and their location in the study area.

Assessment of Baseline Conditions

10.39 Baseline or existing ambient air quality refers to the concentration of relevant substances that are already present in the environment. These are emitted from various stationary / non-stationary sources, such as industrial processes, commercial and domestic activities, traffic and the natural environment.

10.40 A desk-based review was undertaken using the data sources listed above. The review identified the main sources of air pollution within the study area, local air quality monitoring data for the past five years and local background concentrations.

10.41 A baseline scenario of 2016 was also included in the modelling work, which provided a reference case against which the model was verified. A detailed emissions inventory was built for this modelled scenario, using the data sources described in the following sections.

Assessment of Construction Impacts

10.42 As described in previous chapters of this ES, construction activity will be limited to minor airfield infrastructure, comprising:

- Three remote aircraft stands at the Echo apron;
- Six remote aircraft stands next to Taxiway Yankee;
- A Rapid Access Taxiway (RAT) for Runway 22; and
- A Rapid Exit Taxiway (RET) for Runway 22.

10.43 Construction of the above infrastructure is anticipated to take place over a 12-month period, commencing in 2021 and being completed in 2022. The works will be limited to designated airside locations, away from local sensitive receptors.

10.44 The average daily construction traffic flows (two-way) are anticipated to be around 100 movements respectively for the transportation of plant and equipment to site (see ES Chapter 6). All construction vehicles would enter and exit the airport via Bassingbourn Road. This provides direct access to Bassingbourn Roundabout and Thremhall Avenue (A120) and the strategic arterial routes (M11 motorway), thereby avoiding any other local roads where the impact of construction vehicle movements would be more noticeable. Due to the working hours and shift patterns of construction workers, construction traffic movements will predominantly occur outside of peak commuter hours. A Construction Transport Management Plan (CTMP) will be in place for the duration of the works.

10.45 ES Chapters 5 (Development Programme and Construction Environmental Management) and 6 (Surface Access and Transport), along with the Transport Assessment in ES Volume 3, provide further details on the construction works and associated transport and car parking provisions.

10.46 It is not anticipated that the scale and type of works associated with the development of the new airfield infrastructure will result in any adverse air quality effects at any sensitive receptors in the study area. Therefore, an assessment of construction impacts for air quality has been scoped out, which was confirmed to be appropriate by UDC in its Scoping Opinion (ES Appendix 2.4; paragraph 51)

Emissions Inventory Compilation Methodology

10.47 For the ADMS-Airport model, an inventory of NOx, primary NO_2 (pNO_2)[ii], PM_{10} and $PM_{2.5}$ emissions was compiled for the following pollution sources:

- Aircraft main engines in the landing and take-off (LTO) cycle;

[ii] Primary NO_2 refers to the proportion of NOx that is emitted as NO_2.

- Aircraft auxiliary power units (APUs) while in use on the ground;
- Ground support equipment (GSE), namely airside vehicles which handle aircraft turn-arounds, load and unload baggage and cargo, and conduct inspections and essential maintenance of airfield infrastructure, particularly the runway which is in constant use;
- Other airport sources, including car parks, airport heating plant and the fire training ground; and
- Road vehicles using the local and strategic highway network around the airport.

Aircraft Emissions in the LTO cycle

10.48 The LTO cycle is defined by ICAO as the emissions associated with aircraft operations up to a height of 3,000ft. Emissions from aircraft were calculated using fleet data provided by STAL, consisting of annual aircraft movements recorded in 2016. The fleet data was used to build the emissions inventory for all modes of the LTO cycle: taxi out; hold; take-off roll; initial climb; final approach; landing; and taxi in.

10.49 Aircraft emissions were calculated up to a height of 3,000ft. However, ground level concentrations are not significantly affected by aircraft emissions at altitudes above approximately 500m. Therefore, the dispersion modelling assessment has been undertaken up to a height of 460m (1,500ft).

10.50 The airframe-engine combinations that used the airport were grouped into modelling categories (MCATs) of similar types, as required by the dispersion model (see Table 10.3). The detailed aircraft movement data was used to identify the main types of aircraft and helicopters that used the airport in 2016. These were merged into categories of similar aircraft types, relating to short/long haul and narrow/wide body aircraft, and number and type of engines. For each MCAT, a representative aircraft type was selected and information on their engines obtained using an in-house aircraft fleet database and online resources[33]. The introduction of future aircraft types has been considered for calculating emissions for the future assessment scenarios, namely the Boeing B737MAX aircraft in MCAT2 with Leap 1-B engines and the Airbus A320NEO aircraft in MCAT3 with Leap 1-A engines. Details on the engine variants used for each category are presented in ES Appendix 10.2.

10.51 Helicopters were modelled in a similar way to the fixed wing aircraft. Emissions were calculated for each operating mode (i.e. idle before departure, take-off and climb, and idle after arrival) and then added together to derive the total LTO cycle emissions.

Table 10.3: Aircraft modelling categories

MCAT	Aircraft types
1	Piston and turboprop, small light aircraft and corporate jets (e.g. ATP, DH4)
2	Narrow body, short to medium range aircraft (B738 family)
3	Narrow body, short to medium range aircraft (A320 family)
4	Narrow body, medium to long range aircraft (e.g. B757)
5	Wide body, short to medium range aircraft
6	Wide body, medium to long range aircraft (e.g. B777, A330, B767, B788)
7	Wide body, medium to long range aircraft (with 3 engines) (MD11)
8	Wide body, long-range aircraft (with 4 engines) (e.g. B747, A380)
9	Regional jets, short to medium range aircraft (e.g. E135)
10	Helicopters

10.52 Turbofan engine emission factors of NOx and fuel consumption rates were taken from the ICAO aircraft engine emissions databank (issue 23C dated June 2017)[iii]. Emissions of pNO_2 were derived using the fractions described in the methodology of the Project for Sustainable Development of Heathrow[34] (PSDH). PM_{10} emissions were derived from the smoke number following the methodology described in the ICAO airport air quality manual (Document No. 9889). In relation to $PM_{2.5}$ emissions, the EMEP/EEA guidebook[35] states that *"it is reasonable to assume that for aircraft, the particulate matter emissions can be considered as $PM_{2.5}$"*. Therefore, it was assumed that all particulate matter emissions from aircraft engines were in the $PM_{2.5}$ fraction. For aircraft with turboprop engines, emission factors and fuel rates were taken from the FOI confidential database.

10.53 The emissions calculations for the helicopters followed the FOCA methodology using the engine of a twin turboshaft Eurocopter EC155 helicopter as a representative type. Emissions were assigned spatially to the helipad at the western side of the airport and were represented in the model as a volume source up to a height of 50m. Further details on the emission factors and assumptions for each LTO mode are presented in ES Appendix 10.2.

10.54 The runway utilisation data for 2016 was provided by STAL as hourly data and the recorded use of the south-westerly and north-easterly runways was compared to meteorological data for the year. The data showed that Runway 22 (i.e. south-westerly operations) was used for 67% of hours during the year. This is consistent with the meteorological data which shows the prevalence of south-westerly winds (3,433 hours with wind directions between 180^{o} and 270^{o}). A diurnal profile, derived from the detailed hourly 2016 data, was applied to all the aircraft departures and arrivals (Figure 10.2).

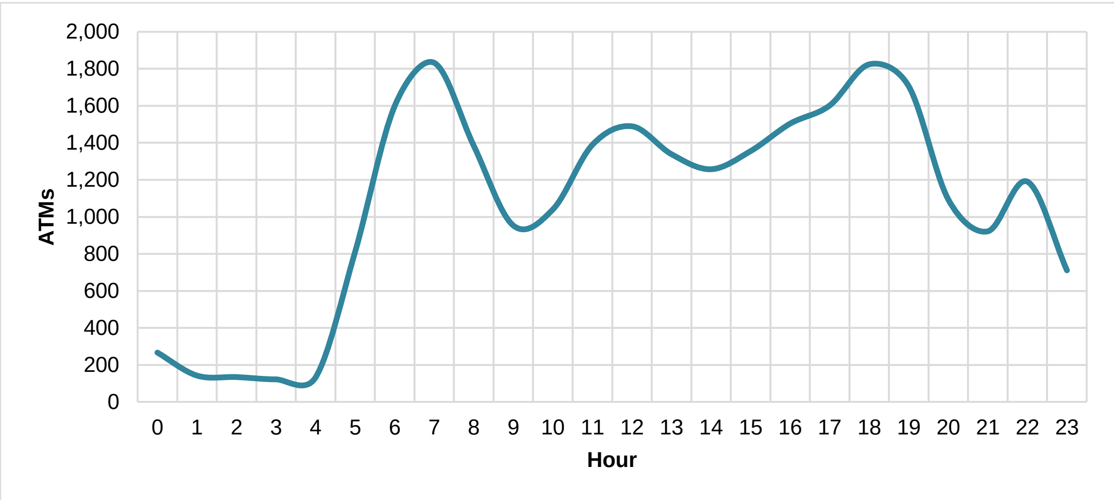

Figure 10.2: Diurnal profile for aircraft movements

Auxiliary Power Units (APUs)

10.55 APUs were modelled at the stands and were represented as volume sources in the model. Emission rates of NOx and PM_{10} were obtained from the EDMS software and are detailed in ES Appendix 10.2. The airport's controls on aircraft APU use (as defined in the existing 2008 Section 106 Agreement) states that arriving aircraft should connect directly to fixed electrical ground power (FEGP) at the stand (where provided and serviceable). Furthermore, the airport operates a policy through its Aeronautical Information Publication (AIP) and Director's Notice

[iii] A new version of the database (v24) was released on 21 November 2017. There are no differences in the emission factors for the aircraft engines used in this assessment compared to v23C.

that during a turnaround APUs should be turned off as soon as practicable following arrival and not restarted up to 10 minutes prior to 'push-back and start'. Between the hours 23:31 – 05:59, except when immediately prior to departure, APUs may not be started without notification to Airport Operations.

10.56 For the air quality assessment, APUs were assumed to run for 10 minutes for departing aircraft only, complying with the airport's policy. This is likely to be an over-estimate of emissions. Typically, all aircraft on short turnarounds would only switch on and run their APU for a few minutes prior to push-back. However, the use of 10 minutes provides a worst case estimate. Emissions were distributed spatially around the airport based on the stand usage for 2016 and the temporal variation was modelled using the diurnal profile of the aircraft movements, as illustrated in Figure 10.2 above.

Other Airport Sources

Aircraft Engine Testing

10.57 Aircraft engines are tested at the airport in run-up bays in front of Hangar 8 at the south-eastern side of the airfield (a figure of the airfield is included in ES Appendix 10.2). This is known as engine ground running (EGR). Short tests performed at idle thrust of up to 5 minutes are also allowed at the stands. Detailed data on EGR tests was provided by STAL and is presented in ES Appendix 10.2. For the engine tests undertaken at the engine testing ground in front of Hangar 8, emissions were calculated for the three most commonly used aircraft types (MCATs 1, 2 and 9) with an average running time of 48 minutes. This was derived as an average from supplied data, but is a strongly conservative estimate since most tests would only run for a few minutes at the higher thrust setting of the engines. Notwithstanding this, the total emissions from aircraft engine testing represent a small proportion of the total so this conservative estimate does not affect the overall results. For the idle runs on stand, emissions were calculated for the two most commonly used aircraft types (MCATs 1 and 2) with a running time of 5 minutes at 7% engine thrust. This is the maximum allowed time for engine run tests on stand at the airport, and therefore represents a conservative case.

10.58 The engine tests were included in the model as volume sources with a height of 5m and distributed spatially around the airport at the west and east pens of the engine testing ground and the stands. Emissions for the future assessment scenarios were scaled up based on the increase in aircraft movements.

Fire Training Ground

10.59 The fire training ground is located in the north-west of the airport and can be accessed from Taxiway Golf. The training ground is operated by STAL's airport fire services for training purposes, using propane (a liquefied petroleum gas, LPG) as the combustion fuel. Emission factors were taken from the NAEI, i.e. 0.007kt NOx/Mth[iv]. It was assumed that pNO_2 emissions were 5% of NOx emissions[36]. No significant particulate matter emissions are generated during combustion of LPG and therefore these have not been included in the assessment. The fuel use from the operation of this facility was provided by STAL and is presented in ES Appendix 10.2. Emissions for the future assessment scenarios were assumed to remain consistent with the 2016 baseline year.

[iv] This has been converted to 0.0034 kg NOx/litre.

Ground Support Equipment (GSE)

10.60 GSE at the airport includes a range of different vehicles, such as belt-loaders, tugs, towers, hydraulic lift platforms and de-icing units. Data for airside vehicles at the airport was provided by STAL, consisting of a record of all licenced vehicles for airside access, date of registration, type of fuel and litres used and the fleet owner. Details for this source are presented in ES Appendix 10.2.

10.61 For the emissions calculations, GSE was split into road vehicles and non-road mobile machinery (NRMM). Emissions of NOx, PM_{10} and $PM_{2.5}$ were taken from the EMEP/EEA air pollutant emissions inventory, taking into account the relevant emission standards for both road vehicles and NRMM. Emissions of pNO_2 were taken for the UK fleet average from the NAEI, i.e. 27.5% for 2016, 27.7% for 2023 and 25.8% for 2028.

10.62 Road vehicles were split into heavy goods vehicles (HGVs), using emissions for a 12-14t rigid HGV, and light duty vehicles (LDVs), using emissions for a light commercial vehicle less than 3.5t. An average fuel consumption of 11.9mpg (23.7 litres per 100km) was used for HGVs, taken from the DfT fuel consumption statistical data[37]. For the LDVs, an average fuel consumption of 21.6mpg (13.1 litres per 100km) was used. Vehicles were assumed to travel with a speed of 20mph (32kph).

10.63 GSE emissions were distributed spatially on the aprons of the airport, based on the stand usage for 2016. The diurnal profile of arriving and departing aircraft was applied to the model. Emissions for the future assessment scenarios were scaled up based on the increase in aircraft movements.

Heating Plant

10.64 The airport buildings use natural gas-fired boilers to supply their heat demand. The main boilers on the airport are located at the main terminal building, Enterprise House and the satellite piers. Data for the annual gas consumption of the boilers was provided by STAL and used for the calculation of NOx emissions. Details are presented in ES Appendix 10.2.

10.65 Emission factors were taken from the boilers specification documents and the boilers were represented in the model as point sources above the rooftops of their respective buildings. A monthly profile was applied to the boiler emissions based on the 2016 consumption data. Emissions for the future assessment scenarios were scaled up based on the increase in passenger numbers at the airport. This is likely to be an over-estimate of the emissions and provides a conservative case, since it assumes that there is no change in the rate of heating consumption per passenger at the airport between 2016 and 2028, and that total heating demand is only sensitive to changes in passenger numbers. The consented planning application for the new Arrivals Building at the airport includes the use of new sustainable technologies and environmental initiatives in its design. In relation to heating demand, the new building is designed to reduce heating load through a high performance building fabric and include the use of an onsite air source heat pump[38], therefore, the assumption of constant heat energy generated for each passenger can be seen to be conservative.

Road Vehicles

Highway Network

10.66 Traffic data for the study area was provided by the specialist transport consultants (SDG) in the form of annual average daily traffic (AADT) flows and the percentage of HGVs. The data included a split between airport and non-airport related traffic on the highway network.

10.67 Emissions were calculated using Defra's Emissions Factor Toolkit (EFT) (version 8.0)[39]. The percentage of primary NO_2 emissions was taken from the NAEI[40]. Speeds were taken from the ITO website[41] (where available) and from the speed limits on the roads. Speeds were also reduced to 20kph near to junctions and at roundabouts following the Defra TG16 guidance.

10.68 Assumptions and limitations in relation to this data are presented later in this chapter (see paragraph 10.92 onwards). The traffic data and location of road links included in the assessment are presented in ES Appendix 10.3.

Car Parks

10.69 Information on car park movements was provided by STAL and SDG in the form of the daily number of vehicles entering and leaving each car park. Emissions were calculated in accordance with the Cambridge Environmental Research Consultants (CERC) note on modelling car parks[42].

10.70 Emission factors for vehicles were taken from Defra's EFT (version 8.0), while cold start emissions were taken from the NAEI database. The percentage of primary NO_2 emissions was also taken from the NAEI. A speed of 5kph was assumed at all car parks. The vehicle flows and location of the car parks included in the assessment are presented in ES Appendix 10.3.

Background Pollutant Concentrations

10.71 An inventory of background emissions was compiled using gridded pollutant emissions. The data was taken from the NAEI, which provides gridded emissions data for each 1x1km^2 square for the UK. The latest data was available for 2014 and included all the emission sources within each square, broken down by pollutant and by sector (e.g. combustion in energy production and transfer; extraction / distribution of fossil fuels; road transport; and other transport and machinery). Since the air quality assessment has included road transport and airport sources in the model explicitly, emissions from the 'road transport' and 'other transport' sources were subtracted from the backgrounds to avoid double-counting.

10.72 A wide area of 60km^{2}x50km^2 around the airport was selected and the gridded emissions were modelled using the ADMS-Airport software to derive NO_2, PM_{10} and $PM_{2.5}$ concentrations for comparison against background monitoring stations (see Baseline Conditions section of this chapter).

10.73 Background concentrations for the future assessment years of 2023 and 2028 were derived using the projections within the Defra background maps. For NOx concentrations, scaling factors were derived for the rural contribution; for PM_{10} and $PM_{2.5}$ concentrations scaling factors were derived for the secondary particulates contribution (Table 10.4).

Table 10.4: Scaling factors for future background concentrations

Year	NOx	PM_{10} and $PM_{2.5}$
2016	1.00	1.00
2023	0.79	0.90
2028	0.88	0.96

Dispersion Modelling Methodology

NOx to NO_2 Conversion

10.74 The model predicts roadside NOx concentrations, which comprise principally nitric oxide (NO) and primary NO_2 (i.e. NO_2 that is emitted directly from the aircraft or vehicle exhaust). The emitted NO reacts with oxidants in the air (mainly ozone) to form more NO_2 (known as secondary NO_2). Since only NO_2 has been associated with effects on human health, the air quality standards for the protection of human health are based on NO_2 rather than NOx or NO. Thus, a suitable NOx to NO_2 conversion needs to be applied to the modelled NOx concentrations.

10.75 The method taken for this conversion in the assessment follows the approach described by Clapp and Jenkin[43,44], which takes account of the proportion of primary NO_2 in the balance between NO and NO_2 and derives total NO_2 concentrations as a function of distance from major sources. The method requires a value for the regional background oxidant, which was taken to be 33.5ppb in 2008 and was projected to increase by +0.1ppb/year for future years (34.3ppb in 2016, 35ppb in 2023 and 35.5ppb in 2028).

Model Verification

10.76 Model verification refers to the comparison of modelled pollutant concentrations with measured concentrations at the same points to assess the performance of the model and determine an adjustment factor, if one is required. Defra's TG16 guidance provides advice on model verification, which is used for the modelling of road networks for highways assessments, local air quality management and other local modelling of roads. Should the model results for NO_2 be largely within ±25% of the measured values and there is no systematic over or under-prediction of concentrations, then the Defra TG16 guidance advises that no adjustment is necessary. If this is not the case, then the modelled values are adjusted based on the observed relationship between modelled and measured NOx concentrations to provide better agreement.

10.77 Modelled results may not compare as well at some locations for various reasons, including:

- Errors/uncertainties in model input data (e.g. traffic flows and speed data estimates);
- Model setup (including street canyons where applicable, road widths, location of monitoring sites);
- Neglect of local effects (including queues, bus stops and street canyons);
- Model limitations (treatment of surface roughness and meteorological data);
- Uncertainty in monitoring data, notably diffusion tubes (e.g. bias adjustment factors and annualisation of short-term data); and
- Uncertainty in emissions and emission factors.

10.78 The above factors were investigated as part of the model verification process to minimise the uncertainties as far as practicable. Details of the model verification are presented in ES Appendix 10.4. Modelled concentrations were within ±25% of measured values at sites influenced mainly by the airport and roadside locations. However, an adjustment was undertaken for the main roads within Bishop's Stortford and Stansted Mountfitchet to account for uncertainties in the traffic data flows and the measured air quality concentrations at these locations.

Assessment of Impacts at Human Receptors

10.79 For the assessment of impacts and significance at sensitive human receptors the approach described in the IAQM/EPUK guidance[45] has been used. This is best practice for undertaking air quality assessments.

10.80 Impact descriptors are determined based on the magnitude of incremental change in pollutant concentrations as a proportion of the relevant assessment level; in this instance the air quality standards. The change is then examined in relation to the predicted total pollutant concentrations in the assessment year and its relationship with the relevant air quality standard (Table 10.5).

Table 10.5: Impact descriptors from IAQM/EPUK guidance

Predicted concentration relative to air quality standard	% Change in concentrations relative to air quality standard			
	1%	2-5%	6-10%	>10%
<75%	Negligible	Negligible	Minor	Moderate
76-94%	Negligible	Minor	Moderate	Moderate
95-102%	Minor	Moderate	Moderate	Major
103-109%	Moderate	Moderate	Major	Major
>110%	Moderate	Major	Major	Major

10.81 Slight and substantial impacts from the IAQM/EPUK guidance have been called ‘minor’ and ‘major’ respectively for this assessment. The resulting impact descriptors at each of the assessed receptors are then used in combination with other considerations, to make a professional judgement on the overall significance of effects from the proposed development. In this assessment, ‘major’ or ‘moderate’ impacts have been judged to result in significant effects and ‘minor’ or ‘negligible’ impacts to result in effects which are not significant.

Assessment of Impacts at Ecological Receptors

10.82 For the assessment of impacts and significance at sensitive ecological receptors, the methodologies outlined in the Environment Agency’s H1 Guidance[46] and the Highways Agency’s Design Manual for Roads and Bridges (DMRB) HA 207/07[47] have been used. Nitrogen deposition rates and information on sensitive habitats for the designated sites were taken from the APIS website[48].

10.83 The DMRB guidance states that where annual mean NOx concentrations are predicted to be below the air quality standard (i.e. 30µg/m^3), or where the change in predicted concentrations is less than 0.4µg/m^3, then no significant effects would be anticipated for the assessed ecological site. Where the annual mean NOx concentrations are predicted to exceed the air quality standard and the change in concentrations due to the proposed development is predicted to be larger than 0.4µg/m^3, then an assessment of nitrogen deposition needs to be undertaken.

10.84 The Environment Agency H1 guidance states that air quality impacts can be considered to be *insignificant* if the annual mean process contribution (i.e. the predicted change in concentrations of nitrogen deposition due to the proposed development) is less than 1% of the long term environmental standard (i.e. the critical load[v] in the case of assessing nitrogen deposition for ecological sites).

10.85 Annual mean NOx concentrations have therefore been predicted and compared against the air quality standard of 30µg/m^3 and the criteria detailed in the DMRB guidance. An assessment of nitrogen deposition was undertaken for those sites that met the criteria. This included the conversion of the modelled NOx concentrations to NO_2 (using the Clapp and Jenkin approach) in order to calculate the nitrogen deposition rate, as follows: the NO_2 concentrations (µg/m^3) were multiplied by the relevant deposition velocity (0.0015m/s for grassland and 0.003m/s for forest habitats) and the resulting value (µg NO_2/m^2/s) was firstly converted to kg NO_2/ha/yr using a factor of 315.26 and then to kg N/ha/yr using a factor of 14/46 (i.e. converting from NO_2 to nitrogen using the molecular mass).

10.86 The calculations were carried out for the baseline and future year assessment scenarios at selected locations on the boundary and within the designated sites in the study area. When predicting future deposition rates, total nitrogen deposition rates were reduced by 2% per year in accordance with the DMRB guidance. This is because of predicted improvements in vehicle technologies (cleaner fuels and electrification) and abatement equipment. The resulting change in nitrogen deposition due to the proposed development was then compared against the lower critical level for each site.

Assumptions and Limitations

Emissions from Aircraft Engines and Other Airport Sources

10.87 All assumptions and limitations for these pollution sources have been discussed in the previous sections and in ES Appendix 10.2. Table 10.6 below presents a summary of the data sources for the 2016 baseline year and future year assessment scenarios.

10.88 No emissions have been assigned to the proposed RET for Runway 22 or the proposed remote stands next to the Yankee taxiway. Both these locations are further away from any sensitive receptors in the study area, and therefore the assignment of emissions at features closer to the airport boundary represent a worst case for the assessment.

10.89 In the 2028 DC scenario, emissions from stationary aircraft in hold and waiting for clearance to enter Runway 22 have been assigned to the proposed RAT at the head of the runway.

Table 10.6: Assumptions for aircraft engines and other airport sources

Source	Baseline 2016 scenario	Future assessment scenarios
Aircraft LTO	Detailed data from STAL and forecasts from ICF	Forecasts from ICF
APUs	Used for 10 minutes by departing aircraft	Scaled by changes to ATMs
Helicopters	Detailed data from STAL and forecasts from ICF	Forecasts from ICF
Aircraft engine testing	Detailed data from STAL	Scaled by changes to ATMs
Fire training ground	Detailed data from STAL	Assumed same as baseline case (its use does not depend on ATMs or pax)
GSE	Detailed data from STAL	Scaled by changes to ATMs
Heating plant	Detailed data from STAL	Scaled by changes to pax

[v] Critical load is defined as a quantitative estimate of exposure to pollutants below which significant harmful effects do not occur (i.e. it relates to the quantity of pollutant deposited from air to the ground).

Emissions from Road Vehicles on the Highway Network

10.90 Traffic data was derived from multiple automatic and manual traffic count sites in the study area and processed by Steer Davies Gleave (SDG) to derive 24-hour annual average daily traffic (AADT) flows. Where detailed information was not available (for example slip roads at Junction 8 of the M11 and the A120), the distribution of traffic flows was obtained from traffic data made available by Highways England, published on the DfT website.

10.91 The 24-hour flow data supplied by SDG for use in the air quality assessment was provided for each road link close to the traffic count location. The transport consultants also advised on how the traffic flows could be extended along each road link (from junction to junction) (see ES Appendix 10.3 for further details).

Baseline Conditions

10.92 This section describes the environmental conditions that exist in the study area in the baseline assessment year (2016) and in future baseline years (i.e. conditions experienced in the future assessment years).

10.93 The air quality around the airport is influenced mainly by vehicle emissions from the surrounding road network, with the M11 and the A120 being the principal sources of pollution. The emissions from aircraft, related activities and on-airport facilities have a localised impact with the concentrations of these sources being largely confined to within the boundary of the airport.

Local Air Quality Management

10.94 Stansted is located within the district of Uttlesford close to the boundary with East Hertfordshire. Each district council has its own ambient monitoring network and management of local air quality. UDC has declared an Air Quality Management Area (AQMA) for annual mean NO_2 concentrations in Saffron Walden, approximately 7km north of the study area. This AQMA is centred on Elm Grove in Saffron Walden town centre and is unlikely to be directly affected by the airport operations, since no significant road traffic from the airport passes through this area.

10.95 EHDC has declared the 'Bishops Stortford AQMA' for annual mean NO_2 concentrations. This is located in Bishop's Stortford town centre and was declared in 2007, encompassing a number of properties around the junction of Dunmow Road, Hockerill Street, London Road and Stansted Road. This is the only AQMA within the study area for the air quality assessment. EHDC has also declared the 'AQMA Sawbridgeworth', approximately 1km southwest of the study area. This AQMA encompasses properties around the junction of Cambridge Road, Station Road and Harlow Road and is unlikely to be directly affected by the airport operations, since no significant road traffic from the airport passes through this area (there is 0% airport-related traffic on the A1184 further north of this AQMA). The location of the Bishops Stortford AQMA is presented in Figure 10.3.

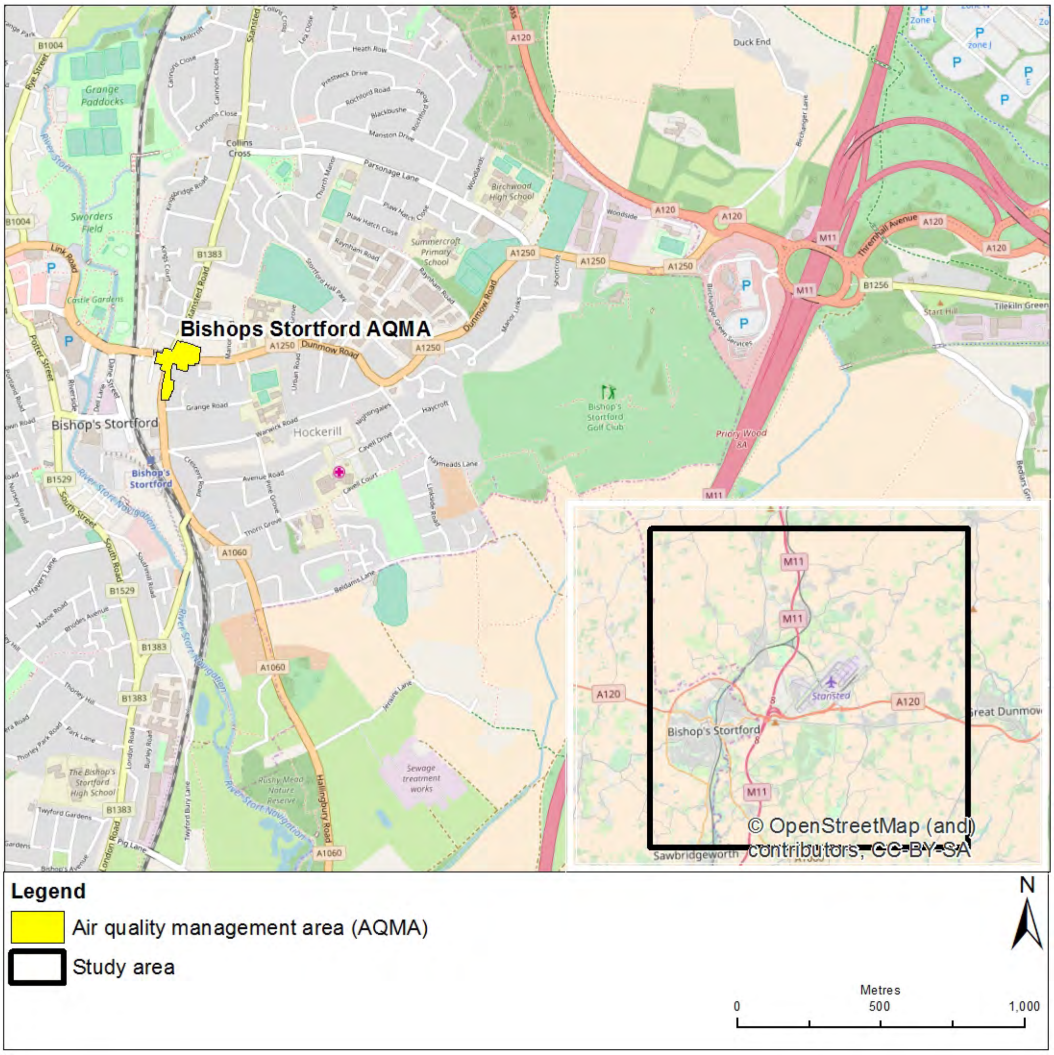

Figure 10.3: Air quality management areas

Local Monitoring Data

10.96 Monitoring of NO_2 and PM_{10} concentrations is currently carried out by UDC, EHDC and STAL. There are four continuous monitoring sites and 21 diffusion tube sites within the study area. Table 10.7 presents details and monitoring data for these sites for the past five years, while their locations are presented in Figure 10.4.

10.97 It can be observed that across most of the study area, pollutant concentrations are well below the relevant air quality standards. Exceedances of annual mean NO_2 concentrations were recorded at site UT009 near the M11 to the northwest of the airport and at three sites within Bishop's Stortford in and adjacent to the AQMA. However, these locations are largely influenced by emissions from road vehicles, rather than aircraft or other airport operations.

Table 10.7: Local air quality monitoring in the study area

ID	Site	OS coordinates	Operator	Location type	Distance to kerb (m)	2012	2013	2014	2015	2016
NO_2 concentrations (µg/m^3) – Continuous monitors										
UTT2	Takeley	556234, 221496	UDC	Roadside	35.0	19.0	18.8	*17.8*	15.9	n/a
UTT3	Birchanger	551496, 222208	UDC	Roadside	30.0	n/a	n/a	15.3	*21.4*	n/a
Stansted 3	East of High House	555768, 223289	STAL	Airport	NR	26.0	24.0	22.0	26.0	21.0
Stansted 4	Airfield	554779, 224448	STAL	Airport	NR	19.0	19.0	17.0	19.0	19.0
NO_2 concentrations (µg/m^3) – Diffusion tubes										
Stansted 3	East of High House	555768, 223289	STAL	Airport	NR	27.0	23.9	22.5	25.5	21.2
Stansted North	North lights, north end of runway	555500, 224800	STAL	Airport	NR	24.0	18.7	20.3	22.5	18.8
Stansted East	Enterprise House	555500, 223400	STAL	Airport	NR	34.0	27.8	28.7	33.8	27.6
Stansted South	Balancing pond	552200, 221500	STAL	Airport	NR	31.0	26.9	25.5	29.9	25.4
Stansted West	Radar tower, Burton End	553600, 223500	STAL	Airport	NR	22.0	17.6	18.3	19.0	15.7
EH12	Hockerill Street	549100, 221200	EHDC	Roadside	1.5	**47.0**	**49.0**	**48.0**	**45.7**	**45.4**
EH16	London Road	549148, 220122	EHDC	Roadside	2.1	35.0	n/a	n/a	n/a	n/a
EH17	Dunmow Road	549364, 221215	EHDC	Roadside	1.5	**61.0**	**74.0**	**68.0**	**65.7**	**64.9**
EH18	Stansted Road	549298, 221313	EHDC	Roadside	1.4	39.0	**41.0**	**41.0**	37.3	36.8
EH19	London Road	549250, 221200	EHDC	Roadside	1.2	**66.0**	**76.0**	**76.0**	**70.3**	**69.6**
EH62	Northgate End	548723, 221719	EHDC	Roadside	1.6	n/a	*35.0*	36.0	33.5	33.5
EH64	79 Rye Street	548741, 222109	EHDC	Roadside	1.0	n/a	*39.0*	39.0	34.0	34.0
EH66	221 Rye Street	549163, 222731	EHDC	Roadside	1.1	n/a	*22.0*	22.0	20.0	19.6
EH68	9 Hadham Road	548611, 221541	EHDC	Roadside	1.5	n/a	*39.0*	38.0	33.5	33.1
UT002	Thatched Cottage	552706, 221403	UDC	Roadside	10.0	27.3	23.8	20.7	21.4	26.7
UT006	Stansted	551358, 225452	UDC	Roadside	5.4	16.3	15.9	15.1	14.1	16.7
UT007	Rose Cottage	556186, 223724	UDC	Roadside	7.5	23.5	24.8	20.0	22.7	27.1
UT008	Hallingbury	551189, 217438	UDC	Roadside	n/a	27.8	29.7	26.2	25.2	29.9

ID	Site	OS coordinates	Operator	Location type	Distance to kerb (m)	2012	2013	2014	2015	2016
UT009	Burton End	552403, 223965	UDC	Roadside	3.1	38.9	38.7	33.6	35.5	**43.0**
UT024	Takeley Hill	554671, 221010	UDC	Urban background	NR	14.5	15.7	13.5	14.7	17.0
UT025	Elman's Green	553271, 221072	UDC	Urban background	NR	15.6	15.8	13.6	13.6	17.8
UT026	South Gate	553141, 218694	UDC	Urban background	NR	13.7	13.3	11.9	12.3	13.5
UT033	Stansted Chapel Hill	551402, 224913	UDC	Roadside	1.8	25.7	29.8	26.9	27.6	36.2
UT034b	Four Ashes	556101, 221243	UDC	Roadside	2.1	n/a	n/a	27.4	26.1	35.2
UT035	Takeley Street	554390, 221279	UDC	Roadside	1.5	n/a	n/a	*21.2*	n/a	n/a
UT038	High Street	554691, 216558	UDC	Kerbside	1.1	n/a	n/a	n/a	21.3	25.8
PM_{10} concentrations ($\mu g/m^3$) – Continuous monitors										
UTT2	Takeley	556234, 221496	UDC	Roadside	50.0	n/a	21.0	26.8	20.6	n/a
UTT3	Birchanger	551496, 222208	UDC	Roadside	30.0	n/a	n/a	31.2	*26.3*	n/a
Stansted 3	Nursery School	555768, 223289	STAL	Airport	NR	20.0	15.0	15.0	16.0	18.0

Notes

Underlined site IDs: monitoring site not found during field visit

NR: not relevant

n/a: data not available this year

Bold font: measurement above the air quality standard (40$\mu g/m^3$)

Italics font: low data capture (below 75%)

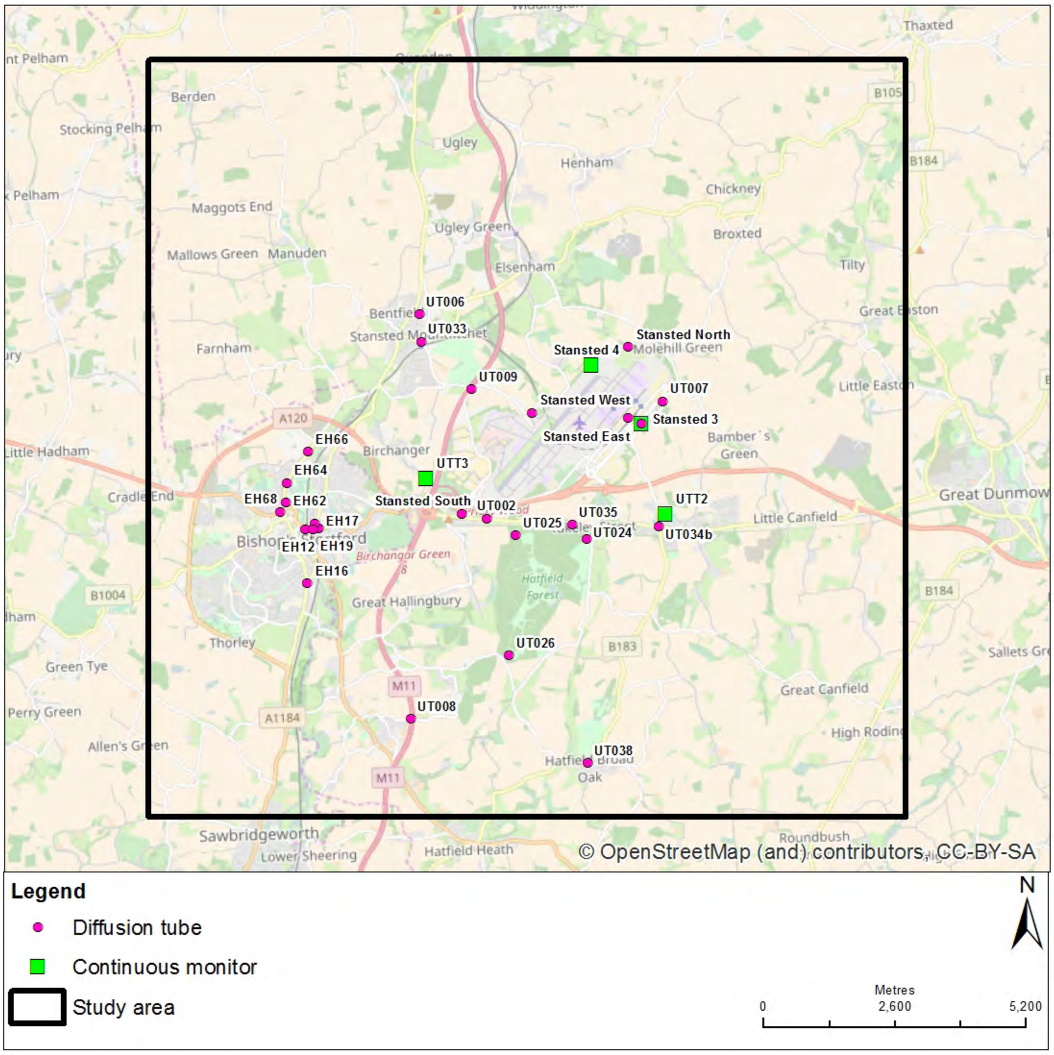

Figure 10.4: Air quality monitoring sites

Background Concentrations

10.98 Background concentrations refer to the existing levels of pollution in the atmosphere, produced by a variety of stationary and non-stationary sources, such as roads and industrial processes.

10.99 As described in the Assessment Methodology section, emissions from various pollutant sources were obtained from the NAEI and modelled using ADMS-Airport over a wide study area at a 1km resolution, to model the impact of diffuse sources on background concentrations in the vicinity of the airport (Figure 10.5). The resulting background concentrations were then added to concentrations recorded at rural background monitoring stations to generate hourly varying total background concentrations for the study area. The latest year for which emissions from the NAEI were available was 2014; therefore, the measured concentrations from the monitoring stations were also taken for 2014.

10.100 Four rural background monitoring stations were selected: Wicken Fen approximately 46km (28.5 miles) to the north of the airport, St Osyth and Rochester Stoke approximately 55km (34 miles) to the east and the south-east of the airport respectively, and Harwell approximately 115km (71 miles) to the west. These are part of Defra's automatic urban and rural network for monitoring in the UK[49] and are the closest rural background sites to the study area. Their location is presented in Figure 10.4. The selection of rural monitoring data was made on an hourly basis depending on wind direction.

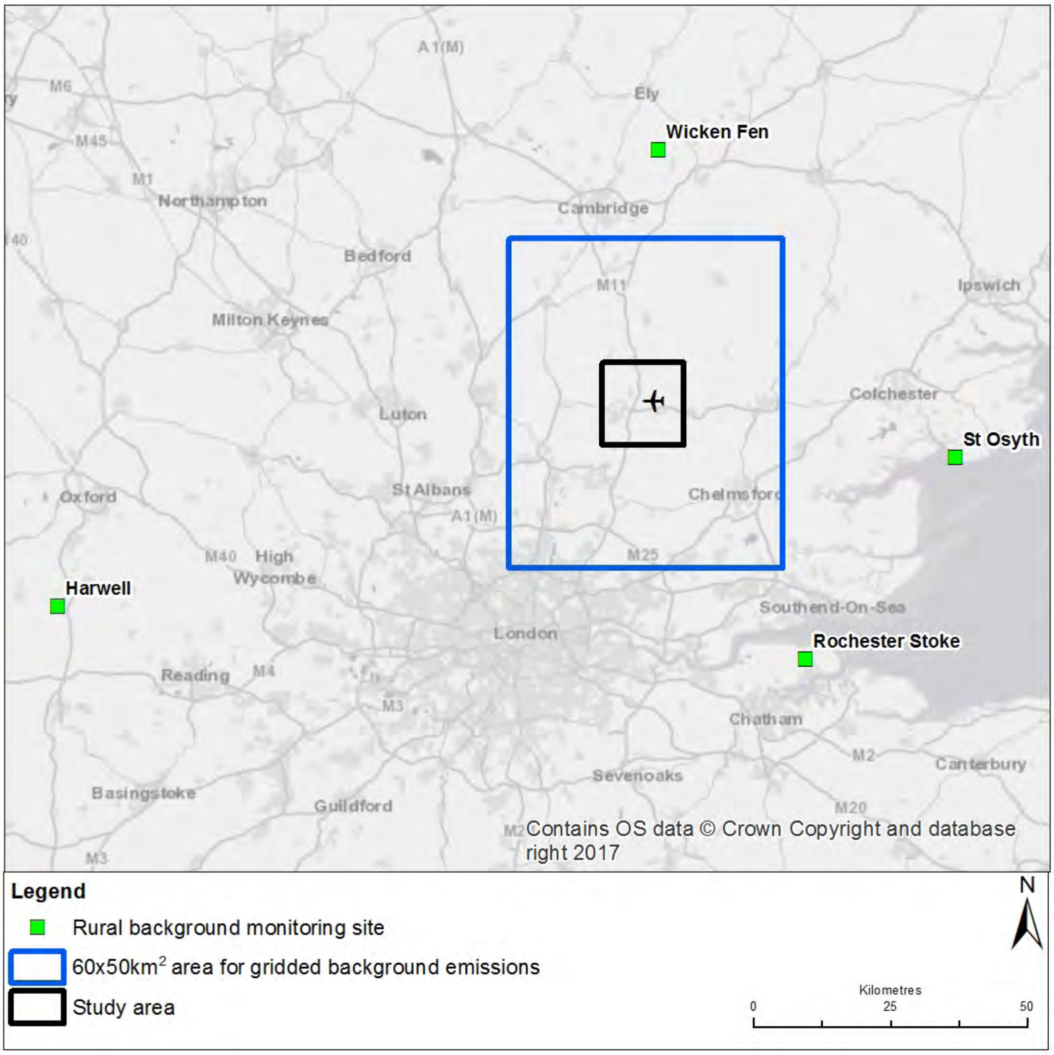

Figure 10.5: Rural background monitoring sites and area of gridded background emissions

10.101 Figure 10.6 presents the angles used for the meteorological data for each background monitoring station. For example, when the wind was between 307° to 52° the background NOx data from the Wicken Fen monitoring station was used. With regards to particulate matter, only data recorded at the Harwell and Rochester Stoke monitoring stations was used, since particulate matter concentrations are not recorded at the other two monitoring stations.

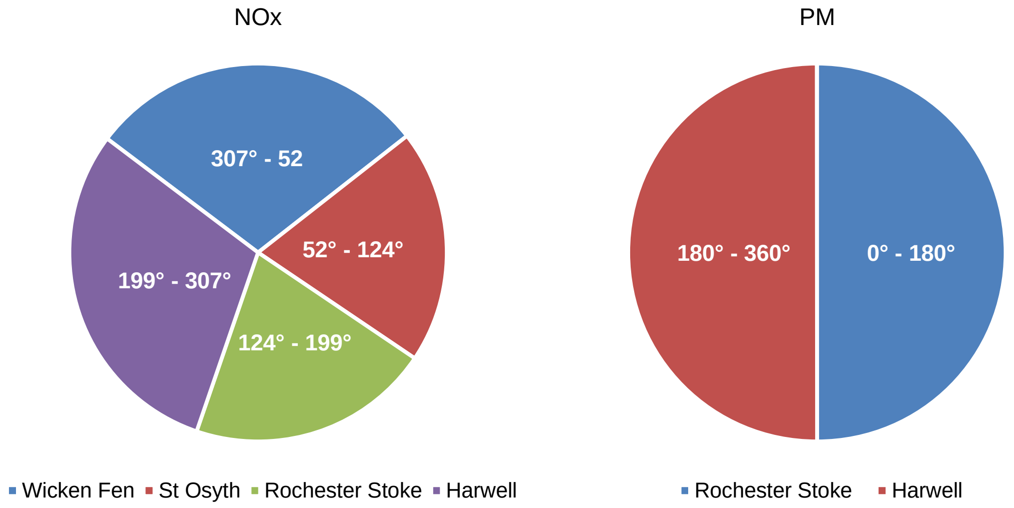

Figure 10.2: Mapping of wind direction to background monitoring stations

10.102 Annual mean pollutant concentrations for 2014 from the four rural background monitoring stations[50] are presented in Table 10.8. The modelled background NOx, PM_{10} and $PM_{2.5}$ concentrations, and a rural background contribution from the four rural background monitoring stations were used as the background concentrations for this assessment. The rural contributions for the baseline scenario in the study area were derived to be 11.8µg/m^3 for NOx, 14.9µg/m^3 for PM_{10} and 11.0µg/m^3 for $PM_{2.5}$, all well below their respective air quality standards.

Table 10.8: Rural background monitoring data for 2014

Site	2014 annual mean concentrations (µg/m^3)			
	NOx	NO_2	PM_{10}	$PM_{2.5}$
Wicken Fen	9.9	7.6	n/a	n/a
St Osyth	15.9	10.7	n/a	n/a
Rochester Stoke	18.2	14.4	17.6	15.0
Harwell	10.5	8.0	14.3	9.1

Other Emission Sources

10.103 Other emission sources in the study area include industrial sources. These are regulated through a system of operating permits or authorisations, requiring stringent emission limits to be met and ensuring that any releases to the environment are minimised or rendered harmless. Regulated (or prescribed) industrial processes are classified as Part A or Part B processes, regulated through the Pollution Prevention and Control system[51,52]. The larger more polluting processes are regulated by the Environment Agency (EA) and the smaller less polluting ones by the local authorities. Local authorities tend also to regulate only for emissions to air whereas the EA regulates emissions to air, water and land.

10.104 There is one industrial process within the study area with releases to air as listed on the EA website[53]. This is the Elsenham Quarry site, approximately 2.5km (1.6 miles) north of the airport. The site is operated by Viridor Waste Management Ltd (permit reference MP3435KP) and undertakes waste landfilling operations.

10.105 Emissions from this site are captured in the NAEI grid emissions used to calculate the hourly background concentrations and so have not been modelled explicitly, as this would lead to double-counting of the emissions.

Ecological Receptors

10.106 Data for the designated ecological sites was obtained from the APIS website and is summarised below.

10.107 The most sensitive habitat in the Hatfield Forest SSSI in relation to nutrient nitrogen is acid grassland. The relevant nitrogen critical load class is for inland dune siliceous grasslands with a lower value of 8kg N/ha/yr. Exceedances of the critical load may cause decrease in lichens and increase in biomass[28]. The average deposition rate is 16.24kg N/ha/yr as a three-year average (2013-2015).

10.108 The most sensitive habitat in the Elsenham Woods, Quendon Wood and High Wood, Dunmow SSSIs in relation to nutrient nitrogen is broad-leaved, mixed and yew woodland. The relevant nitrogen critical load class is for meso- and eutrophic Quercus woodland with a lower value of 15kg N/ha/yr. Exceedances of the critical load may cause changes in ground vegetation[28]. The average deposition rates are 28.42kg N/ha/yr for the Elsenham Woods SSSI, 29.39kg N/ha/yr for the Quendon Wood SSSI and 28.55kg N/ha/yr for the High Wood, Dunmow SSSI as a three-year average (2013-2015).

10.109 The most sensitive habitat in the Sawbridgeworth Marsh SSSI in relation to nutrient nitrogen is fen, marsh and swamp. The relevant nitrogen critical load class is for rich fens with a lower value of 15kg N/ha/yr. Exceedances of the critical load may cause increase in tall graminoids and decrease in bryophytes[28]. The average deposition rate for all three sites is 15.82kg N/ha/yr as a three-year average (2013-2015).

10.110 The most sensitive habitat in the Thorley Flood Pound and Little Hallingbury Marsh SSSIs in relation to nutrient nitrogen is fen, marsh and swamp. There is no lower critical load value reported in the APIS website for these sites and site-specific advice should be sought. The average deposition rates for both sites is 15.82kh N/ha/yr as a three-year average (2013-2015).

Incorporated Mitigation

10.111 Committed mitigation related to the construction works for the proposed development is described in Chapter 5 (Development Programme and Construction Environmental Management).

10.112 As part of previous agreements (the Section 106 Agreement in 2003 and the 25+ Unilateral Agreements with UDC and EHDC in 2008), STAL has set up air quality monitoring stations at and around the airport and within the Hatfield Forest SSSI and NNR. Other mitigation is incorporated within the aims of STAL's 2015 SDP, as follows:

- Continue to monitor and report air quality in the vicinity of the airport;
- Reduce air pollution;
- Reduce emissions generated by ground vehicles and aircraft;
- Continue to promote the use of public transport to access the airport; and
- Work with airline and air cargo partners to minimise the impact of aircraft operations.

Impact Assessment

Construction Stage Effects

10.113 The average daily construction traffic flows (two-way) are anticipated to be around 100 movements for the transportation of plant and equipment to site. The IAQM/EPUK guidance indicative criteria for requiring an air quality assessment are a change in HGV flows of more than 100 AADT. The traffic flows associated with the airfield construction works are equal but do not exceed the IAQM criteria for detailed assessment. It is not anticipated that this scale and type of activity will generate any significant air quality effects.

Operational Stage Effects

10.114 The proposed development will change the mass of pollutants emitted by the sources described in the Assessment Methodology section (i.e. aircraft engines, other airside operations, road traffic, car parks etc.). The impact of these emissions on local air quality is quantified through their impact on pollutant concentrations and deposition. There is no linear relationship between emissions and concentrations, as the calculation of concentrations from emissions depends not just on the emissions themselves, but also on the meteorological conditions and other factors such as the temporal and spatial variation of the emissions. The emissions inventory is presented for information; it is the predicted concentrations and deposition that determine whether there are significant effects or not as a result of the proposed development.

Emissions Inventory

10.115 Figure 10.6 presents the estimated emissions of NOx, PM_{10} and $PM_{2.5}$ for all assessment scenarios. Overall, NOx and $PM_{2.5}$ pollutant emissions in 2028 DC are estimated to be below the current emissions, as estimated for the Baseline Year 2016. In the case of PM_{10}, emissions in 2028 DC are estimated to be slightly higher than the current emissions.

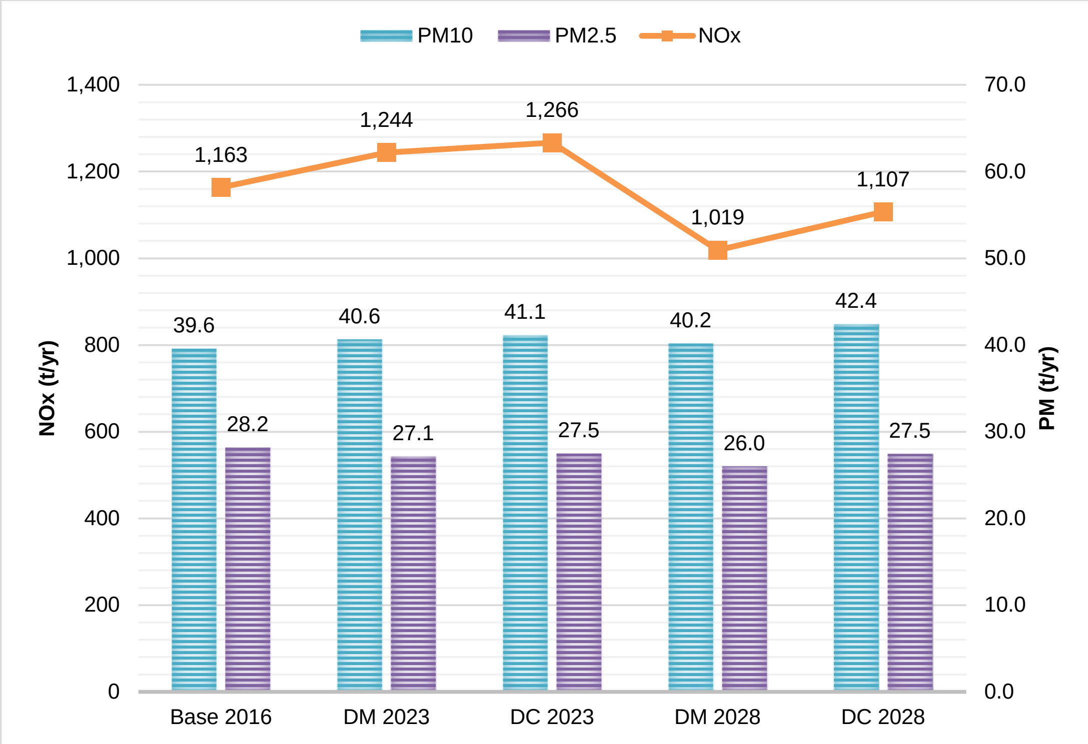

Figure 10.6: Estimated pollutant emissions for all assessment scenarios

10.116 Emissions of NOx have been estimated to be 1,163 t/yr in the Baseline Year 2016 scenario. In 2023, NOx emissions have been estimated to be higher than the Baseline Year. An increase of 23 t/yr NOx has been estimated in 2023 as a result of the proposed development. In 2028, NOx emissions have been estimated to be lower than the Baseline Year, for both DM and DC scenarios. An increase of 88 t/yr NOx has been estimated in 2028 as a result of the proposed development. Table 10.9 presents the source apportionment of the estimated NOx emissions for all sources.

10.117 It can be observed that aircraft LTO NOx emissions are predicted to reduce in magnitude in the Development Case between 2023 and 2028, which is due to changes in the fleet composition with a higher percentage of cleaner engines in MCATs 2 and 3 in 2028 (i.e. the Boeing B737MAX and Airbus A320NEO aircraft). NOx emissions of airport-related road traffic are also predicted to reduce successively from 2016 to 2023 and 2028 DC, which is due to predicted improvements in vehicle engine technology and, to a lesser extent, an increase of alternative and lower emissions vehicles in the national fleet.

Table 10.9: Summary of NOx emissions (t/yr)

Source	Base 2016	DM 2023	DC 2023	DM 2028	DC 2028
Aircraft LTO cycle					
Approach	71.5	110.7	113.1	98.7	107.1
Landing	2.7	4.1	4.2	3.8	4.1
Take-off	130.5	210.7	215.4	183.1	200.0
Initial climb	200.3	306.1	313.2	256.3	284.9
Hold	4.9	7.4	7.6	6.7	7.4
Taxiing	113.6	169.3	173.0	151.8	167.1
Reverse thrust	15.6	24.4	24.9	21.7	23.7
Brake & tyre wear	n/a	n/a	n/a	n/a	n/a

Source	Base 2016	DM 2023	DC 2023	DM 2028	DC 2028
Total from aircraft LTO cycle	***539.2***	***832.7***	***851.3***	***722.2***	***794.3***
Other airport sources					
APUs	12.5	17.0	17.4	15.3	16.9
Helicopters	0.70	0.75	0.75	0.75	0.00
Engine testing	6.2	10.8	11.0	10.9	12.0
GSE	1.8	2.5	2.5	2.5	2.8
Fire training ground	0.01	0.01	0.01	0.01	0.01
Heating plant	6.4	9.7	10.1	9.7	11.9
Total from other airport sources	***27.6***	***40.7***	***41.8***	***39.1***	***43.5***
Road vehicles					
Airport related	104.7	79.7	82.6	52.1	63.7
Non-airport related	489.4	288.6	288.6	204.2	204.2
Car parks	2.5	1.9	2.2	1.2	1.5
Total from road vehicles	***596.6***	***370.1***	***373.4***	***257.5***	***269.4***
TOTAL	**1,163**	**1,244**	**1,266**	**1,019**	**1,107**

10.118 Table 10.10 presents the source apportionment of the estimated PM_{10} and $PM_{2.5}$ emissions for all sources. Emissions of PM_{10} and $PM_{2.5}$ have been estimated to be 39.6 t/yr and 28.2 t/yr respectively in the Baseline Year 2016. Emissions of both pollutants are estimated to remain at similar levels in 2023 and 2028 compared to the Baseline Year. Increases of 0.5 t/yr PM_{10} and 0.3 t/yr $PM_{2.5}$ have been estimated in 2023 as a result of the proposed development. Increases of 2.2 t/yr PM_{10} and 1.4 t/yr $PM_{2.5}$ have been estimated in 2028 as a result of the proposed development. This is because the road vehicle and aircraft engine improvements affect particulates less than NOx and there are therefore lower savings. The largest contributor to emissions of particulates from aircraft is the brake & tyre wear during landing, which is a source that will increase proportionate to the increase in the number of aircraft at the airport.

Table 10.10: Summary of PM10 and PM2.5 emissions (t/yr)

Source	Base 2016	DM 2023	DC 2023	DM 2028	DC 2028
Aircraft LTO cycle					
Approach	0.41	0.55	0.56	0.42	0.45
Landing	0.04	0.06	0.06	0.05	0.05
Take-off	0.63	0.87	0.89	0.62	0.66
Initial climb	1.00	1.35	1.38	0.92	1.00
Hold	0.08	0.10	0.11	0.08	0.09
Taxiing	1.79	2.33	2.38	1.83	1.95
Reverse thrust	0.09	0.12	0.12	0.09	0.10
Brake & tyre wear	2.93 (1.47)	4.31 (2.17)	4.40 (2.21)	4.36 (2.19)	4.81 (2.41)
Total from aircraft LTO cycle	***7.0 (5.5)***	***9.7 (7.6)***	***9.9 (7.7)***	***8.4 (6.2)***	***9.1 (6.7)***
Other airport sources					
APUs	1.47	2.09	2.13	2.13	2.29
Helicopters	0.02	0.02	0.02	0.02	0.00
Engine testing	0.04	0.06	0.06	0.06	0.06

Source	Base 2016	DM 2023	DC 2023	DM 2028	DC 2028
GSE	0.10	0.14	0.14	0.14	0.15
Fire training ground	n/a	n/a	n/a	n/a	n/a
Heating plant	n/a	n/a	n/a	n/a	n/a
Total from other airport sources	***1.6***	***2.3***	***2.3***	***2.3***	***2.5***
Road vehicles					
Airport related	5.4 (3.7)	6.3 (3.8)	6.5 (3.9)	6.0 (3.6)	7.3 (4.3)
Non-airport related	25.5 (17.3)	22.3 (13.4)	22.3 (13.4)	23.3 (13.8)	23.3 (13.8)
Car parks	0.13 (0.08)	0.12 (0.07)	0.14 (0.09)	0.12 (0.07)	0.14 (0.08)
Total from road vehicles	***31.0 (21.0)***	***28.6 (17.3)***	***28.9 (17.4)***	***29.4 (17.4)***	***30.8 (18.2)***
Total	**39.6 (28.2)**	**40.6 (27.1)**	**41.1 (27.5)**	**40.2 (26.0)**	**42.4 (27.5)**

Note: $PM_{2.5}$ emissions are presented in brackets, where different from the PM_{10} emissions.

Modelled Concentrations

10.119 ES Appendix 10.5 presents the predicted pollutant concentrations as contour plots of the study area for all the assessment scenarios. Overall, **negligible** impacts due to the proposed development are anticipated for all pollutants and therefore no significant effects are anticipated for air quality.

Human Receptors

10.120 In 2023 and 2028, **negligible** impacts are predicted at all receptors due to the proposed development, and therefore no significant effects are anticipated for air quality. In all the assessment scenarios predicted concentrations at all receptors are predicted to be below the air quality standard of 40μg/m^3, except at one receptor in Bishop's Stortford.

10.121 Annual mean NO_2 concentrations are predicted to exceed the air quality standard at one receptor in the Baseline Year 2016; receptor R137 (57.0μg/m^3) on London Road. This receptor is located within the town of Bishop's Stortford, near the Hockerill Cross junction, and is mainly influenced by emissions from road vehicles. At all other receptors in the study area, annual mean NO_2 concentrations are predicted to be below the air quality standard of 40μg/m^3.

10.122 In 2023, NO_2 concentrations are predicted to exceed the air quality standard at the same receptor on London Road (R137), both with and without the proposed development. The predicted concentrations are 45.0μg/m^3 in 2023 DM scenario and 45.1μg/m^3 in 2023 DC; therefore the change in concentrations is only 0.1μg/m^3 and the receptor will experience a negligible impact due to the proposed development. No exceedances of the air quality standard are predicted at other receptors in the study area for 2023. The largest change in annual mean NO_2 concentrations due to the proposed development is predicted to be 0.5μg/m^3 at receptors R181 at Anvil Cross (changing from 25.3μg/m^3 to 25.8μg/m^3) and R179 at Hall Green (changing from 23.2μg/m^3 to 23.7μg/m^3). However, the predicted concentrations at these receptors are well below the air quality standard. Overall, **negligible** impacts are predicted at all receptors in 2023 due to the proposed development, and therefore no significant effects are anticipated for air quality.

10.123 In 2028, no exceedances of the air quality standard for NO_2 are predicted at any receptor in the study area. The highest predicted annual mean NO_2 concentrations in 2028 are

$37.1\mu g/m^3$ at receptor R137 on London Road, both with and without the proposed development. The largest change in annual mean NO_2 concentrations due to the proposed development is predicted to be $1.0\mu g/m^3$ at receptor R38 along Goose Lane (changing from $18.7\mu g/m^3$ to $19.7\mu g/m^3$), however predicted concentrations at this receptor are well below the air quality standard. Overall, **negligible** impacts are predicted at all receptors in 2028 due to the proposed development, and therefore no significant effects are anticipated for air quality.

10.124 No exceedances are predicted for annual mean PM_{10} concentrations at any receptor in any of the assessment scenarios. The highest predicted annual mean PM_{10} concentrations are $18.0\mu g/m^3$ in 2023 and $18.9\mu g/m^3$ in 2028 at receptor R137 on London Road. The largest change in annual mean PM_{10} concentrations due to the proposed development is predicted to be $0.1\mu g/m^3$ in both 2023 and 2028. **Negligible** impacts are predicted at all receptors due to the proposed development, and therefore no significant effects would be anticipated for air quality.

10.125 No exceedances are predicted for annual mean $PM_{2.5}$ concentrations at any receptor in any of the assessment scenarios. The highest predicted annual mean $PM_{2.5}$ concentrations are $13.7\mu g/m^3$ in 2023 and $14.4\mu g/m^3$ in 2028 at receptor R11 at Gaunts End. The largest change in annual mean $PM_{2.5}$ concentrations due to the proposed development is predicted to be $0.1\mu g/m^3$ in both 2023 and 2028. **Negligible** impacts are predicted at all receptors due to the proposed development, and therefore no significant effects would be anticipated for air quality.

10.126 ES Appendix 10.5 presents details of the predicted pollutant concentrations for all assessment scenarios.

Ecological Receptors

10.127 In 2023 and 2028, there are no significant effects at ecological receptors due to nitrogen deposition. Predicted NOx concentrations at all ecological receptors in 2023 and 2028 are predicted to be below the critical level/air quality standard of $30\mu g/m^3$.

10.128 Annual mean NOx concentrations at the Hatfield Forest SSSI and NNR are predicted to be below the critical level/air quality standard of $30\mu g/m^3$ for all assessment scenarios. The highest annual mean NOx concentrations are predicted at the north-western boundary of the site, which is located closest to Junction 8 of the M11, the A120 and the airport. They are $24.4\mu g/m^3$ in the Baseline Year 2016, $18.8\mu g/m^3$ in 2023 DC and $18.2\mu g/m^3$ in 2028 DC. In 2028, the largest change in annual mean NOx concentrations due to the proposed development is predicted to be $0.4\mu g/m^3$ at the north-western boundary of the site.

10.129 The background nitrogen deposition at this site has been estimated to be 12.5kg N/ha/yr in 2028, which is a decrease from the 2016 Baseline, but remains above the site's lower critical load of 8kg N/ha/yr, but below the upper critical load of 15kg N/ha/yr. The maximum predicted nitrogen deposition at this site is 14.7kg N/ha/yr in the 2023 DC and 13.1kg N/ha/yr in the 2028 DC. The total deposition on this site is therefore predicted to be below the upper critical load but exceed the lower critical load, mainly due to the already elevated background concentrations. The proposed development is predicted to add only 0.04kg N/ha/yr as a maximum at the site in 2028. The predicted increase in nitrogen deposition is less than 1% of the site's lower critical load and therefore **no significant effects** would be anticipated at this site from the proposed development.

10.130 Annual mean NOx concentrations at the Elsenham Woods SSSI are predicted to exceed the critical level/air quality standard in the Baseline Year 2016 at the western boundary of the site, which is closest to Hall Road and the airport. In the future assessment years, **no exceedances** of the air quality standard are predicted. The highest predicted annual mean NOx concentrations are 32.2μg/m^3 in the Baseline Year 2016, 27.9μg/m^3 in 2023 DC and 28.4μg/m^3 in 2028 DC. In 2028, the largest change in annual mean NOx concentrations due to the proposed development is predicted to be 0.4μg/m^3 at the south-western boundary of the site.

10.131 The background nitrogen deposition at this site has been estimated to be 21.9kg N/ha/yr in 2028, which is a decrease from the 2016 Baseline, but remains above the site's lower critical load of 15kg N/ha/yr and above the upper critical load of 20kg N/ha/yr. The maximum predicted nitrogen deposition at this site is 25.7kg N/ha/yr in the 2023 DC and 23.2kg N/ha/yr in the 2028 DC. The total deposition on this site is therefore predicted to exceed both the lower and upper critical loads, mainly due to the already elevated background concentrations. The proposed development is predicted to add only 0.08kg N/ha/yr as a maximum at the site in 2028, which is a negligible amount. The predicted increase in nitrogen deposition is also less than 1% of the site's lower critical load and therefore **no significant effects** would be anticipated at this site from the proposed development.

10.132 Annual mean NOx concentrations at the other ecological sites in the study area are predicted to be well below the critical level air quality standard of 30μg/m^3. In 2028 DC, the highest predicted annual mean NOx concentrations are 14.5μg/m^3 at the Thorley Flood Pound SSSI, 14.8μg/m^3 at the Quendon Wood SSSI, 13.6μg/m^3 at the Little Hallingbury Marsh SSSI, 13.6μg/m^3 at the Sawbridgeworth Marsh SSSI and 14.1μg/m^3 at the High Wood, Dunmow SSSI. The largest changes in annual mean NOx concentrations due to the proposed scheme in 2028 are predicted to be 0.1μg/m^3 at the Thorley Flood Pound, Quendon Wood and Little Hallingbury Marsh SSSIs and 0.2μg/m^3 at the High Wood, Dunmow SSSI. No change in concentrations is predicted at the Sawbridgeworth Marsh SSSI. Therefore, **no significant effects** would be anticipated at these sites from the proposed development.

Further Mitigation

10.133 STAL is undertaking regular air quality monitoring at and around the airport and has recently installed monitoring equipment within the Hatfield Forest SSSI and NNR, as part of previous agreements. STAL's 2015 SDP includes aims to reduce air pollution, reduce emissions generated by ground vehicles and aircraft, continue to promote the use of public transport to access the airport and work with airline and air cargo partners to minimise the impact of aircraft operations.

10.134 No significant effects have been predicted for air quality in this assessment and therefore no further mitigation is considered necessary or is proposed.

Residual Effects

10.135 As no significant air quality effects have been predicted due to the proposed development, no residual effects are predicted for air quality.

Cumulative Effects

10.136 The traffic data used in the air quality assessment includes growth in future years and traffic generated by committed developments. Therefore, cumulative impacts have been included in the air quality assessment as described in the Impact Assessment section of this chapter. No significant cumulative effects have been predicted due to the proposed development.

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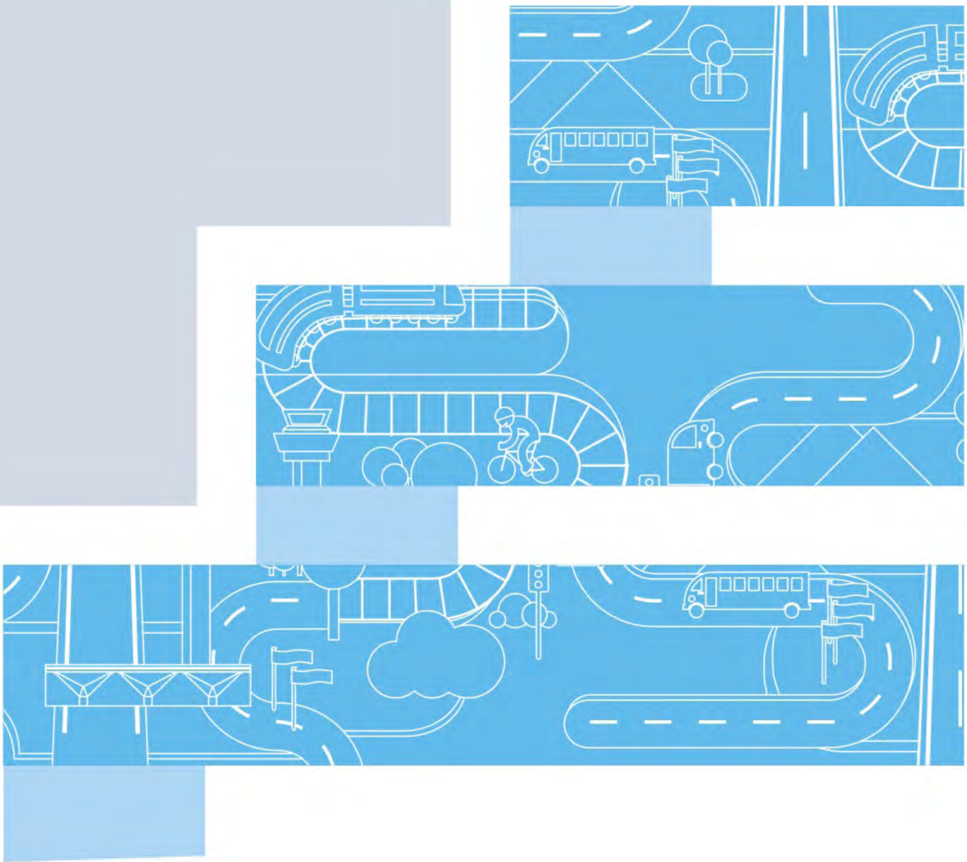
TRANSFORMING LONDON STANSTED AIRPORT

35+ PLANNING APPLICATION

Chapter 11 Socio-Economic Impacts



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11 SOCIO-ECONOMIC IMPACTS

Introduction

11.1 The proposed increase in the passenger cap will enable the airport to handle an additional 8 million passengers per annum (mppa). This will result in increased employment at the airport as well as additional employment and socio-economic benefits at the regional level. The increase in capacity will enable growth in services in terms of destinations served and frequency of flights, which will create benefits for the users of the airport and generate wider beneficial economic effects in the region and beyond, through the airport's role as a facilitator of economic activity. The proposed increase in the cap will enable new services to destinations important for business and high value in-bound tourism.

11.2 This chapter considers the employment impacts and wider socio-economic effects of the proposed development. It should also be read in conjunction with ES Appendix 11.1, which provides details of the study areas used in this assessment and ES Appendix 11.2, which provides baseline information on the study area.

11.3 The chapter is structured as follows:

- The section on **legislation, guidance and planning policy** (read in conjunction with the ES Appendix 3.1) identifies the national, regional and sub-regional policy objectives relevant to the assessment of socio-economic and employment effects;
- The section on **assessment methodology** and significance criteria sets out the methodology used for each component of the impact assessment. Three potential impacts have been identified – user benefits, wider economic impacts and employment impacts. The employment impacts are considered in relation to both the construction and operational phases of the proposed development.
- The section on **baseline conditions** (and ES Appendix 11.2) establishes the existing economic position in the study areas. Due to the differing nature of wider economic and employment impacts, different study areas are considered for each component of impact;
- **Incorporated mitigation** sets out the range of mitigation and enhancement measures related to economic and employment impacts which have already been established through the 2015 Sustainable Development Plan (SDP) and Section 106 agreements;
- The **impact assessment** section establishes the impact of the proposed development and the resulting effects on the wider economy and employment;
- **Further mitigation** identifies ways that the airport intends to further minimise adverse impacts or maximise benefits; and
- **Cumulative effects** take account of the impact of the proposed development in combination with other committed developments in the study area.

Legislation, Guidance and Planning Policy Context

11.4 'Cross cutting' policies and plans which are relevant to the consideration of socio-economic and other effects are described in Appendix 4.1 and the Planning Statement submitted as part of this application. Such policies are not repeated here in detail to avoid the chapter becoming unduly long or repetitive. This section does however highlight the specific legislation, guidance and policies that are most relevant to this topic.

National Policy

Aviation Policy Framework

11.5 The ability to move people and goods across the globe in a matter of hours is fundamental to the global economy. Airports can 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. The Aviation Policy Framework[1] (APF) recognises the vital role that aviation plays in the UK economy and supports aviation growth within a framework which recognises both the benefits of aviation and its costs. The Secretary of State for Transport's Foreword to the document confirms:

"*The Government believes that aviation needs to grow, delivering the benefits essential to our economic wellbeing, whilst respecting the environment and protecting quality of life*."

11.6 The benefits of aviation set out in the document include the gross domestic product (GDP) and employment supported by the air transport and aerospace sector, and the wider contribution that aviation makes as an enabler of other activities. These 'enabling' impacts include:

- Trade in goods: aviation plays an important role in supporting trade in high-value, time critical sectors;
- Greater productivity: aviation enables productivity and growth by enhancing access to markets through improved connectivity. It facilitates inward investment and the movement of goods and people which enhances trade and the diffusion of knowledge;
- Tourism: air travel is essential to international tourism, particularly from more distant markets; and
- Travel, culture and family: aviation also provides wider social benefits enabling UK residents to experience different cultures.

11.7 One of the main objectives of the APF is to ensure that the UK's air links continue to make it one of the best-connected countries in the world and to ensure that the benefits of aviation to the economy are fully realised.

The Airports Commission

11.8 The Airports Commission (AC) final report[2] recognised the benefits of making best use of Stansted Airport. It acknowledged the investment of £80 million into the terminal redevelopment work (underway at that time) and that capacity at Stansted will be important to the wider London airports system before any additional runway capacity is provided. The AC also acknowledged the strategic importance of Stansted to the wider London airport system while supporting the need to ensure that local people are protected from unacceptable negative impacts of living close to an airport.

11.9 Moreover, it was stated in the report that:

"*The Commission considers that there may be a case for reviewing the Stansted planning cap if and when the airport moves closer to full capacity. Its forecasts indicate that this would not occur until at least the 2030s, although the airport has seen rapid growth since its purchase by MAG, which if sustained over a longer period would bring this forward*."

Beyond the Horizon: The Future of Aviation in the UK

11.10 An updated aviation strategy will be published by the end of 2018, which will replace the 2013 APF. It will provide the framework for aviation policy for the period up to 2050 and beyond. To support the development of this strategy, a call for evidence[3] was published in July 2017.

11.11 The aviation sector is central to building a global and connected Britain. The call for evidence recognises the importance of trade and inward investment to the UK and the role that aviation can play in achieving the government's ambitions to increase productivity and grow the economy.

11.12 While the government's preferred option for a new runway at Heathrow is set out in the draft Airports National Policy Statement (NPS)[4], the call for evidence recognises that strong growth is putting pressure on existing infrastructure and that there is a need to make better use of existing airport capacity. To this end:

"The government agrees with the Airport Commission's recommendation that there is a requirement for more intensive use of existing airport capacity and is *minded to be supportive of all airports who wish to make best use of their existing runways including those in the South East*."

National Planning Policy Framework

11.13 The purpose of the planning system according to the National Planning Policy Framework[5] (NPPF) is to deliver sustainable development. This requires the planning system to consider three principal objectives: economic; social: and environmental. The Government is committed to securing economic growth, therefore significant weight should be accorded in planning decisions and policy to the need to support economic growth.

11.14 With specific reference to airports, the policy states:

"when planning for ports, airports and airfields that are not subject to a separate national policy statement, plans should take account of their growth and role in serving business, leisure, training and emergency service needs".

Conclusions on National Policy

11.15 The economic benefits of aviation are acknowledged in the Government's existing aviation policy framework and recent call for evidence supporting the new aviation strategy. The policy framework recognises that Stansted has an important role to play in the development of the London airport system, particularly before any additional runway capacity is provided. The call for evidence recognises the need to be supportive of airports wanting to make best use of their existing runways. The NPPF also calls on local authorities to support sustainable economic growth and to take account of the role of airports in serving business and leisure activity.

Regional, Sub-Regional and Local Policy Review

The London-Stansted-Cambridge-Corridor (LSCC) Growth Commission

11.16 The London-Stansted-Cambridge Corridor (LSCC) Consortium is a partnership of public and private organisations covering the area from North London to Stansted, Cambridge and Peterborough. The partnership was formed to organise and promote what is a defined economic area, with strong inter-connections; commuting to work and learn patterns, clusters of industries and supply chains.

11.17 The LSCC Consortium established the LSCC Growth Commission in 2015 to provide independent analysis and advice to enhance the economic potential of the LSCC and set out a vision for the area to become one of the top five global knowledge regions. The final report from the Growth Commission[6] notes that the LSSC provides a unique opportunity which is critical to the future of the UK economy. The LSCC is characterised by higher than average growth in population, workforce, jobs, businesses, gross value added (GVA) and productivity. It contributes significantly to the UK economy with Europe's leading life sciences cluster and the UK's largest cluster of ICT and digital firms, concentrated around London and Cambridge.

11.18 Five priorities will drive the ambition of the LSCC, one of which is Stansted as a dynamic source of growth and development. The report notes:

"*Our vision is for an airport that is a dynamic driver of growth and local business performance, providing the services and routes that the corridor's tech and life sciences businesses need […] London Stansted Airport has the capacity to expand and could be a big part of the solution to the aviation needs of the Corridor, London and the Greater South East.*"

Greater Cambridge Greater Peterborough LEP Strategic Economic Plan

11.19 The Greater Cambridge Greater Peterborough Local Enterprise Partnership (LEP) is a business-led organisation focused on driving forward sustainable economic growth. The goal of the LEP is to develop an internationally competitive, nationally significant local economy bringing together the diverse strengths of the area. The Strategic Economic Plan[7] aims to realise the area's significant potential for continued economic growth through a targeted range of interventions.

11.20 The role of transport and international connectivity is recognised in the Plan:

"*The area includes London Stansted and Cambridge Airports, which contribute significantly to the LEP area and wider economy. International connectivity by air is a key requirement of any major international business location. In order to help those businesses in our area continue to grow it is vital that they have connectivity with their key markets, and in the case of international businesses, their head offices and other operations.*"

11.21 The Plan supports making maximum use of capacity at Stansted and, particularly, the development of long-haul routes. To enable the development of these routes, the Plan sets out its proposals for an Air Passenger Duty (APD) exemption as a mechanism to provide start-up support for new long-haul routes from Stansted.

South East LEP

11.22 Stansted also lies within the South East LEP area which covers East Sussex, Essex, Kent, Medway, Southend and Thurrock. Within the Strategic Economic Plan[8], the LEP identifies 12 growth corridors, one of which is the M11 London Harlow Stansted Cambridge corridor. The Plan recognises that Stansted has an important role to play in attracting investment from a wide range of global companies seeking a UK base.

Economic Plan for Essex

11.23 The Economic Plan for Essex[9] is based on the collective ambitions of all local authorities in Essex and is designed to be a long-term plan for growth in the Essex economy. The priority of the Plan is to secure sustainable economic growth for businesses and communities across Essex.

11.24 The Plan recognises the important role that Stansted plays in the Essex economy and LSCC in particular, along with the potential of the airport to act as a catalyst for growth across the corridor and beyond. The Economic Plan for Essex supports growth at Stansted and concludes that:

"It is clear that Stansted is, and can continue to be a major driver of economic growth in Essex."

Haven Gateway Partnership

11.25 Stansted lies at one end of the A120 Haven Gateway growth corridor linking the west of Essex with Harwich International Port in the east. The vision of the Haven Gateway Partnership[10] is

"To deliver a thriving economy in a high quality environment for its residents and visitors, by capitalising on its location as a key gateway associated with the Haven Ports, realising its potential for significant growth, addressing its needs for economic regeneration, creating an additional focus on knowledge based employment and SMEs while protecting and enhancing its natural assets."

11.26 The Partnership consider the A120 to be a vital link between Stansted and the ports to the east of the sub-region. A number of investment opportunities and transport improvements have been identified in the Economic Plan for Essex to unlock the growth potential of the corridor by taking advantage of proximity to Stansted and Harwich.

Adopted Uttlesford Local Plan

11.27 The current Uttlesford Local Plan[11] was adopted in 2005. The Plan specifically sets out a number of policies relating to the airport, which are described in Appendix 4.1.

Draft Local Plan – Regulation 18

11.28 The new draft Uttlesford Local Plan[12] was subject to public consultation in 2017. The Plan sets out the vision for Uttlesford for the period to 2033, the spatial strategy of where and when investment should be located and the policies to deliver the Plan. The vision for 2033 is that Uttlesford will continue to be one of the most desirable places to live and work in the UK.

11.29 The vision for Uttlesford is under-pinned by three themes (promoting thriving, safe and healthy communities, supporting sustainable business growth and protecting and enhancing heritage and character) which, in turn, are supported by ten spatial objectives. The following objective is particularly relevant:

- Objective 2a – Enabling Growth and Investment. This objective seeks to strengthen the local economy by enabling the growth of existing and new employers, including providing opportunities for employment growth related to Stansted Airport.

11.30 The Plan recognises the importance of Stansted to the LSCC and, in particular, to the South Cambridgeshire research and bio-technology cluster. In the vision for the District, it is stated that Stansted will "*form a pivotal part of the highly successful London Stansted Cambridge Corridor*" and "*the environmental impact of London Stansted Airport will be effectively managed*."

11.31 The spatial strategy provides the framework for the policies in the Plan. Policy SP11 relates to Stansted Airport and states "*the growth of London Stansted Airport will be supported*." However, development proposals must meet several criteria related to national aviation policy, environmental effects and surface access measures.

11.32 Policy SP11 also includes the North Stansted Employment Area ('Northside') which is a 55 hectare site allocated for B2 (general industry) and B8 (storage and distribution) employment use. Development on this site will not be restricted to airport-related employment.

11.33 Policy SP4 relates to the provision of jobs and states that "provision will be made for a minimum net increase of 14,630 jobs in the period 2011 – 2033 to maintain a broad balance between homes and jobs and to maintain a diverse economic base."

Uttlesford Economic Development Strategy 2016-18

11.34 Uttlesford shares the Government's commitment to sustainable economic growth. Its Economic Development Strategy 2016-18[13] retains the focus of the previous two strategies on facilitating sustainable growth in jobs and businesses. One of the main actions of the Strategy is to promote specific and targeted propositions to attract inward investment and facilitate local business expansion. The international connectivity of Stansted is noted as supporting this action.

Uttlesford Corporate Plan 2017-21

11.35 One of the aims of the Uttlesford Corporate Plan[14] is to support sustainable business growth and the promotion of the economic benefits of Stansted Airport is a key commitment.

Other Local Plans

11.36 The local plans[15] [16] [17] of a number of other authorities[i] acknowledge their positions in the LSCC and seek to capitalise on the strategic location of the corridor in order to promote economic growth and prosperity. These authorities are working with partner authorities in the corridor to deliver the LSCC vision for the area.

11.37 At the heart of the LSCC, with good connections to London, Cambridge and Stansted Airport the Harlow Enterprise Zone is a premier business location[18].

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[i] East Herts, Harlow and Epping Forest

Sustainable Development Plan

11.38 The Stansted SDP[19] is the framework and master plan for growth of the airport based on the capacity of its single runway. The SDP has been finalised following extensive consultation and it sets out the strategic objectives for the growth and development of the airport and comprises four detailed plans covering the economy and surface access, land use, environment and community.

11.39 The economy section of the SDP recognises that Stansted is an important catalyst for growth and an aim of the airport is to maximise its contribution to the economy, support local growth and maintain a fair and sustainable relationship with its supply chain and business partners. The SDP highlights the economic impact of Stansted, particularly its contribution to employment as the largest single-site employer in the East of England, and its role as a gateway for inbound tourists and an important freight hub.

11.40 The SDP also recognises that it can play a role in maximising its local economic benefits through partnership working and the delivery of specific programmes and training/educational packages. Good connectivity to Stansted is important in driving economic regeneration in some local areas around the airport and the Surface Access Strategy will target connections to key areas for current and future workforce recruitment.

Conclusions on Regional, Sub-Regional and Local Policy

11.41 Within the regional and sub-regional economy, Stansted is recognised at all levels of policy and strategy and in all key documents related to economic development as a key driver of future economic growth. Development of the airport is also supported in the draft Uttlesford Local Plan and by key policies. Its growing international air services are seen as especially important for local businesses to compete globally.

Assessment Methodology and Significance Criteria

Assessment Methodology

11.42 The approach adopted for the impact assessment set out below follows a widely accepted set of methodologies for establishing the socio-economic and employment effects of airport development. These methodologies were used in the ES which accompanied the planning application to increase Stansted's capacity to 35 mppa (the 25+ project) and 274,000 air transport movements (ATMs). They have also been applied in a range of other aviation projects and were endorsed by the AC[20].

11.43 The growth of the airport will generate benefits for:

- The users of the airport who will benefit from more flights to existing destinations and new flights to new destinations (these benefits are termed user benefits);
- The wider economy through the enabling of increased economic activity (sometimes termed catalytic impacts or wider economic impacts); and
- The people who secure new airport related employment[ii].

User Benefits

11.44 Airport users will benefit from the increased capacity as Stansted will be better able to accommodate the forecast level of demand. Increased capacity will encourage competition and choice in airlines at Stansted, improving routes, frequency of flights and potentially reducing fares. New passengers, who would otherwise be unable to fly due to the limited capacity (from 2023 onwards), will benefit as a result the increased passenger cap. Existing passengers will benefit from greater choice as a result of the additional flight frequencies, expanded route network and the opportunity to use a more convenient airport. There will also be benefits to freight users, the airport operator and government (from increased tax revenue).

11.45 Quantifying these user benefits would require a detailed analysis of traffic patterns and surface transport costs under alternative capacity assumptions and using a UK wide airport system model which can allocate passengers to airports in response to changes in capacity. DfT has a model which can analyse major changes in capacity but, given the scale of the proposed development, this level of analysis is not practical. Therefore, a qualitative assessment of such benefits, using professional judgment and experience, is provided below. This approach has been agreed by UDC by virtue of its scoping opinion (see Appendix 2.1 in ES Volume 2).

Wider Socio-Economic Effects

11.46 The proposed development will generate economic and social benefits for the wider economic study area, which is defined below. These benefits will comprise:

- Opportunities for businesses in the study area to access a wider range of air services from a local airport;
- Enhancement of the attractiveness of the study area to businesses in terms of its 'air transport offer';

[ii] People employed at the airport, in supplier companies and in the local economy

- Opportunities for increased flights to serve higher numbers of both inbound and outbound leisure[iii] visitors. The potential impacts of these outbound tourists on the economy and domestic tourism industry are discussed later in the chapter; and
- Strengthening the airport's important role in the freight market which helps UK businesses compete in the global economy.

11.47 For the assessment of wider socio-economic effects, an area has been defined in which most effects will be felt. Stansted draws its passengers from an area south of the Midlands, but its core catchment area is the East of England[iv] and London which together account for 78%[21] of UK passengers in 2016. Details are shown in Figure 11.1. The majority of the wider economic effects will therefore accrue to the East of England and London, particularly the inner and north east London boroughs[v]. The wider economic study area is therefore defined as the East of England and London and is shown in Map 1 in Appendix 11.1 in ES Volume 2.

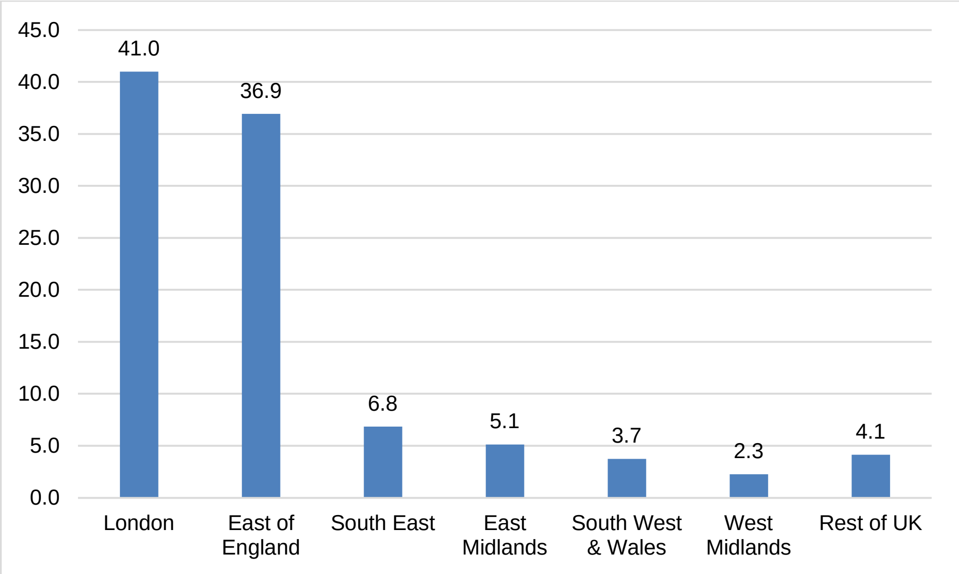

Figure 11.1: Origin/destination of UK passengers at Stansted, 2016[22] (%)

11.48 Paragraph 11.46 above identifies the activities most likely to be affected by airport growth. The approach to the assessment of wider economic effects reported in this chapter establishes the mechanisms by which airport development will create wider effects and how the expansion of Stansted (in terms of passenger numbers) will impact on these mechanisms. The assessment will be quantitative or qualitative as appropriate.

Employment Effects

11.49 The economic impact of airport-related employment growth at the airport can be measured in terms of the number of jobs created or supported by the growth and the GVA associated with those jobs. GVA includes wages, salaries, organisational surpluses and profits.

[iii] Leisure visitors include holiday visits, visits to friends and relatives and other non-business visits e.g. education
[iv] Includes Buckinghamshire and Oxfordshire
[v] London Boroughs of Camden, City, City of Westminster, Islington, Southwark, Barking and Dagenham, Enfield, Hackney, Haringey, Havering, Newham, Redbridge, Tower Hamlets, Waltham Forest.

11.50 For the construction assessment, the approach is to estimate the additional employment associated with the proposed development and assess the impact of this employment within the construction study area.

11.51 For the operational assessment, the approach involves the following main steps:

- Define the study area in which the impact will be felt;
- Estimate the current and future levels of airport related employment with and without the proposed development;
- Estimate current and future labour demand and supply in the study area; and
- Assess the impact of the forecast increase in the level of airport related employment against the wider forecasts of labour demand and supply in the study area.

Employment Study Areas

11.52 To assess the employment effects, it is necessary to define the area in which they will be felt. Given the different characteristics of the construction and the operational workforce, the areas for the construction and operational assessments are different:

- ***Construction Study Area*:** The construction industry is characterised by short, temporary contracts, and longer journeys to work compared to those made by people working in other industries. On this basis, the assessment of the construction effects is undertaken for an area comprising the South East and London. The construction study area is shown in Map 2 in Appendix 11.1 in ES Volume 2.
- ***Operational Study Area*:** The employment impact of the proposed development will be closely related to the home location of the airport workforce. The 2006 planning application defined the study area on the basis of the proportion of the airport's workforce that lives within identified local authority areas. A criterion was adopted such that all local authorities who have at least 1% of the Airport's workforce as residents would be included in the operational study area. This was accepted by UDC as an appropriate approach[vi] and has been adopted for this analysis. Using this approach and the 2015 Stansted Employee and Travel Survey[23] yields an operational study area consisting of 16 local authorities and covering almost 84% of the Stansted workforce in 2015[vii].

11.53 Table 11.1 shows the adopted study area for the operational employment assessment which is also illustrated by Map 3 in Appendix 11.1, ES Volume 2.

[vi] The 2006 study area comprised ten local authorities – Uttlesford, East Hertfordshire, Braintree, Harlow, Chelmsford, Epping Forest, Colchester, St Edmundsbury, South Cambridgeshire and Cambridge

[vii] The Stansted employee and travel survey is undertaken every two years and the 2017 is currently underway, although the results are not yet available.

Table 11.1: Stansted employment study area[24]

Local Authority	No. of Employee's	% Stansted Employment
East Hertfordshire	2,684	24.5
Uttlesford	2,007	18.3
Braintree	1,650	15.1
Harlow	809	7.4
Chelmsford	398	3.6
Colchester	257	2.3
Epping Forest	188	1.7
Newham	167	1.5
Redbridge	145	1.3
Waltham Forest	144	1.3
Enfield	141	1.3
Broxbourne	140	1.3
St Edmundsbury	134	1.2
South Cambridgeshire	133	1.2
Haringey	130	1.2
Cambridge	72	0.7
Total Study Area	**9,199**	**83.9**

Note: Cambridge does not meet the 1% criterion but the local authority is completely surrounded by South Cambridgeshire and is included to ensure there are 'no gaps' in the geographic coverage.

Airport Related Employment

11.54 In assessing the effect of the proposed development in terms of employment, there are three main categories of employment to consider:

- ***Direct employment***: people employed at Stansted during either construction or operation who receive wages and salaries. For the operational assessment only, direct employment is split into two categories – direct on-airport employment and direct off-airport employment. The categories cover similar types of employment. The former category is self-explanatory while the latter concerns people working in businesses whose activity is directly and solely related to Stansted Airport, but which are located outside the airport boundary;

- ***Indirect employment***: employment in firms which are in the supply chain of the businesses at the airport during either construction or operation; and

- ***Induced employment*:** employment supported by the expenditure of people employed directly and indirectly in the operational and construction study areas.

Construction Employment

11.55 As described in Chapter 5 of the ES, the application is for the development of new airfield infrastructure including two new taxiway links to the runway and nine additional aircraft parking stands. The direct employment supported by this work has been calculated by applying output per employee data from official statistics to the estimated capital expenditure.

11.56 Indirect employment is employment in firms in the supply chain of the contactors undertaking the proposed development. The extent to which there would be indirect employment in the

East of England and London will depend on the ability of the study area to supply the goods and services required by these contractors. Induced employment in the East of England and London will be supported by the expenditure of the direct and indirect employees in the area. Indirect and induced employment has been estimated using an employment multiplier which is the ratio of direct, indirect and induced employment to direct employment.

11.57 The indirect and induced employment associated with this expenditure has been estimated by applying an employment multiplier to the direct job estimate. Having calculated the employment impacts, GVA was calculated by applying GVA per person in employment for the East of England and London from official statistics to the employment estimates.

Operations – Baseline Employment

11.58 Stansted's direct on-airport employment is that located within the airport boundary and the baseline figure was obtained from the 2015 Stansted Employee Travel Survey.

11.59 In order to estimate the directly created GVA, GVA per employee for the study area was calculated using the latest official data for GVA and the number of people employed in the study area. GVA is available for NUTS 3 areas and all NUTS 3 areas[25] which cover the study area were included in the calculation. GVA per person in employment for the operational study area is £60,500.

11.60 Stansted's direct off-airport employment has been estimated from a survey of companies undertaken during April 2017 by Optimal Economics. The off-airport estimates are based on 17 interviews undertaken from a population of 40 companies. The approach to the survey was to:

- Identify possible off-airport companies through internet searches of appropriate business categories (e.g. hotels, air freight, aircraft/aviation services). The companies identified were based in Uttlesford, East Hertfordshire and Harlow;
- Undertake a telephone survey of businesses identified to determine the level of employment and the extent to which the business is dependent on the airport; and
- Use the survey results to provide an estimate of direct off-airport employment for the population of off-airport companies.

11.61 GVA per person employed for the operational study area (discussed in paragraph 11.61 above) was applied to the number of direct off-airport employees to calculate direct off-airport GVA.

11.62 Indirect employment in the operational study area is employment in the businesses which are in the supply chain of the airport itself and companies which provide services at the airport.

11.63 Induced employment in the operational study area is the employment supported by the local expenditure of people employed directly and indirectly.

11.64 Both indirect and induced employment has been estimated using appropriate employment multipliers. The employment multiplier is the ratio of direct, indirect and induced employment to direct employment.

11.65 Optimal Economics has reviewed evidence from studies[26] of and use of regional multipliers in the UK including impact studies of airports. These studies identified multipliers within a relatively narrow range of 1.4 to 1.8[viii]. The value of the multiplier is influenced by the size and structure of the local economy. Economies which are relatively large in output and employment terms have a greater capacity to create induced employment and so to have a larger multiplier effect than for smaller economies. Optimal Economics has determined that the appropriate employment multiplier with regard to operational employment (including indirect and induced effects) for the study region is 1.8

11.66 GVA per person employed for the study area was applied to the number of indirect and induced jobs to calculate the associated GVA.

Operations – Future Stansted Related Employment

11.67 The impact of the proposed development was assessed for the future assessment year of 2028 which is the date at which Stansted is projected to reach its throughput of 43 mppa (the Development Case). The projected level of employment at the airport in 2028 without the development (the Do Minimum scenario) has been compared to the level of employment with the proposed development (the Development Case). As detailed above, the figure for future Stansted related employment comprises direct, indirect and induced employment.

11.68 Future levels of employment will be affected by two factors:

- The growth in passenger traffic through the airport; and
- The growth in productivity for direct on-airport employment and in the wider economy for direct off-airport and indirect employment.

11.69 Table 11.2 provides a summary of the forecast air traffic through Stansted in 2028 in the Do Minimum scenario and the Development Case scenario. The Table also shows the annual passenger and air traffic data for 2023 (the 'Transitional Year') and the impact of the proposed development in each assessment year.

Table 11.2: Forecast air traffic data for Stansted Airport[27]

No Development (Do Minimum)	Passengers (mppa)	ATMs (000s)	Cargo (000 tonnes)
2016	24.3	181	254.5
2023	35	247	330.2
2028	35.0	249	374.9
Proposed Development (Development Case)	**Passengers (mppa)**	**ATMs (000s)**	**Cargo (000 tonnes)**
2016	24.3	181	254.5
2023	36	253	330.2
2028	43	274	375.7
Impact of Proposed Development	**Passengers (mppa)**	**ATMs (000s)**	**Cargo (000 tonnes)**
2023	+1	+6	+0.0
2028	+8	+25	+0.8

[viii] Indirect and induced multiplier for Luton airport was 1.8 (covering Bedfordshire, Buckinghamshire and Hertfordshire); Indirect multiplier for aviation industry in the UK was 1.7; Indirect and induced multiplier for Stansted (2006 planning application) was 1.4 (covering ten local authorities in the East of England).

11.70 The proposed development will enable an additional 8 mppa to use the airport in 2028 compared to the Do Minimum scenario. Alongside this, there would be an additional 25,000 air transport movements and around 800 tonnes of cargo throughput in the Development Case.

11.71 The other factor affecting the employment forecasts is the assumption made regarding future productivity growth. The estimates of productivity growth have been based on past trends.

11.72 For direct on-airport employment, the trend in passengers per employee has been reviewed while, for direct off-airport employment, the trend in economy wide productivity (output per worker) has been considered.

11.73 Figure 11.2 shows the numbers of passengers and employees at Stansted over the period from 2003 to 2015. This shows that the number of passengers has tended to grow faster than employment, although the relationship between the two fluctuates.

11.74 Annual levels of productivity (passengers per employee) have risen over time, but have varied from year to year. Very sharp increases in passenger numbers (as over the period 2013-15) tend to be associated with rapid increases in productivity simply because staffing levels cannot be increased in proportion over a short period. A slowing of (or fall in) passenger growth tends to be associated with slow productivity growth because airport businesses hold on to staff and may even be 'catching up' with unfilled vacancies.

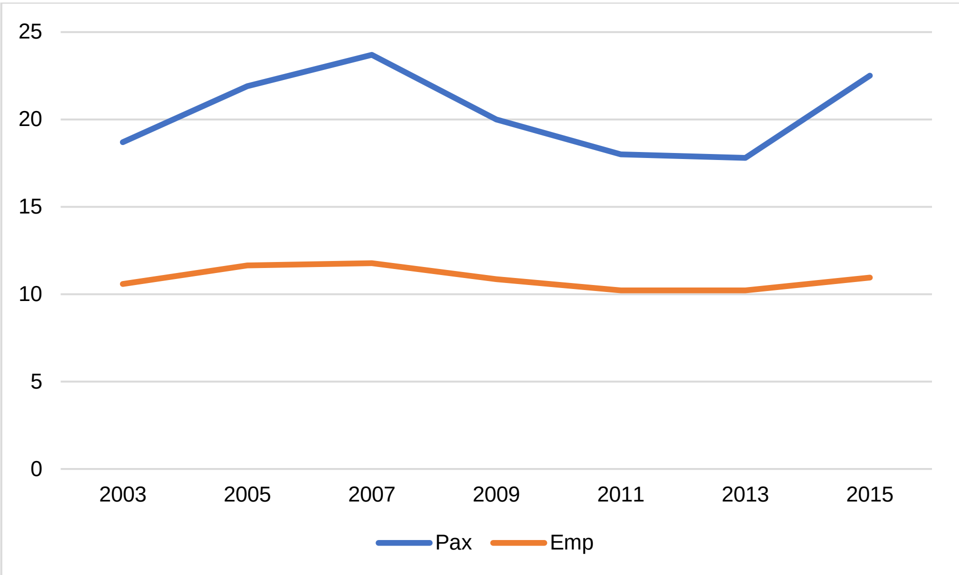

Figure 11.2: Passengers (mppa) and employment (000s) at Stansted, 2003 to 2015[28]

11.75 Table 11.3 shows that estimates of airport productivity growth can be greatly affected by the choice of years for comparison and, more importantly, indicates a strong relationship between passenger growth and productivity growth over the long term. In the analysis presented below, productivity growth over the longest data period (2003 to 2015) is 1.3% p.a., but this is associated with passenger growth of 1.6% p.a. Growth in passengers in the Development Case is 5.1% p.a. in which case productivity growth would be expected to be higher. Over the period 2011 to 2015, relatively fast passenger growth (5.7 % p.a. was accompanied by productivity growth of 3.9% p.a., although both these growth rates are influenced by the very rapid growth in passengers between 2013 and 2015. This suggests a need to temper the productivity growth rate and we have therefore adopted an annual productivity growth rate of 2%[ix] for the analysis.

Table 11.3: Growth in passenger numbers and productivity at Stansted[29]

Period	Passenger Growth per annum	Productivity Growth per annum
2003 to 2015	1.6	1.3
2005 to 2015	0.3	0.9
2007 to 2015	-0.6	0.2
2009 to 2015	2.0	1.8
2011 to 2015	5.7	3.9
2013 to 2015	12.4	8.6

11.76 The approach to forecasting direct off-airport employment was to assume that 2015 employment will grow in line with passenger throughput with an allowance for economy-wide productivity growth. As off-airport businesses differ in their mix of activities, an economy wide average rate of productivity (output per worker) growth of 0.6% per annum has been adopted for the analysis. This is the average annual rate of growth in output per worker in the UK between 2003 and 2015[30].

11.77 Indirect and Induced employment in the study area in 2028 has been estimated using the employment multiplier of 1.8, as discussed above.

11.78 GVA has been estimated by applying GVA per employee (uprated for annual productivity growth) to the employment estimates.

Labour Demand and Supply in 2028

11.79 The forecast of Stansted related employment must be placed within the context of other developments, including the future level of labour supply and employment, in the operational study area.

11.80 Labour Supply is the number of people in work or looking for work in the study area. The supply of labour is dependent on:

- The resident population of working age; and
- The proportion of the working age population who wish to work as measured by the economic activity rate.

11.81 The resident population in an area is dependent on the level of housing provision. In preparing their assessments of future housing need, local authorities consider future employment forecasts and whether adjustments are required to the housing delivery rate to balance jobs and workers.[x] The actual labour supply available to employers in the study area is dependent on the number of local residents who choose to work in the study area and the number of people not resident in the area, but who commute into the study area from the surrounding districts and regions.

[ix] This is in line with other recent studies where the implicit rate of productivity growth is just under 2% including the 2015 SDP.
[x] The Draft Uttlesford Local Plan – Regulation 18 provides for growth at Stansted in its objectively assessed housing need.

11.82 Population projections are available by local authority from the Office for National Statistics (ONS) and have been used to identify the population of working age in the study area. For the purpose of this analysis, the population of working age is assumed to be all people aged between 16 and 64, although it is noted that changes to the state pension age will increase the population of working age to those aged up to 67 years during the forecasting period.

11.83 ONS no longer publishes national economic activity rate projections, hence, estimating the future workforce in the study area draws on recent trends in economic activity rates. Economic activity rates have been increasing and in 2015 the economic activity rate in the study area was 78.4%. Future labour supply has been estimated by applying this rate to the projections of working age population.

11.84 Employment in the study area has been taken from the East of England Forecasting Model (EEFM)[31] which includes forecasts of employment for the local authorities within the East of England. These forecasts have been used in this assessment for the local authorities in the study area that lie within the East of England. For the London Boroughs within the study area, the GLA[32] employment projections for these Boroughs have been used.

Assessment of Effects

11.85 The estimate of employment associated with the operation of the proposed development has been compared to forecast levels of employment in the study area in 2028 to determine the scale of effect.

Significance Criteria

11.86 There are no prescribed significance criteria against which wider economic and employment effects of a proposed development can be assessed. However, to ensure the assessment of effects is undertaken in a meaningful and structured manner, the criteria in Table 11.4 have been used in assessing the likely economic and employment effects of the proposed development. Similar criteria were applied to the assessment of impacts associated with the 2006 planning application to raise the passenger cap at Stansted to 35 mppa.

Table 11.4: Socio-economic significance criteria

Level of Significance	Description
Major	Very large or large change in economic or employment conditions, both adverse and beneficial, which are important considerations at a regional or district level because they contribute to achieving national or regional policy objectives.
Moderate	Intermediate change in economic or employment conditions which are important considerations at a local level.
Minor	Small changes in economic or employment conditions. These effects may be relevant at a local scale but are unlikely to be of importance in the decision-making process.
Negligible	No discernible change in economic or employment conditions. An effect that is likely to have a negligible or neutral (neither net positive nor negative) influence, irrespective of other effects.

Baseline Conditions

Wider Economic Effects

11.87 The baseline assessment of wider economic effects considers the characteristics of air traffic at Stansted, the economic performance of the area over which impacts will be felt and the airport's role within the regional area.

Stansted Airport Traffic

11.88 The characteristics of air traffic at Stansted are summarised in Appendix 11.2 which accompanies this chapter of the ES. The number of business passengers is of prime importance in driving the wider socio-economic impact of the airport. Foreign passengers are particularly important for the UK's tourism industry.

11.89 Drawing on the analysis in Appendix 11.2, the main points to note are:

- Of Stansted's 24.1[xi] million passengers surveyed by the CAA in 2016, the majority (20.6 million passengers or 86%) were making a leisure trip with 3.5 million passengers (14%) travelling for business purposes. The balance between business and leisure trips was similar to that of Gatwick and Luton airports within the London airport system, where leisure passengers account for around 79% of all trips;
- Of the 3.5 million business passengers at Stansted, 2.1 million were UK passengers with almost 1.4 million foreign business passengers. Excluding Heathrow, Stansted has the highest proportion of foreign leisure passengers than any other UK airport which are important for the UK tourism industry;
- Stansted is important to the air freight industry, being the third largest airport in the UK in terms of freight carried, behind Heathrow and East Midlands airports. With over 220,000 tonnes[xii] carried in 2016, it accounts for 10% of UK air freight; and
- Stansted plays a specific role in the freight market, with almost all freight at Stansted carried on dedicated cargo aircraft as opposed to in the holds of passenger aircraft.

Economic Performance of Wider Study Area

11.90 As described previously, the study area for the assessment of wider economic effects comprises the East of England and London. The analysis of economic performance draws on official data published by ONS and uses the latest data available at October 2017. Appendix 11.2 contains supporting data with the key points summarised below:

- The population of the study area was 14.9 million in 2016, which is almost 23% of the population of the UK;
- In terms of population, the East of England and London were the two fastest growing regions in the UK between 2010 and 2016;
- The East of England and London are important drivers of the UK economy and together account for 31% of UK GVA. London is the largest UK region with GVA of

[xi] Stansted's total passengers in 2016 was 24.3 mppa, but the CAA survey data cover 24.1mppa
[xii] Freight only, excludes mail

£378 billion in 2015[xiii] with the East of England the fourth largest region behind London, the South East and North West;

- Both London and the East of England have experienced higher than UK average GVA growth between 2010 and 2015; and
- GVA per employee is a measure of productivity and in 2015 was £56,900 across the UK as a whole. London has the highest level of GVA per employee at £77,400 (36% above the UK average) with East of England GVA just below the UK average at £55,900.

11.91 The LSCC links London and the East of England and is a fast-growing economy, is strongly entrepreneurial and is a major location for knowledge based jobs and innovation. The LSCC's recent economic performance includes[33]:

- A post-recession workforce and employment growth which is more than twice the national average;
- Productivity which is 16% higher than the UK average in 2014;
- Business population growth which is more than twice the national average;
- Being Europe's leading life sciences cluster and the UK's largest ICT and digital cluster;
- London and Cambridge are also in the Top 10 cities in Europe for investment; and
- Stansted's location within the Corridor, and the global nature of its key businesses, heightens the contribution it can make to economic growth.

Summary

11.92 As part of the London air transport system, Stansted serves two of the fastest growing regions which are particularly important to the UK economy, accounting for 31% of UK GVA. It also serves, and contributes to the success of, two important growth corridors (the LSCC and the A120 Haven Gateway corridor) and the GCGP LEP area.

Employment Impacts

11.93 The baseline employment assessment covers the construction and operational aspects of the proposed development. Within the construction baseline an overview of the economy of the construction study area is provided.

11.94 Within the operational baseline, the economic performance of the operational study area is assessed for 2016. The level of Stansted related employment is analysed for 2015 as this is the date of the latest Stansted employment survey.

[xiii] As at October 2017, the latest GVA figures are for 2015

Construction

Baseline Economic Performance:

11.95 As the construction study area is the same as the study area for the assessment of wider economic effects, paragraph 11.92 provides a summary of population and GVA trends. Further details on the construction study area economy are also provided in Appendix 11.2.

11.96 In terms of employment, the key points to note are:

- Almost 8 million people were employed in the construction study area in 2016 which represents 26% of GB[xiv] employment;
- In 2016 there were 348,000 people employed in the construction industry in the study area with the majority (54%) working in London;
- Since 2011 unemployment in the East and London has been decreasing and in 2016, the rate of unemployment in the East of England was 3.9% and 5.8% in London. These rates are equivalent to over 388,000 people looking for work in the construction study area; and
- Additional information on the characteristics of the unemployed is available from job-seekers allowance records. There were over 105,000 people claiming jobseekers allowance in the East of England and London in 2016 with almost 1,100 looking for work in skilled construction and building trades.

Operations

Baseline Economic Performance

11.97 The Stansted operational study area (defined in Table 11.1) includes eleven local authorities within the East of England region and five London boroughs. Detailed information on the economic performance of the operational study area is contained in Appendix 11.2.

11.98 The key features of the operational study area are:

- A population of almost 3 million in 2016 of which, over 1.9 million were of working age (16-64 years). Since 2010, population growth in the study area has been 7.9% which is equivalent to growth of 1.3% per annum and, is almost twice the average growth rate for the UK;
- The economic activity rate in the operational study area in 2016 was 78.8% which is slightly lower than the rate for the East of England but very similar to the London and UK rates;
- Employment in the operational study area was over 1.1 million in 2016, having grown from almost 1 million in 2010. Employment growth in the operational study area has been strong since 2010 compared to the East of England and GB as a whole;
- The service sector dominates employment in the study area with the largest sectors in 2016 being health (13%), education (11%), retail (10%) and business administration and support services (10%). In absolute terms, the largest growth between 2010 and

[xiv] The Business Register and Employment Survey data published by ONS is only for GB

2016 was in professional, scientific and technical services and business administration and support;

- Residence based earnings in the study area are £39 per week higher than workplace earnings which reflects the effect of commuting patterns on earnings in the study area. Average annual residence and workplace earnings in the study area in 2016 are estimated to be £26,100 and £24,000 respectively;

- Following the financial crisis and recession in 2008, unemployment in the study area rose to a peak of 9% in 2011 before falling to 4.4% in 2016. This rate is equivalent to almost 67,000 people looking for work. The unemployment rate in the study area is slightly above the rate for the East of England (3.9%) and below the rate for London (5.8%); and

- The study area is a net exporter of labour, with out-commuters exceeding in-commuters by almost 215,000.

11.99 In terms of recent economic performance, the operational study area is:

- A large fast-growing area in terms of population with a relatively high proportion of young and working age people;

- An area which has had strong employment growth since 2010;

- An area with slightly higher GVA per head than the East of England as a whole; and

- An area which is closely integrated with London and the rest of the East of England in terms of commuting.

Stansted Related Employment

11.100 As described earlier in this chapter, employment related to the operation of Stansted employment may be divided into direct (on and off airport), indirect and induced.

11.101 Total **direct on-airport** employment at Stansted was 11,000 in 2015 which supported an annual passenger throughput of 22.5 mppa. Using the Stansted Employee Travel Surveys, Table 11.5 shows on-airport employment from 2003 to 2015. Passenger throughput is also shown.

11.102 Annual passenger throughput at Stansted reached 23.7 mppa in 2007. The effect of the financial crisis and subsequent recession, combined with the previous owner's commercial strategy, then saw passenger throughput fall to 17.8 mppa in 2013 before recovering and increasing sharply since then. Employment also peaked in 2007 at 11,800; fell to 10,200 in 2013 before increasing to 11,000 in 2015.

Table 11.5: On-airport employment and passengers, 2003 to 2015[34]

Year	Employment	Passengers (mppa)	Passengers per Employee
2003	10,600	18.7	1,800
2005	11,600	21.9	1,900
2007	11,800	23.7	2,000
2009	10,900	20.0	1,800
2011	10,200	18.0	1,800
2013	10,200	17.8	1,700
2015	11,000	22.5	2,100
% Change 2003 to 2015	**3.5**	**20.3**	**16.2**

Note: Data have been rounded

11.103 As discussed above (paragraph 11.75), the number of passengers per employee is a broad measure of productivity at the airport. At peak passenger throughput in 2007, there were 2,000 passengers for every employee. Passengers per employee decreased between 2007 and 2013, but by 2015 had increased to 2,100.

11.104 The 2015 Employee Travel Survey also provides data on the characteristics of the employees at Stansted. The distribution of employees at the airport and in the study area by age group is shown in Figure 11.3. Compared to the operational study area, Stansted has a relatively young workforce with almost 50% of employees aged between 16 and 34. Data limitations prevent a more detailed analysis of the 35 to 64 age group.

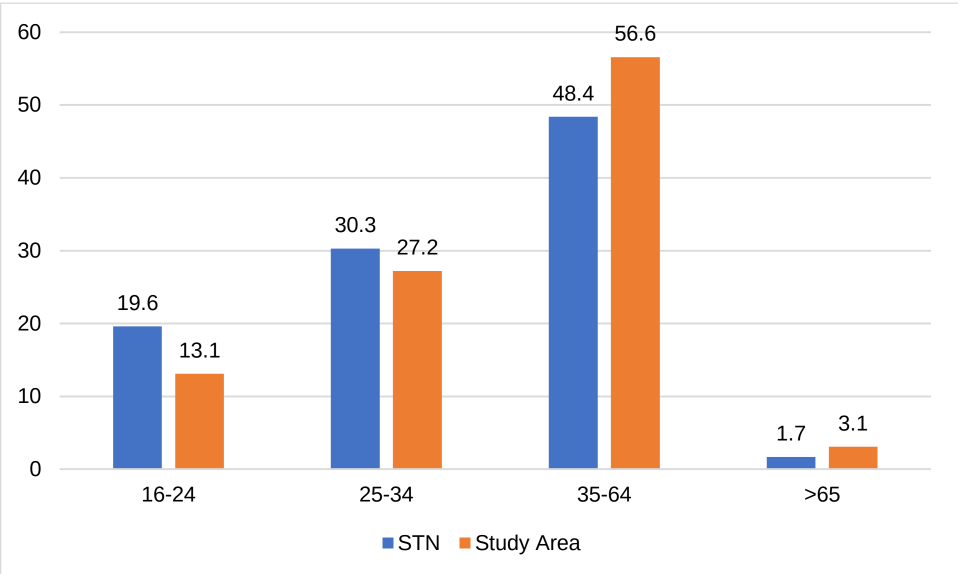

Figure 11.3: Stansted and study area employees by age, 2015[35]

11.105 The number of employees by job type is shown in Table 11.6. The largest number of employees (26%) is in passenger services, sales and clerical roles with a further 20% in the provision of air transport services (either as cabin crew or a pilot or person engaged in flight operations).

Table 11.6: Stansted employees by job type, 2015[36]

Job Type	Number	%
Air Cabin Crew	1,800	16.5
Apron, Ramp, Cargo, Baggage Handling & Drivers	1,100	10.1
Catering, Cleaning & Housekeeping	1,400	12.8
Customs, Immigration, Police & Fire	400	3.6
IT	100	0.7
Maintenance Tradesmen	700	6.7
Management & Professional	1,200	10.8
Passenger Services, Sales & Clerical	2,800	25.6
Pilots, Air Traffic Control, Flight Operations	400	3.8
Security, Passenger Search	1,000	9.3
Total	**11,000**	**100.0**

Note: Numbers have been rounded

11.106 The job types have been used to allocate employment to the major occupational groups, which shows that the airport provides employment opportunities across all occupational groups from professional and managerial to elementary occupations (Table 11.7).

Table 11.7: Occupational distribution of Stansted employees, 2015[37]

Occupational Group	Number	%
1: Managers, Directors and Senior Officials	600	5.4
2: Professional	1,100	9.9
3: Associate Professional and Technical	400	3.6
4: Administrative and Secretarial	700	6.4
5: Skilled Trades	1,100	9.9
6: Caring, Leisure and Other Service	1,800	16.5
7: Sales and Customer Service	2,100	19.2
8: Process, Plant and Machine Operatives	1,100	10.1
9: Elementary	2,100	18.9
Total	**11,000**	**100.0**

Note: Numbers have been rounded

11.107 The distribution of Stansted employees by salary band is shown in Figure 11.4. The average salary across all employees in 2015 was £24,200 which is 8% higher than average workplace earnings in the operational study area[xv].

[xv] Average workplace earnings in the operational study area in 2015 were £22,400.

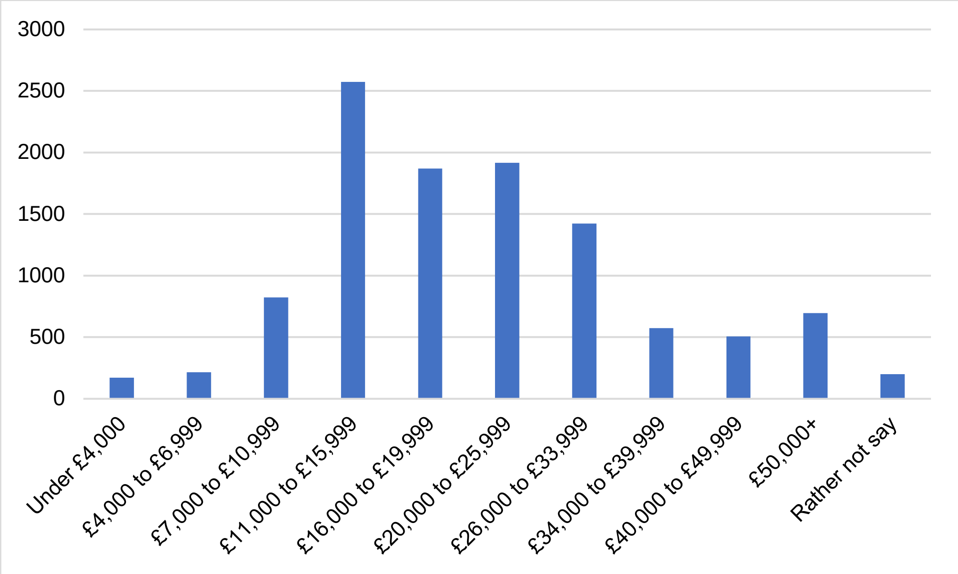

Figure 11.4: Distribution of Stansted employees by salary band, 2015[38]

11.108 **Direct off-airport** employment is limited by local planning policies around Stansted which require that airport related activity should be located within the airport boundary. As previous studies have found negligible amounts of off-airport employment, a survey was undertaken to determine if any employment of this type exists.

11.109 Using the methodology outlined in earlier in this chapter, direct off-airport employment has been estimated to be 330.

11.110 The operation of Stansted supports **indirect employment** in the study area through companies based at the airport buying goods and services in the local economy. Jobs are created in the suppliers (and in the supply chain of suppliers).

11.111 **Induced employment** is employment supported by the local expenditure of people whose jobs are either directly or indirectly supported by the airport.

11.112 As discussed above, a local employment multiplier of 1.8 has been used to calculate indirect and induced employment. GVA has been calculated by applying to the employment figures the average GVA per worker for the operational study area.

11.113 Total Stansted related employment and GVA in 2015 in the study area economy are shown in Table 11.8.

Table 11.8: Stansted related employment and GVA, 2015

	No. Employees	GVA, £m
Direct On-Airport	11,000	663.0
Direct Off-Airport	300	19.8
Indirect & Induced	9,000	546.3
Total	**20,300**	**1,229.1**

Note: Numbers have been rounded

Future Labour Supply in the Study Area

11.114 The population of the operational study area is projected[39] to increase from 2.95 million in 2015 to 3.37 million in 2028 which is an increase of 14%. Figure 11.5 shows operational study area population projections between 2015 and 2028 by broad age group. Although the population aged over 65 is the fastest growing age group, the largest growth, in absolute terms, is in the population of working age which is projected to increase by 201,000 to 2.13 million in 2028.

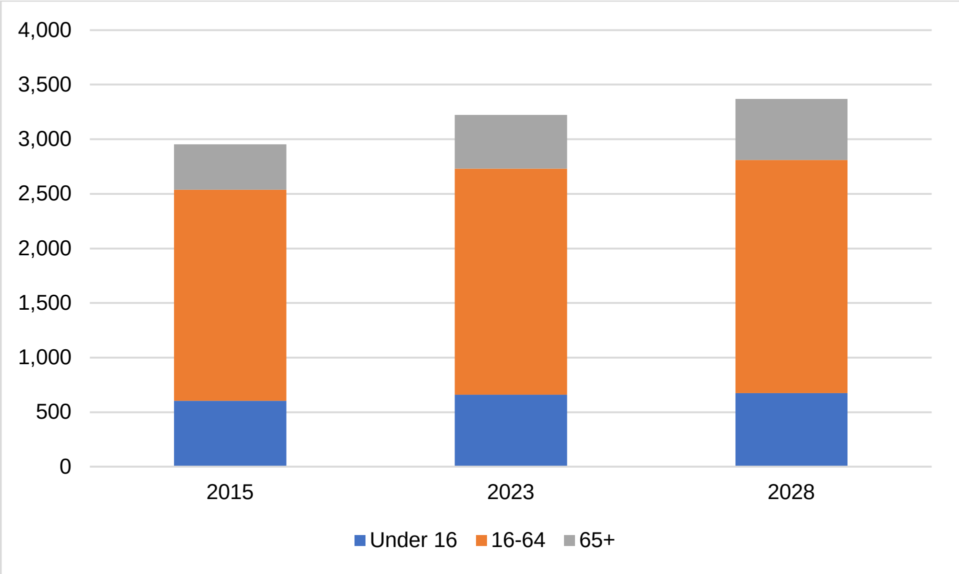

Figure 11.5: Operational study area population projections by age group, 2015 to 2028[40] (000s)

11.115 Using the methodology described earlier in this chapter, the economically active population has been estimated for the operational study area and is shown in Table 11.9. The economically active population resident in the operational study area is forecast by Optimal Economics to increase by 157,300 to almost 1.67 million in 2028. This is an increase of over 10% which is faster growth than in the East of England, but not quite as fast as London.

Table 11.9: Forecast Resident Labour Supply, Operational Study Area, 2015 to 2028[41] (000s)

	2015	2023	2028	Change 2015-2028	% Change 2015-2028
Study Area	1,515.6	1,622.9	1,672.9	157.3	10.4
East	3,025.2	3,134.9	3,189.8	164.5	5.4
London	4,609.6	5,018.0	5,200.4	590.8	12.8

Note: Numbers have been rounded

Future Employment in the Study Area

11.116 Forecast total employment in the operational study area in 2028 is shown in Figure 11.6. Employment is forecast to increase by over 131,000 to 1.4 million in 2028.

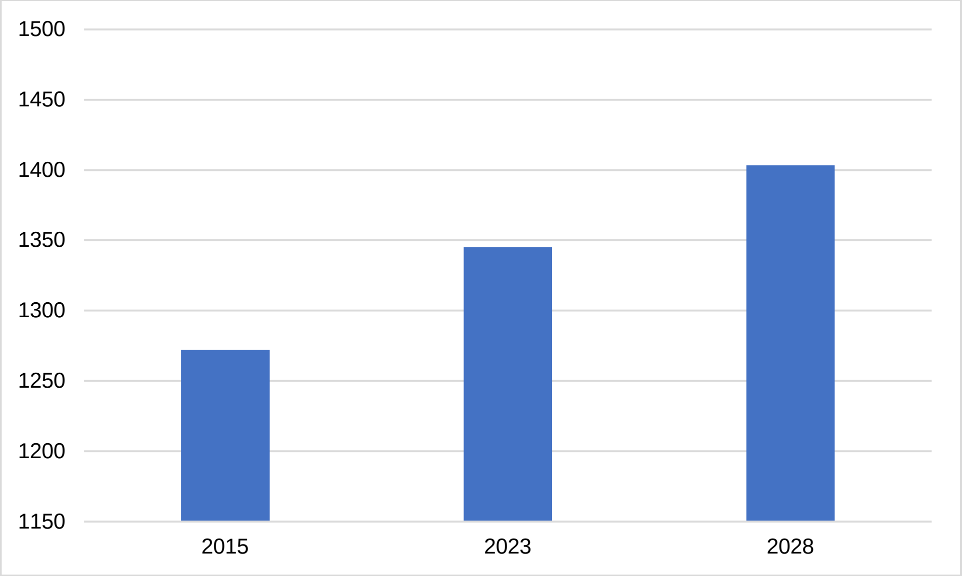

Figure 11.6: Employment forecasts for study area, 2015 to 2028[42], (000s)

Incorporated Mitigation

11.117 Stansted provides employment opportunities across a range of job types which are particularly attractive to young people and are increasingly important to North London's employment needs. The businesses based at the airport also source goods and services from other suppliers in the local area. Various mitigation and enhancement measures in relation to employment and socio-economic impacts have been set in place through the Section 106 Agreement in 2003, unilateral commitments made by STAL in the 2008 25+ permission and the 2015 SDP.

11.118 With regard to employment effects, the 2003 Section 106 Agreement committed Stansted to a regular programme of meetings with the Stansted Airport Employment Forum and to support agreed training programmes over the period to 2009. Commitments were also made to a regular review of the airport's employment and training strategy and to undertaking a survey of airport employment at intervals of no more than five years. In 2008, the airport agreed to commit any unspent resources from the 2003-2009 training programme to further training projects.

11.119 In 2015, the SDP committed the airport to the following:

- To enhance the Stansted Airport Employment and Skills Academy to help provide training and jobs for local people, with particular focus on attracting employees from disadvantaged areas;
- To invest in an apprenticeship programme;
- To develop and enhance a work experience programme;
- To work in partnership with local schools and colleges to secure a pipeline of future employees;
- To increase the annual apprentice intake to 10 and to aim to get 550 local people into work each year; and
- To work to extend bus and rail services to improve access to employment at the airport.

11.120 In 2015 Stansted opened the Aerozone – an on-site education centre providing educational materials to inspire the young generation. Working in partnership with local schools, the Aerozone focuses on:

- Science, technology, engineering and maths to inspire young people to consider engineering as a future career;
- The variety of jobs at the airport to encourage a career in the aviation industry; and
- The history of the airport.

11.121 In 2018 Stansted Airport College will open its doors to its first students and apprentices. The College is a partnership between Stansted Airport and Harlow College and is the first of its kind at any airport in the country. The College will offer a range of technical and professional courses in aviation, engineering, business, hospitality, retail and events.

11.122 In relation to wider economic performance, the 2003 Section 106 Agreement committed the airport to supporting an annual 'Meet the Buyers' event to assist local firms in securing airport related business.

11.123 The 2015 SDP contains a continued commitment to the Meet the Buyer events. It also commits the airport to working in partnership with local authorities, Local Enterprise Partnerships and regional bodies to attract funding for infrastructure to drive growth and job creation into the East of England.

11.124 To support economic development the airport has increasingly focussed on attracting long haul and full-service airlines to Stansted to provide direct services to Europe, the Middle East and USA, and a continuing expansion of the direct short haul network to key tourist and business destinations. From summer 2018, there will be new daily services to North America and a daily service to Dubai. The airport is continuing to work on securing new routes to Asia. Expansion of the route network will improve access for companies in the region to large and fast growing global markets. Long haul routes would also improve connectivity for cargo activity.

Impact Assessment

User Benefits and Wider Economic Impacts

11.125 This section identifies and assesses the impacts in terms of benefits to users and wider socio-economic impacts of the increase in the number of passengers and aircraft handled by the airport up to the level of the new limits associated with the development.

11.126 The proposed development (Development Case) will create user benefits. These benefits include enabling people to undertake flights which they could not otherwise take and increased convenience and reduced costs for other users. In addition to user benefits there will be gains for the economy and society at large. Aviation creates economic and social benefits through several mechanisms:

- Access to air services is an important factor in encouraging business investment, including from overseas (inward investment), in the UK and in specific localities;
- Access to air services supports business growth and increased productivity by enhancing access to markets and the interchange of people, skills and knowledge;
- Access to air services facilitates trade in goods (especially high value goods) and services; and
- Air services support tourism. Air is the predominant mode of transport for international tourists to the UK. Air services also allow UK tourists to enjoy a wide range of overseas destinations with benefits in terms of access to recreation, culture and family members.

11.127 Table 11.2 set out the forecasts of passengers, ATM's and cargo tonnage for Stansted in 2028 with and without the proposed development. For the wider socio-economic effects, the characteristics of these passengers are particularly important. Figure 11.7 shows the breakdown of passengers by journey (i.e. business or leisure) over the period to 2028.

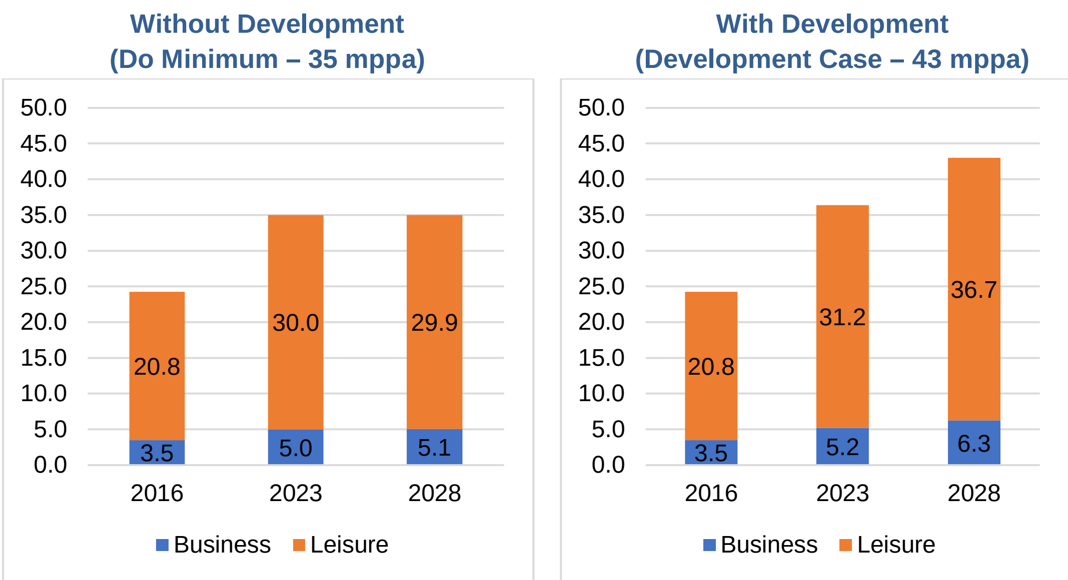

Figure 11.7: Stansted passengers by type, 2016 to 2028[43], (mppa)

11.128 In 2028 with the proposed development (the Development Case), it is forecast that there will be 6.3 million business passengers and 36.7 million leisure passengers using Stansted. This is an additional 1.2 million business passengers and 6.8 million leisure passengers over the Do Minimum scenario. Figure 11.8 shows the number of additional passengers in 2028 by their origin. The majority (57%) of additional passengers will be UK leisure passengers with a further 28% being foreign leisure passengers.

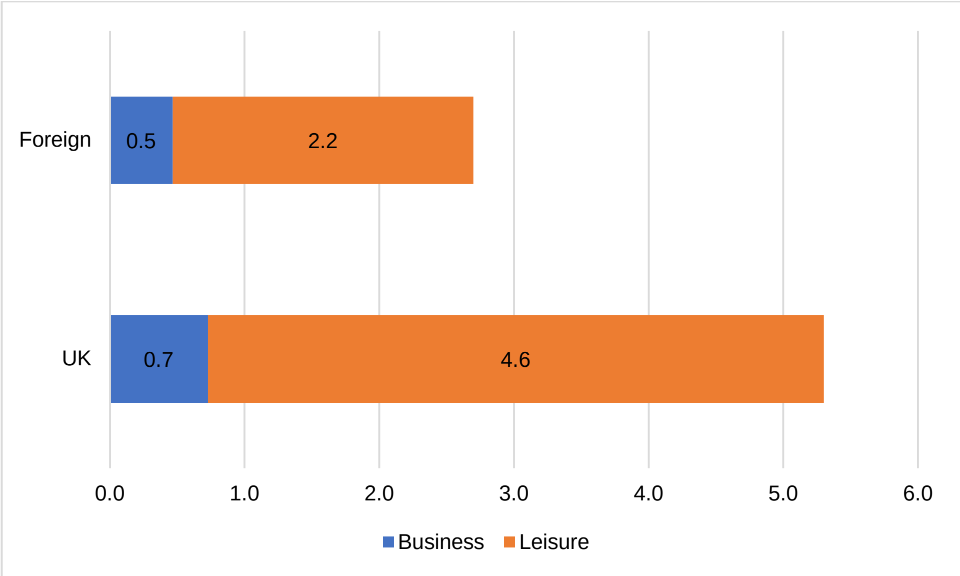

Figure 11.8: Additional Stansted passengers by origin & journey purpose comparision, Do Minimum v Development Case in 2028[44], (mppa)

11.129 Of the additional 5.3 million UK passengers, the place of residence is known for 4.4 million of them. It is forecast that 79%[xvi] will live in the East of England and London.

User Benefits

11.130 Additional airport capacity allows passengers to access flights more conveniently and/or at a lower cost. There is a direct benefit to people who would use the airport in any case from greater frequency of flights and flights to new destinations, making them more likely to be able to travel at their preferred time and providing access to a wider range of destinations without having to transfer. There will also be benefits for new passengers who can now fly from the airport. Some of these passengers would not be able to fly without the increased capacity and some will be passengers who would otherwise use another (less convenient) airport. The benefits from the proposed development to the users and providers of the additional capacity can be summarised as:

- Benefits to new (generated) passengers who would otherwise be unable to take these ‘additional’ flights;
- Existing users of the airport who will benefit from additional flight frequencies in terms of cost and convenience as a result of the additional capacity;
- Existing users able to fly direct to new destinations

[xvi] Also includes Buckinghamshire and Oxfordshire

- Freight users who will benefit from the cargo capacity;
- Benefits to airport businesses from increased throughput; and
- Government revenue including the air passenger duty paid by the additional passengers and other taxes from increased activity.

11.131 The proposed development will generate the types of benefit listed above. However, the quantification of user benefits is a complex process requiring large amounts of data for all UK airports along with forecasts of how provision of new capacity at airports would affect annual passenger numbers. As such, it is beyond the agreed scope of this study to value the user costs and benefits associated with the proposed development.

11.132 In 2028, the London airports system will be capacity constrained such that all demand will not be met. The proposed development at Stansted will enable 8 million more passengers to travel each year than would otherwise be the case. Even with the proposed development, there will still be an excess of demand for travel through the London airports system, but the excess will be reduced compared to the situation if the proposed development did not proceed (the Do Minimum scenario). The effect of the Development Case is assessed as **moderate beneficial**.

Wider Benefits

Inward Investment and Productivity

11.133 It is UK Government policy[45] to encourage investment in the UK by international businesses. Government policy aims to ensure the UK remains the leading destination in Europe for foreign direct investment (FDI) and becomes the leading destination for FDI from emerging economies. As stated in the Government's aviation policy call for evidence 'Beyond the Horizon', "*Aviation has a key role to play in achieving the government's ambitions to increase productivity and grow the economy*".

11.134 Air transport plays a major role in contributing to the attractiveness of an area to FDI. Appendix 11.2 provides further details of FDI to the UK and the role of transport in investment decisions.

11.135 A number of studies have found that expansion of air passenger traffic has a positive impact on economic growth and productivity. A study undertaken by Oxford Economic Forecasting (OEF)[46] in 2006 found that increased use of air services helps to improve the competitiveness of almost all aspects of companies' operations, including sales, logistics and inventory management, production and customer support. Moreover, by expanding the market in which firms operate, air services also act as a spur to innovation, increased sales and profits, and improved efficiency.

11.136 The OEF report set out calculations of impact which indicate that every additional business air passenger travelling will result in an increase of annual national income (GDP) after 10 years of approximately £1,000 (in 2016 prices).

11.137 A report produced by Oxera in 2009[47] set out various calculations of the wider impact of alternative policies (and thus passenger numbers) on the UK economy. These calculations implied that every additional passenger (of all types) would eventually create an impact on GVA of over £700 per annum through impacts on trade, investment and transport efficiency.

Contribution of Proposed Development

11.138 The evidence noted above shows that access to air transport is an important consideration in foreign direct investment decisions. Stansted is an important asset for the East of England and London and the proposed development will enable an additional 1.2 million business passengers to travel through the airport, the majority of which will have an origin or destination in the study area. While it is not possible to quantify the effect of the Development Case in terms of the number of additional investment projects to the area, the proposed development will enable the Airport to contribute to the 'attractiveness' of the area and its growth and vision, particularly the LSCC, the GCGP LEP area and the A120 Haven Gateway growth corridor in Essex..

11.139 If the figure derived from the OEF work referred to above is adopted, the wider impacts on business efficiency and productivity from the proposed expansion at Stansted would produce an increase in annual UK GVA of £1.2 billion. As around 79% of the passengers will be from the East of England and London the impact at that level is estimated to be £0.95 billion.

11.140 Were the figures implied by the Oxera work to be adopted, the wider impact would be even greater at around £5.6billion at the UK level and £4.4 billon at the London and East of England level.

11.141 On this basis, and using the criteria in Table 11.4, the effect of the Development Case is assessed as **major beneficial**.

Wider Benefits – Tourism

In-Bound Tourism

11.142 International tourism is a major worldwide industry and air travel is a key facilitator of the UK tourism industry. Appendix 11.2 provides details of the value of tourism to the UK economy. In summary, the main points to note are:

- In 2016, international tourists made 37.6 million visits to the UK and spent almost £22.5 billion;
- The majority of visits (74%) and spending (86%) were made by people arriving by air. Spend per visit of people arriving by air is almost £700 per visit compared to £310 and £330 for arrivals by sea and the Channel Tunnel respectively;
- Of the 37.6 million visits to the UK in 2016, almost 9.2 million were for business purposes with air transport being used by 63% of these visits. Expenditure per visit by business passengers arriving by air (£860) is, on average, eight times more per visit than those arriving by sea (£100) and four times more than those arriving by the Channel Tunnel (£200);
- Stansted is an important port of entry into the UK for foreign leisure passengers. Heathrow is the principal port of entry for visitors to the UK, accounting for 25% of all arrivals, with Gatwick, Stansted, Dover and the Channel Tunnel each accounting for between 10% and 13%. Stansted is the third busiest airport and fourth busiest port of entry accounting for almost 4.4 million arrivals (12% of all arrivals) with the majority coming from Europe; and
- London is the main tourist destination accounting for over 50% of all visits to the UK and 53% of all expenditure.

Out-Bound Tourism

11.143 The experiences, including cultural experiences, enjoyed by UK residents who are able to travel abroad is acknowledged in the Government's aviation policy call for evidence as a benefit and an enhancement to quality of life. Appendix 11.2 provides details of out-bound tourism from the UK in 2016. The main points to note are:

- In 2016 there were 70.8 million visits abroad by UK residents who spent £43.8 billion;
- Air transport accounts for 84% of visits abroad and 88% of spending abroad by UK residents. Almost 83% of all business trips are made by air; and
- Heathrow and Gatwick are the largest ports of exit for UK tourists traveling abroad, accounting for 9.9 million and 11.5 million UK residents respectively. Stansted is the fifth largest port of exit with 3.2 million people travelling through the airport (5% of UK residents travelling abroad), the great majority of who were travelling to Europe (97%).

Contribution of Proposed Development

11.144 The proposed development will enable more leisure trips to be made through Stansted, some of which will be inbound to the UK and some will be outbound from the UK. It has been argued that increasing airport capacity will have an adverse effect on the UK trade balance and the domestic tourism industry as an increase in overseas holidays by UK residents will be at the expense of domestic holidays.

11.145 However, in the event that the demand for overseas holiday trips was suppressed by failure to proceed with the proposed development, the result might be:

- An increase in people going abroad by rail or sea with associated increased expenditure;
- A reduction in the number of overseas trips made, but the trips taken could be for longer and be more expensive;
- An increase in people taking holidays in the UK with associated increased expenditure;
- People spending the money that would have spent on the trip on other things which may well be imported goods or services; and
- Increased savings.

11.146 It is also necessary to recognise that many overseas trips have a substantial element of 'home country' content such as locally based UK airlines; UK based staff and airport revenue and agent costs.

11.147 Hence, the effect of a constraint in air travel is likely to be some combination of the expenditure shifts described above, but the overall effect is impossible to quantify. It cannot however, be assumed that the Do Minimum scenario at Stansted would improve the balance of trade as compared to the Development Case[xvii].

11.148 The UK economy will certainly benefit from the additional foreign leisure visitors using Stansted in 2028 as a result of the proposed development. Figure 11.8 showed that the proposed development would enable an additional 2.2 million foreign leisure passengers to arrive in the UK through Stansted. Assuming that these passengers would not be able to visit the UK without the expansion in capacity and that a passenger is counted twice (once on arrival and once on departure), the number of additional foreign visits to the UK via Stansted in 2028 is estimated to be 1.1 million. This is an increase in visits of 2.9% over the level of international visits to the UK in 2016.

11.149 Overseas visitors to the UK by air spend, as noted above, an average of almost £700 per visit. Applying this figure to the number of additional overseas visits yields an estimate of spending by these additional visitors of £779 million in 2028 (2016 prices). This additional expenditure is estimated to support an additional 13,900 jobs in the tourism industry which would create GVA of £336 million (2016 prices) in 2028. This estimate assumes that all the additional passengers who are able to fly to the UK through Stansted in 2028 would not visit the UK in the absence of the proposed development and is therefore the maximum estimate of the effect on in-bound international tourism.

11.150 While it is possible that some of the additional foreign tourists who will arrive through Stansted if the cap is lifted would otherwise make the trip by another route, the constraints on airport capacity and the existence of other holiday options mean that many, if not most, of these trips would not take place. If follows logically that the associated spending in the UK may not be made at all, without the increase in capacity at Stansted.

11.151 The proposed development would enable an additional 4.6 million UK leisure[xviii] passengers to make international trips in 2028 which would equate to 2.3 million additional trips. These additional trips by UK residents provide an increase in consumer benefit and social/cultural benefits to those individuals.

11.152 Using the criteria in Table 11.4 the effect of the proposed development on international tourism is assessed to be **major beneficial**.

Wider Benefits – International Trade

11.153 International trade is an important mechanism in promoting economic growth and in raising standards of living. The aviation industry plays an important role in facilitating international trade in goods to and from the UK. Appendix 11.2 provides details of the volume and value of UK exports and imports and the role of air transport. The main points to note are:

- In 2016, the value of UK exports and imports was £291 and £425 billion respectively[48]. London and the East of England together account for 21% of all exports and 25% of all imports;

[xvii] Stop Stansted Expansion (SSE) proposed in the High Court in February 2009, that the 'tourism deficit' had not been properly taken account of at the public inquiry to increase passenger throughput at Stansted to 35mppa (G1). This challenge was dismissed by the Judge who stated that *"by trying to bring the 'tourism deficit' into account against a particular air transport scheme (i.e. the G1 proposal), SSE were calling into question the Government's judgement of national economic policy which had already taken that phenomenon into account*".
[xviii] Leisure passengers include holidays, visiting friends and relatives, education and other social activities.

- The majority (55%) of UK imports are from the EU while just over half (51%) of UK exports are to non-EU destinations;
- In 2016, over 48 million tonnes of goods were exported and 158 million tonnes imported through UK ports from non-EU[xix] destinations with a value of £163 billion and £226 billion for exports and imports respectively;
- All UK airports account for 48% of exports and 46% of imports by value, but less than 1% of the total volume of exports and imports which reflects the high value, low weight characteristics of air freight; and
- In 2016, goods with a value of £6.3 billion were exported through Stansted to non-EU destinations while goods with a value of £6 billion were imported. Overall, Stansted accounted for 5% of all non-EU trade carried through UK airports in volume terms but almost 7% in value terms.

Contribution of Proposed Development

11.154 Stansted has a unique role in the London airports system, in that the majority of its freight is carried on cargo aircraft reflecting its role as a freight base for the main logistics operators and integrators. Table 11.2 showed that in 2028 the proposed development would enable an additional 800 tonnes of cargo to be carried through the airport. This represents an increase of 0.2% on the Do Minimum scenario and is thus assessed as a **minor beneficial** effect.

Employment Effects: Construction

11.155 The construction of the new stands and taxiway links to the runway will cost almost £48 million over a twelve month period between 2021 and 2022. This expenditure is a relatively small proportion of total forecast capital expenditure at Stansted of £481 million between the third quarter of 2016 and the first quarter of 2030.

11.156 Total employment related to the construction of the proposed development comprises the same components (direct, indirect and induced) as operational Stansted employment which were defined at the beginning of the Chapter. Using the methodology set out above, direct employment has been estimated as almost 200 over the twelve-month period between 2021 and 2022. The number of jobs per year is shown in Figure 11.9. Construction employment is forecast to be approximately 100 in 2021 and 2022. GVA associated with this employment is estimated to be £16.2 million in 2015 prices.

11.157 Optimal Economics has reviewed evidence on regional multipliers from other studies and concluded that the appropriate multiplier for airport construction work at the study area level is 1.5. The indirect and induced employment in the study area is thus estimated to be 100 over the twelve month period supporting GVA of £7.2 million. In total the construction of the new airfield infrastructure to support the proposed development will create a total of almost 300 jobs and support GVA of £23.4 million over the twelve-month period between 2021 and 2020.

[xix] Detailed information on the volume and value of international trade by UK port is only available for trade conducted with countries outside the EU.

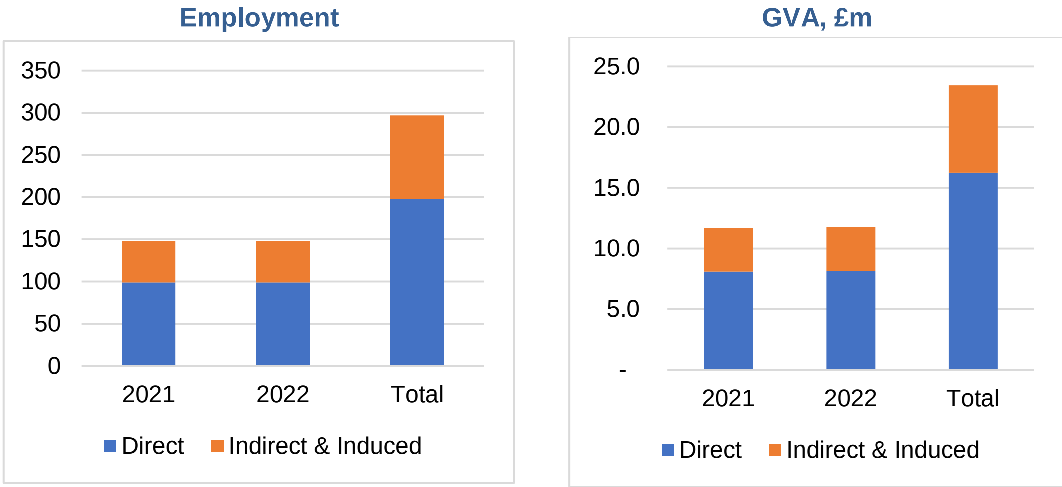

Figure 11.9: Construction employment and GVA, 2018 to 2020[49]

11.158 As referred to earlier in this chapter, in 2016 there were 384,000 people working in the construction industry in the study area. Construction work associated with the proposed development is estimated to create 100 direct jobs in both 2021 and 2022. These jobs represent 0.03% of construction employment in the study area. The number of indirect and induced jobs at 50 in each year is also very small relative to total employment in the study area (almost 8 million). Given the scale of forecast construction employment, the employment effect of the construction of the required infrastructure for the proposed development is assessed as **negligible**.

Employment Effects: Operations

11.159 The assessment of the employment effects associated with the operation of the proposed development requires forecasts of the future levels of Stansted related employment for the Do Minimum scenario and the Development Case. These forecasts have been made using the methodology outlined above. Table 11.10 shows the forecasts of Stansted related employment and GVA in 2028 in the Do Minimum scenario and the Development Case.

Table 11.10: Stansted related employment and GVA, 2028

	Without Development (Do Minimum)		With Development (Development Case)	
	Employment	GVA, £m	Employment	GVA, £m
Direct on-airport	13,200	866.9	16,200	1,065
Direct off-airport	300	20.6	300	21
Indirect & Induced	10,800	710.0	13,200	869
Total	**24,300**	**1,597.6**	**29,700**	**1,954.8**

11.160 Table 11.11 shows the effect of the proposed development on employment and GVA in 2028. By this time, the proposed development is estimated to support additional employment of 5,400 and GVA of £357 million in the operational study area compared to the Do Minimum scenario.

Table 11.11: Effect of proposed development on Stansted related employment and GVA, 2028

	Employment	GVA, £m
Direct (on and off-airport)	3,000	198.5
Indirect and Induced	2,400	158.8
Total	**5,400**	**357.3**

11.161 To assess the effect of the additional employment Table 11.12 sets out the forecasts of labour supply and demand in the study area. The Table shows that employment in the study area is forecast to be over 1.4 million in 2028 which is an increase of 131,100 from 2015. The availability of people to take up this employment is forecast to be 1.67 million which is an increase of 157,300 from 2015. In 2028, there are forecast to be 269,600 more people available for work in the study area than there will be jobs.

Table 11.12: Labour supply and demand in the study area

	2015	2028	Change 2015-2029	% Change 2015-2019
Labour Supply	1,515.6	1,672.9	157.3	10.4
Labour Demand	1,272.2	1,403.3	131.1	10.3
Supply minus Demand	243.4	269.6		

11.162 The additional jobs created by the proposed development (Development Case) would thus contribute to reducing this 'shortfall' of 269,600 jobs, reducing the need for out-commuting and to achieving the jobs target (117,745 new jobs) in the Economic Plan for Essex.

11.163 Changes in the level of employment in an area can, by affecting in and out migration, impact on housing demand, though demand can also be affected by changes in commuting patterns. As stated previously, in preparing their assessments of future housing need, local authorities consider future employment forecasts and whether adjustments are required to the housing delivery rate to balance jobs and workers. In work to support the emerging local plans of Uttlesford and East Hertfordshire (the two largest authorities in terms of Stansted employees), growth at Stansted of level now contemplated has been planned for. In the light of the very small labour market impact of the development relative to wider forces, Optimal Economics conclude that the scale of any consequential effects on the net demand for housing in the study area can only be very minor.

11.164 Using the criteria in Table 11.4 the operational employment effect of the proposed development is assessed as beneficial. In terms of the scale of the effect, the additional jobs represent 3.4% of the forecast increase in labour supply in the study area between 2015 and 2028 and would reduce the *growth* of the shortfall of jobs by 21%. On this basis, the employment effects are assessed as **moderate beneficial**.

Further Mitigation

11.165 No significant adverse effects have been identified during the assessment but, to ensure the socio-economic benefits of the proposed development are maximised, STAL will continue to develop and enhance the initiatives that are already in place. Stansted is one of the largest employment sites in the East of England and provides employment opportunities across all occupational groups.

11.166 STAL will continue to develop some key initiatives including the Stansted Airport Employment and Skills Academy with a particular focus on attracting employees from disadvantaged areas including Harlow, Braintree, other parts of Essex and North-East London. By 2028 STAL's aim is to increase employment of local people in line with airport employment growth to 700 per year.

11.167 The new Stansted Airport College will provide a purpose-built training facility for up to 500 young people per year to gain industry recognised qualifications and work experience around the airport. This will ensure the students have the correct skills to take advantage of the employment opportunities at the airport and will secure a pipeline of future employees.

11.168 As described in ES Chapter 6 (Surface Access and Transport and the Transport Assessment in ES Volume 3), the ASAS focuses on connections to areas targeted for workforce recruitment including North London Boroughs and the Airport Travelcard provides significant savings over standard fares to encourage travel by public transport.

Residual Effects

11.169 The residual socio-economic effects of the proposed development, accounting for the 'further mitigation', will remain at the same broad level of significance as identified in the impacts assessments above.

Cumulative Effects

11.170 The new draft Uttlesford Local Plan[50] includes the Northern Ancillary Area of Stansted Airport ('Northside') in its strategic allocation of employment land. This is a 55 hectare site allocated for B2 and B8 employment uses with a target provision of 145,500m^2 of B2 and B8 floorspace[xx]. Assuming an even split between B2 and B8 employment uses, it is estimated that the site could support employment of 2,900 when fully developed.

11.171 Table 11.13 shows the cumulative effect of developing this land and the direct employment required by Stansted in 2028 in the Do Minimum scenario and the Development Case. The development of additional capacity at the Airport under the Development Case combined with the full development of Northside is forecast to support employment of 19,400 in 2028.

Table 11.13: Cumulative effect of development of Northside and direct airport employment, 2028

	Without Development (Do Minimum)	With Development (Development Case)
Direct Airport Employment	13,500	16,500
Northside	2,900	2,900
Total	**16,400**	**19,400**

[xx] Uttlesford District Council, Regulation 18 Local Plan, Appendix 2 – Monitoring Framework

Conclusions

11.172 Table 11.14 provides a summary of the socio-economic impacts.

Table 11.14: Summary of socio-economic impacts

Impact	Description of Impact of Proposed Development	Assessment of Impact
User Benefits	Benefits to new and existing passengers from increased range of flights and improved flight frequencies. Enabling an additional 8 million passengers to travel at a time where there is excess ('unmet') demand for travel through the London airports.	**Moderate Beneficial**
Wider Benefits: - Inward Investment & Productivity	Enabling an additional 1.2 million business passengers to travel through the Airport and contributing to the 'attractiveness' of the area to inward investors.	**Major Beneficial**
Wider Benefits: - Tourism	Enabling 2.2 million foreign leisure passengers to arrive in the UK through Stansted and 4.6 million UK passengers to make a leisure trip abroad. In-bound leisure passengers are estimated to support 13,900 jobs and GVA of £336 million in 2028.	**Major Beneficial**
Wider Benefits: - International Trade	Enabling an additional 800 tonnes of cargo to be carried.	**Minor Beneficial**
Construction Employment	Employment constructing the physical works of 300 and GVA of £23.4 million over a ten month period.	**Negligible**
Operational Employment	Additional employment of 5,400 and GVA of £357.3 million compared to the Do Minimum scenario.	**Moderate Beneficial**

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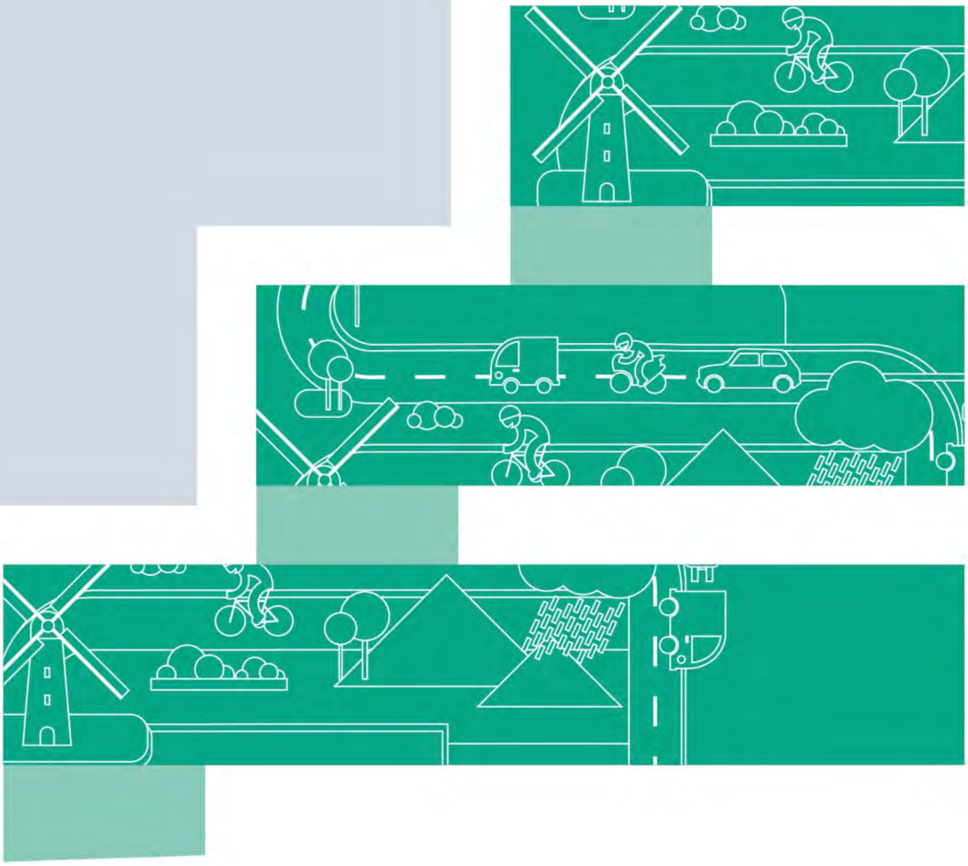
TRANSFORMING LONDON STANSTED AIRPORT

35+ PLANNING APPLICATION

Chapter 12
Carbon Emissions



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12 CARBON EMISSIONS

Introduction

12.1 This chapter has been prepared to assess the carbon emissions associated with the proposed development. The proposed development is described in detail in Chapter 3 (Site Context, Scheme Description and Alternatives) of this ES.

12.2 It details the findings of the carbon assessment, including legislation, guidance and planning policy context, assessment methodology, baseline, impact assessment, incorporated and further mitigations, as well as residual and cumulative effects.

12.3 The terms ‘carbon’ and ‘greenhouse gases’ (GHGs) are often used interchangeably, but have different meanings. GHGs are gases in the atmosphere which absorb heat, of which carbon dioxide (CO_2) is the most common and important gas. Other directly emitted GHGs are: methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3). Ozone (O_3), and water vapour (H_2O) also have a warming impact in the atmosphere but are not considered in GHG inventories.

12.4 GHGs have different impacts, which are expressed through a global warming potential for each gas. Using the global warming potential, the mass of each gas can be expressed in terms of the carbon dioxide equivalents (CO_2e), that is, the mass of CO_2 with the equivalent warming potential. For CO_2 itself the emissions of CO_2 would be identical to the emissions of CO_2e.

12.5 In this assessment, different GHGs have been covered for different emission categories and the terms ‘GHGs’ and ‘carbon’ have been used interchangeably. For emissions from aircraft, only CO_2 emissions are reported in line with UK target for the aviation industry. For non-flight carbon, CO_2e has been reported which includes CO_2, CH_4 and N_2O, in line with the UK carbon budgets. Emissions of the other direct GHG from the sources considered are zero or negligible.

Legislation, Guidance and Planning Policy Context

12.6 Relevant 'cross cutting' policies and plans are described in Appendix 3.1 (Planning and Aviation Policy) of this ES and the Planning Statement submitted with this application. Such policies are not repeated here in detail to avoid the chapter becoming unduly long or repetitive. This section does highlight the specific legislation, guidance and policies of most relevance to the carbon topic.

International

Aviation Industry Commitment to Action on Climate Change

12.7 In 2008, the aviation industry made its first global climate action commitment at the 3rd Aviation and Environment Summit in Geneva, Switzerland[1]. In 2009, the aviation industry adopted a set of three ambitious climate action goals to mitigate CO_2 emissions from aviation. It is a full sector commitment involving airports, airlines, air navigation service providers and aircraft and engine manufacturers. The three global goals to reduce aviation's carbon emissions are:

- An average improvement in fuel efficiency of 1.5% per year from 2009-2020;
- A cap on net carbon CO2 emissions from 2020 (carbon neutral growth) through offsetting under a globally agreed market-based measure (MBM) – the Carbon Offset and Reduction Scheme for International Aviation; and
- A reduction in net CO_2 emissions from aviation of 50% relative to 2005 levels.

12.8 The three global climate action goals are underpinned by a 4-pillar strategy to address aviation's climate change impacts and meet carbon targets:

- Push forward the development and implementation of new technologies, including sustainable alternative fuels;
- Further optimise the efficiency of aircraft operations both in the air and on the ground;
- Improve and modernise air routes, air traffic management and airport infrastructure; and
- Implement a single global MBM to fill and drive carbon emission reductions and fill the remaining emissions gaps.

Carbon Offset and Reduction Scheme for International Aviation (CORSIA)

12.9 In October 2016, a unanimous agreement was reached at the 39th Assembly of the International Civil Aviation Organisation (ICAO) to implement a global market-based measure on international flight (i.e. civil aviation flights that depart in one country and arrive in a different country) emissions, referred to as the Carbon Offset and Reduction Scheme for International Aviation (CORSIA). This is one of ICAO's basket of measures to stabilise carbon emissions from international emissions.

12.10 The scheme is set to commence with a pilot period (2021-2023) and a 1st phase (2024-2026) which would apply to countries that have volunteered to participate in the scheme. The 2nd

Phase, from 2027 to 2035, would be mandatory to all countries with exemptions agreed for least developed countries, small island developing states, landlocked developing countries and states with minimal international aviation activities. Under CORSIA, aircraft operators will be required to purchase offsets, or 'emission units', for the growth in CO_2 emissions covered by the scheme. CORSIA is designed to cap emissions from international civil aviation at 2020 levels. This will enable international aviation to deliver carbon neutral growth from 2020 onwards.

12.11 By January 2018, 73 states representing more than 87.7% of international aviation activity have agreed to participate voluntarily in the scheme from 2021 onwards[i].

ICAO CO_2 Emissions Standard for Aircraft

12.12 In March 2017, the 36-State ICAO Council adopted the first global CO_2 emissions certification standard for new aircraft. The CO_2 Standard sets aircraft emissions limits according to their size and weight. From 2020, new aircraft types will need to meet stringent fuel efficiency (and therefore CO_2) standards and be certified. This will also apply to aircraft type designs already in production as of 2023. Those in-production aircraft that do not meet the standard by 2028 will no longer be able to be produced unless their designs are sufficiently modified.

Europe

European Union Emissions Trading Scheme (EU ETS)

12.13 Aviation emissions were first addressed by the European Union (EU) through the European Union Emission Trading Scheme (EU ETS)[2]. When legislation for the aviation ETS was adopted in 2008, it was intended to apply to all airlines operating flights from, to and within European Economic Area (EEA) airports. However, since the implementation of the EU ETS its scope was reduced in 2012 only to cover flights operating within the EEA, referred to as 'stop the clock'[ii], in response to international criticism of the scheme and to allow ICAO time to formalise the 'market-based' CORSIA scheme.

12.14 EU ETS airlines are required to monitor, report and verify their emissions, and to surrender allowances against those emissions. They receive tradable allowances covering a certain level of emissions from their flights per year. The system has so far contributed to reducing the carbon footprint of the aviation sector by more than $17MtCO_2$ per year, with compliance covering over 99.5% of emissions.

12.15 For Stansted Airport, flights operating within the EEA cover: 90% of the departing flights and 89% of the arriving flights in terms of movements; and 83% of the departing flights and 78% of the arriving flights in terms of distance travelled.

12.16 Stansted Airport also participates in the EU ETS in respect of its power plant, through the Small Emitter Scheme, which sets out annual targets for reducing emissions during the period 2013-2020. Stansted Airport is excluded from Phase III of the EU ETS as it is not considered large-scale heavy emitter of carbon emissions such as a power plant or manufacturing industry, and hence falls under the Small Emitter Scheme. The airport is required to monitor

[i] http://sdg.iisd.org/news/participation-in-aviation-carbon-offsetting-scheme-reaches-70-states/ accessed November 2017
[ii] https://ec.europa.eu/clima/news/articles/news_2012111202_en accessed November 2017

and report its emissions data in line with EU Monitoring and Reporting Regulations. The emission target for Stansted Airport is 2,798 tCO_2 for 2016 and 2,580 tCO_2 for 2020[3].

UK

DfT UK Aviation Forecast

12.17 The DfT Aviation Forecasts (2017)[4] presented three aviation carbon emission scenarios under the baseline capacity case (i.e. assuming no new runways) to 2050, which show that the UK's aviation emissions would rise to 38.6$MtCO_2$ in 2030 (central), within a range of 36.6$MtCO_2$ to 41.6$MtCO_2$. After 2030, the growth in aviation carbon emissions is forecast to slow as a result of market maturity, airport capacity constraints, and technology advancement. By 2040, the balance of these factors would cause emissions to stabilise, before starting to fall. The forecasts suggested that in 2050, UK aviation carbon emissions are likely to be 37$MtCO_{2,}$ within a range of 35$MtCO_2$ to 42.1$MtCO_2$.

The Clean Growth Strategy and the UK Carbon Budgets

12.18 The UK's obligations on GHG emissions are set out in the Clean Growth Strategy[5], which includes a 2050 target to reduce its GHG emissions by at least 80% on 1990 levels, and a commitment to a series of five-year carbon budgets leading up to 2050. The second carbon budget, which includes the baseline assessment year of 2016, covers the period 2013-2017. The UK's total carbon budget during this period is 2,782$MtCO_2e$. The remaining period covered in this environmental assessment is mostly covered by the third (2018-2022) and fourth carbon budget (2023-2027), which are 2,455$MtCO_2e$ and 1,950$MtCO_2e$ respectively. The future assessment year of 2028 is covered by the fifth carbon budget (2028-2032), which is 1,725 $MtCO_2$.

12.19 In the UK, domestic aviation emissions are included in the 2050 target established by the Clean Growth Strategy. Domestic flights accounted for 7.4% of total Stansted Airport aircraft movements in 2016. Carbon emissions from international aviation (i.e. civil aviation flights that depart in one country and arrive in a different country) are covered by the EU ETS and so are excluded from the 2050 target and from the five carbon budgets which have been set to date (covering the period up to 2032). However, the UK's carbon budgets have been set at a level that accounts for international aviation.

12.20 The construction of the new airfield infrastructure proposed in the 35+ Project is programmed over 12 months starting in 2021 and ending in 2022, which falls within the third carbon budget (2018 – 2022). The operational impact of the new infrastructure will be covered by the Committee on Climate Change (CCC)'s fourth (2023 – 2027) and fifth (2028 – 2032) carbon budgets.

Committee on Climate Change

12.21 The CCC advised that UK aviation emissions, covering all domestic and international flights, should be limited to 37.5$MtCO_2$ per year by 2050 (the same as 2005 levels), which is consistent with the target set by the 2005-2010 Government[6]. The 37.5$MtCO_2$ from aviation would represent around 25% of all UK emissions by 2050.

Low Carbon Route Map for the Built Environment

12.22 The construction industry and Government set a target of a 50% reduction in GHG emissions in the built environment by 2025, based on the 1990 baseline[7] which was reported as 226MtCO_2e[8]. This will be achieved through resource efficiency and adapting the built environment to deal with the effects of climate change; in particular by developing plans, led by the Green Construction Board, to drive carbon out of the built environment.

UK Aviation Industry Sustainable Aviation CO_2 Road-Map

12.23 In December 2016, Sustainable Aviation, a coalition of UK airlines, airports, aerospace manufacturers and the National Air Traffic Services (NATS), updated its CO_2 Road-Map[9]. STAL, as part of MAG, is a founding member and signatory to Sustainable Aviation, and current Chair of the Sustainable Aviation coalition. The Road-Map demonstrates the potential for the UK to accommodate significant aviation growth to 2050 without a substantial increase in CO_2 emissions. The report explains how this can be achieved through the adoption of newer, more efficient aircraft, sustainable fuels and better air traffic management and operational procedures. The Sustainable Aviation CO_2 Road-Map has been used in this assessment to estimate the change in emissions from the assessment year of 2028 to 2050, the year in which the emissions target must be met.

PAS 2080:2016 Carbon Management in Infrastructure

12.24 PAS 2080[10] is the publicly available specification that provides a framework for identifying and managing whole life carbon associated with infrastructure projects. It was developed in response to the Infrastructure Carbon Review, which was published by HM Treasury in 2013. PAS 2080 has been used to provide the guiding principles for the assessment methodology used in this report.

Airport Commission Appraisal Framework

12.25 The Airport Commission Appraisal Framework (ACAF)[11] set out how the AC assessed the options it examined for meeting the UK's international connectivity needs. The methodology used in this assessment is aligned with the carbon emissions assessment principles endorsed by ACAF.

Assessment Methodology and Significance Criteria

Assessment Methodology

12.26 This section sets out the methodology used to quantify the carbon emissions associated with the construction and operation of the proposed scheme. The carbon assessment has been undertaken in accordance with the principal steps identified in the Publicly Available Specification 2080: Carbon Management in Infrastructure (PAS2080)[10] and is illustrated in Figure 12.1. A lifecycle approach (i.e. from cradle to grave) has been adopted capturing direct and indirect carbon emissions arising as a result from the proposed development.

Figure 12.1: Principal steps of GHG emissions quantification (adopted from PAS 2080)

12.27 The Airport Commission, in assessing the options for meeting the UK's international connectivity needs[11], has identified five areas where carbon emissions may change as a result of an airport scheme. Table 12.1 shows how these emission source categories have been addressed in this assessment.

Table 12.1: Comparison of ACAF emission categories[11] and scope of activities in this assessment

ACAF categories	Relevance to the proposed scheme	Scheme phase
Increased airport capacity leading to a net change in air travel	Aircraft in the air and on the ground (LTO* + CCD**)	Operation
Departure and arrival route changes through altered flight operations	Not impacted by the proposed scheme	Operation
Construction of new facilities and surface access infrastructure	Embodied carbon from construction materials	Construction
	Energy consumption during construction	Construction
Airside ground movements and airport operations	Power and heat generation on-site	Operation
	Consumption of energy generated off-site	Operation
Changes in non-aviation transport patterns brought about by a scheme	Transport associated with staff commuting and passenger travel	Operation

*LTO: aircraft on the ground and in the landing and take-off cycle (below 3,000ft)
**CCD: aircraft in the climb, cruise and descent cycle (above 3,000ft)

12.28 Where relevant, carbon calculations in this assessment have been carried out to align with the methodology sets out in HM Government's appraisal guidance produced by the Department for Energy and Climate Change, now the Department for Business, Energy and Industrial Strategy (DBEIS)[12]. In summary, the Guidance requires GHG assessment to:

- Quantify net changes in energy use;
- Adopt a common unit to express GHG emissions;
- Identify key elements of emissions impacted by the project proposal (i.e. the 35+ Project), both direct and indirect;
- Include embodied emissions associated with the production of materials;
- Map carbon emissions into traded and non-traded sectors; and
- Report changes in GHG emissions.

Construction

12.29 Construction carbon emissions cover the embodied impact of construction material as well as the fuel use during construction by on-site plant and equipment. Excluded from the assessment is the delivery of construction material such as concrete and steel to site, workers daily commute to site, and maintenance of the asset.

12.30 Table 12.2 presents the proposed development's assets considered in this assessment.

Table 12.2: List of construction assets

<table>
<tr><th>Asset</th><th>Number</th><th>Construction duration</th><th>Description</th></tr>
<tr><td>Echo aircraft stands</td><td>3</td><td rowspan="4">12 months</td><td rowspan="2">Code C Stand with an aircraft area allowance of 3,824 m^2 per stand</td></tr>
<tr><td>Yankee aircraft stands</td><td>6</td></tr>
<tr><td>Runway Tango 22/04 RAT</td><td>1</td><td>25,446 m^2</td></tr>
<tr><td>Runway Mike Romeo 22 RET</td><td>1</td><td>28,054 m^2</td></tr>
</table>

12.31 The construction of the assets presented in Table 12.2 is expected to take place over a 12-month period, commencing in 2021 through to completion in mid-2022. The construction carbon assessment is based on the predicted volume of concrete used in the aircraft stands and taxiways, steel in stand foundations and display systems for aircraft docking, as well as fuel used by the plant. For further details of the plant used for construction and underlying assumptions refer to Appendix 12.1, presented in ES Volume 2.

Operation

12.32 For each of the five scenarios described in Chapter 2 (EIA Methodology) of this ES, operational GHG emissions include emissions from the following components:

- Flights;
- Landside activities;
- Airside activities; and
- Surface access transport.

12.33 The following section describes in detail the methodology applied to each component.

Flights

12.34 Emissions from 2016 to 2028 employed a 'bottom up' approach, using operational data provided by STAL. This data was also used in the topic assessments for Air Noise and Air Quality (Chapters 7 and 10 of this ES), and a 'top down' approach from 2028 to 2050. For the top down approach, three scenarios were modelled as summarised in Table 12.3.

Table 12.3: Summary of approach to the calculation of flight emissions

Assessment scenario	Assessment scenario			
	2016-28	2028-50		
	Pessimistic	Pessimistic	Central	Best practice
Do Minimum	bottom up	-	-	-
Development Case	bottom up	top down	top down	top down

12.35 A 'bottom up' approach is where carbon emissions have been calculated from operational data provided by STAL. LTO cycle fuel use was based on air quality assessment outputs calculated from the ICAO's Aircraft Engine Emissions Databank (AEED)[13]. CCD fuel consumptions were calculated using the EMEP/EEA Emission Calculator 2016, available as part of the EMEP/EEA Air Pollutant Emission Inventory Guidebook[14]. A detailed description of the methodology for the 'bottom up' approach is presented in Appendix 12.

12.36 A 'top down' approach is where large scale data or projections, in this case national projections, are used to provide factors on carbon emission reductions that have then been applied to Stansted Airport. This approach has been used for the period between 2028 and 2050 due to the uncertainties associated with operational forecast data over such time ranges and the lack of emissions data on future aircraft which are not even at the design stage. Three scenarios have been presented to reflect the uncertainties in the projections:

- **Pessimistic:** The pessimistic scenario assumed a small amount of improvements in aircraft and engine efficiency to represent a conservative projection of future aviation improvements. The assumed improvement rate in this scenario is consistent with the bottom-up approach used for 2016-2028.

- **Best Practice:** The 'best practice' scenario assumed improvements in all three improvement areas listed below in section 12.37, and reflects the assumptions set out by Sustainable Aviation in their Sustainable Aviation Carbon Road-Map report[9].

- **Central:** The 'central' scenario represents a centred projection of improvement between the pessimistic and best practice scenario.

12.37 The carbon emissions annual percentage improvement factors used under each of the scenarios have been built up from annual improvement potentials from three areas as defined in the latest Sustainable Aviation Carbon Road-Map (2016)[9]:

- Improvement in aircraft and engine efficiency;

- Improvement in air traffic management and operations such as optimising fuel-loads, regular engine and airframe cleaning, checking aircraft's external surfaces to reduce drag and weight reduction measures; and

- Sustainable aviation fuels[iii].

12.38 The annual percentage improvement factors used for each scenario are presented in Table 12.4. For the pessimistic scenario, only a 0.9% annual improvement in aircraft and engine efficiency has been assumed. This is an average annual improvement rate calculated from the 'bottom up' approach. The 'best practice' scenario used annual improvement rates suggested by the latest Sustainable Aviation Carbon Road-Map (2016) and has assumed improvements in all three areas listed in paragraph 12.37. The 'central' scenario assumed mid-range improvement rates between the pessimistic and best practice.

12.39 The overall improvement range covered by the 'pessimistic', 'central' and 'best practice' scenarios is 0.9%-1.94%, which is in line with the range quoted in similar studies presented in the table, including Heathrow Airport North-West Runway assessment (2014)[15] and CCC Meeting the UK Aviation Target report (2009)[6].

Table 12.4: Comparison of improvement factors used in similar assessments (% improvement per annum)

Future improvement	This assessment			Other studies	
	Pessimistic 2028-50	Central 2028-50	Best practice 2028-50	Heathrow NW runway	CCC UK aviation target
Aircraft and engine efficiency	0.9%*	1%	1.22%	0.8-1.22%	0.8-1.5%
Air traffic management & operations	-	0.15%	0.23%	0.1-0.2%	-
Sustainable aviation fuels	-	0.25%	0.49%	0.07-0.53%	0.1-0.3%
Total	0.9%	1.40%	1.94%	0.97-1.95%	0.9-1.8%

* This is an average annual improvement rate calculated from the 'bottom up' approach

Airport Energy Plant

12.40 Future gas and electricity consumption figures (2023 and 2028) for the entire Stansted Airport were estimated using 2016 average energy consumption figure per passenger. This represents a 'reasonable worst case' where the benefits of investing in energy efficient and low carbon technologies are not considered. Stansted Airport's energy consumption figures per passenger (including electricity and gas) are expected be lower in the future.

12.41 Although total electricity consumption is calculated its carbon impact is reported as net zero. This is because Stansted purchases 100% of its electricity from renewable sources. To align with Stansted's reporting practices, carbon emissions from electricity consumption are calculated based on the carbon intensity of the UK's electricity grid and reported separately.

[iii] Currently two types of sustainable fuels are certified for use in aviation jet engines: Synthetic Fischer-Tropsch (FT) based kerosene produced through the gasification of biomass, and Hydro-processed Ester and Fatty Acids (HEFA) based from plant, algal and microbial oils.

12.42 Table 12.5 presents electricity and gas consumption used for the carbon assessment respectively.

Table 12.5: Stansted Airport electricity consumption

Year	Scenario	Passenger numbers (mppa)	Energy (kWh)	Electricity consumption per passenger (kWh/Pax)	Gas consumption per passenger (kWh/Pax)
2016	Baseline	24.3	41,458,000	1.7	0.23
2023	Do Minimum	35	59,671,000		
2025	Development Case	36.4	62,011,000		
2028	Do Minimum	35	59,671,000		
2028	Development Case	43	73,310,000		

Airside Activities

12.43 To calculate emissions from airside activities, the following components have been included:

- Ground Support Equipment (GSE);
- Aircraft Auxiliary Power Units (APUs);
- Aircraft engine testing; and
- Fire training ground exercises.

Ground Support Equipment

12.44 GSE refers to the equipment used to service aircraft during turnarounds (i.e. whilst 'on the ground'), such as trailers, passenger shuttle buses (only used for remotely parked aircraft), general maintenance equipment, baggage loaders/unloaders, refuelling trucks, flight catering trucks and lighting. For the purpose of this assessment, all GSE, STAL owned and leased vehicles, have been included in the calculation. This is in line with the calculations made in the air quality assessment.

12.45 Fuel consumption for the financial year 2015-16 was provided by STAL and was used as the baseline. Fuel use for future years has been scaled on ATMs, as shown in Table 12.6. This is 'worst case' as it assumes no improvements in vehicle or equipment technology. To calculate GHG emissions from fuel consumption, Defra's GHG conversion factors[16] have been used.

Table 12.6: GSE fuel consumption for difference assessment scenarios

	Base 2016	DM 2023	DC2023	DM 2028	DC2028
ATMs	180,619	246,568	252,607	248,820	273,966
Fuel					
Diesel (litres/pa)	119,702	163,408	167,411	164,901	181,565
Gasoil (litres/pa)	95,750	130,711	133,912	131,905	145,235
Unleaded (litres/pa)	2,318	3,165	3,242	3,149	3,516

Auxiliary Power Units

12.46 Carbon emissions from the use of aircraft APUs parked on stand have been calculated using the simple approach as described in the ICAO airport air quality manual (2011)[17]. APU emissions per minute were calculated using the typical APU fuel burn and duration of operation for short and long haul turnarounds as provided in Table 3-A1-3 of the ICAO Airport Air Quality Manual, and a conversion factor of 3.15kgCO_2/kg[iv] aviation fuel burnt.

12.47 The typical APU operation time suggested in Table 3-A1-3 of the ICAO manual was not used[v], instead, an average of 10 minutes APU running time per departure has been used. This is in accordance with Stansted's operating procedures for the use of aircraft APUs, which states that:

"For departing aircraft the APU is not to be started until 10 minutes prior to 'push-back and start' and for arriving aircraft, the handling agent should connect Fixed Electrical Ground Power (FEGP) immediately. The APU if running should then be shut down".

12.48 This is likely to be an over-estimate of emissions. Typically, airlines serving high frequency, short haul routes turnaround aircraft in 25-30min only switch on their APU for 2-3 minutes prior to push-back. However, to maintain consistency with the air quality and noise assessment, a value of 10 minutes per departure flight has been used.

Engine Testing

12.49 Fuel consumption for engine testing activities at Stansted Airport has been calculated as part of the air quality assessment in this ES using actual consumption data provided for the 2016 Baseline Year. The detailed methodology can be found in Chapter 10 (Air Quality). Fuel consumption for the future year scenarios has been estimated based on the ATMs shown in Table 12.7. To calculate GHG emissions from fuel consumption, a conversion factor of 3.15kgCO_2/kg aviation fuel was used in accordance with the EMEP/EEA Air Pollutant Emission Inventory Guidebook[18].

Table 12.7: Engine testing fuel consumption for different assessment scenarios

Scenarios	Base 2016	DM 2023	DC2023	DM 2028	DC2028
ATM	180,619	246,568	252,607	248,820	273,966
Fuel consumption (kg/pa)	294,287	468,328	479,798	472,606	520,368

Fire Training Ground

12.50 Carbon emissions associated with the fire training ground have been calculated using metered fuel consumption during the 2016 Baseline Year. The total fuel consumption from the fire training ground was 3,309 litres of liquefied petroleum gas (LPG) in 2016. It was assumed that future year operations will remain the same as the 2016 Baseline Year. This assumption was made due to the absence of fuel consumption projections for future assessment years, as well as to align assumptions with the air quality chapter. To calculate GHG emissions from

[iv] Conversion factor sourced from the EMEP/EEA calculator 2016, available as part of the EMEP/EEA Air Pollutant Emission Inventory Guidebook.
[v] In the ICAO Airport Air Quality Manual, the duration of APU operation considered representative for short-haul flights is 45 minutes and for long-haul flight is 75 minutes.

fuel consumption, Defra's GHG conversion factor[16] for LPG has been used, which is 1.51kgCO_2e per litre of LPG.

Surface Access Transport

12.51 Surface access transport-related carbon emissions are based on outputs from the Transport Assessment (TA) undertaken by SDG (refer to Volume 3 of this ES). The TA examines road and rail surface access trips generated for passengers and airport employees. It also reports the vehicle and passenger distances travelled by:

- Car (driver and passengers);
- Rail; and
- Bus/coach.

12.52 Information used in the carbon assessment is presented in Table 12.8 and Table 12.9.

Table 12.8: Stansted Airport employee travel data

Year	Scenario	Car (vehicle-km)	Rail (passenger-km)	Bus/ Coach (passenger-km)
2016	Baseline Year	151,139,296	34,036,956	35,985,017
2023	Do Minimum	176,044,227	42,767,314	60,066,021
2023	Development Case	176,087,232	42,787,274	60,100,821
2028	Do Minimum	147,943,305	38,176,064	65,617,025
2028	Development Case	181,566,784	47,454,143	80,529,985

Table 12.9: Stansted Airport passenger travel data

Year	Scenario	Car (vehicle-km)	Rail (passenger-km)	Bus/ Coach (passenger-km)
2016	Baseline Year	408,726,007	1,060,706,068	458,227,681
2023	Do Minimum	592,207,773	658,247,048	710,544,229
2023	Development Case	491,385,393	716,603,209	738,414,036
2028	Do Minimum	604,967,002	649,674,891	695,401,712
2028	Development Case	743,844,789	797,965,436	853,316,284

12.53 For car travel, baseline and future UK car fleet composition data was obtained from the DfT[19]. Projected car fleet fuel efficiency (gCO_2/km) improvements were also obtained from the DfT. This covers all petrol, diesel, hybrid, plug in hybrid and electric cars (see Appendix 12 for further detail).

12.54 For rail travel carbon emissions (gCO_2e/pass-km) were obtained from the Office of Rail and Road (ORR)[20].The ORR's annual statistics publishes both the latest and historical carbon figures on UK rail travel which was used to extrapolate carbon emissions per rail passenger to 2028.

12.55 For further details on the transport related assumptions refer to Appendix 12.

Significance Criteria

12.56 There is currently no specific guidance or standard that explains how to determine whether carbon emissions are significant and thus scoped in or out of an EIA. The Institute of Environmental Management and Assessment (IEMA)[21] has published a set of overarching principles that state the following:

"The GHG emissions from all projects will contribute to climate change; the largest inter-related cumulative environmental effects…as such any GHG emissions or reductions from a project might be considered to be significant…"

12.57 The draft airports National Policy Statement (draft NPS)[22] states that:

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

12.58 Accordingly, in line with IEMA's principles, a best practice approach has been adopted and carbon emissions associated with the proposed change from 35mppa to 43mppa have been reported.

12.59 Based on IEMA's principles and guidance from the draft NPS, the proposed approach to determining significance is through contextualisation of carbon emissions from the 35+ Project. Total carbon emissions have been compared to the UK's carbon budgets. Aviation and non-aviation emissions have also been contextualised separately in terms of their relative contribution to specific sectors. Construction emissions have been compared with the UK's third carbon budget (2018 to 2022). Operational emissions have been compared to the UK's 2050 target for aviation emissions of 37.5MtCO_2.

Baseline Conditions

12.60 This section describes the carbon emissions at Stansted in the 2016 Baseline Year and in future baseline years 2023 and 2028. As presented in Table 12.10, the total carbon emissions from Stansted in 2016 are 1.7MtCO_2e and this is projected to reach to approximately 2.5MtCO_2e in 2023 and remain at 2.5MtCO_2e in 2028.

Table 12.10: Carbon emissions for 2016 Baseline Year and future baseline years (2023 and 2028)

	Unit	Base 2016	DM 2023	DM 2028
Passenger number	mppa	24.3	35	35
ATM	no.	180,619	246,568	248,820
Carbon				
Flights	MtCO_2	1.560	2.304	2.274
Landside activities[vi]	MtCO_2e	0.003	0.004	0.004
Airside activities	MtCO_2e	0.007	0.010	0.010
Surface access transport	MtCO_2e	0.170	0.211	0.189
Total	**MtCO_2e**	**1.740**	**2.529**	**2.478**
Per passenger[vii]	**kgCO_2e/ passenger**	**107**	**113**	**110**

12.61 Figure 12.2 shows the trend of total carbon emissions and carbon intensity, measured in kgCO_2e per passenger (kgCO_2e/passenger), for the 2016 Baseline Year and two future baseline years (2023 and 2028). It shows that Stansted Airport's total carbon emissions are projected to increase from 2016 to 2023 as the airport reaches its current operational limit of 35mppa. The total annual carbon emissions then remain relatively constant between 2023 and 2028 as the airport continues to operate at its permitted passenger limit, with a slight reduction due to the combined effect of aircraft engine improvements, the increased uptake of hybrid and electric vehicles and the gradual decarbonisation of the UK grid electricity lowering landside emissions.

12.62 Total carbon emissions per passenger are projected to increase from 107kgCO_2e/passenger in 2016 to 113kgCO_2e/passenger in 2023 and then decrease to 110kgCO_2e/passenger in 2028. This increase is likely to be due to a higher proportion of long-haul ATMs estimated for future years and the subsequent decrease is likely to be due to technological and efficiency improvements in the aviation industry and grid carbon intensity.

[vi] Landside activities capture carbon emissions from gas consumption only. Electricity related carbon emissions are zero to reflect Stansted's electricity supply contract from 100% renewable sources. Based on UK grid carbon intensity factors Stansted's electricity carbon footprint would be 0.0146 MtCO_2e (less than 1% of total 2016 carbon emissions). Electricity carbon emissions are projected to decrease to 0.007 MtCO_2e by 2028.

[vii] The kgCO_2e per passenger figure is only representative of the average carbon footprint of departing passengers at Stansted Airport, excluding freight and general aviation emissions.

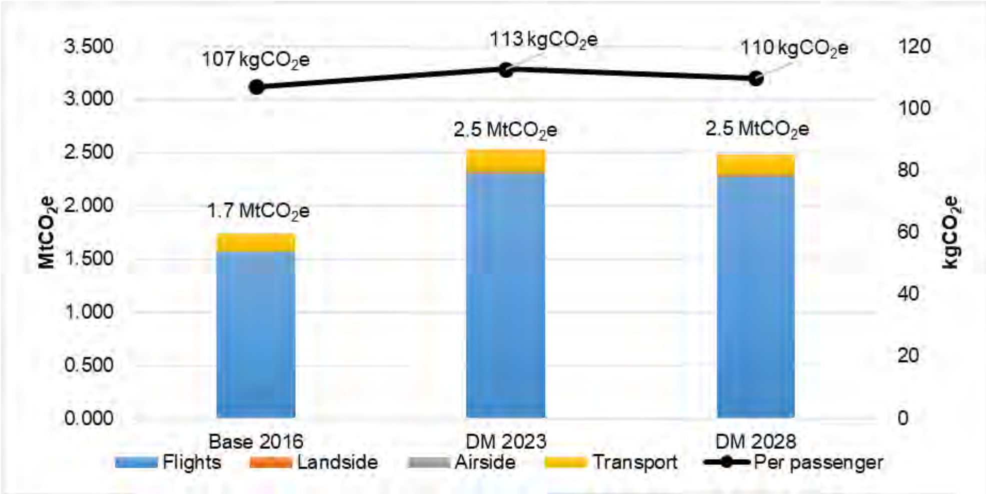

Figure 12.2: Carbon emissions for 2016 baseline year and future baseline years

Incorporated Mitigation

Construction

12.63 STAL is committed to minimising construction-related carbon emissions wherever reasonably practicable. This could include the sourcing of materials locally to reduce logistics carbon as well as procuring material with low embodied carbon emissions i.e. high recycled content will minimise emissions. Construction-related emissions may also be reduced by connecting to the grid early on during the construction period and minimising the use of diesel generators.

12.64 A Construction Environmental Management Plan (CEMP) and Code of Construction Practices (CoCP) will be produced by the Main Contractor, as described in ES Chapter 5 (Development Programme and Construction Environmental Management). The purpose of these two documents is to control and manage the environmental impacts of construction as well as establish responsibilities for contractors and developers.

Operation

12.65 STAL has been measuring its carbon footprint since 2009, the latest reported in the 2016/17 Corporate and Social Responsibility (CSR) Report. STAL's earlier 2015/16 CSR Report explicitly describes the airport's carbon management strategy of identifying carbon emission sources within its sphere of influence, such as focusing on reducing airport and surface access energy use whilst working in partnership to influence flight emissions. The following sections detail STAL's commitments and current activities in reducing operational carbon emissions.

Flights

12.66 STAL is committed to implementing the Sustainable Aviation Carbon Road-Map[8] with regards to its own operations as well as supporting others (i.e. airlines) in delivering their carbon reduction commitments. The improvements discussed in the Carbon Road-Map have been used as a basis for projecting the flight carbon emissions from 2028 to 2050, as detailed in paragraphs 12.37 to 12.39.

12.67 Moreover, STAL is working in partnership with its key stakeholders to develop policies and systems which will reduce and manage emissions from indirect sources of carbon emissions over which it does not have direct control.

Airport Energy Plant

12.68 STAL is reducing its carbon emissions by increasing energy efficiency and sourcing renewable/clean alternative energy where possible. Its electricity currently 100% supplied from renewable source. As stated in the 2015 SDP and the 2016-17 CSR Report, STAL is pursuing the following initiatives:

- Achievement of Level 3 (Optimisation) under the ACI ACA Programme;
- Investment in low energy and low carbon technology such as low/ultra-low energy lighting and fuel efficient vehicles, and where possible meet the remaining energy requirements through onsite renewables (i.e. solar and biomass) and/or low carbon energy technologies;

- Upgrading energy monitoring to a 'smart metering' system which will lead to improved information on energy consumption and help prioritise future energy reduction measures, which will also lead to carbon reduction; and

- Continuation of carbon emissions reporting by STAL annually, including emissions from STAL's own operations, as well as contributions from activities it can influence such as aircraft 'on the ground', ground handling and surface access.

12.69 STAL has adopted the following targets in its 2015 SDP:

- Reduce absolute energy demand by a further 15% in the next five years;

- New buildings to target a BREEAM rating of 'Excellent', with a minimum standard of 'Very Good';

- Smart metering across the site over the next five years; and

- Maintain compliance with the Carbon Trust Standard, renew certifications under ISO 14001 (Environmental Management Systems) and 50001 (Energy Management Systems) and continue participation under the ACI Airport Carbon Accreditation (ACA) scheme[viii] by renewing Stansted's current Level 3 (Optimisation) certification and seeking Level 3+ (Neutrality) certification by 2020.

Surface Access

12.70 STAL is committed to delivering a high quality and reliable transport infrastructure which focuses on the delivery of sustainable travel choices. Stansted Airport has one of the highest airport public transport mode shares of all European airports at 51.9%. The airport is well served by strategic transport infrastructure with direct rail, coach and bus services and direct highway connections to the trunk road network. Detailed analysis of future passenger and employee travel patterns has demonstrated that the expanded use of the airport is capable of being accommodated on the surrounding transport network with appropriate mitigation and further expansion is anticipated to lead to further enhancement of the coach and bus networks in response to greater demand (see Chapter 6 Surface Access and Transport for more detail).

12.71 STAL's 2015 SDP sets a travel planning objective to develop and improve surface access links. This is reflected in the TA's modelling assumptions where a 10% decrease in car driver trips between 2016 and 2030 has been applied. Stansted has set up the Stansted Area Transport Forum (SATF) to help improve surface access in a collaborative and strategic manner. Some of the latest aims from the SDP including actively discouraging 'kiss and fly' traffic, introducing real-time bus travel information, or introducing earlier train time as well as improve existing rail connections. During 2016/17, 51.9% of passengers travelled to and from the airport by bus, coach or rail.

[viii] http://www.airportcarbonaccreditation.org/

Impact Assessment

Overall Effects

12.72 This section presents the overall assessment results for the Do Minimum and Development Case scenarios under the ‘pessimistic’, ‘central’ and ‘best practice’ scenarios. As shown in Table 12.11, the total carbon emissions from Stansted in 2028 are projected to be 2.8MtCO_2e for the Development Case[ix], compared with 2.5MtCO_2e for the Do Minimum[x] scenario. The majority of these carbon emission increases are from flights (83%) with surface access accounting for another 17%.

12.73 Total emissions in 2028 are predicted to increase by around 0.3MtCO_2e in the Development Case compared with the Do Minimum scenario. Despite the increase, the carbon intensity (carbon emissions per passenger) is predicted to improve by around 4% from 110kgCO_2e/passenger to 106kgCO_2e/passenger. The improved carbon intensity is principally attributed to a greater number of passengers using the airport’s buildings, infrastructure and facilities.

12.74 After 2028, only flight emissions have been projected for the Development Case. Under all three scenarios (Pessimistic, Central, Best Practice), flight emissions are projected to reduce from 2028 to 2050, as shown in Table 12.12. By 2050, the annual carbon emissions from flights are projected to fall to within the range 1.5MtCO_2e to 2.0MtCO_2e. This is mainly due to the anticipated improvements discussed in paragraph 12.37 to 12.39.

Table 12.11: Overall carbon assessment results showing annual carbon emissions for different assessment years between 2016 and 2028

	Unit	2016-2028				
		Pessimistic				
		Base 2016	DM 2023	DC 2023	DM 2028	DC 2028
Passenger number	mppa	24.3	35	36.4	35	43
ATM	no.	180,619	246,568	252,607	248,820	273,966
Carbon						
Flights	MtCO_2	1.560	2.304	2.353	2.274	2.504
Landside[xi]	MtCO_2e	0.003	0.004	0.005	0.004	0.006
Airside	MtCO_2e	0.007	0.010	0.010	0.010	0.011
Transport	MtCO_2e	0.170	0.211	0.196	0.189	0.232
Total	**MtCO_2e**	**1.740**	**2.529**	**2.563**	**2.478**	**2.753**
Emissions per passenger[xii]	**kgCO_2e/ passenger**	**107**	**113**	**110**	**110**	**106**

[ix] Development Case (DC) represents the scenario whereby capacity is increased to 43mppa by 2028 through the proposed development construction work at Stansted Airport.

[x] Do Minimum (DM) represents the baseline scenario whereby current maximum capacity (35mppa) is reached by 2023 and levelled off thereafter.

[xi] Landside activities capture carbon emissions from gas consumption only. Electricity related carbon emissions are zero to reflect Stansted’s electricity supply contract from 100% renewable sources. Based on UK grid carbon intensity factors Stansted’s electricity carbon footprint would be 0.0146 MtCO_2e (less than 1% of total 2016 carbon emissions). Electricity carbon emissions are projected to decrease to 0.009 MtCO_2e by 2028 under the DC scenario.

[xii] The kgCO_2e per passenger figure is only representative of the average carbon footprint of departing passengers at Stansted Airport, excluding freight and general aviation emissions.

Table 12.12: Overall carbon assessment results showing annual carbon emissions for 2050 (flights only)

	Unit	2028-2050		
		Pessimistic	Central	Best practice
		DC 2050	DC 2050	DC 2050
Passenger number	mppa	43	43	43
ATM	no.	-	-	-
Carbon				
Flights	$MtCO_2$	2.031	1.768	1.484
Landside	$MtCO_2e$	-	-	-
Airside	$MtCO_2e$	-	-	-
Transport	$MtCO_2e$	-	-	-
Total	**$MtCO_2e$**	**-**	**-**	**-**
Emissions per passenger[xiii]	**$kgCO_2e$/ /passenger**	**-**	**-**	**-**

12.75 Figure 12.3 shows the interpolated time series of annual carbon emissions and carbon intensity between the 2016 Baseline Year and the 2028 future assessment year. The figure shows a small increase in total annual carbon emissions in 2022, compared with the Do Minimum scenario for the same year, reflecting construction activities. The carbon footprint under the Do Minimum scenario and the Development Case would increase between 2016 and 2023. Under the Development Case, carbon emissions show a steeper increase without the restriction of the 35mppa operating limit. Thereafter, the Do Minimum scenario annual emissions would slightly decrease by 2028, whereas the Development Case emissions would see an increase.

12.76 Conversely, the carbon intensity at Stansted Airport, expressed as $kgCO_2e$ per passenger[xiv], would see an improvement after 2023 due to the increased passenger capacity created by the proposed development.

[xiii] The$kgCO_2e$ per passenger figure is only representative of the average carbon footprint of departing passengers at Stansted Airport, excluding freight and general aviation emissions.
[xiv] The $kgCO_2e$ per passenger figure is only representative of the average carbon footprint of departing passengers at Stansted Airport, excluding freight and general aviation emissions.

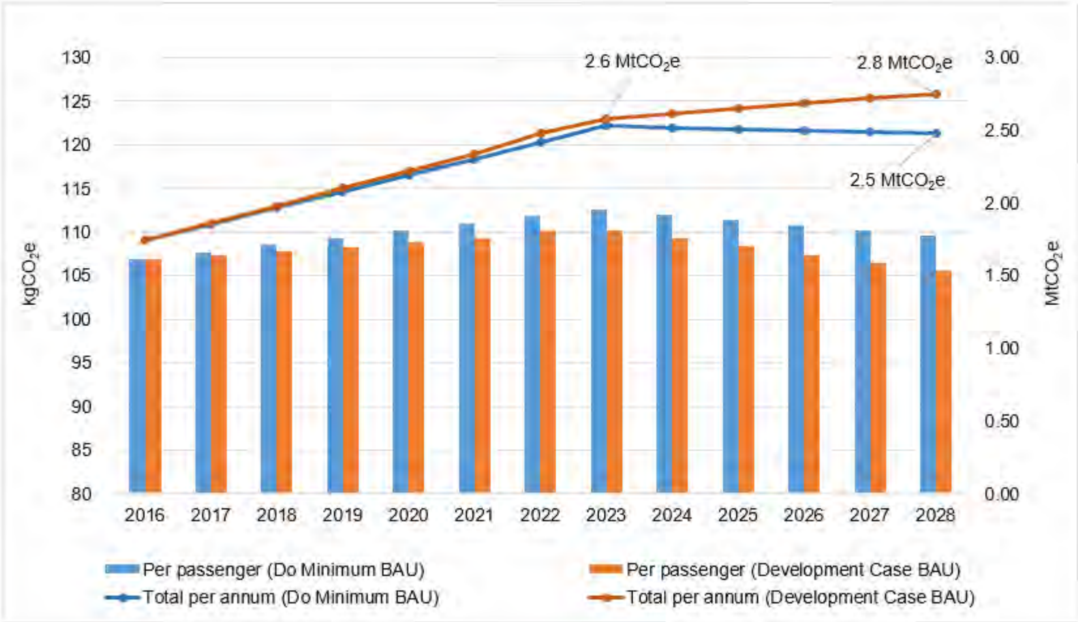

Figure 12.3: Interpolated time series for overall annual carbon emissions and carbon intensity from 2016 to 2028

12.77 Figure 12.4 presents the overall cumulative carbon emissions for the Do Minimum scenario and the Development Case from 2016 to 2028. For the Do Minimum scenario, the calculated cumulative emissions are 29.6MtCO_2e in 2028 and for the Development Case the cumulative emissions would be 30.7MtCO_2e, a difference of 1.1MtCO_2e due to the proposed development. The additional emissions would largely occur between 2023 and 2028, most of which falls under the fourth UK carbon budget (2023-2027) of 1,950MtCO_2e.

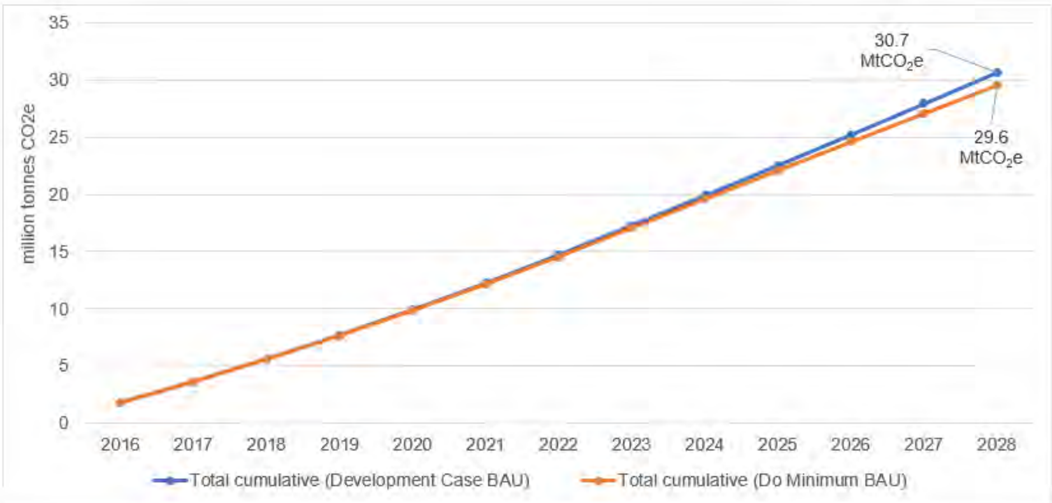

Figure 12.4: Interpolated time series for overall cumulative carbon emissions from 2016 to 2028

12.78 The assessment results for the period between 2028 and 2050 are presented under the *operational stage effects* section as only flight emissions were quantified for this period.

Construction Stage Effects

12.79 The construction of the aircraft parking stands and taxiways will contribute an estimated 0.022MtCO_2e. This includes carbon emissions that would be associated with the production of concrete and steel used (0.020MtCO_2e), as well as fuel use by construction plant equipment on site (0.002MtCO_2e). This represents 0.9% of Stansted's 2022 total annual emissions in the year during which construction of the proposed development is planned to be completed (see Figure 12.5).

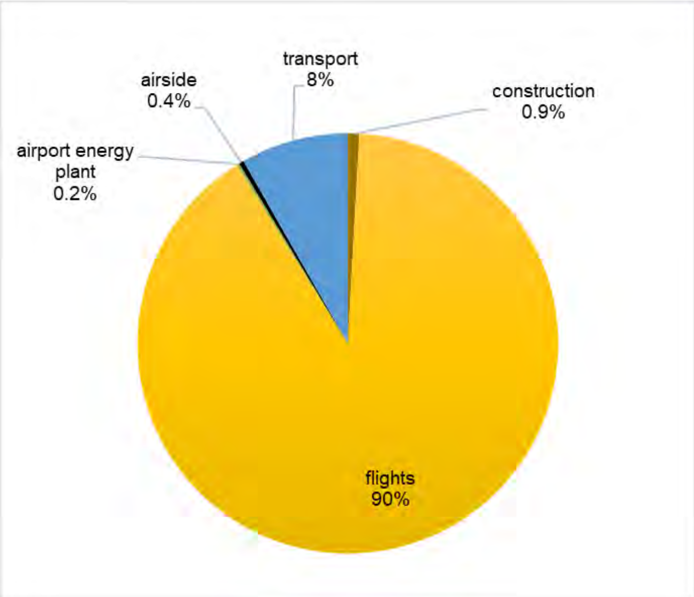

Figure 12.5: Annual (2022) carbon emissions by contributing element

12.80 The construction of the proposed development falls within the UK's third carbon budget (2018-2022) of 2,544MtCO_2e proposed by the CCC. To put the emissions into context, construction emissions would account for approximately 0.001% of the total allocated budget, and it would account for approximately 0.09% of all UK construction in 2022.

12.81 For further details of the assumptions relating to construction carbon emissions refer to Appendix 12.

Operational Stage Effects

Flights

12.82 Table 12.13 and Table 12.14 present the annual flight carbon emissions for different assessment years between 2016 and 2050. Flight emissions amount to approximately 2.3MtCO_2 for the Do Minimum scenario and 2.5MtCO_2 for the Development Case in 2028. The difference of 0.4MtCO_2 between the Do Minimum and Development Case is due to the additional capacity created by the Development Case. The annual flight carbon is projected to decrease between 2028 and 2050, reducing to between 1.5MtCO_2 and 2MtCO_2 by 2050. Flight carbon accounts for 89% of carbon emissions at Stansted Airport in 2016 and would account for 91% in 2028 under the Development Case. Of these, the majority can be attributed to emissions taking place during the CCD cycle of aircraft departing from Stansted Airport.

12.83 By 2028, between the Do Minimum scenario and the Development Case there would be a 23% increase in mppa, a 10% increase in ATMs, and a 10% increase in flight carbon emissions. As such, the carbon intensity of the Development Case would improve by around 4% (flights only) in 2028 from 105kgCO_2/passenger to 100kgCO_2/passenger compared with the Do Minimum scenario.

12.84 After 2028, total annual passenger numbers would remain level at 43mppa whereas total flight carbon emissions would continue to fall due to improvements in aircraft and engine design and associated technological advancements. As such, carbon intensity per passenger is projected to reduce to between 56kgCO_2/passenger and 77kgCO_2/passenger by 2050.

Table 12.13: Flights carbon results showing annual carbon emissions between 2016 and 2028

	Unit	2016-2028				
		Pessimistic				
		Base 2016	DM 2023	DC 2023	DM 2028	DC 2028
Passenger number	mppa	24.3	35	36.4	35	43
ATM	no.	180,619	246,568	252,607	248,820	273,966
Carbon						
LTO	MtCO_2	0.204	0.304	0.311	0.294	0.323
CCD	MtCO_2	1.355	2.000	2.042	1.981	2.181
Total flights	**MtCO_2e**	**1.560**	**2.304**	**2.353**	**2.274**	**2.504**
Per passenger[xv] (flight only)	**kgCO_2e/ passenger**	**101**	**107**	**105**	**105**	**100**

Table 12.14: Flights carbon results showing annual carbon emissions in 2050

	Unit	2028-2050		
		Pessimistic	Central	Best practice
		DC 2050	DC 2050	DC 2050
Passenger number	mppa	43	43	43
ATM	no.	-	-	-
Carbon				
LTO	MtCO_2	0.262	0.228	0.191
CCD	MtCO_2	1.769	1.540	1.292
Total flights	**MtCO_2e**	**2.031**	**1.768**	**1.484**
Per passenger[xvi] (flight only)	**kgCO_2e/ passenger**	**77**	**67**	**56**

12.85 Figure 12.6 presents the linear-extrapolated annual flight carbon emissions between 2016 and 2050 from assessment results shown in Table 12.13. The figure shows that for Do Minimum, flight emissions would rise annually until 2023 and decrease slightly thereafter. For the Development Case, annual flight emissions would increase until 2028, when the 43mppa capacity is anticipated to be reached. Thereafter, annual emissions would start to decrease as

[xv] ThekgCO_2e per passenger figure is calculated from passenger flights emissions and is only representative of the average carbon footprint of departing passengers at Stansted Airport.
[xvi] The kgCO_2e per passenger figure is calculated from passenger flights emissions and is only representative of the average carbon footprint of departing passengers at Stansted Airport.

a result of aviation industry improvements. The rate of the decrease would depend on the rate of improvement in aircraft and engine efficiency, air traffic management modernisation and use of sustainable fuel.

12.86 By 2050, the annual flight emissions from Stansted are projected to reduce to between 1.5MtCO_2 (best practice scenario) and 2.0MtCO_2 (pessimistic scenario). This represents between 4% and 5.3% of the 37.5MtCO_2 target for UK aviation by 2050.

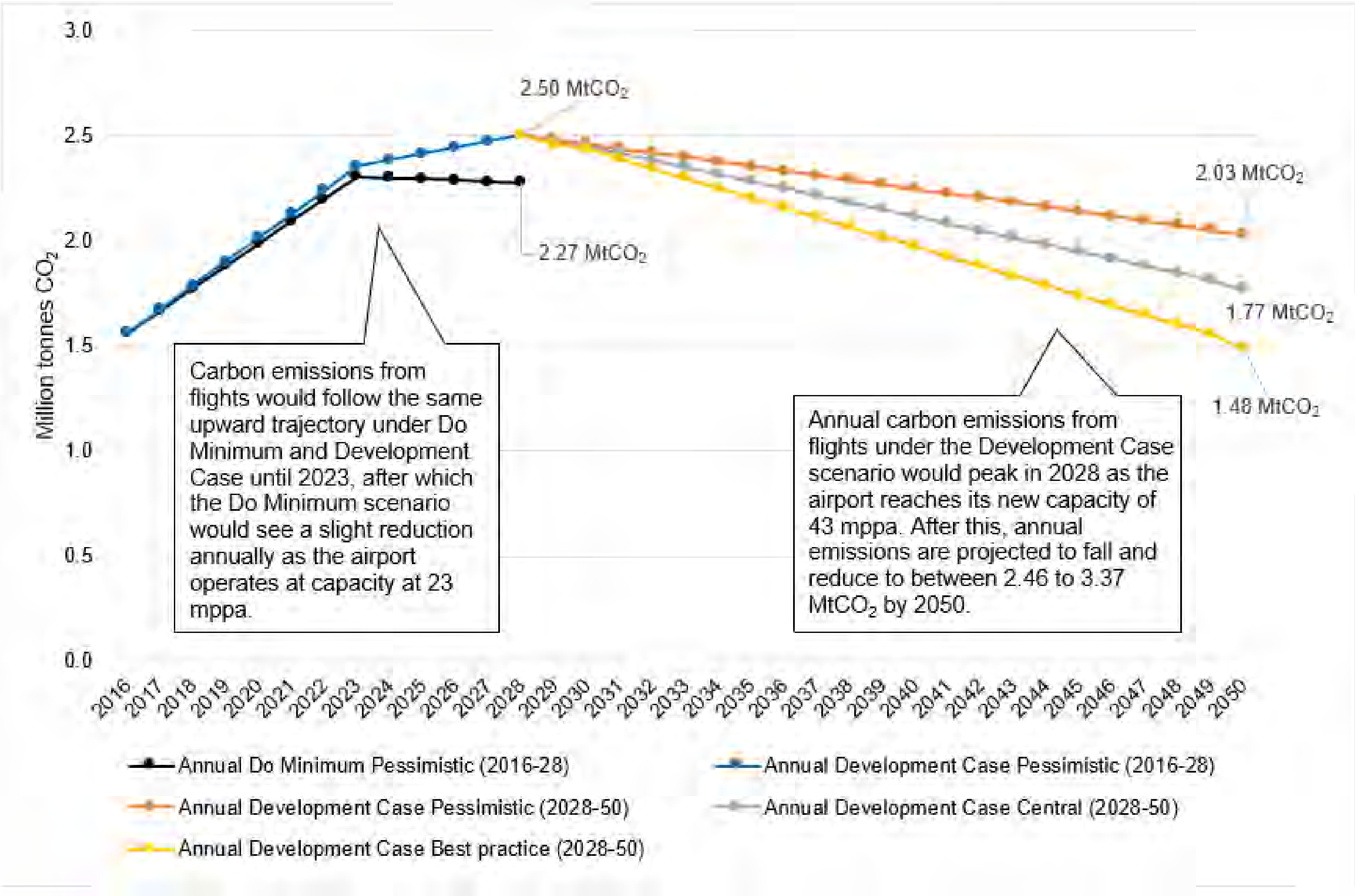

Figure 12.6: Annual flight emissions for the Do Minimum and Development Case scenarios under Pessimistic, Central and Best practice scenarios between 2016 and 2050

Surface Access

12.87 Transport carbon emissions relating to employee and passenger travel to Stansted are the second largest source of emissions after flights, accounting for 6% of the airport's total annual emissions in 2016 (0.17MtCO_2e), and 5% of total annual emissions in 2023 (0.20MtCO_2e) and 2028 (0.23MtCO_2e).

12.88 Figure 12.7 presents the change in annual transport carbon emissions between the 2028 Do Minimum (35mppa) scenario and the 2028 Development Case (43mppa). Under the Do Minimum scenario transport emissions are forecast to increase steadily from 2016 to 2023 reflecting the increase in passenger numbers to 35mppa. Thereafter transport emissions will slightly decrease due to changes in road fleet mix and improvements in vehicle efficiencies. For the Development Case, transport emissions would continue to increase between 2023 and 2028 because the increase in passenger numbers would outweigh vehicle efficiency improvements. For further detail on the assumptions behind the transport carbon assessment refer to Appendix 12.

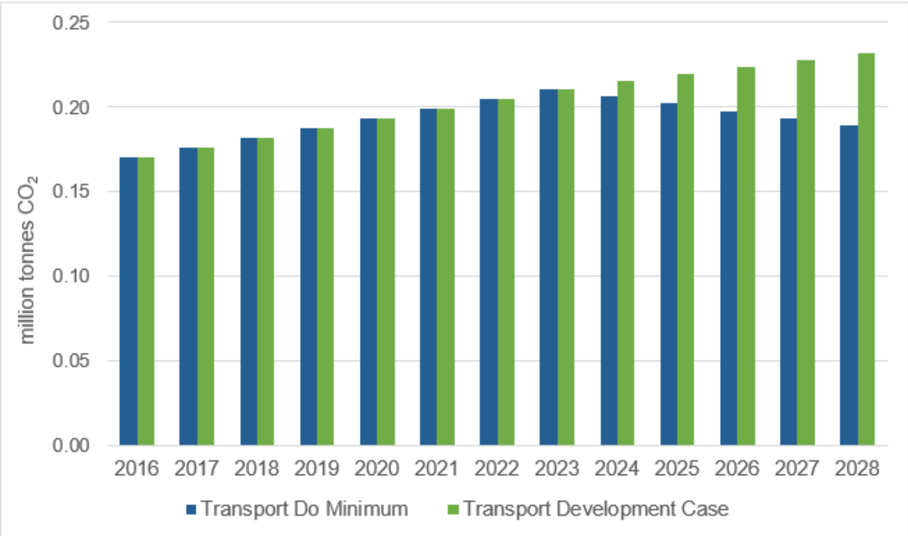

Figure 12.7: Interpolated time series of transport carbon emissions from 2016 to 2028

Airport Energy Plant

12.89 Carbon emissions due to gas consumption at Stansted Airport account for 0.2% of annual carbon emissions generated in 2016. Electricity consumption is not included and reported as zero carbon emissions reflecting the 100% 'green' tariff supply contract. Figure 12.8 shows how airport energy plant carbon emissions are expected to increase gradually reflecting the increase in passenger numbers under the Do Minimum scenario and the Development Case. In the Development Case (43mppa) landside carbon emissions would be higher (by 23% by 2028) than in the Do Minimum because of the larger number of passengers travelling to the airport from 2023 onwards and using the airport's buildings, infrastructure and facilities. For further detail on the landside carbon calculations refer to Appendix 12.

Figure 12.8: Interpolated time series of landside carbon emissions from 2016 to 2028

Airside

12.90 Airside carbon emissions include aircraft APUs, GSE, aircraft engine testing and use of the fire training ground. Figure 12.9 presents the change in annual airside carbon emissions between the Do Minimum (35mppa) scenario and the Development Case (43mppa). Under both scenarios the annual airside emissions are predicted to rise steadily between 2016 and 2023, from 0.007MtCO_2e to 0.010MtCO_2e, reflecting the increase in passenger and ATM numbers. From 2023, the Do Minimum scenario is predicted to plateau as the maximum capacity is reached, whereas the Development Case would continue to rise due to the increased capacity being made available by the proposed development.

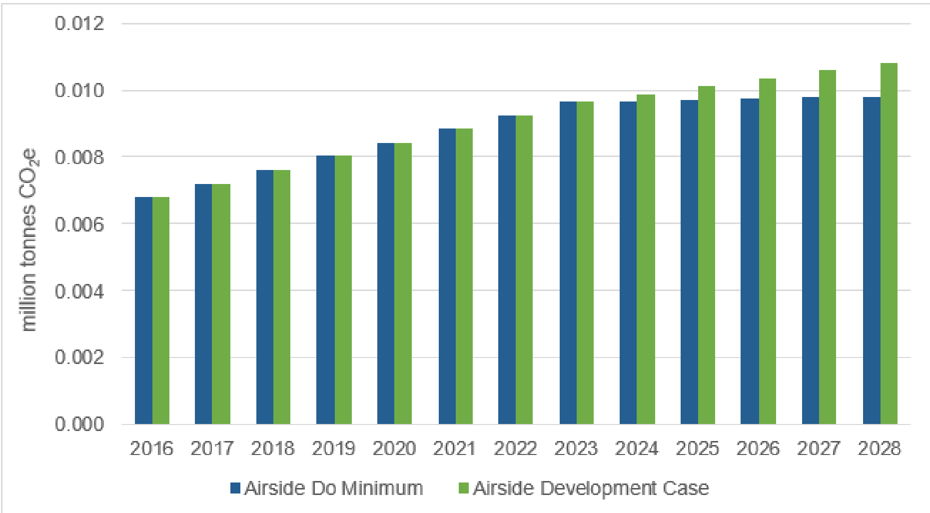

Figure 12.9: Interpolated time series of airside carbon emissions from 2016 to 2028

Mitigation

12.91 The incorporated mitigation (paragraphs 12.61 to 12.69) is extensive and covers elements of the carbon footprint that Stansted has direct (airport energy plant or construction) and indirect (aviation and surface access) influence over. This reflects best practice by combining compliance with international standards (such as the ACI ACA), engagement with government departments (such as Department for Transport and Network Rail) and setting long term targets.

Residual Effects

12.92 The UK's 2050 aviation target of 37.5MtCO_2e and the carbon budgets set by the CCC, if met, will not compromise the UK's wider ability to align itself with keeping global temperature increase below 2 degrees. The 37.5MtCO_2 emission target is a national target and as such is not sub-divided between UK airports. Stansted Airport's potential contribution towards this target has been estimated.

12.93 According to the DfT, Stansted Airport's share of UK aviation carbon emissions was 4% in 2016. By 2050 its share of emissions is not expected to change substantially, ranging between 4% and 5.3% of the UK's aviation emissions target (37.5MtCO_2). This is despite a 23% increase in passenger numbers from 35mppa to 43mppa. Stansted Airport's annual aviation carbon emissions are projected to decrease between 2028 and 2050 (see Figure 12.6). The rate of decrease will depend on the speed at which the aviation sector modernises airspace, invests in research and development, and introduces sustainable fuel (see Table 12.4). Although Stansted Airport cannot directly influence the wider aviation sector, the Development Case is unlikely to materially impact the UK's ability to meet its 2050 national aviation target of 37.5MtCO_2.

12.94 Emissions from the construction of the 35+ Project would account for approximately 0.001% of the total allocated budget for the UK's third carbon budget (2018-2022). This represents approximately 0.09% of all UK construction related emissions in 2022. Construction emissions represent a fraction of the UK's allocated carbon budgets set by the CCC, and will be further reduced through the CEMP and CoCP once a Main Contractor is appointed (see section 12.64). Construction emissions are not expected to materially impact on the ability of the UK government to meet its UK national carbon reduction target.

Cumulative Effects

12.95 All human activities produce carbon emissions. For the purpose of this report the proposed development's carbon impact has been set in the context of projected UK aviation emissions and the CCC's 2050 aviation carbon budget aligned with keeping global mean surface temperature increases below 2 degrees centigrade compared to pre-industrial temperatures.

12.96 According to the DfT UK aviation passenger demand has grown by an average of 3.8% between 1990 and 2016, and projected to continue to grow at a rate pf 1.2% to 1.5% by 2050. This growth is compatible with the UK's aviation and wider carbon commitments, but dependent on the aviation industry meeting its climate change goals of: achieving an average fuel efficiency improvement of 1.5% per year from 2009-2020, implementing a global offsetting scheme, and reducing net carbon emissions from aviation by 50% relative to 2005 levels.

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Chapter 13 Climate Change

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13 CLIMATE CHANGE

Introduction

13.1 This chapter of the ES, which has been prepared by Arup, provides the relevant legislative and policy context, an overview of the assessment methodology, baseline climate data, incorporated mitigation, results and additional mitigation measures for two separate, but related, climate change assessments. Summary descriptions for these two assessments are:

- The in-combination climate change impacts assessment: An assessment of the combined effects of the proposed development and potential climate change impacts on the receiving environment and community; and
- The climate change resilience assessment: An assessment of the resilience of the design, construction and operation of the proposed development to potential climate change impacts.

13.2 An illustration of the two assessments and their relation to each other, the proposed development, and the receiving environment and community is provided in Figure 13.1.

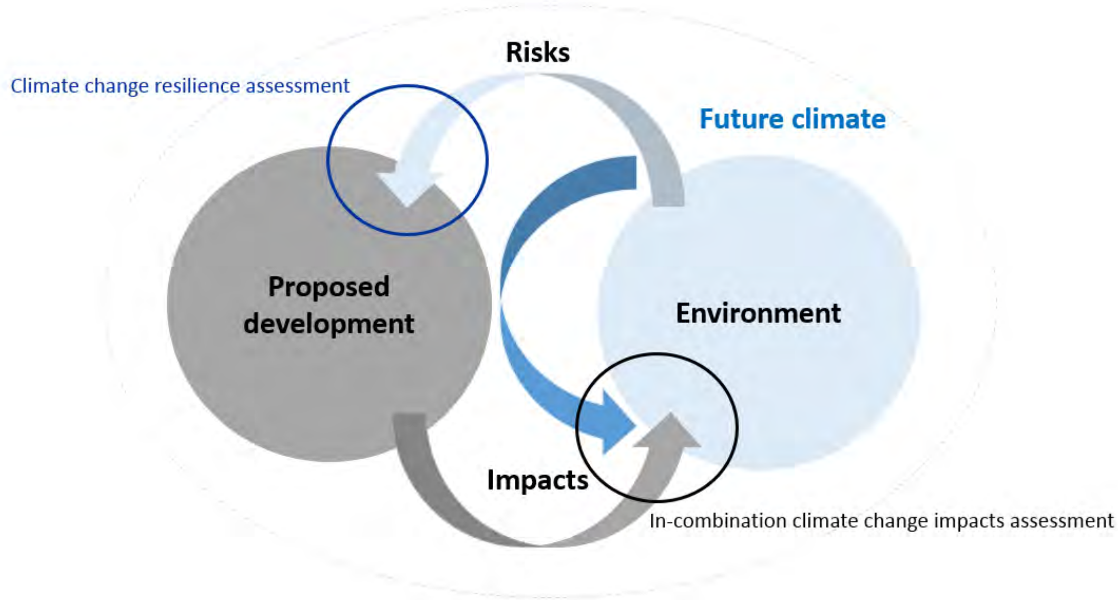

Figure 13.1: Illustration of the in-combination climate change impacts and climate change resilience assessments

13.3 Definitions of key terminology used in this chapter are summarised in Table 13.1.

13.4 This chapter has been written to enable the integration of aspects of the two climate change assessments into the planning, design and construction processes for the proposed development. It is supported by the following Appendices included in ES Volume 2:

- Appendix 13.1: In-combination climate change impacts assessment;
- Appendix 13.2: Climate change resilience assessment; and

- Appendix 13.3: Validation of the UKCP09 Weather Generator.

Table 13.1: Definitions of key terminology

Term	Definition
Weather	Conditions of the atmosphere over a short period of time (minutes to months).[1]
Climate	Description of the long-term pattern of weather in a particular area, typically over a 30-year period.[1]
Climate change	A change in climate conditions that can be statistically identified by changes in the mean and/or variability of its properties that persists for decades or longer.[2]
Extreme weather event	Events at the extremes of the full range of weather conditions and climate patterns experienced in the past.[3]
Climate hazard	An extreme weather event which poses a threat to an environment, population or development.[2]
Climate impact	The impact of an extreme weather event on an environment, population or development.[2]
Climate risk	Likelihood of a climate hazard occurring multiplied by the potential impact of this hazard.[4]
Resilience	The ability of a system to anticipate, withstand, adapt to and recover from shocks and stresses.[2]

Legislation, Guidance and Planning Policy Context

13.5 'Cross cutting' policies and plans which are relevant to the consideration of climate change and other effects are described in ES Appendix 3.1 and the Planning Statement which accompanies the planning application. Such policies, including those in the UDC Local Plan, are not repeated here to avoid the chapter becoming unduly long or repetitive of other parts of the ES. Instead, the section acts to highlight some of the more pertinent and specific legislation, guidance and policies that are relevant to this topic.

European Legislation and Policy

13.6 The amended EIA Directive 2014/52/EU[5] identifies the important role that the EIA process can play in assessing climate change impacts and risks. It states that EIAs shall identify, describe and assess the direct and indirect significant effects of climate, and the risk of major accidents and/or natural disasters that are relevant to the project, including those caused by climate change. On 16 May 2017 the amended EIA Directive 2014/52/EU was transposed into UK law[6].

National Legislation and Policy

13.7 The UK Climate Change Risk Assessment (CCRA) 2017[7] was published in January 2017. This is the second CCRA to be published since the 2008 Climate Change Act[8] which requires the Government to publish a national climate change risk assessment every five years. The CCRA 2017 summarises observed and projected climate changes in the UK, and categorises risks into urgency categories allowing for prioritisation of adaptation programmes. Key challenges highlighted for air transport include extreme weather events such as thunderstorms, flooding, changes to seasonal precipitation, high temperatures, and snow and ice. These risks and challenges have been considered in the assessments.

13.8 Under the 2008 Climate Change Act, the UK Adaptation Reporting Power (ARP) grants the Government power to request organisations to report on their climate change related risks and to set out proposals for adapting to these risks. In 2015, STAL submitted a Climate Change Adaptation Progress Report[9] under the ARP first and second rounds of reports, which has informed the climate change resilience assessment.

13.9 In June 2017 the Committee on Climate Change, (CCC), an independent body providing advice to the UK Government, issued its annual report to Parliament[10]; the findings of which were used to inform the resilience and in-combination assessments. In the report, the committee highlighted growing concerns regarding surface water flooding and associated impacts such as damage to land and freshwater habitats and that there is a need to consider the impacts on health from current and future high temperatures. The CCC does not believe current adaptation plans are adequate to address these risks. Risks from infrastructure interdependencies were also raised as potential concerns. Whilst the CCC acknowledges improved resilience of airport infrastructure, it does not believe sufficient progress is being made in road and rail infrastructure resilience. Finally, concerns have also been raised regarding the ability to meet future water demand, although the CCC does believe good progress is being made in managing vulnerabilities in this area.

13.10 A call for evidence on a new aviation strategy[11] from the Government was published in July 2017. The document states that airports should consider how investment in future infrastructure could be used to support greater resilience, including resilience to extreme weather events. Furthermore, the document highlights that airports should establish well-developed resilience plans and share these with relevant stakeholders.

13.11 The draft Airports National Policy Statement (NPS)[12] and revised draft Airports NPS[13] state that major airport infrastructure applications should account for the effects of climate change. Although the documents are directed at development at London Heathrow Airport, they indicate the direction of travel for climate change policy and the UK aviation industry. The draft and revised draft NPSs recognise that climate change adaptation is necessary to deal with the potential impacts of a changing climate, that impacts are already occurring and that new developments should be planned, designed, built and operated to avoid increased vulnerability to the range of impacts arising from climate change.

Local Policy

13.12 The currently adopted UDC Local Plan[14] states that assessments of areas with a high potential risk of flooding need to take into account new information in line with climate change projections. A draft of the new Local Plan for UDC was made available in 2017[15]. The draft plan states that proposals for development are expected to mitigate against and be resilient to climate change impacts and the risk of flooding.

13.13 The UDC Climate Local Strategy and Action Plan 2015 – 2018[16] sets out UDC's objectives and a framework for local action on climate change over the next four years. It recognises the importance of businesses, such as STAL, working with local residents and communities to build in climate resilience to the impacts of climate change, and the benefits of doing so in terms of health and wellbeing and economic resilience. The strategy highlights that UDC will continue to work in partnership with local groups, organisations and businesses to deliver action and help the district mitigate and adapt to climate change.

13.14 The Essex County Council (ECC) Action Plan on 'Managing the risks from weather extremes - Adaptation in Action'[17] highlights the potential disruption severe climatic events could have on services in the region and sets out how ECC plans to build resilience into its services and reduce potential damage and cost.

Technical Guidance

13.15 At an international level, the Intergovernmental Panel on Climate Change (IPCC) published the IPCC Fifth Assessment Report[18] (AR5) in 2014. The principal findings demonstrated that warming of the atmosphere and ocean system is indisputable, and that this will lead to changes in current climate conditions. Moreover, the United Nations (UN) have incorporated aims to combat climate change as part of their Sustainable Development Goal number 13[19]. At the UN 21st Conference of the Parties (COP21) in 2015[20], participating countries signed the Paris Agreement, committing to work to limit global temperature rise and build climate resilience.

13.16 In 2016, the International Civil Aviation Organisation (ICAO) published an Environmental Report 'On Board a Sustainable Future'[21]. Chapter 7 (Climate Change Adaptation and Resilience) of the report outlines the potential climate risks to the aviation industry, particularly to aircraft and airport operations whilst highlighting the risks posed by high temperatures, changes in rainfall and storm patterns, and other weather phenomenon. A series of international airport case studies are also provided; these risks and case studies were used to inform the assessments.

13.17 The European Commission (EC) has prepared guidance to help Member States improve the way in which climate change is integrated into EIAs carried out under the amended EIA Directive[22]. This guidance has been used to develop the methodologies used for the assessments. The document includes climate change related guidance for screening and scoping, analysing evolving baseline trends, identifying alternative and baseline measures, monitoring and adaptive management. It also recommends that alternatives and measures are considered at the planning and design stages to ensure that projects are resilient to the impacts of climate change. It highlights a shift in thinking to account for possible long-term risks in environmental assessments, and the role of resilience in this shift.

13.18 The European Organisation for the Safety of Air Navigation (EUROCONTROL) published the summary report 'Challenges for Growth'[23] in 2013. The report provides a review of climate change risks up to 2050 and highlights their relevance to the aviation industry. Potential resilience measures are outlined, including review of infrastructure and personnel requirements, airspace design changes, and contingency planning. Furthermore, in 2016 EUROCONTROL published the European Aviation Environmental Report[24], including a section on adapting the aviation industry to a changing climate. The report highlights heavy rain, higher temperatures, changes in snow cover, storms, changing wind and sea level rise as key climate change impacts for European aviation. A set of adaptation case studies are also included. The risks and resilience measures outlined in these two documents were used to inform the assessments.

13.19 The Institute of Environmental Management and Assessment (IEMA) has published guidance on climate change resilience and adaptation in response to the requirements specified in the amended Directive[25]. This guidance describes an approach to integrating climate change adaptation and resilience assessments into the EIA process in the UK, which has been used to inform the assessments described here.

13.20 The Planning Practice Guidance section on climate change[26], a supporting document to the National Planning Policy Framework (NPPF)[27], focuses on the integration of adaptation and mitigation approaches in the planning process. It includes guidance on approaches to support sustainable development via 'win-win' solutions such as multi-functional green infrastructure[i] and natural ventilation, and recommends building in flexibility to allow future adaptation if needed.

13.21 The latest Environment Agency (EA) advice on climate change and flood risk assessments[28] provides the climate change allowances and peak rainfall intensities to be considered in the assessment of climate change resilience. These allowances have not been used directly in the climate change assessments, but were considered by the flood risk assessment outlined in ES Chapter 15 (Water Resources and Flood Risk) and ES Appendix 15.1.

[i] Natural networks of vegetated, soil covered, or water covered spaces that maintain and enhance ecosystem services, improve health and wellbeing, reduce pollution, and help mitigate effects of climate change. Examples include trees, green roofs, parks, woodlands, and wetlands.

Assessment Methodology and Significance Criteria

13.22 Both assessments have used the baseline data summarised under 'Baseline Conditions' later in this chapter, and have considered potential weather and climate related impacts and risks during construction and operation. The results are presented in the subsequent sections.

13.23 General information on potential climate impacts and climate adaptation for airports has been reviewed. Table 13.2 lists potential impacts on airport infrastructure due to climate risks, based on a climate resilience factsheet from EUROCONTROL[29]. This information has informed the two climate change assessments by indicating which climate-related changes are most likely to impact air transport and infrastructure.

Table 13.2: Climate risks and potential impacts to airports based on EUROCONTROL climate resilience factsheet

Climate risk	Impact
Precipitation change	▪ Disruption to operations e.g. airfield flooding, ground subsidence ▪ Reduction in airport throughput ▪ Inadequate drainage system capacity ▪ Inundation of underground infrastructure ▪ Inundation of ground transport access ▪ Loss of local utilities provision
Temperature change	▪ Changes in aircraft performance ▪ Changes in noise impact due to changes in aircraft performance ▪ Heat damage to airport surface ▪ Increased heating and cooling requirements ▪ Increased pressure on local utilities
Wind changes	▪ Convective weather: disruption to operations ▪ Convective weather: route extensions ▪ Jet stream: potential increase in en-route turbulence ▪ Local wind patterns: potential disruption to operations and changes to distribution of noise impact
Extreme events	▪ Disruption to operations, route extensions ▪ Disruption to ground transport access ▪ Disruption to supply of utilities

13.24 The specific approaches and methodologies for each assessment are summarised below.

In-Combination Climate Change Impacts Assessment

13.25 The scope for the in-combination climate change impacts assessment has been defined to include the following ES topics: Surface access and transport; Air noise; Ground noise; Surface access noise; Air quality; Socio-economic effects; and Public health and wellbeing.

13.26 The approach and methodology for the in-combination climate change impacts assessment is as follows:

1. Analysis of relevant climate change and weather data, emissions scenarios and probability levels;
2. Assessment of potential climate change impacts for all environmental topics, informed by guidance and topic-specific literature about climate change impacts;

3. Assessment of each environmental topic's respective significant effects and the corresponding mitigation measures identified by each topic;

4. Assessment of any potential in-combination climate change impacts given existing mitigation measures (i.e. mitigation measures identified by each environmental topic) and categorisation of these impacts as 'likely' or 'unlikely' and 'high' or 'low' consequence;

5. Assessment of whether there are any significant in-combination climate change effects, based upon whether potential in-combination climate change impacts are assessed to be 'likely' or 'high' consequence;

6. Consideration of additional mitigation measures to address significant in-combination climate change effects, beyond those identified by other environmental topics; and

7. Inclusion of allowances for future mitigation measures and monitoring, to provide continued resilience of receiving environment.

13.27 Following the in-combination climate change impacts assessment, environmental topics will be categorised into one of four categories:

1. Many potential in-combination climate change impacts, considered likely with high consequences;

2. Some potential in-combination climate change impacts, considered likely with high consequences;

3. Some potential in-combination climate change impacts, considered unlikely with low consequences; and

4. No potential in-combination climate change impacts.

13.28 The in-combination climate change impacts assessment and results are summarised in this chapter of the ES and presented in more detail in ES Appendix 13.1.

Climate Change Resilience Assessment

13.29 The scope of the climate change resilience assessment considers the proposed Rapid Exit Taxiway (RET), Rapid Access Taxiway (RAT), 9 new remote aircraft parking stands, current airport infrastructure (airfield pavements and terminals), flights, and surface access. Although no further proposed changes to current airport assets and infrastructure are made by this application, assets and infrastructure associated with the current airport are likely to be affected by the increase in passenger capacity, and have therefore been considered in the assessment. Additionally, the underlying resilience of Stansted Airport to weather events and climate change risks contributes to the resilience of the proposed development.

13.30 The approach and methodology for the climate change resilience assessment is as follows:

1. Analysis of relevant climate change and weather data, emissions scenarios, timescales and probability levels;

2. Identification and assessment of climate hazards and disruptive weather conditions, informed by guidance and topic-specific literature on climate change impacts;

3. Identification of potential risks from these climate hazards to the infrastructure and operations of Stansted Airport (including those brought about by the proposed development);

4. Consideration of the resilience of the planning application within the context of any incorporated mitigation measures, including STAL's existing risk management policies, the existing Adaptation Plan, resilience measures which are embedded within the design, and operational resilience measures; and

5. Identification of need for any further resilience measures to protect Stansted Airport against the effects of climate change.

13.31 The risk assessment is based on the likelihood of a hazard having an impact on the proposed development, and the consequence of the impact. The resulting risk level is assessed as the likelihood multiplied by the consequence. As described in ES Appendix 13.2, the potential likelihood and consequence of impacts to the proposed development were assessed using a qualitative five by five risk assessment matrix with five distinct risk levels.

13.32 The climate change resilience assessment and results are summarised in this chapter of the ES and presented in more detail in ES Appendix 13.2.

Baseline Conditions

Current Climate Conditions

13.33 This section summarises current climate conditions for the area around Stansted based on historic weather data and information about extreme weather events, in accordance with the definitions set out in Table 13.1. The data reviewed includes historic weather data from the Met Office weather station in Andrewsfield, and Local Climate Impact Profiles (LCLIPs) for ECC and HCC. These locations in relation to the airport are shown in Figure 13.2 below.

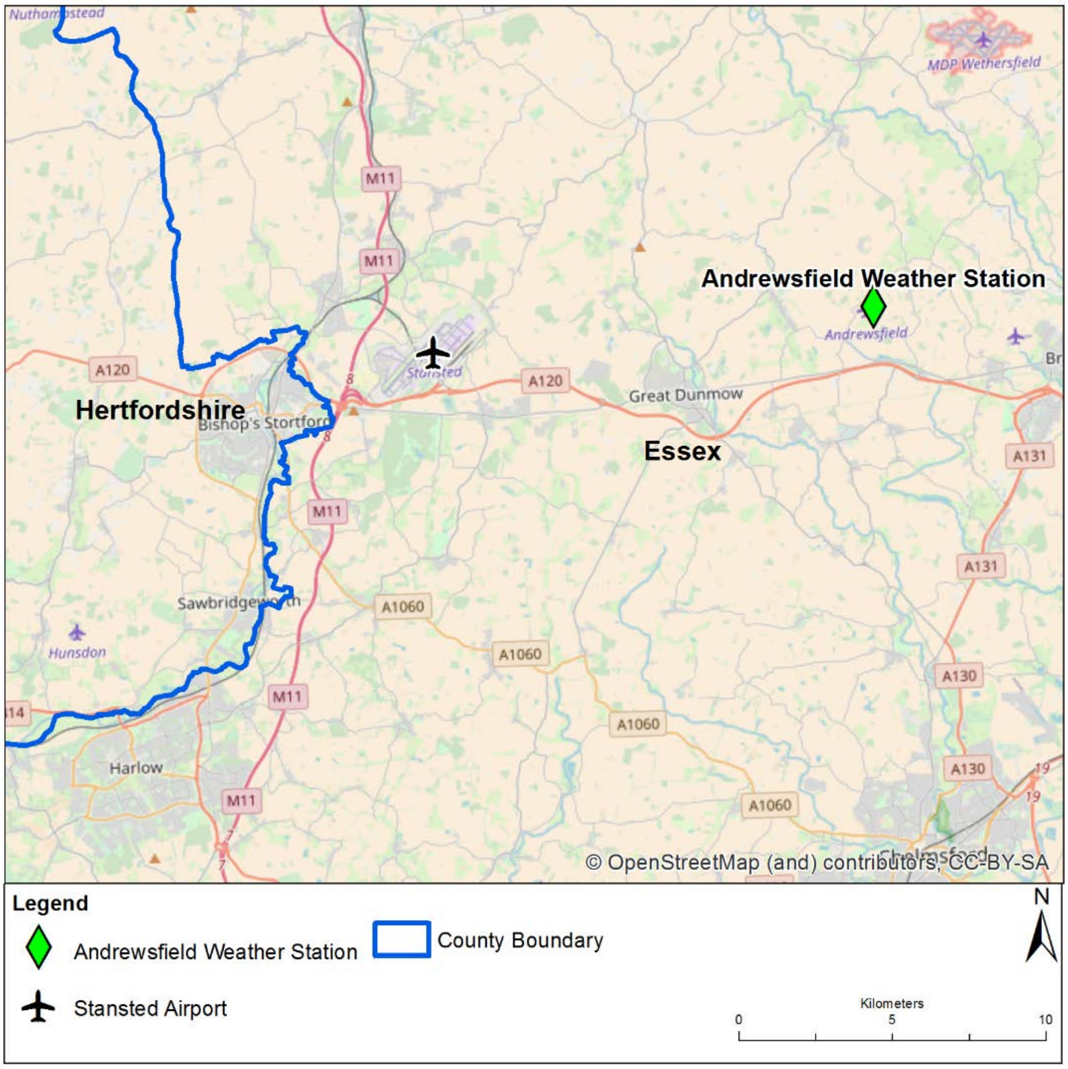

Figure 13.2: Map of Stansted Airport, Andrewsfield weather station, and their relation to Essex County and Hertfordshire County (Source: OpenStreetMap and Arup)

13.34 The baseline climate is defined as the average values of climate variables over a 20-30-year period. To determine current climate conditions for the area around Stansted, a baseline period for 1981-2010 was used, as the data for this period was freely and readily available. However, it should be noted that the climate change projections described in the subsequent section are available based on a baseline period of 1961-1990.

13.35 Table 13.3 provides historic weather data for the period 1981-2010, from the Met Office weather station in Andrewsfield[30] located 13 km (8 miles) east of Stansted Airport. There is also a weather station located at Stansted Airport; however, data from this station dating back to 1980 is not freely available. To enable comparison of the current climate of the Stansted area with the wider region, average values for the Met Office East Anglia region are also provided. These values are used as a baseline for later comparison with future climate projections in the Stansted area.

Table 13.3: Historic weather data for Andrewsfield and East Anglia (1981-2010), Met Office

Parameter	Andrewsfield 1981-2010	East Anglia 1981-2010
Annual average maximum temperature [°C]	13.8	14.2
Annual average minimum temperature [°C]	6.1	6.2
Average maximum summer temperature [°C]	21.1	21.3
Average minimum winter temperature [°C]	1.4	1.4
Annual number of frost days[ii] [days]	48	47
Annual number of cold days[iii] [days]	7.3	10.4
Annual number of sunshine [hours] (cloud cover [%])	data unavailable	1,570 (82%)
Annual average rainfall [mm/day]	1.68	1.71
Annual number of days with rainfall >1mm [days]	112	115
Annual average wind at 10m [m/s]	4.2	data unavailable

13.36 Stansted Airport is located in the UDC administrative area in Essex close to the border with Hertfordshire. Therefore, Local Climate Impact Profiles (LCLIPs) for Essex and Hertfordshire are useful for identifying past extreme weather events in the area and their associated impacts. The LCLIP reports contribute to an understanding of the local areas' exposure and vulnerability to extreme weather events and how prepared the relevant authorities and organisations, such as local councils, emergency services, and public transport providers, are in responding to these events and impacts. Understanding exposure and vulnerability can increase awareness of and action to prepare for future climate change and contributes to strategies for mitigating climate change related risks.

13.37 The main findings from the LCLIPs for ECC[31] and HCC[32] are summarised in Table 13.4, including the potential impacts to Stansted Airport. The LCLIPs were undertaken in 2010 and have not been updated since. The Essex LCLIP covers a 5-year period from 2004-2009 only, whilst the Hertfordshire LCLIP covers a 10-year period from 1999-2009. The LCLIPs clearly demonstrate, due to the number of reported incidents, that the two counties and therefore STAL are potentially at risk from a range of weather impacts. These weather impacts are not necessarily a result of climate change, but rather events that have occurred due to current conditions and natural variability. However, the frequency of these types of events is likely to increase as a result of climate change, and the LCLIPs therefore provide an indication as to how changes in climate might impact the airport and surrounding local areas.

[ii] Days where the daily minimum air temperature is less than 0°C.
[iii] Days where the daily mean air temperature is less than 0°C.

Table 13.4: Summary of past extreme weather events for Essex (2004-2009) and Hertfordshire (1999-2009), and resulting impacts, along with potential risks to Stansted Airport

Weather event	Impacts on community and local services		Potential risks to Stansted Airport
	Essex LCLIP (2004-2009)	Hertfordshire LCLIP (1999-2009)	
Heavy rain and flooding	Caused over 60 incidents across Essex Road and rail travel disruptions Disruption to public sector services such as school closures and a surge in calls from the public to emergency services	Over 30 flooding events Increased road accidents and associated injuries, and injuries to individuals trapped in floods Disruption to surface access travel, increased travel congestion and delay, and strain on council resources Damage to rail infrastructure, highways and homes Raw sewage leakages, overflows and detrimental impacts on water quality	Inundation of airfield, airport building basements and sub-structures, utility cables/tunnels Flash flooding, erosion/scouring of embankment areas, ground destabilisation/subsidence and possible weakening of foundations Inundation of access roads and railways causing delayed access to airport Damage to airfield pavements Submergence and inoperability of underground utility equipment (i.e. fuel system valves, pumps and controls)
Storms and strong winds	Structural damage to buildings from falling trees Rail and road disruptions Power cuts and outages	Over 15 storm and wind events Fatalities, tree fall and debris causing minor and major injuries Power cuts, congestion and disruption Wet weather affecting local farmers crop quality and yields	Debris on runways, fallen trees on ground transport networks impeding access Failure or damage to airport buildings and/or infrastructure due to extreme winds and gusts Exceedance of cross wind speed limits and greater turbulence interfering with aircraft operations Damage from direct lightning strikes and hail
Heatwaves and high temperatures	Health concerns in vulnerable people Agricultural difficulties intensified by drought conditions Rail disruption due to track and overhead cable issues	7 instances of heatwaves or high temperatures Cases of extreme dehydration, sunburn and heat stroke Increase in cases of people with breathing difficulties Water cuts due to increased demand and prolonged	Increased heat stress for passengers and staff Sensitive electronic equipment and mechanical operating mechanisms may fail to operate correctly at high temperatures Increased cooling demand and duration of heating, ventilation and air-conditioning (HVAC) system running

Weather event	Impacts on community and local services		Potential risks to Stansted Airport
	Essex LCLIP (2004-2009)	Hertfordshire LCLIP (1999-2009)	
		drought-like conditions Disruption to rail services, damage to road infrastructure Rivers, trees and plants affected by drought Issues surrounding domestic refuse and litter	to maintain comfortable internal conditions for passengers and staff Reduced water availability due to increased incidence of drought conditions Impacts on aircraft and utilisation schedules due to maximum take-off weight limits and impacts on aircraft refuelling
Snow, ice and cold temperatures	Inaccessible roads due to low grit supply Road incidents and rail disruptions Long term damage to roads, e.g. potholes, which are expensive to repair	13 incidences of snow, ice and cold temperatures Increased demand on emergency services Injuries and fatalities due to traffic incidents and slips/falls Loss of public services for a period of time Disruption to road transport and rail infrastructure Increased demand for council services, e.g. gritters	Sensitive electronic equipment and mechanical operating mechanisms may fail to operate correctly at low temperatures Cracking of pavement surfaces, snow/ice accretion on aircraft and runways/airfield pavements causing delays Build-up of ice on airport building rooftops Increased demand for heating and duration of HVAC system running to maintain comfortable internal conditions for staff and passengers More intensive de-icing activities increasing the use of aircraft de-icing fluids (ADF) on aircraft and critical pavement surfaces with the potential for environmental pollution incidents

13.38 As the LCLIPs only covered incidents up to 2009, a high level review was undertaken of more recent local weather events. A sample of these findings are summarised in Table 13.5.

Table 13.5: Sample of more recent weather events (2014-2017) that have impacted the area around Stansted

Weather event	Date	Impacts
Storms and heavy rainfall	February 2014	Flooding causing road and rail closures between Takeley, Hatfield Heath, Hatfield Broad Oak and Stansted Airport[33,34]
Storms and heavy rainfall	July 2015	Roads in Bishop's Stortford closed due to flooding[35,36]
Storms and heavy rainfall	January 2016	Flooded roads cause traffic disruption around Saffron Walden[37]
Lightning	September 2016	Rail disruption to trains between Bishop's Stortford and Stratford due to lightning strike[38]
Heavy fog conditions	December 2016	Flight delays and increased incoming air traffic due to diversions[39,40]
Storms and heavy rainfall	July 2017	Lightning storms caused rail closures and cancellation of trains after overhead cables were brought down, closure of all lines between Bishop's Stortford and Stansted Airport, damage to buildings[41,42]
Snow	December 2017	Temporary runway closure and suspension of flights due to heavy snow[43]

Future Climate Conditions

13.39 This section provides climate change projections for a range of climate variables. The projections are based on the Met Office's UK Climate Projections 2009 (UKCP09)[44], which are the most recent and comprehensive projections for the UK.

13.40 The projections are based on different probability levels and emission scenarios for 'the 2020s' (which is defined by the Met Office as the period 2010-2039) and 'the 2050s' (which is defined by the Met Office as the period 2040-2069). These periods cover the construction and operation stages of the proposed development; including the future assessment years of 2023 (and 2028. Additionally, these periods represent the short term and medium term climate change scenarios respectively.

13.41 All climate change projections are subject to uncertainties, due to the complexity of the climate system, natural climate variability, and uncertainty over future greenhouse gas emission levels[45]. These uncertainties are dealt with in UKCP09 through emissions scenarios and probability levels and do not detract from the robustness of the assessments. Table 13.6 gives the UKCP09 climate change projections for meteorological changes for 'the 2020s' and 'the 2050s', for both a medium emissions and high emissions scenario at the 50% probability level. A reference range is also provided in each case, using the 10% probability level medium scenario as a lower limit and the 90% probability level high scenario as an upper limit. This provides an estimate of the uncertainties associated with the 50% level estimate, as it is highly likely the future climate variable will lie within this range. Baseline values for the current climate, based on data from the Andrewsfield weather station, are also provided in brackets for comparison where data is available.

13.42 The UKCP09 climate change projection data is available for 25x25km grid squares, due to the fact the Regional Climate Models (RCMs) which the projections are based on operate at 25km resolution. The grid square used to obtain data for the Stansted area is shown in Figure 13.3 below.

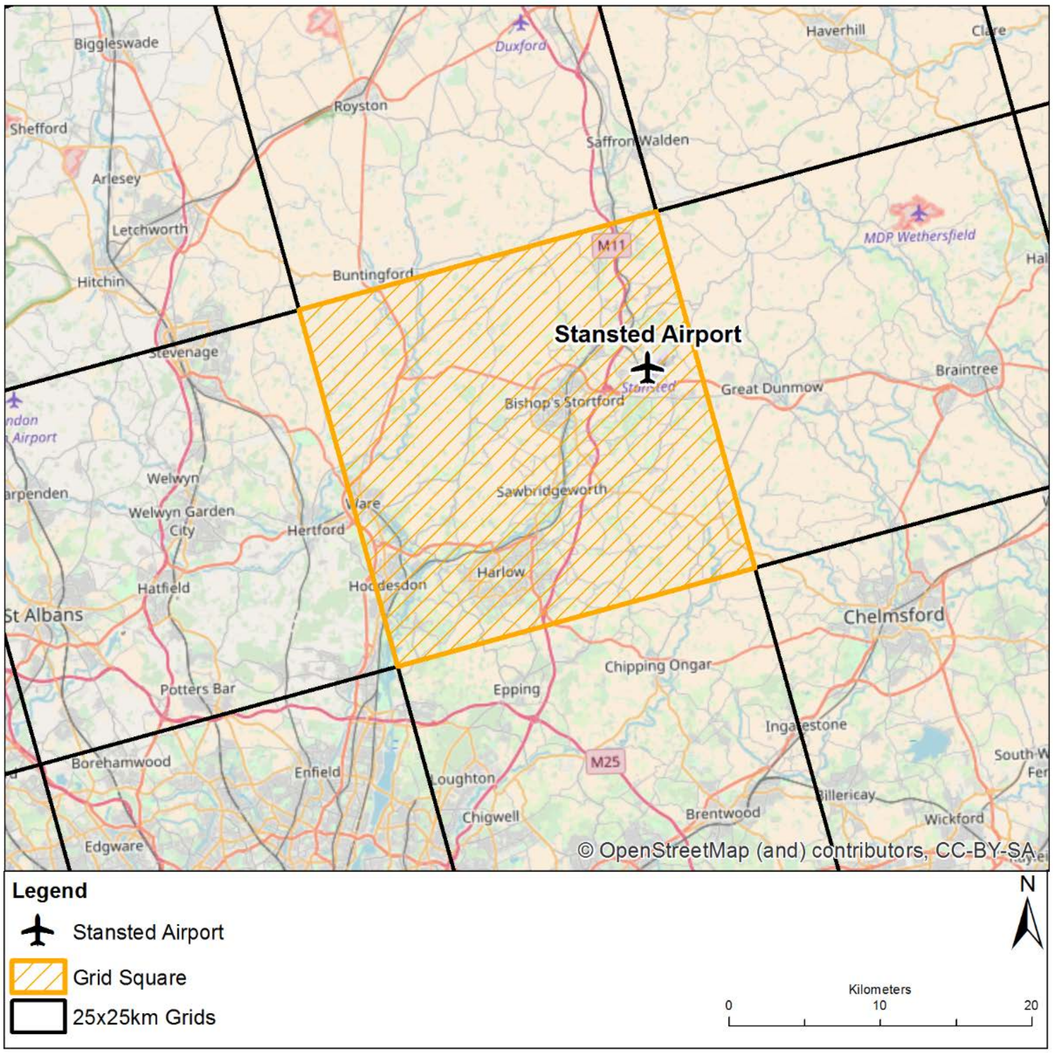

Figure 13.3: 25x25km grid square used for obtaining future climate change projections in the vicinity of the airport (Source: OpenStreetMap, UKCP09 and Arup)

13.43 It can be seen from Table 13.6 that for 'the 2020s' projections there is little variation (around 0-3%) between the medium and high emissions scenarios. For 'the 2050s' projections however, the differences between the medium and high scenarios are greater (ranging from 1%-14%) and the ranges indicate higher uncertainty, as to be expected looking into the future. On average, the data suggests that mean temperatures will increase, winter precipitation rates will increase and summer precipitation rates will decrease.

Table 13.6: UKCP09 climate change projections for meteorological changes for the Stansted area[44]

Parameter and baseline (in brackets) * = baseline data unavailable		'2020s' (2010-2039)			'2050s' (2040-2069)		
		Medium emissions scenario (50% level)	High emissions scenario (50% level)	Range[iv]	Medium emissions scenario (50% level)	High emissions scenario (50% level)	Range
Temperature	Mean winter daily temperature [°C] (*)	5.11	5.12	4.36-5.98	5.98	6.30	4.92-7.61
	Mean summer daily temperature [°C] (*)	17.2	17.2	16.29-18.39	18.42	18.76	16.98-20.84
	Mean daily summer maximum temperature [°C] (21.1)	22.62	22.57[v]	21.26-24.07	24.11	24.63	22.05-27.41
	Mean daily summer minimum temperature [°C] (11.2)	12.22	12.27	11.39-12.35	13.39	13.81	11.98-15.85
	Mean daily winter maximum temperature [°C] (6.9)	8.0	8.0	7.16-8.98	8.77	9.04	7.48-10.77
	Mean daily winter minimum temperature [°C] (1.4)	2.20	2.28	1.29-3.22	3.10	3.54	1.69-5.22
Precipitation	Annual mean daily precipitation [mm/day] (1.68)	1.67	1.67	1.59-1.76	1.67	1.66	1.58-1.76
	Winter mean daily precipitation [mm/day] (1.63)	1.74	1.75	1.58-1.29	1.89	1.92	1.68-2.24
	Summer mean daily precipitation [mm/day] (1.70)	1.58	1.63[vi]	1.27-1.99	1.39	1.38	1.03-1.84
Wind	Change in winter mean daily wind speed (*)	-	-	-	-	-	-
	Change in summer mean daily wind speed (*)	-	-	-	-	-	-
Relative humidity	Annual relative humidity (*)	81.55	81.58	79.89-83.11	80.42	80.08	77.95-82.35
Cloud cover	Annual cloud cover [%] (*)	0.66	0.66	0.64-0.69	0.65	0.65	0.62-0.68

13.44 These predictions are based on baseline climate values from 1961-1990, and predict future *average* changes in climate. Extreme changes in climate are difficult to predict as they do not

[iv] Range is from 10% probability level at the medium emissions scenario to 90% probability level at the high emissions scenario.
[v] Value for the '2020s' high emission scenario at the 50% probability level is marginally lower than value for the medium emissions scenario, but overall trend for the 2020s and 2050s is an increase.
[vi] Value for the '2020s' high emission scenario at the 50% probability level is marginally higher than value for the medium emissions scenario, but overall trend for the 2020s and 2050s is a decrease.

always build on historic patterns[46]. These limitations should be considered when analysing the below climate change projection data.

13.45 Table 13.7 contains projections for extreme weather events, including hot days, cold days, heavy rainfall and dry spells. These projections were obtained from the Weather Generator (WG) in UKCP09. Baseline values for the current climate are provided in brackets. These values vary between threshold detection runs, therefore an average of these values has been used.

13.46 The definition of cold days used here should not be confused with the Met Office definition of frost days which is 'the annual number of days where the daily minimum temperature is 0°C or lower'. In Table 13.7 'cold days' are defined as the number of days where the daily mean temperature is 0°C or lower. This definition is considered to be more illustrative of the types of cold weather events which may result in operational impacts for Stansted Airport, such as snow and ice accretion on aircraft, runways and airfield pavements.

13.47 The WG data is available for 5x5km grid squares, due to the fact it is based on 5km gridded rainfall data from the Met Office. The grid squares used to obtain WG projections for the Stansted area are shown in Figure 13.4 overleaf.

Table 13.7: UKCP09 Weather Generator projections for future extreme weather events for the Stansted area[47]

Parameter and baseline (in brackets)		'2020s' (2010-2039)		'2050s' (2040-2069)	
		Medium emissions scenario	High emissions scenario	Medium emissions scenario	High emissions scenario
Temperature	Annual number of hot days – defined as events when daily mean temperature is >25°C (0.06)	0.42	0.43	1.34	1.48
	Annual number of cold days - defined as when daily mean temperature is <0°C (6.59)	3.74	3.65	2.23	2.03
Precipitation	Annual number of events when precipitation is greater than 25mm per day - based on Met Office definition of 'heavy rain' (0.91)	1.27	1.27	1.36	1.40
	Annual number of dry spells - defined as 10+ days with no precipitation or <0.2mm/day (5.25)	5.90	6.04	6.54	6.70

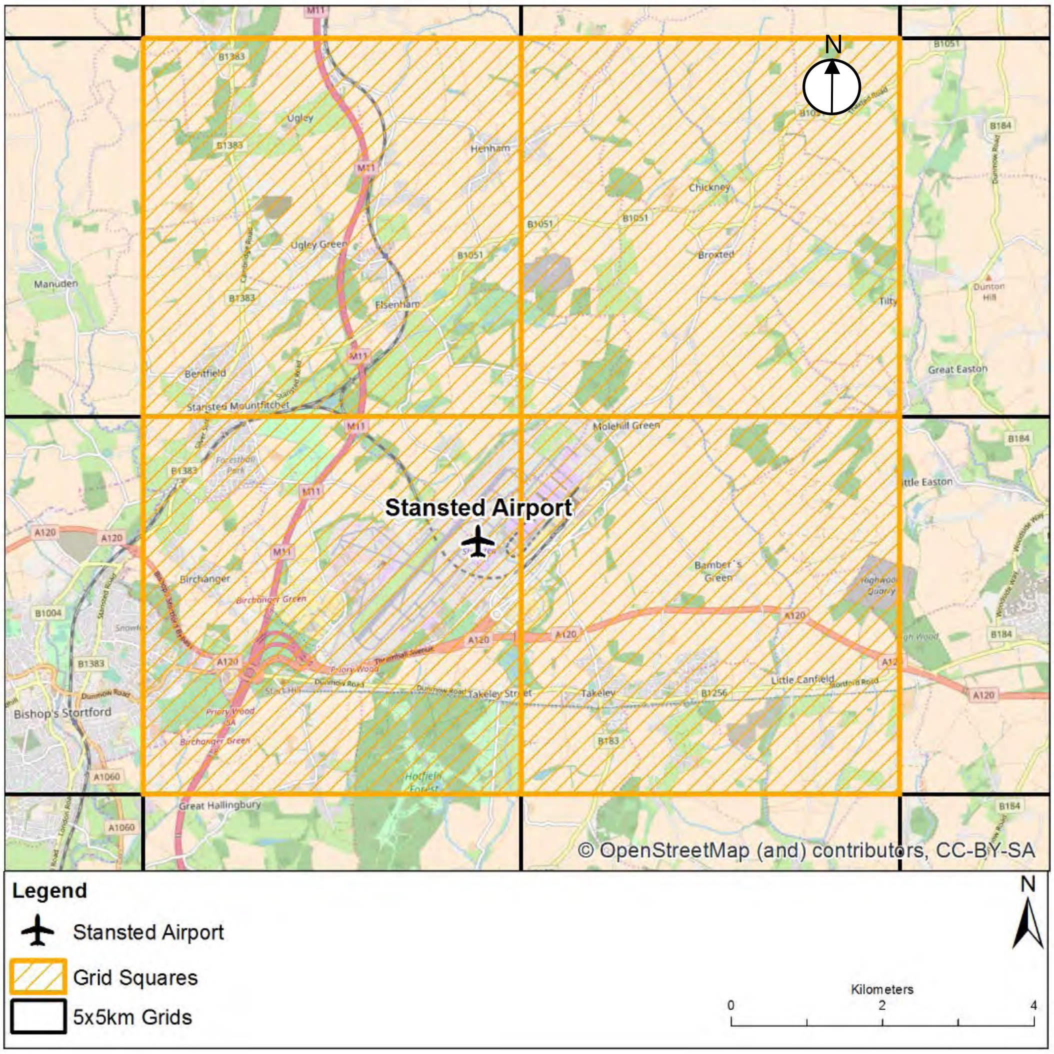

Figure 13.4: 5x5km grid squares used for obtaining WG projections (Source: OpenStreetMap, UKCP09 and Arup)

13.48 Data in Table 13.7 demonstrates that the frequencies of hot days, dry spells and heavy rainfall will all increase in the future compared to the baseline, whilst the number of cold days will decrease. This suggests hot day temperatures (>25°C) and heavy rainfall will pose a higher risk to Stansted Airport than cold temperatures, and that the need for de-icing is likely to decrease. Variability between the medium and high emissions scenarios is not significant. However, the change between the '2020s' and '2050s' is substantial. As observed previously in Table 13.6, a higher level of uncertainty is associated with projecting extreme weather events for the '2050s'.

13.49 The UKCP09 projections and WG results for an increase in the frequency of heavy rainfall events is supported by recent research carried out by the Met Office[46]. This demonstrates that it is likely that there will be one or more monthly regional rainfall record events in the coming decade.

13.50 It should be noted that the WG is subject to certain limitations, which are addressed in detail in the WG Report published by UKCP[47]. These limitations include lack of physical basis, as the WG is based on a statistical model, no spatial consistency across grid squares, and poor representation of long-term variability. In line with UKCP09 good practice, a WG validation exercise has been carried out for the results generated here compared with observed historic data (see ES Appendix 13.3).

Incorporated Mitigation

13.51 Prior to carrying out the assessments, a review was undertaken of relevant incorporated mitigation. This helped identify whether any additional mitigation measures might be required.

13.52 The documents that have been reviewed include:

- Climate Change Adaptation Progress Report (CCAPR) for STAL;
- 2015 Stansted Airport Sustainable Development Plan48;
- Relevant chapters of this ES: Surface access and transport; Air noise; Ground noise; Surface access noise; Air quality; Socio-economic effects; and Public health and wellbeing; and
- STAL's Works Contract Template49 which sets out terms for any construction works carried out at the airport.

13.53 Due to the relatively larger changes in climate projected for the '2050s' (2040-2069) compared to the '2020s' (2010-2039), as indicated in Tables 13.6 and 13.7, results for the '2050s' or 'medium term' climate scenario have been used in both assessments. Considering a longer period of time, over which more significant changes in climate are projected, results in a more robust assessment of the proposed development's resilience and impact.

In-Combination Climate Change Impacts Assessment

13.54 This section summarises the potential in-combination climate change impacts and effects that may occur during construction and operation of the proposed development. A detailed account of the assessment is given in ES Appendix 13.1. Any additional mitigation or monitoring measures required are proposed.

Construction Stage Effects

13.55 The construction works are programmed for a 12-month period during 2021-2022. Although extreme weather events are still likely to occur during this period, the frequency and intensity of these are not expected to change significantly compared to the baseline climate set out in Tables 13.6 and 13.7. Therefore, no in-combination climate change effects have been identified at the construction stage.

Operational Stage Effects

13.56 No in-combination effects were identified for the noise topics nor the public health and wellbeing topic. A summary for the remaining topics is provided in Table 13.8.

Table 13.8: Operational stage in-combination climate change effects by environmental topic

Environmental topic	In-combination climate change effect	Existing or embedded mitigation
Surface access and transport	Adverse effect from increased stress on existing road and rail network in combination with increase in frequency of extreme weather events negatively impacting surface access and transport (e.g. damage to cabling and rails, inundation from flooding).	Existing mitigation is outlined in the STAL CCAPR and includes emergency contingency plans and coordination with road and rail operators (see risk ID CCA27).
Air quality	Adverse effects from increased prevalence of hotter and drier conditions in combination with increase in vehicle and aircraft emissions may result in changes in concentrations of nitrogen oxides (NO_x), fine particulate matter (PM_{10} and $PM_{2.5}$) and ozone (O_3). Unclear whether the concentrations will increase or decrease.	Airlines have new, cleaner fleet on order. In cases where air quality targets are not met, an action plan to restore compliance is put in place by local authorities, which may include actions with which STAL would be expected to comply.. Whilst ozone is likely to increase there are limited mitigation measures available to STAL.
Socio-economic effects	Adverse effect from increase in frequency of extreme weather events in combination with direct and indirect job creation during operation leading to increased stress on local infrastructure.	Existing mitigation is outlined in the STAL CCAPR and includes emergency contingency plans and coordination with road and rail operators (see risk ID CCA27).

Further Mitigation and Monitoring

13.57 Based on the above effects and current mitigation measures, no further mitigation measures are proposed. However, the following measures for monitoring are recommended:

- STAL to ensure its climate change resilience plans and information are robust, monitored and reviewed annually, and shared with third parties;
- STAL to continue careful monitoring of trends in weather events, particularly more frequent and severe precipitation events and high temperatures (as defined in Table 13.7 previously), in line with mitigation measures outlined in the STAL CCAPR;
- STAL to make use of on-site weather station to provide location specific baseline data for future assessment; and
- STAL to continue to review resilience measures related to infrastructure interdependencies including road, rail and surface water runoff, based on the CCC's 2017 Annual Report , and to develop plans to address any identified risks.

Residual Effects

13.58 No residual effects have been identified.

Climate Change Resilience Assessment

13.59 This section summarises the potential climate change resilience effects during construction and operation of the proposed development. A detailed description of the assessment is given in ES Appendix 13.2.

13.60 The climate hazards that have been considered are high and low precipitation, high and low temperatures, strong winds and lightning.

Construction Stage Resilience

13.61 The construction works are programmed for a 12-month period during 2021-2022. Although extreme weather events are still likely to occur during this period, the frequency and intensity of these are not expected to change significantly compared to the baseline climate set out in Tables 13.6 and 13.7. STAL's Works Contract[49] sets out terms for any construction works carried out at the airport. It contains specific references to the consideration of weather events and to the health and safety and risk assessment procedures to be followed. Thus adequate mitigation measures are already in place for the construction programme.

Operational Stage Resilience

13.62 The assessment of operational stage resilience has been informed by the STAL CCAPR[9] (see STAL CCAPR Appendix 1 Stansted Airport climate change adaptation risk register).

13.63 The assessment concludes that mitigation and monitoring measures are currently in place for several climate hazards (low precipitation, low temperature) and for several potential climate change impacts and risks identified.

Further Mitigation and Monitoring

13.64 Recommendations for additional mitigation measures in relation to high temperature, strong winds and high precipitation impacts and risks are:

- STAL to continue to review the demand placed on energy supplies to heat and cool buildings with mechanical and ventilation systems (HVAC) as a result of future temperature changes;
- STAL to continue to review temperature thresholds for cooling systems within the main terminal building, satellite piers, and ancillary buildings, to ensure effective and efficient provision of cooling given projections for increased passenger numbers and higher temperatures in the future;
- STAL to continue to review allowances for maximum aircraft operating temperatures in collaboration with the airline operators to determine whether they are within tolerance of hot day (>25°C) occurrences which are likely to increase due to climate change;
- STAL to check cross wind speed limits for take-off and landing with operators and assess risks using forecast data;
- STAL to continue to monitor lightning events and review and update electrical resilience strategy; and

- STAL to continue to review risks of managing short term extreme precipitation events on airport property and infrastructure including the capacity of the balancing pond system and wider airport drainage system.

13.65 Resilience measures have been outlined in the STAL CCAPR. However, this progress report is concerned with risks to airport operations at the existing 35mppa cap. A full review of the climate change adaptation risk register will be undertaken in 2021, in light of the upcoming UKCP18 climate projections. It is recommended that this review should consider the increase in passenger capacity up to 43mppa in 2028 and adjust mitigation measures accordingly. Based on the updated climate change adaptation risk register, it is recommended that an action plan should be produced in order to address the findings of the risk assessment.

13.66 In line with mitigation measures outlined in the STAL CCAPR, it is recommended that STAL should continue to commit to careful monitoring of trends in weather events and the level of risk these events may pose to airport property, built assets (infrastructure and buildings) and operations. In particular, intense rainfall events and high temperatures should be monitored, in line with mitigation measures outlined in the STAL CCAPR. Collaboration and communication with local government bodies and owners and operators of surface transport networks is also encouraged, to ensure co-ordination of climate change resilience plans and information before, during and after extreme weather events occur.

Residual Effects

13.67 No residual effects have been identified.

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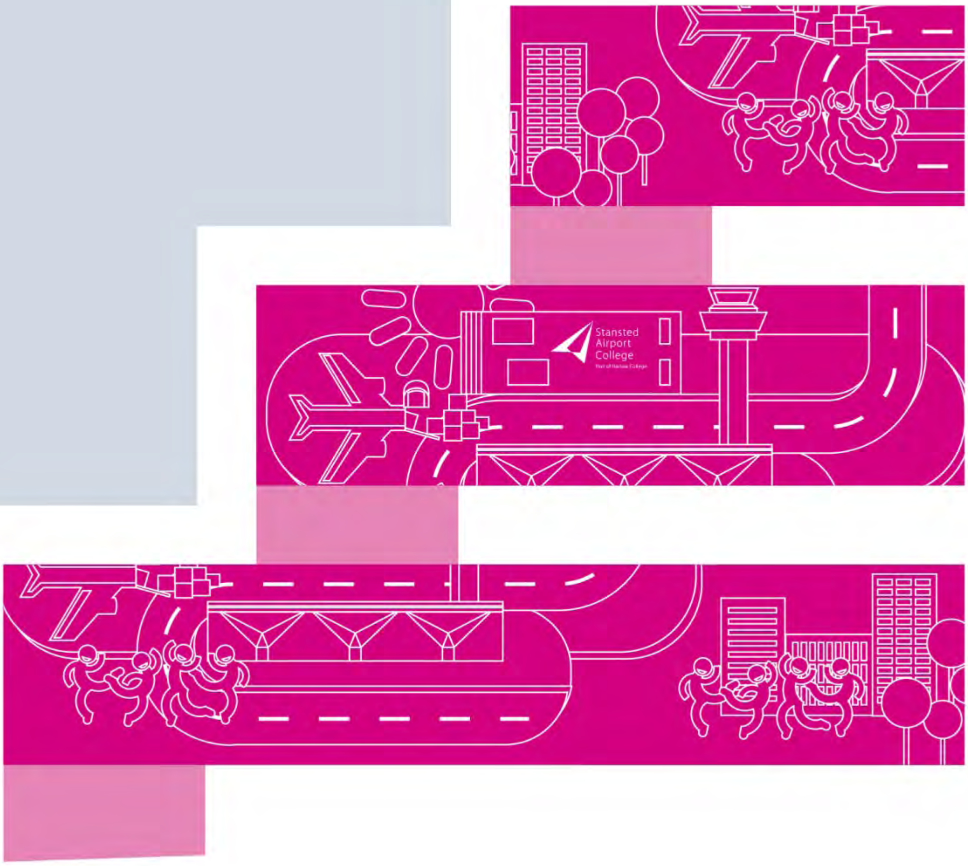
TRANSFORMING LONDON STANSTED AIRPORT

35+ PLANNING APPLICATION

Chapter 14
Public Health and Wellbeing



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14 PUBLIC HEALTH AND WELLBEING

Introduction

14.1 This ES chapter presents the findings of a Health Impact Assessment (HIA) that assesses whether the construction and operational activities associated with the proposed development are predicted to beneficially or adversely affect public health and wellbeing through environmental and socio-economic pathways. It also outlines measures to mitigate adverse effects and improvements to enhance beneficial effects.

14.2 This chapter should be read in conjunction with the HIA at ES Appendix 14.1 (Health Impact Assessment), and its supporting annexes, which contain the baseline community profile, health evidence base and impact assessment methodology, as follows:

- Annex 14.1.1 – Quality of Life;
- Annex 14.1.2 – Community Profile; and
- Annex 14.1.3 – Health Evidence Base and Literature Review.

Legislation, Guidance and Planning Policy Context

Legislation

14.3 Paragraph 4(2)(a) and Schedule 4 of the 2017 EIA Regulations[1] require that an EIA assesses the effects (where likely to be significant) on population and human health, among other factors.

National Planning Policy

14.4 Promoting healthy communities is a theme of the NPPF[2], which states that "*the planning system can play an important role in facilitating social interaction and creating healthy, inclusive communities*" (paragraph 69).

Regional and Local Planning Policy

14.5 The Uttlesford District Council (UDC) adopted Local Plan lists "*to improve the health of the community*" among its overarching objectives for its built and natural environment policies, in section 5. The evidence base for the UDC draft Local Plan concerning local health and wellbeing status and priorities has been produced by the Essex Health and Wellbeing Board and Clinical Commissioning Group (CCG), and this is summarised in the baseline (community profile) section, below.

14.6 The draft UDC Local Plan makes a number of references to promoting healthy communities and supporting health and wellbeing through good design, provision of healthcare services, access to green space and recreation, and facilitation of healthy lifestyles. It notes at paragraph 8.14 that "*a person's health and wellbeing is inextricably linked to socio-economic and environmental factors*" and that "*the way in which an area is planned and managed can have a significant impact on an individual's quality of life, health and wellbeing*".

14.7 Policy INF3 of the draft Local Plan indicates that developments "*designed, constructed and managed in ways that improve health and promote healthy lifestyles and help to reduce health inequalities in the District will be supported*". The policy indicates that HIA should be undertaken for various development types, although none listed in the policy are directly applicable to the proposed development of Stansted Airport.

14.8 Draft Policies EN15 and EN16 and associated text concern pollutant exposure that may adversely affect residents and visitors' health and wellbeing, requiring that this be assessed and mitigation measures provided to minimise adverse effects. With regard to air pollution specifically, draft Policy EN16 indicates that development would only be permitted where it does not lead to significant adverse effects on health. Draft Policy EN18 seeks to site noisy developments appropriately and avoid new noise-sensitive developments being permitted in areas of existing high noise.

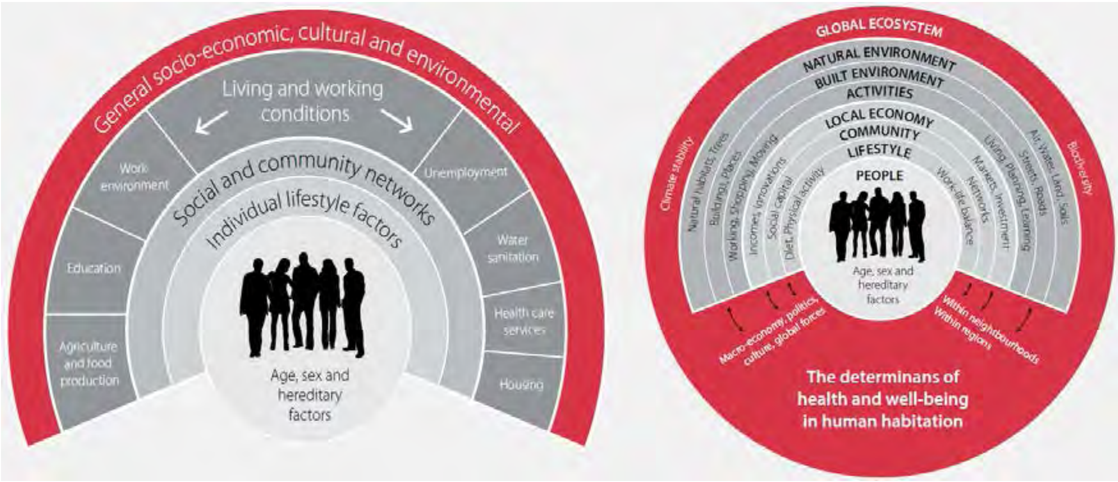
14.9 Draft Policy SP11 refers specifically to the growth of Stansted Airport, referencing a number of points including daytime and night-time noise, air quality and local environmental amenity that are relevant to health and wellbeing.

Guidance

14.10 'Health' is commonly defined as "*a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*"[3] (the definition used by the World Health Organisation, WHO, since 1948).

14.11 There is a large body of guidance on HIA generally and in the context of development planning[4 5 6 7], drawing from expert evidence and national government policy regarding the importance of integrating public health into the planning system[8 9 10].

14.12 The basis of this assessment is to apply a broad socio-economic model of health that encompasses conventional health impacts such as disease, accidents and risk, along with wider health determinants vital to achieving good health and wellbeing such as employment and local amenity. It considers both physical and mental health, and also addresses equality and social impacts where possible. The assessment is therefore based on both 'social' and 'ecological' (environmental) determinants of health, illustrated in Figure 14.1, which are affected through relevant health pathways defined.



Reproduced from reference 5, citing references 11 and 12.

Figure 14.1: Social (left) and ecological (right) determinants of health

14.13 When defining potential health pathways for a development project, it is also useful to consider three broad domains of public health practice[13]:

- Health protection (i.e. environmental pollution and standards set to protect health);
- Health promotion (i.e. healthy lifestyles, socio-economic status and inequalities); and
- Health care (i.e. provision, effectiveness and equity of access to healthcare services).

Assessment Methodology and Significance Criteria

Consultation

14.14 The Scoping Report stated that the Essex and Hertfordshire Directors of Public Health and the UDC Senior Health and Wellbeing Officer would be consulted during the scoping stage, via the scoping request and a meeting if that were desired.

14.15 The Hertfordshire Director of Public Health has responded by letter to UDC on 23 June 2017, requesting information concerning the health assessment study area, which has been provided on 24 July 2017, and in subsequent correspondence the Hertfordshire public health team has provided references to a number of sources of public health statistics for use in the community profile and health assessment.

14.16 In the Scoping Opinion, UDC has requested that reference be made to a forthcoming WHO publication concerning environmental noise guidelines and the impacts of aviation noise. Such documents are not released before being published. However, RPS has reviewed and referred to related emerging evidence in the form of journal publications and conference proceedings (see Annex 14.1.3).

14.17 UDC indicated that the assessment of health and wellbeing should comprise a "*free-standing HIA*" even where it draws upon relevant ES chapters. The HIA, summarised in this chapter, is provided at Appendix 14.1.

14.18 Health and wellbeing have also been integrated as topics of pre-application public and other stakeholder consultation, with non-statutory consultee and other stakeholder responses discussed in ES Chapter 2 (EIA Methodology) and the Statement of Community Involvement (SCI) prepared by Forty Schillings that accompanies this application.

14.19 Comments made in the community consultation suggested that the health assessment should consider evidence concerning annoyance, sleep disturbance and cardiovascular system impacts from noise, cognitive development impacts from noise, cardio-respiratory impacts of air pollutant exposure, and should recommend mitigation where needed. Consultees have suggested that the health assessment should include a community profile, identifying vulnerable individuals and groups, and taking local stakeholders' views into account. A detailed account of consultation comments and responses is provided in the SCI, ES Chapter 2 and ES Appendix 2.3.

Assessment Methodology

14.20 The assessment follows a source-pathway-receptor approach to identify and assess health impacts that are plausible and directly attributable to the proposed development. A hazard source itself is not necessarily a health risk: it is only when there is a hazard source, a sensitive receptor and a pathway of exposure where there is a potential for risk to health. Where a source-pathway-receptor linkage exists, then the nature of the specific hazard source, the magnitude of impact via the pathway and the sensitivity of the receptor determine what level of health risk is predicted.

14.21 Potential health and wellbeing pathways have been identified as set out in the section below. The scope of environmental and social health and wellbeing pathways typically assessed in HIA has been developed in this assessment to include relevant quality of life measures, based on a review of quality of life indicator suites used by various statistics bodies and in work for the Airports Commission. This is discussed further in Annex 14.1.1 of the HIA (ES

Appendix 14.1). Governance and social connection quality of life indicators were considered relevant to this assessment

14.22 The health impacts of change in noise and air pollutant exposure have been assessed quantitatively, applying exposure-response functions based on epidemiological studies. The assessment takes account of noise levels, air pollutant concentrations, the exposed population, and the baseline rate of relevant disease or mortality. Further details are given in Annex 14.1.3 of the HIA. Impacts through the other health pathways, defined in Table 14.1, have been assessed qualitatively.

14.23 The Operational Phase assessment has been undertaken for the Principal Assessment Year, 2028.

Health and Wellbeing Pathways

14.59. The potentially relevant health and wellbeing pathways that have been assessed are identified in Table 14.1. These pathways have been identified from two sources, namely: the proposed development's operational and construction phase activities as defined in ES Chapter 3 (Description of Site, Proposed Development, Policy Context and Alternatives) and Chapter 5 (Development Programme and Construction Environmental Management), respectively, and the health evidence base (Annex 14.1.3 of ES Appendix 14.1).

14.60. Identification of a potentially relevant health pathway at this stage does not necessarily indicate that there would be a significant impact through that pathway. A significant impact would depend on the magnitude of change, the sensitivity of receptors and the degree to which they are affected.

Table 14.1: Potential health pathways summary

Health pathway	Potential for impact	Impact type*
Construction		
Exposure to air pollution including dust, noise, ground or water contamination	The proposed physical infrastructure to be constructed is minimal, with no potential for significant environmental impacts identified in ES Chapter 5 or in the relevant ES topic chapters. Construction-stage health pathways are therefore not considered to give rise to any likely significant health or wellbeing effects, and are scoped out of the further assessment in this chapter.	Temporary. Direct, indirect or secondary.
Construction traffic (safety, amenity, severance)		
Construction workforce (housing/services demand, crime, infectious disease)		
Construction employment, supply chain spending		
Operation		
Airport / aircraft air pollutant emissions	Change in air quality at residential and other sensitive locations	Direct
	Impact on habitats and resulting change in amenity value of green / recreational space	Direct
Airport / aircraft noise	Change in noise environment at residential and other sensitive locations	Direct
	Change in amenity value of green / recreational space	Direct
Surface access road traffic generation	Contribution to air pollutant and noise exposure	Direct

Health pathway	Potential for impact	Impact type*
	Change in amenity value of green / recreational space	Direct
	Change in road safety	Direct
	Change in capacity or demand for public transport	Direct
	Community severance	Direct
	Impacts on non-motorised users (NMUs)	Direct
	Change in congestion, access to services	Direct
Governance (airport and regulator)	Public participation and empowerment concerning operational impacts	Direct
Increase in airport's economic activity with more passengers and flights	Direct employment generation	Direct
	Education / training opportunities	Direct
	Supply chain spending – indirect employment / wealth generation	Indirect
	Additional employees' impact on services, housing capacity, community cohesion	Indirect
Increase in flight capacity and/or connections	Increased opportunity for leisure travel and social connections	Direct
	Increased opportunity for business travel with economic benefit, with resulting employment / wealth benefit	Indirect, secondary
Flood risk	Risk to life or property; displacement from housing; impaired access to services	Direct
Water contamination	Drinking water contamination	Direct

* Impact type is 'permanent' (i.e. persisting for the foreseeable future) unless otherwise specified

Impact Magnitude and Significance Criteria

14.24 The terms in Table 14.2 have been used to describe the magnitude of predicted impacts, consistent with the EIA methodology defined in ES Chapter 2.

14.25 Health impact assessment considers a number of environmental and social health pathways, with potential for a mixture of adverse or beneficial effects depending on the pathways and the groups affected. In EIA terms, however, it is essential to characterise overall impacts and the significance of resulting effects in a summary form that can be communicated to decision-makers.

14.26 The determination of the significance of effects has been through professional judgement, taking into account the magnitude of potential impacts (Table 14.2), sensitivity of the communities affected (community profile in Appendix 14.1 and Annex 14.1.2) and identified health needs and objectives (Table 14.3). It is not usual in the HIA process to pre-define generic thresholds of impact magnitude and receptor sensitivity from which to form a deterministic significance matrix[13].

Table 14.2: Impact magnitudes

Level of impact (adverse or beneficial)	Description
Major	Very large or large change in health and wellbeing outcomes. Impacts that are likely to be important considerations at a district or greater level because they contribute to achieving national, regional or local objectives, or could result in exceedance of statutory objectives and/or breaches of legislation.
Moderate	Intermediate change in health and wellbeing outcomes. Impacts that are likely to be important considerations at a local level.
Minor	Small change in health and wellbeing outcomes. These impacts may be raised as local issues but are unlikely to be of importance in the decision-making process.
Negligible	No discernible change in health and wellbeing outcomes. An impact that is likely to have a negligible or neutral influence, irrespective of other impacts.

14.27 The sensitivity of affected communities and the local, regional and national health needs and objectives are summarised in the following Baseline Conditions section and detailed in Annex 14.1.2 of ES Appendix 14.1.

Baseline Conditions

14.28 The baseline comprises population and demography, socio-economic status, and existing health status and needs data. From this, potential changes due to the proposed development can be predicted and the impact assessed. It also informs the mitigation measures and community support initiatives. The baseline is presented as a community profile in Annex 14.1.2 of the HIA (ES Appendix 14.1) and is summarised here.

14.29 The geographic scope of the health and wellbeing baseline concentrates primarily on the districts of Uttlesford, East Herts, Braintree, Harlow and Epping Forest. Socio-economic impacts of the airport, such as employment generation, extend to all these authorities; while communities within Uttlesford and East Herts are those most likely to be affected by local environmental impacts of the airport.

14.30 Between 2011 and 2016, there has been high population growth in the study area, at almost twice the national average. At present, there is a larger proportion of 40-64 year olds within the study area compared to the national average. It is also projected that the economically active population will grow by over 10% between 2015 and 2028.

14.31 Based on the Index of Multiple Deprivation (IMD) overall rankings, Uttlesford and East Hertfordshire have relatively low deprivation compared to the national average, while Harlow has relatively high deprivation and Braintree and Epping Forest have an intermediate level of deprivation. Individual domains analysed (employment, income, education, crime, and health) are generally consistent with the overall deprivation rank for each local authority.

14.32 There is a higher burden of poor health and clusters of deprivation largely concentrated within Harlow, which consistently performs worse than the national average for the majority of physical and mental health indicators.

14.33 Within the study area, Uttlesford and East Herts have consistently higher male and female life expectancy compared to the national average. Harlow has the lowest life expectancy of all districts within the study area. It is lower than the national average for males, but similar to the national average for females.

14.34 Uttlesford and East Herts have relatively comparable levels of mental health whereby there is a lower proportion of adults accessing NHS specialist mental health services compared to regional and national indicators. Harlow has the highest proportion of adults accessing NHS specialist mental health services within the study area and is higher than the regional and national averages. In addition, hospital stays for self-harm in Uttlesford and East Herts are lower than the national average, whereas Harlow is higher than the national average.

14.35 For lifestyle indicators such as hospital stays for alcohol related harm, smoking prevalence, percentage of overweight or obese adults, and the percentage of physically active adults, Uttlesford and East Herts perform better than the national average. Harlow has the worst lifestyle indicator performance out of all the districts within the study area.

14.36 Overall, it can be concluded that Uttlesford and East Herts do not have greater than average health needs, whereas Harlow has a more evident existing burden of poor health and as a result will have greater vulnerability and lower resilience to environmental changes impacting health. However, the more socio-economically deprived districts such as Harlow and areas of Braintree and Epping Forest, are also most likely to benefit from opportunities associated with the proposed development such as employment generation and skills training.

14.37 Health needs and objectives are outlined within Health and Wellbeing Strategies or Joint Strategic Needs Assessments, undertaken at district and/or county level. Table 14.3 summarises the health issues and priority actions for improvement in Essex and Hertfordshire as identified by the Health and Wellbeing Boards. This forms part of the local health needs and objectives policy against which any changes can be appraised. National priorities, as identified in the 'Promoting Healthy Communities' section of the NPPF, are also summarised.

Table 14.3: Identified health needs and objectives

Health/wellbeing issue	Action to improve	Ref. no.*
Essex		
Lifestyle	Increase physical activity and improve diet across all age groups, reduce alcohol misuse, reduce smoking, reduce the harm caused by substance misuse.	14
Employment and skills	Increase opportunities for training, apprenticeships, employment and skills and increase employment and other opportunities for people suffering from mental illness	14
Loneliness and social isolation	Combat rural and social isolation using technological and transport solutions to enhance social connections. Make links with Campaign to End Loneliness and further engage with emerging evidence on good practice	14
Support for the elderly	Enable people to age well by improving and developing services to respond to the rising prevalence of dementia, and ensure independence is maintained for longer via technology and equipment, supporting carers, and re-ablement services	14
Mental health and wellbeing	Ensure that mental health and wellbeing is regarded across all streams of work	15
Support those most in need	Ensure key services are provided for all residents, but that resources and interventions are targeting those most in need	15
Hertfordshire		
General	Promoting events, projects and initiatives which facilitate health and wellbeing quality for all ages Providing appropriate support for vulnerable groups and individuals as part of an inclusive public health approach Developing and sustaining mutually supportive environments which seek to encourage health, wellbeing and community	16
Healthy lifestyles	Seek to help people adopt healthy lifestyles to reduce the risk of experiencing health problems from obesity or by smoking, drinking alcohol and drug use Promoting events, projects and initiatives which facilitate health and wellbeing quality for all ages including increasing physical activity levels, promoting healthy eating, giving up smoking and reducing alcohol usage	16 17
Mental health and emotional wellbeing	Strive to address the wider causes of poor mental health and support those who are experiencing mental health problems to recover or manage their condition Fair and accessible services for those that need them; promoting interventions which enable good mental health and wellbeing	16

Health/wellbeing issue	Action to improve	Ref. no.*
Economic wellbeing	Improving the economic and social opportunities available to our communities and reduce consequential health and wellbeing inequalities	16
Social exclusion	Ensure good support and access to services to reduce social exclusion	17
Elderly support	Empower older people to live a life of increasing independence and support ways to enable this by increasing opportunities for social interaction and reducing isolation	16
Open space provision	Maintain our parks, play areas and open spaces to provide areas for recreation and enhance wellbeing	16
National (NPPF)		
Community cohesion	Promote safe and accessible environments, high quality public space and opportunities for meetings between members of the community	18
Social, recreational and cultural facilities	Plan positively for and deliver the services the community needs, including guarding against unnecessary loss	18
Open space provision and rights of way	Access to high quality open spaces and opportunities for sport and recreation; protect and enhance public rights of way and access	18
Economic growth and prosperity	These matters are not set out in detail this chapter, which should be read alongside the socio-economic assessment in ES Chapter 11.	-

* To be read in conjunction with the reference list at the end of this chapter.

Incorporated Mitigation

14.38 Stansted's existing mitigation and enhancement measures are enacted through its 2003 and 2008 S.106 agreements, its 2015 Sustainable Development Plan and Corporate Responsibility Strategy. The extensive list of embedded mitigation and enhancement measures can be found in ES Chapter 18 (Summary of Mitigation and Residual Effects). Table 14.4 summarises the main mitigation measures relevant to health and wellbeing.

Table 14.4: Existing, embedded mitigation

Health pathway	Existing, embedded mitigation	Health and wellbeing influence
Air pollutant emissions	Continuous pollutant monitoring; target to reduce air pollutant emissions from ground vehicles and aircraft; use of fixed electrical ground power (FEGP); promotion of public transport.	Mitigates adverse respiratory and cardiovascular health impacts from air pollutant exposure.
Noise	Restrictions of night-time flight, reverse thrust, auxiliary power units (APU) and cargo aircraft; continuous descent approaches; penalties for off-track flying (paid to community fund) and charges to incentivise quieter aircraft; sound insulation grant scheme for homes and community buildings; target for daytime 57 dB $L_{Aeq,\ 16hr}$ noise contour not to increase in maximum envelope size beyond that predicted in the 2006 25+ ES and conditioned as part of the 2008 planning permission; general target to minimise impact of all noise aspects.	Mitigates adverse wellbeing and quality of life impacts due to annoyance or sleep disturbance; mitigates or avoids associated adverse physical and mental health impacts.
Surface access	Car parking tariffs; airport employee public transport scheme (subsidy) and financial support to bus services; working with bus and train operators to improve travel experience; improve rail connections; Travel Plan with targets to maintain 50% public transport modal share, increase rail share, reduce 'kiss and fly' (two-way trip per PAX) car share, improve emissions performance of buses and coaches; off-site parking monitoring and hotline.	Mitigates air pollutant and noise emissions, with effects as above; mitigates road safety and community severance impacts; benefits lower-income staff with associated health and wellbeing impact due to greater income retained.

Health pathway	Existing, embedded mitigation	Health and wellbeing influence
Socio-economics	Employment and Skills Academy assisting job applicants from disadvantaged areas; apprenticeship programme; business forum and meet-the-buyer events for local procurement; education and outreach programmes and centre at airport; Community Fund and support to staff and business charitable giving (Airport Community Network).	Increases health and wellbeing benefits of airport employment growth, by improving accessibility to people with lower qualifications, in long-term unemployment and/or from disadvantaged areas; benefits health and wellbeing where Community Fund and Community Network financial support is for relevant activities and services; benefits children's wellbeing through educational opportunities.
Governance	Consultative committee and community impact surveys with annual report; outreach events; complaints monitoring and noise track keeping system; reporting of air quality and noise monitoring; consultation and engagement with stakeholders regarding development plans.	Mitigates or avoids wellbeing and quality of life impacts due to disempowerment, or stress associated with uncertainty and perceptions of risk.
Amenity, green space and physical activity	Community Trust can support sports/recreational facilities/activity; cycling facilities for staff; target for net gain in biodiversity through off-site enhancement/habitat creation.	Mitigates or compensates for health and wellbeing impacts associated with reduced access to green space / tranquillity / outdoor recreation due to amenity impacts of airport operations.
Flood risk and water contamination	Existing drainage system, providing surface runoff attenuation and control of potentially contaminated runoff via balancing pond and water treatment works where necessary.	Mitigates or avoids adverse health or wellbeing issues due to property flooding; avoids adverse health impacts due to water contamination.

14.39 This existing, embedded mitigation and enhancement will, if maintained, continue to be effective in limiting adverse health and wellbeing outcomes and enhancing the airport's benefits as a major employer and economic entity.

Assessment

Socio-Economics

14.40 ES Chapter 11 (Socio-Economic Impacts) has assessed benefits to airport users, employment and the wider economic value of increased operations, and other socio-economic impacts such as demand for housing and services in the area.

14.41 In 2028, the airport with the proposed development is predicted to have an additional 3,000 direct employees and to generate a further 2,400 indirect and induced jobs compared to the future baseline without development. Around 200 people would also be directly employed during the construction phase. Being in stable, good-quality employment is strongly associated with good health and wellbeing compared to being in long-term unemployment (though noting the influence of the 'healthy worker effect', i.e. the relationship runs both ways), as detailed in Annex 14.1.3 of ES Appendix 14.1. As a result, the direct and indirect/induced employment generated by the proposed development has the potential to offer important long-term health and wellbeing benefits affecting up to 5,400 people.

14.42 Indirect quality of life, wellbeing and possibly health benefits would also be associated with the £357m of GVA per annum by 2028 that Chapter 11 shows the proposed development would create in operation. These would arise through increased personal wealth (which facilitates healthier lifestyles and is generally associated with less frequency of risk-taking behaviour) and increased public revenue enabling spending on public services that affect health.

14.43 Given the future baseline labour market surplus in the area predicted (analysed in Chapter 11), the employment generated by the proposed development would not be expected to lead to additional housing or consequent additional demand on other local public services over the baseline scenario without the development.

14.44 The proposed development would enable around 2.3 million additional leisure trips abroad by UK passengers per year by 2028. Many of these trips would help maintain social and family connections, or be for cultural, recreational or educational experiences. Leisure travel abroad by air has been reported to be generally associated with improvements in levels of life satisfaction, happiness, self-reported general health and mental health, all of which contribute to quality of life. While the health and wellbeing benefits of additional leisure travel enabled by the proposed development are not readily quantifiable, they should not be underestimated given the very large number of people affected.

14.45 These are regional level benefits and, overall, the magnitude of impact on health and wellbeing is considered to result in a **major beneficial** effect (see Table 14.2). The impacts would support actions to address the Essex health objectives for 'People not in education, employment or training', 'Loneliness and social isolation' ('transport solutions to enhance social connections') and the Hertfordshire objective 'Economic wellbeing', defined in Table 14.3.

Surface Access

14.46 The surface access and transport assessment in ES Chapter 6 (Surface Access and Transport) indicates that construction traffic generation would be negligible due to the relatively minor nature of construction work. Construction traffic would route mainly via the M11, would require no closures or diversions to pedestrian or cyclist routes, and is therefore predicted in Chapter 6 to have no adverse impacts on road safety, active travel, or community severance.

14.47 The only road links predicted to have significant traffic growth due to growth to 43 mppa are the M11 Junction 8 and the link roads from it into the airport. The traffic chapter predicts no adverse impacts on pedestrians, cyclists or community severance, as non-car traffic does not use these roads, and a negligible impact on road safety. In consequence, no direct adverse impact from the proposed development on health and wellbeing due to road traffic growth would be expected, with road traffic growth being mainly confined to these road links as predicted.

14.48 The traffic chapter indicates that the proposed development would have a negligible impact on driver delay on local minor and trunk roads, and a minor impact on the M11 Junction 8. No significant adverse impact on health and wellbeing due to increased congestion and reduced access to services is therefore considered likely.

14.49 The surface access chapter indicates that there would be a minor adverse impact on some rail, bus and coach travel services from the proposed development due to the increased ratio of demand to capacity. This has the potential to adversely affect wellbeing for residents using local public transport networks, and may disproportionately affect young, old or disadvantaged people without access to a private car, or those with reduced mobility. However, the surface access chapter notes that local bus and coach service operators can respond quickly to new demand and that the proposed development may provide a catalyst for public transport improvements. In this context, any adverse wellbeing impact is likely to be very minor, if present.

14.50 Adverse impacts on airport employees are unlikely due to the embedded mitigation of travel subsidies and coach connections geared to employee transport.

14.51 Overall, the magnitude of impact on health and wellbeing is considered to be **negligible** and would not result in a significant effect.

Air Quality

14.52 The air quality assessment in Chapter 10 (Air Quality) has predicted changes in concentrations of nitrogen dioxide (NO_2) and particulate matter at sensitive receptor locations in the study area. The receptor locations including existing residential areas, schools, hospitals and consented future residential developments.

14.53 Table 14.5 shows the potential change in health outcomes associated with the predicted change in air pollutant exposure. The predicted negligible changes in air quality would have no measurable adverse health outcomes per annum, with an increase of fewer than one emergency hospital admission or an effect on mortality equivalent to fewer than one additional death at typical ages predicted. The air quality assessment predicts no exceedances of air quality standards in 2028 with or without the proposed development at the sensitive receptor locations. Further details and explanatory text are provided in ES Appendix 14.1.

14.54 Vulnerable individuals, such as those in healthcare facilities or with existing respiratory diseases, will in some cases have greater susceptibility to health impacts from air pollutant changes; this cannot be quantified from statistical risks applicable to the general population, but given the negligible magnitude of air pollutant concentration changes predicted (detailed in Chapter 10), additional risks are unlikely to be significant.

Table 14.5: Air pollutant exposure health outcomes – population attributable fraction

Health outcome*	Do Minimum	Development Case	Change
Annual mortality	5.4	5.6	0.2
Annual respiratory disease hospital admissions	4.9	5.0	0.2
Annual cardiovascular disease hospital admissions	<0.1	<0.1	<0.1

Note: totals may not equal sums of parts due to rounding.

14.55 The air quality assessment in Chapter 10 has also shown that there would be no significant adverse impacts on sensitive ecological habitats, and thus no impact on health and wellbeing through affecting green space and recreation.

14.56 Overall, the magnitude of impact is considered to be **negligible** and would not result in a significant effect.

Noise

14.57 The noise impact assessments in ES Chapters 7 (Air Noise), 8 (Ground Noise) and 9 (Surface Access Noise) have predicted noise levels with and without the proposed development using a number of metrics for average day- and night-time noise and number of events above certain noise level thresholds in the day and night.

14.58 Table 14.6 shows the potential change in health outcomes associated with the predicted change in air noise exposure, which affects the greatest number of people. The predicted changes in air noise would have no measurable adverse health outcomes for ischemic heart disease (IHD), stroke or dementia, with an increase of fewer than one additional annual incident case predicted.

14.59 Approximately four to six additional cases of hypertension prevalent within the population are predicted, and additional cases of depression or anxiety associated with high annoyance are also possible (though the evidence for this is less clear, as discussed in ES Appendix 14.1). These diseases are common in the baseline population, and while the magnitude of change predicted is a measurable adverse health outcome, the change as a proportion of the baseline rate is very small – less than 1%.

14.60 An increase of around 339 people who consider themselves highly annoyed by aircraft noise is predicted, which is around a 28% increase compared to the do-minimum situation. However, a small reduction in the number of people with high sleep disturbance is predicted, due to the very limited change in L_{night} contours with the proposed development.

Table 14.6: Noise exposure health outcomes – population attributable fraction

Health outcome*	Do Minimum	Proportion of baseline rate*	Development Case	Proportion of baseline rate*	Change	Proportion of baseline rate*
Hypertension prevalence (a)	72.5	5.2%	76.1	5.4%	3.6	0.3%
Hypertension prevalence (b)	127.6	9.2%	133.7	9.4%	6.2	0.4%
Stroke incidence or mortality	0.6	3.6%	0.6	3.7%	<0.1	<0.1%
IHD incidence or mortality	3.0	4.4%	3.1	4.5%	0.2	0.2%
IHD incidence	3.8	6.8%	4.0	7.0%	0.2	0.3%
Depression or anxiety prevalence	76.1	4.0%	97.2	4.0%	21.1	0.9%
Dementia prevalence	0.2	0.2%	0.2	0.2%	<0.1	<0.1%
Highly sleep disturbed	1,222.8	n/a	1,207.9	n/a	-15.0	n/a
Highly annoyed	1,223.6	n/a	1,562.3	n/a	338.7	n/a

* The total baseline rate of mortality or disease incidence or prevalence within the population exposed.
Note: totals may not equal sums of parts due to rounding.

14.61 Changes in air noise exposure as measured by the number of events per day or night above a certain level have also been assessed in ES Appendix 14.1, and the evidence is considered to support the prediction of effects made in the preceding paragraphs.

14.62 Changes in air noise at other noise sensitive receptors that are not dwellings have been assessed in ES Appendix 14.1. The air noise assessment (Chapter 7) indicates that there would be little measurable change in average day- or night-time noise at any of these locations, with all noise increases ≤1 dB. However, there would be a 13% increase in the number of daytime noise events above the assessment threshold at the most-affected school, Howe Green; the most-affected church, St Giles in Great Hallingbury; and the most-affected healthcare facility, Falcon House residential care home in Little Hallingbury. Depending on the actual noise levels of these events, the building fabric and degree of external noise attenuation, there may be minor potential for increased disruption to learning, to the care environment at Falcon House, or an impact on the quality of life for worshippers at the affected churches.

14.63 Overall, the magnitude of impact on health is considered to result in at most a **minor adverse** effect. Changes in cardiovascular health impacts would be small, around 0.5% or less of the baseline rate, which meets the definition for minor impacts in Table 14.2. The magnitude of impact on wellbeing and quality of life, taking into account the predicted changes in annoyance and sleep disturbance, is considered to result in a **minor adverse** effect. The impacts would not affect the Essex or Hertfordshire health objectives defined in Table 14.3 save for the 'General' Hertfordshire objective.

Amenity, Green Space and Physical Activity

14.64 The air noise assessment in ES Chapter 7 describes noise impacts as being of negligible significance overall, with the change in noise levels during the day or night averaging periods being less than 1 dB(A) in 2028. On that basis, significant reductions to the amenity of green space resulting in significant effects on quality of life and wellbeing are unlikely.

14.65 With reference to Figure 2028DC vs. DM/N65/Day, showing the increase in N65 events from overflights in the day due to the proposed development in 2028, it can be seen that areas of countryside with a number of rights of way, including parts of Hatfield Forest, would be affected by additional overflights generating noise at a level considered likely to affect people's behaviour. However, it is clear that the area with an increase of greater than 25 N65 events per day (i.e., in round terms, greater than one additional overflight every 20 minutes) is limited to a relatively narrow band in-line with the runway.

14.66 As a conservative prediction, therefore, it is considered that the magnitude of impact would result in at most a **minor adverse** effect on quality of life and wellbeing due to reduction in the amenity of green space. The impacts would adversely affect actions to address the Hertfordshire objective 'Open space provision' and NPPF objective 'Open space provision and rights of way', defined in Table 14.3.

Flood Risk and Water Contamination

14.67 No impact on health and wellbeing due to water contamination is predicted, as runoff would continue to be managed to protect water quality in line with the airport's existing systems. No impact on health and wellbeing due to off-site flooding is predicted as the proposed development's additional physical infrastructure would not increase flood risk, as detailed in ES Chapter 15 (Water Resources and Flood Risk).

Governance

14.68 STAL has undertaken extensive public consultation since 2014 as the project has developed, to seek and respond to stakeholders' views. This has been through public events, meetings, focus groups and published information. This has gone beyond the minimum requirements for a planning application and, indeed, played a part in the decision not to seek to increase the number of ATMs above those already permitted. Consultation details are given in ES Chapter 2 (EIA Methodology) and the Statement of Community Involvement accompanying the application. Public consultation by the planning authority will continue once the application has been submitted.

14.69 The EIA process is designed to clearly communicate any significant impacts of the development to members of the public and to their elected representatives. STAL engages actively with local stakeholders through the quarterly Stansted Airport Consultative Committee, Parish and District Council liaison meetings, annual community impact surveys, outreach events, complaints monitoring and a noise track keeping system, and reporting of air quality and noise impacts.

14.70 Overall therefore, the governance for decision-making on the planning application for the proposed development is considered to have a high degree of transparency and public participation. This matches STAL's ongoing approach to engagement regarding impacts of its current operations and future changes, and hence any adverse wellbeing and quality of life impacts due to poor governance are minimised. A **negligible** impact is predicted overall.

Further Mitigation

14.71 The assessments of environmental and social impacts reported in the other chapters of this ES include further mitigation and enhancement measures. The full list is extensive, and is summarised in ES Chapter 18 (Summary of Mitigation and Residual Effects). Table 14.7 gives an overview of the points that are relevant to health and wellbeing.

Table 14.7: Further mitigation proposed in ES chapters which are relevant to health and wellbeing

Health pathway	Mitigation measure	Health and wellbeing influence
Transport	Continued commitment to Travel Plan initiatives, joint working with train operating companies and increased coach & bus capacity with additional routes introduced.	Reduction in potential for adverse wellbeing impacts due to effects on public transport capacity.
Noise	A new sound insulation grant scheme (SIGS) for dwellings and other defined noise-sensitive properties located within the following contours: ▪ 57 dB $L_{Aeq, 16\ hour}$ daytime air noise; ▪ 200 N65 air noise; ▪ 90 dB SEL Quota Count 2 at night; and ▪ 600 m distance or 55 dB $L_{Aeq, 16\ hour}$ ground noise. To encourage uptake, the SIGS will be promoted.	The reduction of internal noise levels within participating properties will reduce potential adverse health and wellbeing outcomes by reducing noise exposure and consequent annoyance or sleep disturbance.
Socio-economics	A new Community Fund with scope extended to support projects for cultural and community wellbeing.	Wide-ranging health and wellbeing benefits would be possible: e.g. supporting participation in sports and active recreation; or supporting third-sector organisations working with people with physical or mental health needs.
	The Stansted Airport College is being developed at Stansted Airport in partnership with Harlow College. This will complement the Airport Employment and Skills Academy, which will maintain its focus on attracting employees from disadvantaged areas including Harlow, Braintree, other parts of Essex and north-east London.	As a result of the education and skills training facilities at Stansted, individuals will benefit from enhanced skills, knowledge and thus employability. Being in stable, good-quality employment is strongly associated with good health and wellbeing compared to being in long-term unemployment.

14.72 The proposed mitigation and enhancement measures provided in Table 14.7 address the two health and wellbeing pathways, changes to noise and surface transport, where potential for minor adverse effects has been identified. They also provide important enhancements to the beneficial health and wellbeing effects through the socio-economic pathway.

14.73 Taking this into account, together with the existing embedded mitigation detailed in Table 14.4, no further health-specific mitigation is considered to be required. Nevertheless, further measures are recommended in Table 14.8 to develop and enhance the initiatives, maximising the effectiveness for health and wellbeing. These measures have been recommended with reference to the identified local health needs and objectives that were detailed in Table 14.3.

Table 14.8: Additional further health and wellbeing mitigation recommendations

Mitigation measure	Summary of action	Identified health needs and objective reference*
Iterative engagement with local public health teams	Seek a closer working relationship with the Directors of public health/local public health teams, potentially via participation in the Stansted Airport Consultative Committee.	Herts *'General'*
Benefiting health and wellbeing as one objective of Community Fund	The Community Fund has the potential to support a wide range of actions to benefit health and wellbeing. The following are examples that could be considered.	Essex '*Obesity*' and *Loneliness and social isolation';* Herts '*Mental health and emotional wellbeing*' and *'Healthy lifestyles';* NPPF '*Social, recreational and cultural facilities*'
	Support to amateur sports clubs and facilities, encouraging physical activity. This should seek to support sports for all demographics including small children and older people.	
	Support to community social facilities (e.g. halls, societies or events) to benefit community cohesion and reduce loneliness and social isolation.	
	Support third-sector organisations working to reduce loneliness, e.g. via visits and events for the older population.	
	Support third-sector organisations working to provide mental health care in the community.	
	Support third-sector organisations assisting older people to live independently in the community.	
	Support community wildlife and nature groups, e.g. those working on recreational projects such as nature trails.	

* See Table 14.3.

Residual and Cumulative Effects

Residual Effects

14.74 The noise health impact assessment is based on predicted external noise levels, because the exposure-response factors used (see ES Appendix 14.1) are derived from large epidemiological studies of people who individually live in buildings of various types and have different lifestyle factors affecting their noise exposure. For example, the fabric of buildings attenuates exterior noise levels to differing degrees, and preference for sleeping with windows open is an important factor affecting night-time noise exposure in the home. The assessment of predicted health outcomes therefore cannot account directly for specific noise levels *inside* individual dwellings that would be achieved by the SIGS.

14.75 However, the SIGS measures are expected to reduce noise exposure within the home, and therefore to help reduce annoyance and sleep disturbance. As discussed in the health evidence base section (ES Appendix 14.1 and Annex 14.1.3), the causal pathway for adverse health outcomes from noise exposure ultimately relates back to these effects. A reduction in residual interior noise levels after mitigation would therefore be expected to lead to a proportional reduction in residual health and wellbeing outcomes.

14.76 The proposed socio-economic mitigation and enhancement measures are predicted to support the predicted major beneficial health and wellbeing effects, particularly through targeting the employment benefits in areas with greater socio-economic disadvantage.

14.77 Residual health and wellbeing effects through the air quality and surface access transport pathways are considered to be not significant.

Cumulative Effects

14.78 The environmental and social effects of cumulative developments (due to additional impacts or introduction of new sensitive receptors) were considered in the assessments reported in the other relevant topic chapters of this ES that form the health and wellbeing pathways assessed in this chapter. Relevant cumulative impacts and resulting effects have therefore been included in this assessment.

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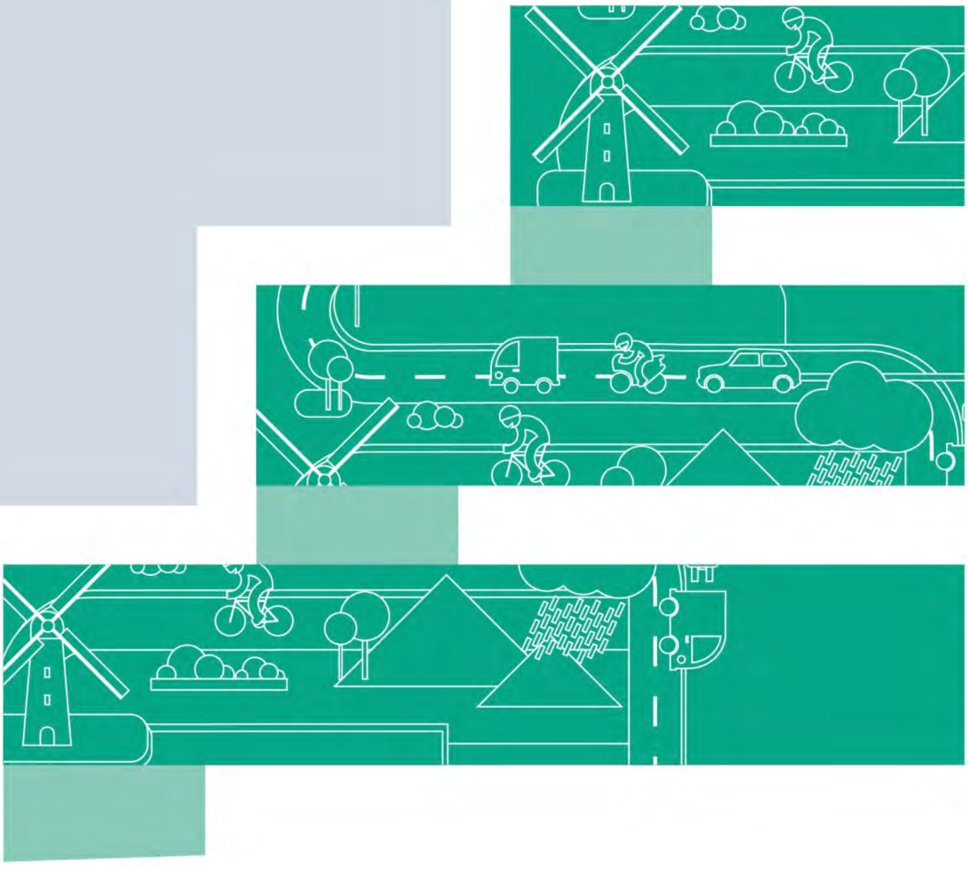
TRANSFORMING LONDON STANSTED AIRPORT

35+ PLANNING APPLICATION

Chapter 15 Water Resources and Flood Risk



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15 WATER RESOURCES AND FLOOD RISK

Introduction

15.1 This chapter considers the impacts of the proposed development on flood risk, hydrology, foul drainage, surface and ground water quality, and potable water supply (collectively referred to as ‘water resources’).

15.2 It describes the methods used to assess the impacts of the proposed development on these water resources and also sets out: applicable legislation and planning policy; the baseline conditions which currently exist at the airport and its surroundings; the incorporated/ committed mitigation measures which act to prevent, reduce or offset any significant adverse effects; and, the likely residual effects once these measures have been employed.

15.3 The assessment presented in this chapter is supplemented by the Flood Risk Assessment (FRA) and Drainage Strategy prepared by WSP, which are included as ES Appendix 15.1. It has been further informed by ongoing discussions with UDC, Thames Water, Affinity Water (AW), and Essex County Council (ECC) as the Lead Local Flood Authority (LLFA).

15.4 The potential impacts of the proposed development on water resources and flood risk are not considered to be significant, particularly when accounting for the commitments set out in the 2015 SDP and airport-wide improvements (these commitments are on-going and have either been implemented or will be implemented over the upcoming years prior to the construction of the new airfield infrastructure in 2021-2022). However, this chapter has been prepared in response to the comments raised by the Environment Agency (EA) and other consultees during EIA Scoping and reflected in UDC’s Scoping Opinion dated 21st December 2017 (and which are summarised herein).

Legislation, Guidance and Planning Policy Context

The Water Framework Directive

15.5 The Water Framework Directive (WFD)[1] established a framework for a European wide approach to action in the field of water policy. Ultimately, the aim of the WFD is to ensure all inland and near shore watercourses and water bodies (including groundwater) are of 'Good' status or better, in terms of ecology, chemical, biological and physical parameters, by the year 2021. Therefore, any activities or developments that could cause detriment to a nearby watercourse, or prevent the future ability of a water resource to reach its potential status, must be mitigated in order to reduce the potential for harm and allow the aims of the Directive to be realised.

Groundwater Daughter Directive

15.6 The 1980 Groundwater Directive was repealed by the WFD in December 2013. The 'new' Groundwater Directive[2] is commonly referred to as the Groundwater Daughter Directive.

15.7 The WFD and the new Groundwater Daughter Directive make changes to how groundwater can be protected. The existing principle of preventing or limiting the inputs of list 1 (hazardous pollutants) or list 2 (non-hazardous pollutants) substances respectively into groundwater under the original Groundwater Regulations 1998 remains, but has been expanded to encompass all pollutants (any substance liable to cause pollution). For example, nitrate which is commonly used in agricultural fertilizers and other applications, is now included as a pollutant.

The Water Industry Act 1991

15.8 The Water Industry Act 19913 is an Act of Parliament consolidating previous enactments relating to the water supply and the provision of wastewater services in England and Wales. It sets out the main powers and duties of the water and sewerage companies, thus replacing those set out in the Water Act 1989, and defined the powers of the Director General of Water Services (now the Water Services Regulation Authority (Ofwat)).

The Water Resources Act 1991

15.9 The Water Resources Act 1991[4], in particular Section 92(1)(a), stipulates that the Secretary of State may make provisions *"for prohibiting a person from having custody or control of poisonous, noxious or polluting matter unless prescribed works and precautions and other steps have been carried out or taken for the purpose of preventing or controlling the entry of the matter into any controlled waters"*. This Act is applicable to the proposed development in that all potential pollution sources of controlled waters must be mitigated.

The Water Act 2003

15.10 The Water Act 2003[5] contains four broad aims, which are: the sustainable use of water resources; strengthening the voice of consumers; a measured increase in competition; and the promotion of water conservation. The Act amends the Water Resources Act 1991 to improve long-term water resource management and also amends the Water Industry Act 1991 so that water companies are given a duty to prepare and publicise drought plans; are placed under a duty to agree and publicise water resource management plans; and are placed under an enforceable duty to further water conservation through these measures.

The Flood and Water Management Act 2010

15.11 The Flood and Water Management Act 2010[6] implements several key recommendations of Sir Michael Pitt's Review of the summer 2007 floods. It also protects water supplies to consumers and prohibits community groups from excessive charges for surface water drainage. It gives the EA a strategic overview role for flood risk, and gives local authorities (known as LLFAs) responsibility for preparing and putting in place strategies for managing flood risk from groundwater, surface water and ordinary watercourses in their administrative areas. ECC is the LLFA for Uttlesford District and therefore for Stansted Airport.

National Policy

National Planning Policy Framework and Planning Practice Guidance

15.12 The National Planning Policy Framework (NPPF)[7] and the accompanying Planning Practice Guidance (PPG)[8] sets out the Government's national policy on development and flood risk. The NPPF aims are to ensure that flood risk is considered at all stages in the planning process to avoid inappropriate development in areas at risk of flooding and to direct development away from areas of highest risk.

15.13 The NPPF advocates the use of a risk based sequential test, in which new development is directed towards the areas of lowest risk of flooding. The different areas of flooding are defined by the following Flood Zones (defined within PPG):

- Flood Zone 1: Low probability of flooding (less than 1 in 1,000 annual probability of river flooding in any year);
- Flood Zone 2: Medium probability of flooding (between a 1 in 100 and 1 in 1,000 annual probability of river flooding in any year);
- Flood Zone 3a: High probability (1 in 100 or greater annual probability of river flooding in any year); and
- Flood Zone 3b: The functional floodplain (annual probability of 1 in 20 or greater in any given year).

15.14 EA supporting guidance to the NPPF – 'Flood Risk Assessments: Climate Change Allowances'[9], specifies how new development must include appropriate consideration of the potential effects of climate change on flooding and the hydrological regime. Such climate change factors have been accounted for on the calculations underpinning the FRA and Drainage Strategy (see ES Appendix 15.1).

15.15 The 2015 updates to the PPG reflect the updated non-statutory technical standards for sustainable drainage systems. The PPG provides information on what details should be provided with regards to waste water, water quality, water infrastructure and water supply. It states the need to consider whether waste water infrastructure will have sufficient capacity to cope with the increased demand of any proposed development.

Other National Guidance

15.16 DEFRA's 'Non-statutory technical standards for sustainable drainage systems'[10] should be used in conjunction with the NPPF and PPG. It provides planning guidance for the implementation of Sustainable Drainage Systems (SuDS).

15.17 SuDS are described in CIRIA C753[11] guidance which outlines approaches to deal with surface water as close to the source as possible and to reproduce natural drainage patterns to prevent an increase in the volume and peak discharge from development sites.

15.18 At a later stage in the design process of the proposed development, further guidance will be referenced and the conceptual strategies outlined here have been considered in this context. These design guides or regulations include:

- Designing for Exceedance in Urban Drainage (CIRIA C635), Sewers for Adoption 7th Edition[12];
- Building Regulations Part H[13]; and
- BS EN 752:2008 – Drain and Sewer Systems Outside Buildings[14].

Local Planning Policy

Uttlesford Adopted Local Plan

15.19 Section 5 of the adopted UDC Local Plan[15] covers environmental issues and Policy ENV12 – Protection of Water Resources, the only policy related to water, notes that:

"Development that would be liable to cause contamination of groundwater particularly in the protection zones shown on the proposals map, or contamination of surface water, will not be permitted unless effective safeguards are provided."

15.20 Paragraphs 5.23 and 5.24 of the Local Plan go on to discuss the locations of potable water supply in the district and state that environmental best practice and mitigation measures must be adopted to minimise impact on the environment.

Uttlesford Emerging Local Plan

15.21 As outlined in ES Chapter 3 (Description of Site, Proposed Development, Policy Context and Alternatives), a Regulation 18 draft version of the emerging New Local Plan[16] was published for consultation in July 2017. There are three policies in this emerging Plan that are relevant to water resources and flood risk:

- Policy EN11 – Minimising Flood Risk; requires that risk of flooding is not increased to existing properties as a result of new development. The Policy states that, where necessary, an FRA must be provided along with appropriate mitigation measures agreed with by UDC.
- Policy EN12 – Surface Water Flooding; requires all new development to incorporate SuDS, in order to ensure local and national standards for run-off rates are achieved. Alternative methods of drainage can be used with justification. With regards to Stansted Airport, the policy states: "*SuDS systems should be designed so as not to increase the bird hazard risk or the safe operation of London Stansted Airport or the movement of aircraft; where appropriate the implementation of a bird hazard management plan will be secured by condition or planning obligation.*"
- Policy EN13 – Protection of Water Resources; states that: *"Major development applications will need to demonstrate the relevant measures that the scheme incorporates and the anticipated levels of water consumption. The proposed measures will need to result in the current targets being met in order to be*

acceptable." It also details measures to ensure that off-site water resources will not be depleted and that groundwater will not become polluted as a result of any development.

Essex County Council April 2016 Sustainable Drainage Systems Design Guide

15.22 The Flood and Water Management Act (2010)6 places SuDS approval responsibilities with county and unitary local authorities. The LLFA strategically overviews surface water and flooding issues which is critical in ensuring well designed, effective and sustainable drainage responding to the catchment rather than an "end of pipe" approach. It also determines whether the proposed drainage system complies with both the National Standards and where applicable, their own supplementary standards.

15.23 Where planning permission is required, the LLFA will be a statutory consultee to UDC during the planning approval process.

Uttlesford District Water Cycle Study (2017)

15.24 This Water Cycle Study[17] (WCS) update, published in January 2017, was commissioned by UDC to provide evidence that the developments proposed within the emerging Local Plan can be accommodated by the water and wastewater infrastructure, and wider water environment.

15.25 No specific references are made within the WCS to the airport and whether the existing network would have sufficient capacity.

Industry Guidance

International Civil Aviation Organisation (ICAO)

15.26 The Manual of Aircraft Ground De-icing/Anti-icing Operations (Second Edition, 2000[18]) provides the most recent guidance on de-icing operations from ICAO. It provides guidance on the minimum procedural requirements to conduct safe and efficient operations when carrying out de-icing activities. This includes information on how to reduce contamination risk to local watercourses and storm drainage systems.

Assessment Methodology and Significance Criteria

Assessment Methodology

Scope of Assessment

15.27 The scope of this ES chapter has been informed by UDC's Scoping Opinion dated 21st December 2017 (see ES Appendix 2.2). In regard to water resources, drainage and flood risk, paragraph 80 of UDC's Scoping Opinion states the following in reference to comments made by the EA on the initial Scoping Report (June 2017):

- *"An assessment of the effect of the Envisaged Development on potable water supply [should] be included in the proposed environmental statement. This is because the Envisaged Development envisages an additional 9.5mppa [sic; now 8mppa] passing through the Airport and the demand on existing potable water resources is likely to significantly increase. The Environment Agency has also advised that an assessment should quantify the increased demand, and its source, essentially because of the likely significant effect on local water supply".*
- *"In the absence of the Envisaged Development including features to avoid the capacity of the pump-rate being breached, there must be an assessment of the likely significant effect of water flow on the Rye Meads Sewage Treatment Works. UDC considers that the construction of 6 [sic.] new aircraft stands may increase flow in Winter months to Rye Meads in circumstances where the Environment Agency has advised that the drainage system is subject to biofilm reducing carrying capacity of the transfer main and is unable to accept the maximum pump rate".*

15.28 With reference to the 'Ecology and Biodiversity' sub-section of the Scoping Report, paragraph 76 of UDC's Scoping Opinion states:

- *"In the event that surface water runoff continues to be a conduit for untreated surface water runoff, the Environment Agency has advised that the impacts on ecology arising from the use within the runway and stands surface water drainage systems of the Pincey Brook watercourse (in so far as it relates to relevant SSSIs) should be identified and subject to assessment of their likely significant effects because the Envisaged Development may lead to a deterioration of its water quality".*

15.29 Paragraph 77 further requests the following to be addressed in the ES:

- *"Assessment of the impact of likely contaminated surface water run-off on the water ecology environment to be included in the proposed assessment if the Envisaged Development does not incorporate features or measures that prevent other than clean water being discharged to the [Pincey] Brook".*

15.30 The assessment of water resources (flooding, hydrology, drainage and water quality) therefore accounts for the above matters and the effects of the proposed development on:

- Local receptors, by altering the water catchments and the possibility that hydrological flow and recharge patterns could change;
- Surface water features which are in hydraulic connectivity to the site, by increasing surface water discharge rates and volumes, and by maintaining the quality of surface water discharge; and

- The existing infrastructure and off-site Sewage Treatment Works (STW), by increasing foul water discharges, including surface water contaminated with glycol.

Extent of Study Area

15.31 The airport is located on the watershed between the Roding, Stort and Chelmer River catchments. The study area assessed for the water environment considers both direct effects from the airport and indirect effects which may occur downstream from on-airport activities.

15.32 The study area used for data collection is generally within the airport boundary (see ES Appendix 15.1). However, some effects such as flood risk, potable water supply capacity and water quality, can extend well beyond the airport boundary. Accordingly, a wider area has been applied to these effects where applicable; for example, the regional supply network and capacity of the local water company (AW) has been examined.

15.33 The study area for hydrology, flood risk and drainage encompasses the site and sensitive receptors within the potential 'area of influence'[i] of the airport, including the Pincey Brook.

Consultation

15.34 The following stakeholders were consulted as part of this assessment:

- Essex County Council (LLFA);
- Thames Water Utilities Limited (TWUL);
- Affinity Water (AW); and
- Environment Agency (EA).

15.35 The detailed consultation responses are provided in the FRA and Drainage Strategy provided at ES Appendix 15.1.

[i] The area of influence of the airport includes the surrounding water bodies into which pollutants released by the airport could enter, including the potential distance these pollutants could travel downstream. This covers a wider ranging area than the study area, which is defined above and in ES Appendix 15.1.

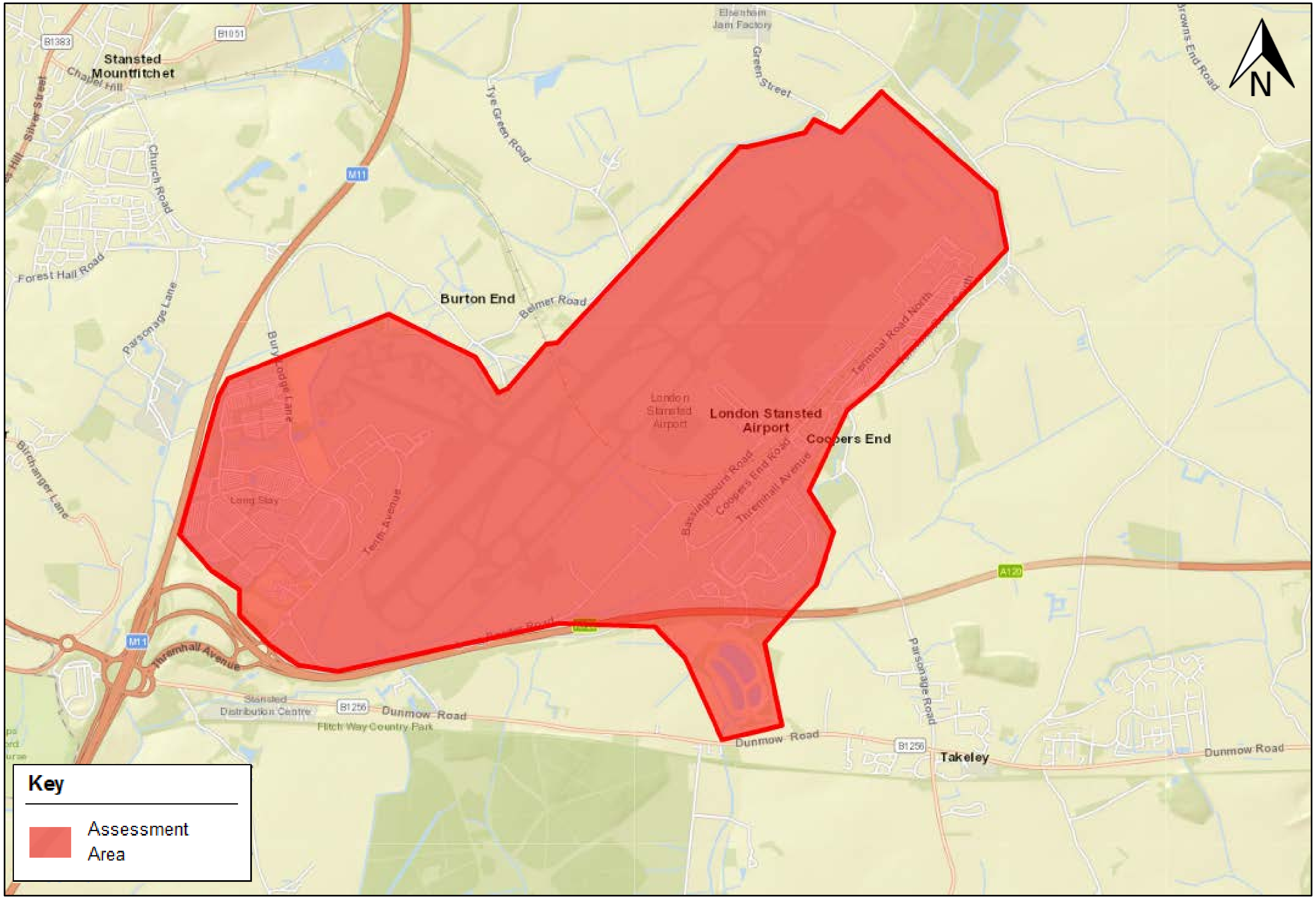

Figure 15.1: Assessment Area

Method of Baseline Data Collation

Desk Study

15.36 The baseline data was collected by WSP through the undertaking a desk-top study. Key sources of information reviewed, included:

- Stakeholder consultation responses, including the UDC Scoping Opinion and specific issued raised in respect of the FRA and Drainage Strategy (see ES Appendix 15.1);
- EA online database;
- British Geological Survey 1:50,000 geological mapping;
- ECC Preliminary FRA (2011);
- ECC Strategic FRA (2015);
- ECC Local Flood Risk Management Strategy (2013);
- UDC Water Cycle Study (2017);
- Civil Aviation Authority – Cap 772 – Wildlife Hazard Management At Aerodromes (2014); and
- UDC Strategic FRA, 2007.

15.37 A review of the following information was also undertaken to establish the baseline for the impact assessment:

- Environment Agency (EA) – full review of their flood risk mapping;
- ECC LLFA – review of the Preliminary FRA, Strategic FRA and Surface Water Management Plan; and
- British Geological Survey – review of mapping for soil types and historical borehole logs.

15.38 The proposed development has the potential to impact the airport's surface water drainage regime and the local water catchment area. As part of the FRA and Drainage Strategy, many preliminary strategy options for managing surface water runoff were developed to reduce the potential for adverse impacts on flood risk and water quality 'on-/off-airport'.

15.39 Following the initial desk-top study, a modelling exercise was undertaken to more fully understand the existing drainage system across the airport and identify how it performs in its existing (baseline) state. The additional areas of hard, impervious surfaces introduced to the airfield have been integrated into the model and proposals put forward on how the runoff from these areas may be attenuated and discharged at rates no greater than the 1:1 greenfield runoff rate (which equates to 14.1l/s), in line with the LLFA Guidance. In particular, the FRA and Drainage Strategy (see ES Appendix 15.1), have been prepared to conform with the following standards:

- Non-statutory technical standards for sustainable drainage systems;
- ECC's adopted Sustainable Drainage Systems Design Guide;

- The CIRIA SUDS Manual (C753); and
- BS8582 Code of practice for surface water management for development sites.

Sensitive Receptors

15.40 The following water sensitive receptors have been identified:

- The Stort River catchment, Pincey Brook and other associated ordinary watercourses that are tributaries to the main rivers;
- Existing groundwater within the study area;
- Human health and wellbeing, in respect of:
  - Flood risk from all sources, including fluvial, pluvial, groundwater, sewer, or other artificial sources;
  - Water quality, notably in respect of the risk of contamination from the use of glycol as a de-icer on the airport, as well as traces of oils, hydrocarbons and aircraft fuels;
  - Water supply and capacity, notably the potential increased demand on potable water supply.
- Existing drainage assets (water utility infrastructure) for the airport which traverse the study area.

Assumptions and Limitations

15.41 This assessment has been based on the proposed development components described in ES Chapter 3 (Description of Site, Proposed Development, Policy Context and Alternatives).

15.42 No physical on-site measurements (e.g. discharge flow rates) were undertaken or considered necessary, although quantitative calculations, including fluvial and surface water modelling, have informed the FRA and Drainage Strategies.

Significance Criteria

15.43 The assessment of effects apportions any corresponding impacts to one of two clearly defined scenarios:

a) Short-term temporal impacts occurring during the construction phase (construction effects) as described in ES Chapter 5 (Development Programme and Construction Environmental Management); or

b) Longer-term permanent impacts occurring after the proposed development has been built out, resulting from physical changes or its ongoing operation (operational effects). These are considered for the Principal Assessment Year (2028), as described in ES Chapter 2 (EIA Methodology).

15.44 The significance of effects on surface water and flood risk is determined by qualitative assessment based upon the data available. This includes establishing the baseline site condition, an appraisal of the development proposals and operational processes, and the application of professional judgement.

15.45 Table 15.1 sets out the significance criteria used to assess impacts in this chapter.

Table 15.1: Significance Thresholds

Level of Significance	Criteria
Major Adverse	Irreversible or major impact (by extent, duration or magnitude) affecting a receptor of more than local significance, or a breach applicable legislation, guidance or policy.
Moderate Adverse	Moderate (by extent, duration or magnitude) negative impact on water resources, water quality or flood risk which may be considered significant in the context of the sensitivity of the receptor, or does not conform to applicable guidance or policy.
Minor Adverse	Slight, reversible or short-term negative impacts on water resources, local water quality or flood risk.
Negligible	Impact of no significance due to the low magnitude of the impact or the low sensitivity of the receptor.
Minor Beneficial	Slight, short-term or highly localised improvement in water resources, water quality or flood risk.
Moderate Beneficial	Moderate (by extent, duration or magnitude) improvement in water resources, water quality or flood risk which may be considered important in the context of the sensitivity of the receptor.
Major Beneficial	Permanent and major (by extent, duration or magnitude) improvement in water resources, water quality or flood risk, affecting one or more receptors of more than local significance.

Baseline Conditions

15.46 The existing conditions at the airport site and in the surrounding area in respect of hydrology, flood risk and drainage have been determined through a site walkover and desk-top review of a number of information sources.

15.47 An overview of the airport's topography, geology and hydrology is provided in the FRA and Drainage Strategy (see ES Appendix 15.1). For the sake of brevity, it is not repeated in this chapter.

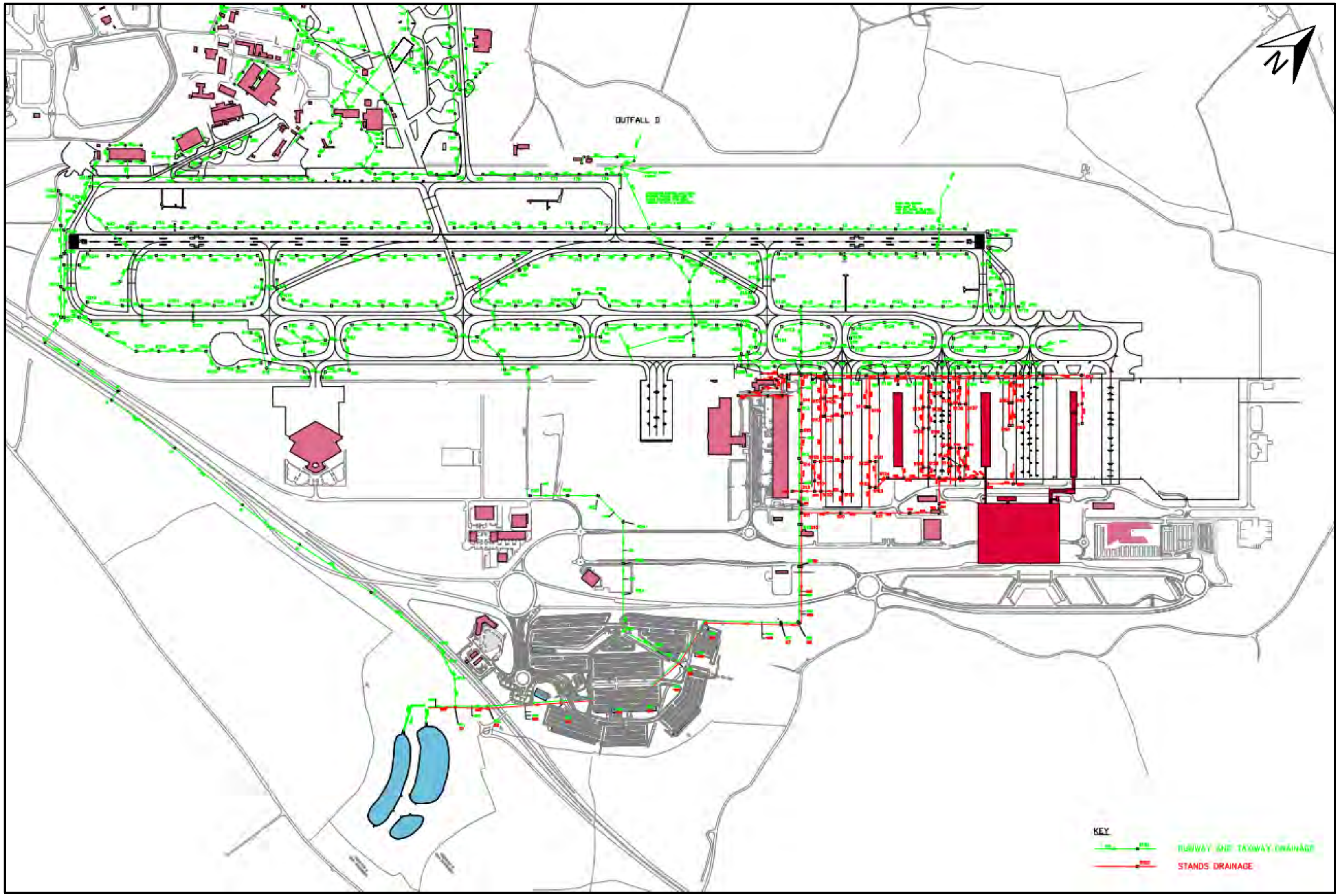

Figure 15.2: Stansted Airport – Surface Water Drainage System

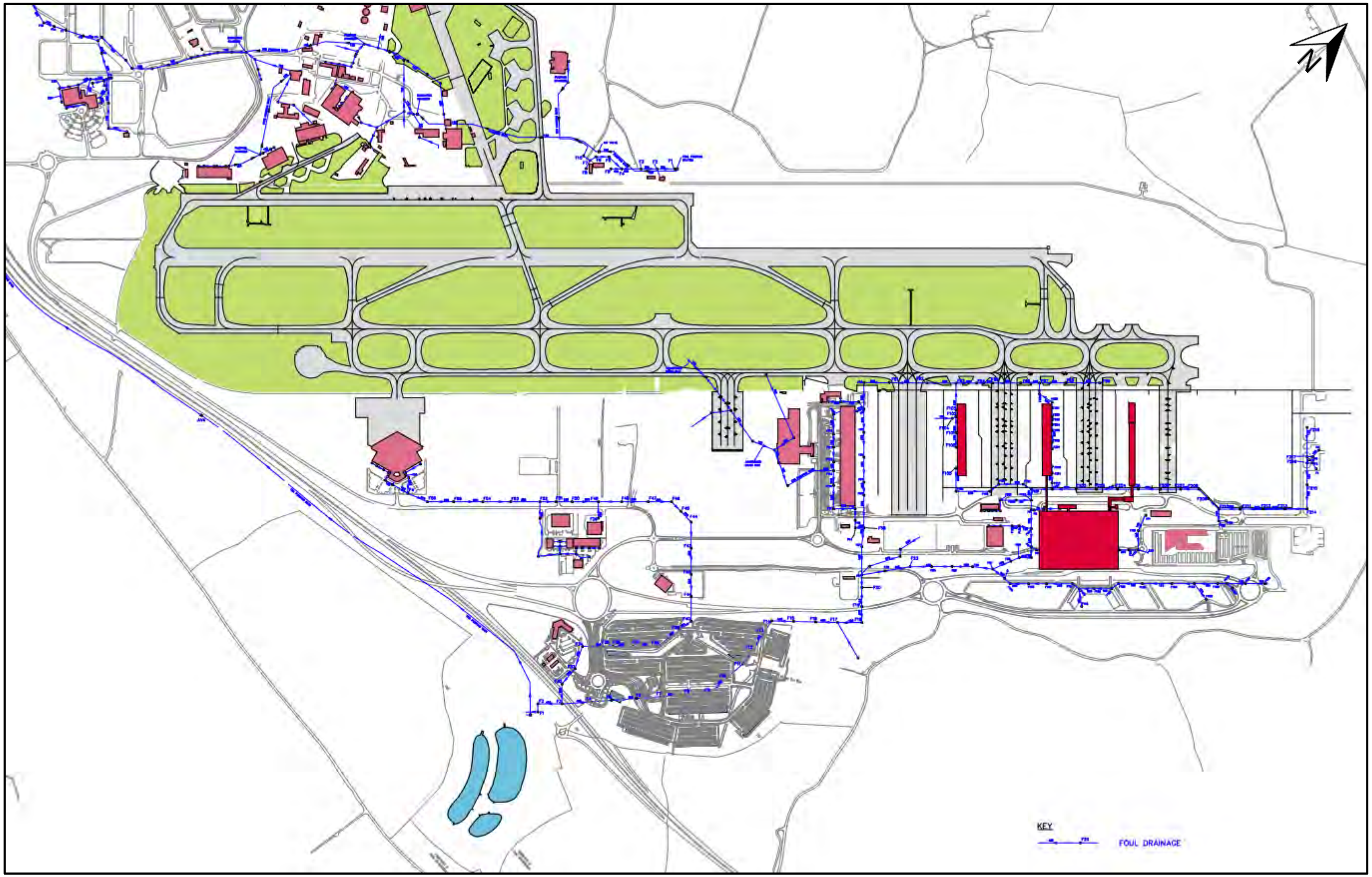

Figure 15.3: Stansted Airport – Foul Water Drainage System

Hydrological Setting

Surface Water Bodies

15.48 Stansted Airport is located in a predominantly rural area characterised by undulating arable farmland and isolated woods. The headwaters and tributaries of the River Stort and River Roding drain radially away from the plateau of high ground occupied by the airport. The entire airport lies within the River Stort surface water catchment area. The principal tributaries of the Stort include the Pincey Brook, Great Hallingbury Brook, Starthill Brook, the Tye Green Brook and numerous minor ditches. The source of the River Roding is located near Molehill Green to the east of the airport.

15.49 The airport is drained to the north by the Tye Green Brook. This drainage feature follows the line of the Stansted buried channel in the Tertiary and Chalk bedrock. The buried channel passes beneath the Airport terminal buildings bearing towards the south-east before turning south. The Pincey Brook follows the southerly extension of this buried channel (known as the Pincey channel) south of the airport.

15.50 A network of open drainage ditches and culverts are maintained across the airfield. The ditches feed a series of balancing ponds (Ponds A to D). The ponds act as holding areas for the airport drainage prior to discharging into local Brooks and streams under current EA discharge consents.

15.51 The new airfield infrastructure (i.e. the new aircraft parking stands, RAT and RET) being proposed is located within the largest drainage catchment at Stansted, which feeds into Pond C (made up of three individual ponds) to the south of A120. The current discharge consents for Water Quality at Pond C are detailed below:

- Total Glycol content shall not exceed 20 mg per litre; and
- Oil content not to exceed 20 mg per litre, and in any event, shall not cause any visible trace of oil and grease to appear on the surface of the receiving waters.

Flood Risk and Surface Water Drainage

Flood Risk

15.52 The potential for increased heavy rainfall events has been forecast by the UKCP09 projections and Weather Generator assessments. These findings have also been ratified by recent research carried out by the Met Office[19]. It was concluded that, even within the next decade, it is likely there will be one or more monthly regional rainfall record events occuring. Furthermore, in the Committee on Climate Change (CCC) annual report, released June 2017[20], a growing concern regarding the increased risk of surface water flooding was highlighted. It is therefore assumed that with the increased heavy rainfall events that are predicted to occur as a result of climate change that the risk of surface water flooding will also increase. This has been assessed within this chapter, in addition to ES Chapter 13 (Climate Change), and within STAL's Climate Change Adaptation Plan[21].

15.53 The risk of flooding to the site from all current and future potential sources has been undertaken within the FRA and Drainage Strategy report (see ES Appendix 15.1). A summary of the findings of this FRA is provided in Table 15.2 below.

Table 15.2: Degree of risk from each source of Flooding Source Risk

Source	Risk
Fluvial	Low
Groundwater	Low
Surface Water	Low
Sewer	Low
Other – Reservoir	Negligible
Other – Canals	Negligible
Other – Culverts	Possible

Surface Water Drainage

15.54 The airport features five separate infrastructure systems or catchments which together contain over 80 km of drainage pipes served by over 1,300 manholes. Within each system, positive drainage (i.e. drainage that occurs through existing drainage infrastructure such as pipes) carries surface water to collection facilities for onward treatment or discharge. The catchments comprise impermeable areas with rapid runoff and slow runoff response times and also permeable areas where the rate and volume of surface water runoff perform as per greenfield conditions.

15.55 Pond C is the most complex of the four ponds in use at the airport for the attenuation, balancing and treatment of surface water drainage. The pond receives the majority of surface water runoff from the airfield; including those areas where glycol based de-icing fluids are applied and distributed. It comprises three separate but interlinked storage compartments that allow for variation in the pond's use between winter and summer operation. The pond compartments are termed 'clean', 'dirty', and 'overflow'. The three individual compartments allow flexibility in the ponds operation, and the dirty and overflow compartments can be linked during the winter months to provide additional storage for polluted surface water runoff.

15.56 Surface water flows entering Pond C are controlled by means of Total Organic Carbon (TOC) meters that divert contaminated surface water to the 'dirty' pond compartment. TWUL then pump polluted storm water from a 'wet well' sited near Pond C to Rye Meads WWTW.

15.57 Flows from the Urban North Catchment that are captured within the Pond A 'dirty' compartment are pumped into the runway drainage system and so also pass eventually to Pond C.

15.58 Clean surface water can be diverted back to the clean pond compartment from which it is discharged to Pincey Brook via an oil interceptor. TOC monitors are also sited at the outfall to Pincey Brook to ensure all water quality discharge conditions are met.

Foul Water

15.59 Foul flows at Stansted Airport are divided into two general areas:

- The Northside private foul sewer system collects all private foul flows to the north-west of the runway. The flows are collected and flow by gravity to TWUL's pumping station to the western side of the M11 motorway for onward pumping to Bishop's

Stortford WWTP. The layout of the Northside private foul sewer network is shown in Figure 15.3.

- The southern private foul sewer system collects all private foul flows to the south-east of the runway. These collect via gravity sewers at a pumping station adjacent to Pond C and are pumped by TWUL for treatment at Bishop's Stortford WWTP. TWUL has not adopted any foul sewers in use by the airport.

15.60 The capacity of the sewage transfer system is TWUL's responsibility under the terms of its licence as the statutory authority. An agreement is in place with TWUL for them to take all of the airport's 'domestic' effluent, provided that all development is within the current airport boundary and that the airport remains operational with only a single runway.

Surface and Groundwater Quality

15.61 The 2015 SDP highlights that there are many possible sources of surface or groundwater contamination from the airport that are managed to minimise the risk of pollution and degradation of water quality. These include:

- *"Chemicals used for aircraft and airfield anti-icing and de-icing;*
- *Detergents used in aircraft and vehicle washing and general cleaning;*
- *Chemicals and oils from aircraft and vehicle maintenance;*
- *Silt, chemicals and fuels from construction activities;*
- *Spillages of fuel and sewage from aircraft and service vehicles;*
- *Leaks from storage of chemicals and fuel; and*
- *Fire-fighting foam (mainly from training)."*

15.62 Much of the existing surface water drainage discharges to the onsite watercourses. These are regulated by the EA and STAL has relevant Environmental Permits. To comply with the Environmental Permits, STAL monitors and manages the water quality prior to discharge, this includes:

- Provision to allow settlement of suspected solids within the onsite basins prior to discharge;
- Aeration to increase oxygen levels to allow aerobic bacteria to break down organic matter; and
- Water quality monitoring and diversion of flows with de-icer above the set level to the Dirty Pond for discharge to Thames Water for treatment at Rye Meads WWTS

Local and Regional Potable Water Supply

15.63 AW operates the district network supplying the airport. A single connection is taken from the 500mmØ DI AW network in the north east of the airport and is split to supply separately to each storage tank. The water system within the development is owned and operated by STAL.

Airport Supply Infrastructure

Network Summary

15.64 The 500mmØ DI AW network supplies two water tanks each with a capacity of 3.5 million litres of water. The tanks are interconnected and, under normal working conditions, allowed to self-balance. The tanks can be configured as ‘duty’ and ‘standby’ to allow maintenance of one of the tanks while not impacting on the supply of water to the airport.

Baseline Assessment

15.65 The tanks feed into a set of three duty pumps supplying the normal operating condition. A second set of three fire duty pumps, each operating in parallel with the duty pumps and are triggered by a reduction in pressure in the downstream pipework. It is assumed that the base water demand of the airport is met by one duty pump operating with two pumps on standby. Both the normal operation pumps and fire pumps feed into a primary water distribution network consisting of a 300mmØ main operating at a design pressure of 6bar.

15.66 AW has reported that the airport draws a peak of up to 180l/s over a two hour period. STAL and AW are currently reviewing options to reduce the supply rate to 50l/s and increase the draw down across a longer period of the day. AW estimates the current daily demand to be two million litres.

Water Consumption

15.67 The airport has experienced significant improvements in water efficiency in recent years due to numerous factors such as improvements in demand management, operational water use, leakage reduction and ‘economies of scale’ due to increases in passenger numbers.

15.68 STAL’s comprehensive water efficiency programme has included the installation of water saving technology in many of the terminal and office toilets. Low-flow water technology will be standard in new facilities with all new major airport buildings targeting a BREEAM Excellent rating.

15.69 Furthermore, STAL has a rolling annual programme of leakage detection and repair and in 2011, undertook some significant water pipework repairs which reduced consumption by 33%, saving a total of 205 million litres of water.

15.70 In 2016, around 639 million litres of potable water was consumed across the entire airport, which corresponds to a usage of approximately 26 litres per passenger. This compares to 2015, when the airport consumed around 688 million litres of water, meaning there was a 7% decrease in overall water consumption in the year, despite an increase of approximately 1.8 million passengers (i.e. 24.3mppa in 2016 vs. 22,5mppa in 2015).

15.71 In 2008 the consumption of potable water per PAX was 30 litres, this is a year after peak passenger throughput in 2007, but no fully validated data is available for 2007. By 2016, total pax numbers had increased by 537,303; however, following the efficiency measures and leakage detection undertaken by STAL, potable water consumption had reduced by 6.4% in total with Potable Water litre per PAX reducing by 8.7% (see Table 15.3).

15.72 The potable water usage set out in Table 15.3 includes water usages other than passenger demand, such as water used by airport staff, third party companies, freight operators, cleaning etc. These represent a base flow usage which is unlikely to change markedly with passenger numbers. Unfortunately, base flow cannot be removed from the total as the metering at the airport is unable to differentiate for these usages. However, it should be noted that if it were possible to subtract this base flow figure from the Potable Water m³ per PAX calculation, the overall reduction per passenger would be notably greater.

Table 15.3: Potable Water Usage – Stansted Airport

Year	Potable Water Usage (m^3)	PAX (000,000)	Potable Water (litres per PAX)
2008	720,568	23.8	30
2016	672,849	24.3	28

Incorporated Mitigation

Water Management at the Airport

Measures Detailed in the 2015 SDP

15.73 Potable and other water usage is addressed in the 'Environment' section of the 2015 SDP with various existing and future water efficiency measures being described, which STAL has committed to implementing.

15.74 STAL operates a certified Environmental Management System (EMS) under the internationally recognised standard for Environmental Management, ISO14001:2015. As part of this certified EMS, a Water Management System (WMS) has been developed to audit and manage water supply to all STAL and airport tenant/ concessionaire facilities. The aims and targets for this system are as follows:

"Aims:

- *Explore opportunities to further reduce water consumption;*
- *Install water efficiency devices within existing buildings where beneficial;*
- *Implement measures to reduce peak run off rates and volumes;*
- *Improve water quality using natural methods where possible;*
- *Work with key stakeholders and local authorities including our water supplier and sewage undertaker and the EA to inform our plans for drought management and to manage surface water run-off; and.*
- *Ensure water stress and surface water issues are included in our climate change adaptation plans.*

Targets:

- *All new buildings to include water efficiency devices;*
- *Continue to undertake leakage monitoring of the water distribution pipework to reduce the amount of water lost as a result of leaks;*
- *Capture the first 5mm of rainfall in 80% of summer events and 50% of winter events; and*
- *Detail any S106 agreements that have been made, along with agreements from other planning conditions."*

Pollution Prevention

15.75 As described earlier in this chapter, waste water is currently discharged directly into the sewer network, with storm water runoff flowing into a series of on-airport balancing ponds. The balancing ponds help control the volume and rate of discharge as well as minimising the risk of pollution. All potentially contaminated surface water runoff is either treated prior to being discharged into the local water environment or discharges to the TWUL foul public sewers.

15.76 Runoff from the stands and runway that contains de-icing chemicals is managed away from watercourses within the onsite balancing ponds; it is then pumped to the TWUL sewerage network for off-site treatment. Any clean water from the surface run-off is directly discharged back into local watercourses from the balancing ponds.

15.77 To further reduce the risk of pollution, controls are placed on vehicle and aviation fuels that are stored on site. Products and processes are in place for all aircraft related procedures to minimise any potential for pollution risk to the local water environment. The use of herbicides and pesticides at the airport is also monitored and regulated to reduce the amount of chemicals used. Spill response procedures are in place including an automatic shutdown system to capture large spills in the balancing ponds, with contingency plans in place as required.

Water Consumption

15.78 Water consumption is actively monitored to determine usage and to implement reduction measures, either through leakage repair or the installation of more efficient appliances.

15.79 The current potable water efficiency measures include the installation of water saving technology in many of the public and staff washrooms throughout the main terminal building and satellite piers. A rolling annual programme is also in place to monitor and control the leakage and repair of the airport's water pipework system. This is additional to the significant repairs undertaken in 2011 to the water pipework, which reduced water consumption by 33% and saved over 205 million litres of potable water per annum.

15.80 Potable water quality is also monitored through sampling methods, and in conformance with permits to ensure the quality of drinking water is maintained.

Regional Resources and Supply Infrastructure

15.81 Uttlesford District contains nine borehole pumping station locations. These are all groundwater sources, with treatment carried out at source before being put into supply. AW identified many strategic options for the region; these include leakage reduction, universal metering and water efficiency measures. The current AW Water Resource Management Plan includes an indicative dwelling forecast for up to 2040, with allowances for a 30% increase in dwellings during this time. The current UDC development trajectories forecast an increase of approximately 35% in the UDC study area from 2014 figures by 2032; slightly exceeding the expectations of AWAW.

15.82 AW has provided outline details of its preferred strategy for delivering water over the 25 years, this strategy includes measures as follows:

- Distribution network leakage reduction;
- Universal metering through automated meter reading;
- Household water efficiency measures implementation;
- Increases to existing licences where sustainable; and
- Water transfers from neighbouring water companies.

15.83 A detailed timeline is set out the UDC Water Cycle Study, aside from the more general measures around metering and wider efficiency it notes preferred options for an increased licence for supply in Stansted (2016) and airport water efficacy at Stansted (2039).

Impact Assessment

15.84 This section identifies and assesses the potential effects that are predicted to occur during construction and operation of the proposed development.

Construction Stage Effects

15.85 To comply with current legislation, policy and guidance requirements, the design of the new airfield infrastructure (the new stands, RAT and RET) will mitigate flood risk and safeguard surface and ground water resources from pollution. This will be achieved by implementing suitable drainage infrastructure to ensure surface water drainage flows are in line with the required greenfield run-off rates (as specified in ES Appendix 15.1), connected to the existing drainage ponds to manage the run-off of pollutants.

15.86 Similarly, the management of surface water run-off is an important issue. Increased surface water run-off may exacerbate flood risk or reduce groundwater levels through the interception of water and changes to recharge rates. It is EA and LLFA (ECC) policy to promote the use of at-source surface water controls and to provide attenuation on-site prior to discharge off-site into local watercourses.

15.87 Potential effects on flood risk, surface water quality, quantity and groundwater during the construction and operational phases have been identified and are discussed further within this chapter.

15.88 It should be noted that under powers of the Anti-Pollution Works Regulations 1999[22], the EA is able to stop construction activities at any time, should a significant risk be posed to the environment.

Potential Contamination of Water Resources

15.89 The operation of construction vehicles and general construction activities can potentially give rise to the contamination of surface water through the mobilisation of hydrocarbons, suspended solids and construction materials. This may lead to deterioration of surface water quality and, if discharged from the construction area in an uncontrolled manner, may impact on the receiving watercourses (Pincey Brook).

15.90 The movement of plant and machinery may damage soil stability, creating boggy conditions during wet weather and generate dust during dry periods. This has the potential to increase sediment entering the existing local surface water drainage ditches via overland flows, with the potential to eventually reach local watercourses. This could lead to reduced flow and a potential increase in flood risk along these watercourses, in addition to the reduction of water quality and clarity.

15.91 As set out in ES Chapter 5 (Development Programme and Construction Environmental Management) the new airfield infrastructure will necessitate various earthworks; comprising topsoil stripping, stockpiling, trench excavations, excavation for SuDS installation, and excavation of service corridors.

15.92 This could increase the quantity of suspended solids (loose, uncovered soil and other particulate matter) in the surface water runoff from the site, which could in turn impact upon local water quality and aquatic biota. The excavations could also lead to a localised deterioration of groundwater quality as direct pathways to the underlying groundwater could occur through the exposed soils. However, this risk is expected to be very low due to the absence of any known (or expected) ground contamination and the general low permeability of the soils (see ES Chapter 16), and the shallow depths of excavations required to construct the new airfield infrastructure.

15.93 The potential impact on water quality within the existing drainage network resulting from increased sedimentation and pollutants mobilised by loose soil and related breakdown of the soil matrix and construction plant operation, is considered to potentially cause a minor adverse effect before mitigation.

15.94 The sensitivity of underlying groundwater at the site is considered high (due to the regional importance of the groundwater resources), but the risk of vertical migration of pollutants from the construction works is low. Therefore, there could be a short term **negligible to minor adverse** effect, before mitigation.

Alteration to Drainage Regime

15.95 Construction activities, such as topsoil stripping within the construction works areas could result in soil compaction and ultimately less water being bound up in the unsaturated soil matrix. This, combined with the net increase in impermeable hardstanding within the airport boundary, may increase the volume and the rate of surface water run-off discharged into the Pond C, Rye Meads WWTW and/or to the Pincey Brook or other watercourse. This could, without mitigation, pose a localised flood risk, however it is unlikely that any exceedance flows would pass off the airport site, refer to the FRA and Drainage Strategy within ES Appendix 15.1 for further details on flood risk.

15.96 Increasing the rate and volume of surface water run-off will affect local drainage patterns and may also result in temporary pooling of water in the four different works areas during the construction phase, although excess water would normally be pumped away before accumulating (due to runway safeguarding reasons).

15.97 The sensitivity of the watercourses and effects to the local drainage network is considered high and the magnitude of change, prior to mitigation, is predicted to be moderate. Accordingly, there could be a direct, temporary, short term **minor to moderate adverse** effect on the drainage regime during the construction phase.

Increased Risk of Fluvial Flooding

15.98 The proposed development does not entail any ground raising earthworks or built development within a floodplain. Therefore, there is likely to be a **negligible** effect on the risk of fluvial flooding.

Increase in Water Demand

15.99 During construction of the proposed development, potable water will be required to supply the site facilities and construction processes (e.g. concrete batching). The demand will vary throughout the programme of works, dependant on the tasks being carried out.

15.100 It is considered that that this demand for additional water supply during construction will be minimal, particularly in the context of daily water consumption across the whole airport campus. As such, this is likely to represent a **negligible** effect on the local water supply network.

Increase in Demand on Foul Water Infrastructure

15.101 During construction of the proposed development the existing foul water sewer network will be used to discharge effluent from the site welfare facilities and other sources.

15.102 In view of the modest scale of the construction works and the associated workforce, it is considered that the temporary increase in foul water discharge associated with construction activities this will have a **negligible** effect on the local public sewer network operated by TWUL.

Operational Stage

Potential Contamination of Water Resources

15.103 Contamination of water resources may lead to a deterioration of water quality and could impact on watercourses and the natural water table within the underlying sub soil.

15.104 Due to the nature of the proposed development, which comprises a modest (7.02ha) increase in hardstanding within the airfield, it is considered that the surface water discharges from these new areas will be similar in nature to the run-off from existing stands and taxiways. As such, this discharge will, at certain times of the year, contain glycol (used as a de-icer) as well as small traces of oils, hydrocarbons and aircraft fuel. However, the proposed infrastructure does not include any new or potentially hazardous uses – being limited to aircraft taxiing, parking and servicing between flights. This means there is no requirement to introduce a separate / bespoke drainage system or specific pollution controls measures, beyond those already in use at the airport. Instead, the surface drainage scheme supporting the proposed new infrastructure will tie-into the exiting airfield drainage network, with any necessary upgrades made to the 'end-of-pipe' attenuation ponds and treatment systems.

15.105 Options for upgrades and improvements to the existing Pond C to manage surface water discharge from the airport site are set out within the FRA and Drainage Strategy in ES Appendix 15.1. These improvements will ensure that there is adequate storage capacity to accommodate runoff from the new aircraft parking stands, RAT and RET.

15.106 As outlined in detail within the FRA and Drainage Strategy (see ES Appendix 15.1), the airport currently operates a comprehensive water quality management system for Pond C. Clean water is managed within a separate compartment of Pond C where it is treated to an appropriate standard and discharged to the Pincey Brook at agreed rates and in line with the EA Environmental Permit. During the winter period the surface water may be contaminated with glycol, this contaminated water will continue to be pumped through the TWUL sewerage network for treatment at Rye Mead WWTW at the rates agreed with TWUL.

15.107 Accounting for the above, there is likely to be a direct, long term **negligible** effect due to the additional surface water discharges from the site, prior to the implementation of additional mitigation (see below).

Increased Risk to Fluvial Flooding

15.108 The proposed development lies within Flood Zone 1 (low flood risk), which has an annual flood probability of 0.1%.

15.109 The proposed development will involve no built development within floodplain. As a consequence, there will be no displacement or obstructions to existing fluvial flood waters for events up to and including the 1 in 100 year plus climate change event.

15.110 The sensitivity of the local watercourses is considered to be high; however, as no permanent earthworks or ground raising is proposed within floodplain, there is likely to be a **negligible** impact on the risk of fluvial flooding.

Increase in Potable Water Consumption

15.111 It is envisaged that total water consumption will rise with increasing numbers of passengers and employees at the airport in future years in both the Do Minimum (DM) scenario and Development Case (DC). However, this increase will not be linear as water consumption per passenger is likely to fall due to continued improvements in water efficiency (as detailed in the 2015 SDP) and the fact that certain operational/ non-passenger water usage (such as for cleaning) will not increase in proportion to passenger growth.

15.112 As a worst case, assuming a linear growth and no further improvement in water efficiency (measured in both absolute terms or on a per passenger basis), the airport would consume approximately 1,172.5 million litres in the 2028 case DM (35mppa) scenario and 1,474 million litres in the 2028 DC (43mppa).

15.113 Total consumption however is not the key issue; rather AW has greater concerns in regard to the rate of supply as opposed to total volume. AW has proposed reducing the rate in which the airport draws water from the mains and extending this over a longer time frame, this is discussed in more detail within the FRA and Drainage Strategy (see ES Appendix 15.1). The effect of this change would reduce the pressure on the existing AW mains, but should allow the airports private water supply network to continue to operate in a similar manner to existing.

15.114 On the strength of the above, the impact of the proposed development (comparing the DM and DC in 2028) on water consumption would be **minor adverse** in the worst case (unmitigated) scenario, but **negligible** with a 20%+ improvement in efficiency and changes to draw down from the mains.

Impact on Potable Supply Network

15.115 Based on the above, with regards to potable water supply, the anticipated effect of both the DM and DC scenarios is a **moderate adverse** effect prior to the implementation of any additional mitigation measures (which are to be discussed and agreed with AW).

Increase in Demand on Foul Water Infrastructure

15.116 The proposed development sites in isolation will not require any dedicated foul drainage. However, as previously explained, during the winter period when glycol is in use the storm water will become contaminated and will be pumped to Rye Mead WWTW. At this time, it is not proposed to increase the existing pump rate which has been agreed with TWUL and so the proposed development will not increase pressure on the local sewer capacity. TWUL has been consulted with regards to the treatment capacity at the WWTW and a meeting was held with TWUL on the 23rd November 2017. TWUL is consulting their asset planners, but as it stands they are not aware of any constraints with regards to treatment volume at the Rye Mead WWTW.

15.117 As the four development areas are proposed to support an increase in passenger numbers at Stansted, an assessment is required to review what impact the changes to foul flows and volumes may have on the TWUL foul water public sewers.

15.118 It should be noted that this increase in passenger numbers should not result in an increase in peak foul flows, but rather overall volume. The airport currently operates at capacity during the peak morning and evening time slots and passenger number increases are not envisaged to impact on this period. The proposed uplift in passenger numbers will instead occupy the times in which the airport is not operating at capacity. As a result, the total foul volume may increase post development, which could put pressure on the Bishop's Stortford WWTW, but there should not be increased pressure on the intervening sewer capacity.

15.119 The total increase in foul water volume is also not a straight forward uplift, as identified for potable water supply, certain operational / non-passenger water usage (by STAL staff, third party companies, cleaning) will not increase in proportion to passenger growth. Furthermore, the water efficiency measures set out within the 2015 SDP should see an overall reduction of foul flows as low flush toilets/urinals, spray taps etc. are retrofitted through the terminal. If total foul discharge does increase post development, the UDC Water Cycle Study confirms there is capacity to serve this.

15.120 A Pre-Development enquiry was made to TWUL and the proposals were discussed at the meeting on the 23rd November 2017. As it stands, the asset planners at TWUL are reviewing the proposed uplift and a Hydraulic Impact Assessment may need to be undertaken to confirm if the above proposals have an impact on the local sewers. If capacity issues are identified, from April 2018 TWUL will be responsible for reinforcing their network to support development and they will recapture the costs through Infrastructure Charges to the airport.

15.121 The anticipated effect on foul water infrastructure resulting from the proposed development will represent a **minor adverse** effect prior to the implementation of mitigation measures (to be discussed with TWUL).

Further Mitigation

Construction Phase

Measures to Avoid Contamination of Water Resources during Construction

15.122 As described in ES Chapter 5 (Development Programme and Construction Environmental Management), the Main Contractor appointed for the proposed construction works will have the primary responsibility for environmental legislation and best practice and reviews and approves all CEMP information and authorised connections / dewatering, other construction activities and the proposed control measures from contractors. This will ensure that the risk of pollution incidents to water is minimised as far as reasonably possible; for example, the use of bunds around earth stockpiles, fuel and chemical stores. It will also describe the procedures to be adopted in the event of environmental emergency, such as an accidental fuel spillage. The Water Assets & Compliance Manager fulfils this role within STAL. STAL has operational staff that inspects, operates and manages the balancing ponds, which includes inspections of incoming and outgoing water for any impacts from such construction activities.

15.123 The CEMP will be developed and agreed with STAL Asset Management and the EA (as necessary) prior to the commencement of the construction works. All contractors working on the site will be required to comply with the CEMP and will be briefed accordingly.

15.124 In addition, STAL will control and authorise a localised surface water run-off management system, which will be employed by the main contractor. This will enable containment of pollutants and, where necessary, the diversion and prior treatment of any sediment-laden water before discharge to the airport's drainage system or directly into the ground. Only surface water which is of a suitable bio-chemical standard will be permitted to be discharged from the site.

Further Alterations to Drainage Regime

15.125 As detailed in ES Appendix 15.1, proposals have been put forward for further upgrade works to Pond C and associated drainage devices to ensure discharge rates and volumes are not increased or altered as part of the development proposals. Any contaminated water will continue to be pumped to the TWUL sewerage network for treatment at Rye Mead WWTW.

Operational Phase

Proposed Drainage Strategy

15.126 The FRA and Drainage Strategy (see ES Appendix 15.1) has calculated the additional volumes and maximum rates of surface water runoff (accounting for climate change) due to the net increase in impermeable surfaces resulting from the proposed development.

15.127 As previously identified, it is proposed that the impermeable areas associated with the proposed sites will drain to the existing airport drainage network. To inform the proposed drainage strategy for the new impermeable areas an extensive hydraulic model was created was constructed. The surface water hydraulic modelling exercise covers the whole airport and was undertaken using Infoworks ICM (Integrated Catchment Modelling) system. The model comprised of:

- 1D – Stansted sewer network, including pipes, manholes, attenuation ponds, flows controls etc.; and

- 2D – over ground flow (based upon Lidar digital terrain model).

15.128 A key objective of the exercise was to better understand surface water flood risk at the airport and to establish and support any future drainage network development design, through a 1D-2D surface water model. Both the model and study works have enabled WSP to establish the effect of changes of land use on the airfield (i.e. the proposed development) on discharge to Pond C (and ultimately watercourses downstream), as well as potential mitigation works required in order to manage discharges off-site.

15.129 The total discharge rate (over the spillway, through the orifices and out through the three foul pumps) for the baseline was calculated at 10.22m³/s, this increased to 10.37m³/s for the proposed scenarios. This assumes a conservative scenario where all three sections of Pond C are 85% full prior to the 1:100 year storm event occurring with 40% allowance for climate change. In summary, if unmitigated the total increase in flows equates to 150l/s post development.

15.130 Outputs from the modelling for the baseline and proposed scenarios are set out in ES Appendix 15.1. Review of the full discharge curves for the baseline and proposed scenario indicates a difference between the two lines equating to 256m³. This volume, as a minimum, will need to be attenuated and discharged at a rate no greater than the 1:1 greenfield runoff rate as per the requirements set out by the LLFA (ECC), this equates to 14.1l/s.

15.131 Further upgrade works to Pond C are proposed in conjunction with the proposed development to ensure that it has capacity to store and treat the additional airfield drainage from the new stands, RAT and RET. The four areas of new infrastructure will tie into the existing airport drainage network based on topography. As per the existing drainage network, contaminated water will be managed within its own compartment of Pond C. Outline modelling for mitigation options indicates that this may be achieved through one or more of the following options:

- Merge the two eastern basins into a single basin;
- Increase the size of one or both of the eastern basins; or
- Construct a new attenuation basin next to the existing basins.

15.132 To ensure the effectiveness of the proposed drainage network a robust maintenance regime in accordance with CIRIA C753 will be implemented. It will also be necessary to implement treatment devices such as trapped gullies and catch pit manholes to limit contamination and silt ingress into the drainage system. The SuDS maintenance and management plan along with the method statement regarding the management of surface water during construction can be found in the FRA and Drainage Strategy in ES Appendix 15.1.

15.133 The proposed drainage network is designed not to exacerbate any existing flood risk associated with properties situated upstream, or downstream, of the airport and will ensure the proposed development is effectively drained in accordance with principles set out within the NPPF.

Additional Measures to Manage Water Supply and Demand

15.134 As set out earlier in this chapter, the proposed development and the associated increase in passengers will place an additional demand on the potable water supply network in future years. This increase in demand will occur both with and without the proposed development, albeit the demand will be greater in the DC due to the 8 million additional passengers and greater number of on-site employees by 2028. As such, STAL will continue to liaise with AW to determine the requirement for, and timing of, any changes to the way in which the airport currently draws from the mains and/or off-site reinforcement works to their mains supply.

15.135 Building on the water efficiency and conservation measures already identified and committed to by STAL in the 2015 SDP, additional measures and revised targets will be explored and reported on in the next revision of the SDP, which is scheduled to occur before 2020 (i.e. in advance of the implementation of the proposed development).

15.136 Possible additional water conservation measures that could be introduced at the airport include water recycling (rainwater and treated effluent/ de-icer) for toilet flushing and irrigation, and the use of low flow/ dual flush WCs and aerated spray taps throughout the airport campus.

Residual Effects

Potential Contamination of Water Resources

15.137 Accounting for the preceding assessment and proposed mitigation measures, there is likely to be a **negligible** risk/effect of the proposed development contaminating local watercourses, harming aquatic ecology or other sensitive receptors.

Alteration to Drainage Regime

15.138 Accounting for the preceding assessment and proposed mitigation measures, including the employment of SuDS and the proposed upgrade to Pond C to manage both clean and contaminated discharges, there is likely to be a **negligible** effect from the proposed development.

Increased Risk to Flooding

15.139 Accounting for the preceding assessment and the conclusions of the FRA (see ES Appendix 15.1), including the proposed attenuation of surface water runoff, there is likely to be a **negligible** effect on flood risk, both on and off-site.

Increase in Potable Water Demand

15.140 Accounting for the preceding assessment and proposed water efficiency measures, including those committed to in the 2015 SDP, there is likely to be a **negligible** effect from the predicted increase in water demand as a direct result of the proposed development, but a **minor adverse** effect on AW's off-site infrastructure and capacity (in both the DC and DM scenarios).

Increase in Foul Water Demand

15.141 Accounting for the preceding assessment and TWUL's apparent concerns over the capacity of their local foul water treatment infrastructure, the proposed development could result in a **minor adverse** effect prior to the implementation of any mitigation measures (which are to be discussed and determined with TWUL). However, with necessary and planned upgrades to this off- site infrastructure, the effects from additional passengers and employees by 2028 are expected to be **negligible**.

Cumulative Effects

15.142 Residual effects resulting from the proposed development have been determined to be mainly negligible or minor adverse, at worst. Accordingly, no significant cumulative ('in combination') effects with other committed developments are anticipated.

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References

1 European Commission, (2000); Water Framework Directive.

2 Groundwater Daughter Directive

3 HMSO, (1991); Water Industry Act 1991

4 HMSO, (1991); Water Resources Act 1991

5 HSMO, (2003); Water Act 2003.

6 HSMO, (2010); Flood and Water Management Act 2010.

7 Department for Communities and Local Government (DCLG), (2012); National Planning Policy Framework.

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9 Environment Agency, (2017); Flood risk assessments: climate change allowances.

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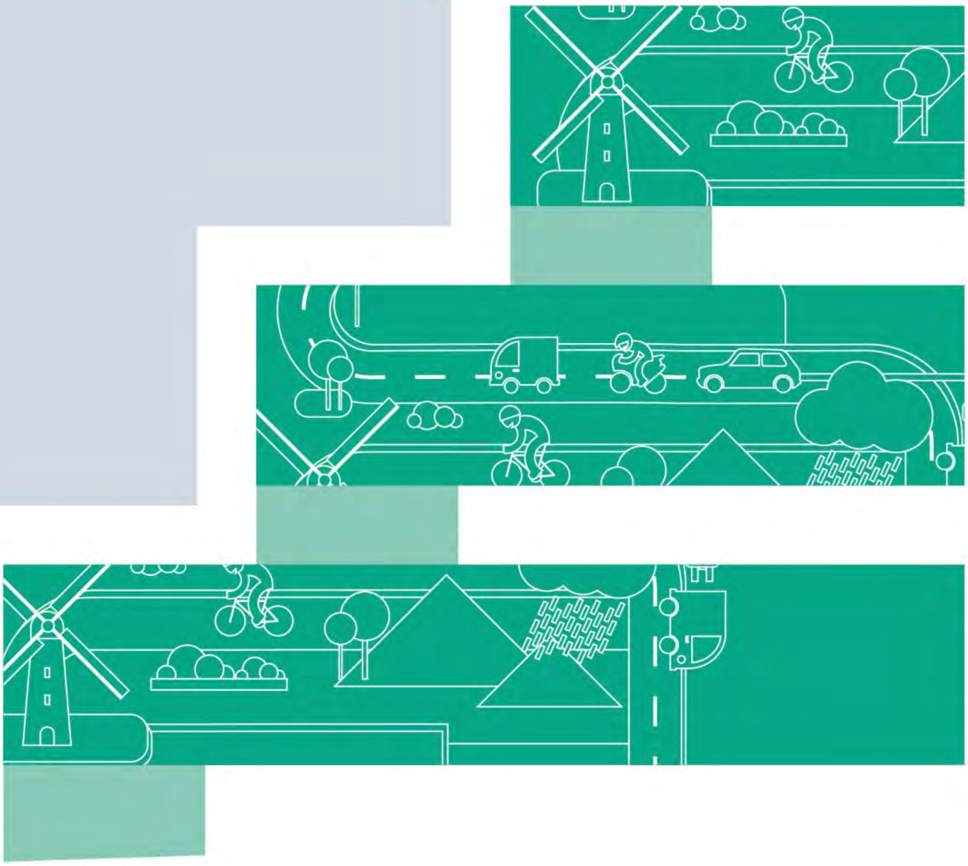
TRANSFORMING LONDON STANSTED AIRPORT

35+ PLANNING APPLICATION

Chapter 16 Non-Significant Topics



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16 NON-SIGNIFICANT TOPICS

Introduction

16.1 This chapter of the ES considers the environmental topics that were examined at the EIA scoping stage and determined to be unlikely to be materially affected by the proposed development or to have the potential to give rise to significant environmental effects.

16.2 The rationale for scoping out these topics was first set out in the Scoping Report (ES Appendix 2.1) which was subsequently confirmed by the Scoping Opinion issued by UDC on 21st December 2017 (ES Appendix 2.4). However, for the sake of completeness, this chapter provides a further account of these 'non-significant topics' and also responds to UDC's request for additional information on specific matters, such as the STAL's waste strategy and absence of any effects of the proposed development on the airport's Public Safety Zones (PSZs) and the Cadent (formerly National Grid) gas network within the airport boundary.

16.3 The non-significant topics are grouped together and presented within this chapter in accordance with the environmental 'factors' listed in the EIA Regulations, namely:

- Biodiversity;
- Land and Soil (including contamination);
- Cultural Heritage (including archaeology and built heritage assets);
- Landscape (including visual impacts);
- Waste; and
- Major Accidents and/or Disasters.

16.4 Of these factors, biodiversity (particularly on-airport ecology) is the most relevant consideration. This is due to the physical works associated with the proposed development requiring the development of four areas of airfield grassland and, at one location, the potential disturbance/ displacement of protected species (common lizard and great crested newt) the presence of which was recorded through recent site surveys. The balance of this chapter is therefore skewed towards this topic and it is further supplemented and informed by a Preliminary Ecological Appraisal (PEA) (ES Appendix 16.1) together with an Ecology Mitigation Strategy (ES Appendix 16.2) which describes how adverse effects on these protected species will be avoided.

16.5 The biodiversity section of this chapter should be read in conjunction with the assessment of nitrogen deposition effects to statutory designated sites including Hatfield Forest, as reported in ES Chapter 10 (Air Quality). The PEA (ES Appendix 16.1) also incorporates ecological baseline and survey data to inform a Habitats Regulation Assessment (HRA). This HRA 'screening assessment' separately considers the potential effects of any increase in nitrogen oxides (NOx) on the more distant Epping Forest; which is a Special Area of Conservation (SAC) and therefore afforded the highest level of protection. Both of these assessments conclude that there will be no significant adverse effects on these protected habitats, either with or without the proposed development, due to NOx emissions from changes in surface access traffic and other emission sources at the airport. For the sake of brevity, these assessments are not repeated in full within this chapter.

16.6 With regard to the topic of ‘Land and Soil’ reference should additionally be made to the methods of construction and proposed mitigation measures described in ES Chapter 5 (Development Programme and Construction Environmental Management).

Biodiversity

On-Airport Ecology/ Biodiversity

16.7 As a result of initial research and consultation at the scoping stage, a Phase 1 Habitat Survey and associated PEA was undertaken at the airport in August 2017. This survey covered the four areas of the airfield which will be affected by the construction of proposed development (i.e. the RAT, RET, Echo and Yankee aircraft stands).

16.8 The four areas of the proposed infrastructure development comprise species-poor, semi-improved mown grassland of little ecological value. However, on the northern edge of the airfield, at the site of the additional Echo stands, dense scrub and tall ruderal habitats were present on a bund of spoil together with a shallow drainage ditch. It was determined that this area, shown in Figure 16.1, has some potential for reptiles and amphibians and therefore further survey work was undertaken using artificial reptile refugia to establish whether reptiles inhabited the site. The refugia were checked on seven separate occasions from September to October 2017 in suitable weather conditions. The surveys identified a 'low' population of common lizards, of which a high proportion were juveniles; suggesting that this is a breeding population. Two great crested newts (GCNs) were also found during the reptile surveys. The full findings of the reptile surveys are included in ES Appendices 16.1 and 16.2.

16.9 The Ecological Mitigation Strategy at ES Appendix 16.2 provides details of the mitigation strategy that will be implemented to ensure that the presence of common lizards and GCN is fully accounted for within the development. In particular, given the legal protection afforded to GCN, it is proposed to re-survey the land prior to the construction works and to translocate any specimens found under a licence from Natural England (NE). Translocation, if necessary, will be to an off-site receptor site (Monks' Farm) which is within the land ownership of STAL. This is currently under construction (completed late spring 2018) and will provide suitable habitat for a range of species including reptiles and amphibians.

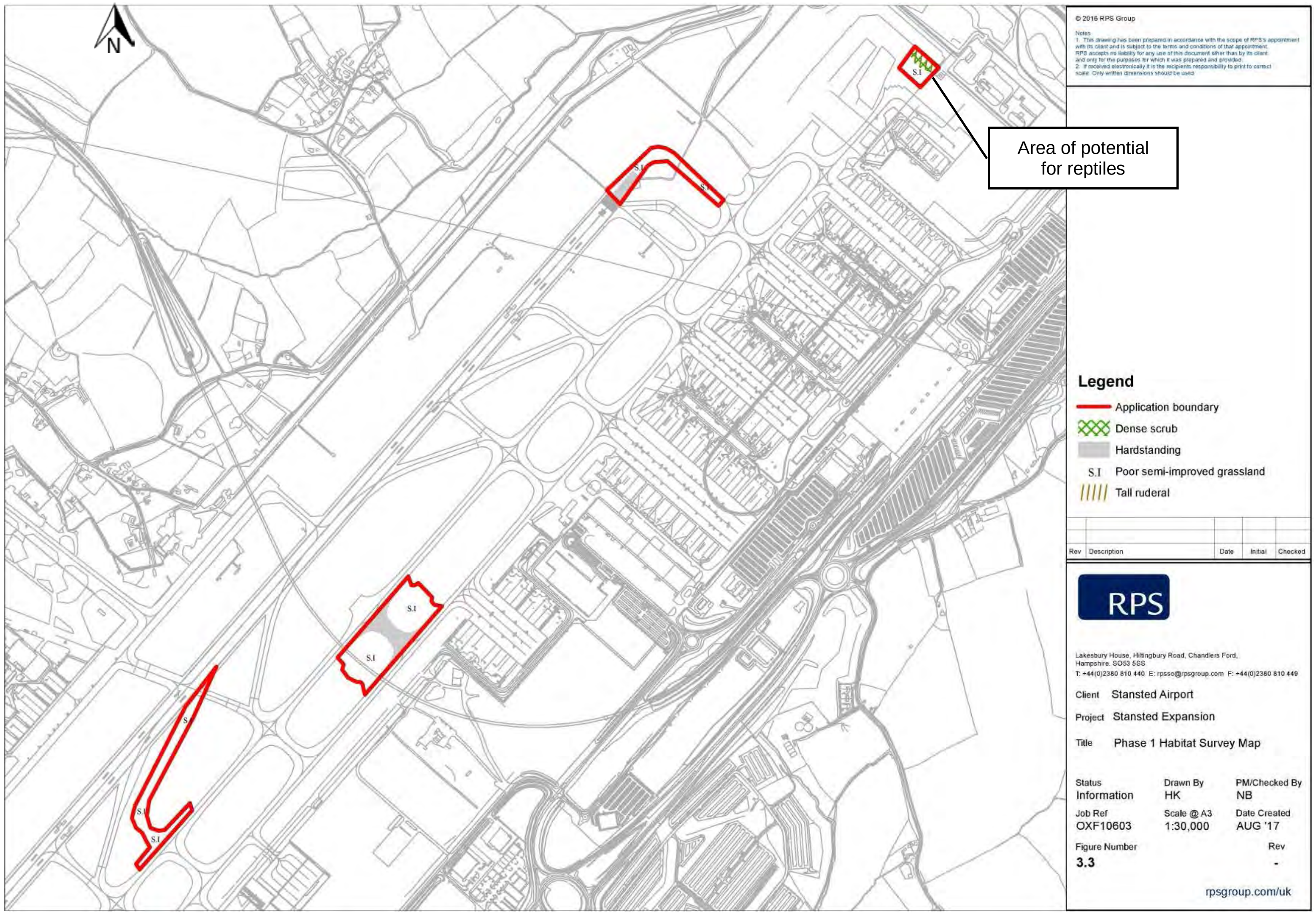


Figure 16.1: Habitat survey map including area with potential for reptiles

Off-Airport Ecology

Statutory EU Designated Sites – Epping Forest SAC

16.10 Consultation was undertaken with Natural England (NE) during the formal EIA Scoping process, and through a follow up meeting with STAL and RPS' ecologist on 20th October 2017, provided as part of NE's Discretionary Advice Service (DAS). This meeting focused on discussing the approach to be undertaken in any HRA for the Epping Forest SAC, which is some 23km to the southwest on the airport.

16.11 The Epping Forest SAC contains Atlantic acidophilus beech forest in the north-eastern part of the habitat's UK range. It is an important site for a range of rare epiphytic species, including the moss *Zygodon forsteri*. The long history of pollarding, and resultant large number of veteran trees, ensures that the site is also rich in fungi and dead-wood invertebrates. Stag beetles *Lucanus cervus* are another primary reason for its designation.

16.12 Should it be determined that the proposed development would give rise to significant environmental effects on the Epping Forest SAC an 'Appropriate Assessment' would be required under Article 6(3) of the European Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (known as the Habitats Directive). In this regard, NE's particular concern related to whether or not there would be any significant increase in traffic emissions on the M25 and other roads passing Epping Forest SAC, due to the increased passenger throughput facilitated by the proposed development. High levels of NOx from vehicles and other sources can adversely affect vegetation, including causing leaf or needle damage and reduce plant growth. Deposition of pollutants derived from NOx emissions potentially contribute to acidification and/or eutrophication of sensitive habitats leading to loss of biodiversity.

16.13 However, as reported Section 6 of the PEA report (ES Appendix 16.1) under the Do Minimum scenario with London system airports at capacity, passengers would divert to other airports such as Birmingham, East Midlands and Bristol. As such, the traffic analysis (see ES Chapter 6) calculated that in the Development Case, there will be a net decrease in traffic on the M25 adjacent to the Epping Forest SAC in comparison to the Do Minimum situation (see Appendix I of the Transport Assessment, ES Volume 3). This is from the redistribution of passengers (8mppa) to other airports (Birmingham, East Midlands, Bristol, and other smaller airports), who would resultantly travel to these airports via the M25. Accordingly, as there will be no net increase in NOx emissions from traffic generated by the proposed development, no likely significant effect on the Epping Forest SAC is predicted. Therefore, it is concluded that there is no need to progress to the full HRA Appropriate Assessment stage[1].

Statutory UK Designated Sites

16.14 A map of the designated and non-designated sites in proximity to the airport is provided at Figure 16.2, towards the end of this section.

16.15 Hatfield Forest National Nature Reserve (NNR) and Site of Special Scientific Interest (SSSI), is located approximately 1 km south of the airport. It is the last small medieval Royal Forest to remain virtually intact in character and composition. The Forest, together with the purlieu woods (Wall Wood, Monk's Wood and Wallis's Spring) was originally an outlying part of the extensive Forest of Essex and still covers over 400 ha of mixed ancient coppice woodland,

[1] At the time of writing NE has not reviewed the information and conclusions of the HRA screening assessment presented in Section 6 of the PEA (ES Appendix 16.1) and therefore has not provided any definitive opinion on the need to undertake an Appropriate Assessment.

scrub, unimproved grassland chases and plains with ancient pollards, and herb-rich marshland bordering a large lake. The woodland is predominantly wet ash-maple and the ash-maple variant of oak-hornbeam. There is a small area of plateau alder, a restricted habitat within Essex and also the only example in the County of calcareous mixed oak coppice.

16.16 Elsenham Woods SSSI, is located 0.4 km north-east of the application site. This site is an ancient mixed woodland, comprising ash, maple, and wych elm. There is a coppice layer of hazel within the woodland, and a rich ground flora. A large number of seasonally wet ponds are present within the woodland, which provide suitable habitat for a range of species.

16.17 Both of these designated sensitive ecological sites are recorded as experiencing high nitrogen deposition rates (above the threshold at which some changes to habitats would be expected), which is largely due to emissions from vehicular traffic on surrounding roads especially including the M11 and A120. Although airport-derived movements contribute to traffic on these roads, and therefore to emissions, this traffic represents only a small proportion of the overall base traffic flow which has a range of sources including housing and commercial developments in the wider region.

16.18 In view of the above, the potential for air quality and other impacts from the proposed development on Hatfield Forest and Elsenham Woods, as well as several other designated ecological sites within the vicinity of the airport (including Quendon Wood SSSI and High Wood Dunmow SSSI) have been considered in ES Chapter 10 (Air Quality) and in the PEA (ES Appendix 16.1) respectively. As concluded in the Transport Assessment (Volume 3 of the ES), the proposed development would only increase traffic near these sites by a marginal amount (<5%) between the Do Minimum and Development Case scenarios. Moreover, it is predicted that there will be a marked improvement in the concentrations of NOx between the 2016 Baseline Year and 2023 due to advancements in engine technology, as described in ES Chapter 10. The resultant nitrogen deposition levels are predicted to remain below their respective 'critical load' and for nitrogen deposition at all ecological sites around the airport. By 2028, the NOx contribution of the proposed development is predicted to be a maximum of 0.4μg/m3 and less than 1% of the lower critical load, meaning that no significant effects would be experienced at any of these designated sites.

16.19 In light of the above, both UDC in its Scoping Opinion (ES Appendix 2.4) and NE in its DAS response of 8th November (ES Appendix 16.3) agreed that it is unlikely that any significant adverse effects will result from the development on these SSSI designated sites.

Non-Statutory Wildlife Sites

16.20 In addition to the statutory designated sites described above, there are ten Local Wildlife Sites (LWS) within 2 km of the application boundary, which are non-statutory designated sites of County Importance, including the Stansted Fen LWS, the grassland meadows of the Molehill Green LWS, and the ancient woodland LWS at Flemings Hill Farm.

16.21 Six of these LWSs are located within the airport boundary, along with other non-designated areas of wildflower grassland, blocks of ancient woodland, trees, hedgerows, scrub, ponds and ditches, as well as airside grasslands adjacent to the runway and other aircraft manoeuvring areas (taxiways and aprons). These wildlife sites are described more fully in the PEA, but the key LWS are as follows:

- **Bulmer Road Verge LWS**, 0.4 km south of the proposed airfield works, is protected road verge which supports a chalky grassland flora;

- **Stansted Airport Sewage Works Fen LWS**, 1 km east of the proposed airfield works, has been designated due to containing areas of species rich grassland towards the north. To the south, wet grassland, fen and an increasing amount of scrub are also of particular note;
- **Pigeon Wood LWS**, although it was returned from the data search (and so included in Figure 16.2), it has been built over due to previous airport expansion within the Echo Stands North with associated mitigation measures already implemented;
- **Pritchetts' Spring LWS**, 80 m north of the proposed airfield works, is a small woodland within the security perimeter of the airport. It is a small, ancient woodland copse, dominated by hornbeam *Carpinus betulus*;
- **Priors' Wood LWS** lies 2.1 km east of the application site and is an ancient wood, which comprises tree-sized coppiced hornbeam and pedunculate oak *Quercus robur* standards. The ground flora has an unusual abundance of sedges;
- **Priory Wood LWS**, is located 0.7 km south. The canopy cover is largely hornbeam *Carpinus betulus* and ash *Fraxinus excelsior*, although many other woody species are present in the canopy and understorey; and
- **Molehill Green and Molehill Green Meadow LWS** are areas of unimproved damp grassland, located 0.4 km north-east of the site and are, a rare habitat type within the wider area.

16.22 A number of the sites also support protected animal species such as brown hares, skylarks and bats, great crested newts, as well as populations of water voles, grass snake, common lizards and a range of notable terrestrial invertebrate species.

16.23 All of these areas are carefully managed (by STAL and others) to maintain their ecological value and reduce wildlife and bird hazard risk to the airport. It is important to note that none of these sites will be directly impacted by the proposed development.

Air Quality Assessment

16.24 The potential effects of changes to air quality due to increased surface access traffic as a result of the proposed development are considered within ES Chapter 10 (Air Quality) and in ES Appendices 10.1 to 10.5. The annual mean NOx concentrations at Hatfield Forest and Elsenham Woods and other SSSI sites are predicted to be well below the relevant air quality standard or 'critical load' for such ecological receptors (30μg/m^3). The predicted change in nutrient nitrogen deposition will only add a maximum of 1% of the respective lower critical loads for these sites. Therefore, no significant adverse air quality impacts have been identified for any site in either the 2023 Transitional Year or the 2028 Principal Assessment Year.

16.25 A HRA has been under$_t$aken following a request from NE. The first stage of this process comprises a 'screening' exercise to assess whether significant effects are likely or unlikely on the Epping Forest SAC. This phase involved determining the potential impacts of the proposed development during the construction and operational phases, and comparing these against screening matrices to determine any impact. The findings of this screening demonstrate that no likely significant effects on Epping Forest will result from the proposed development. Further details are given in Section 6 of the PEA report (at ES Appendix 16.1).

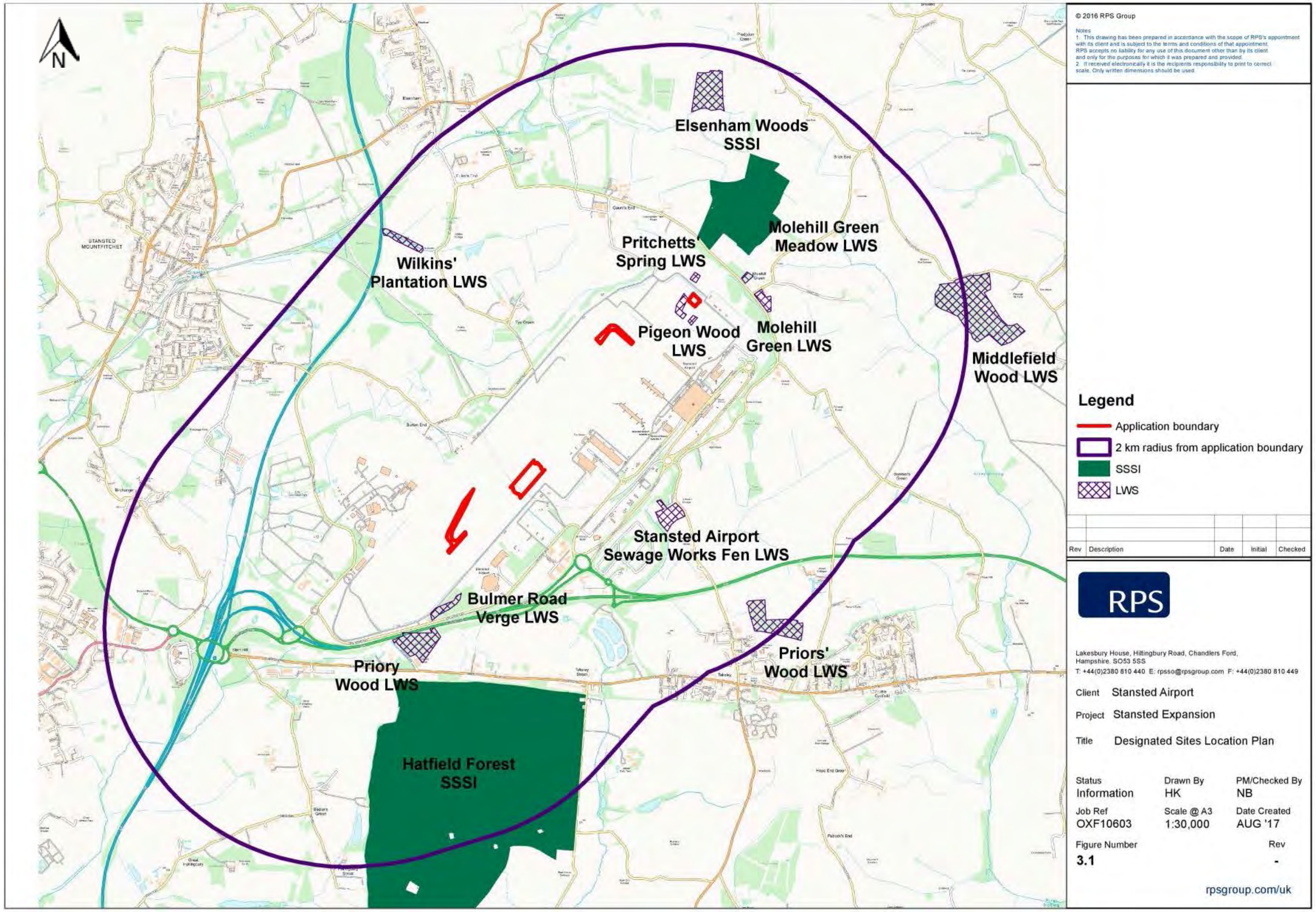


Figure 16.2: Designated sites near Stansted Airport.

Ecological Mitigation and Management

16.26 STAL's approach is to protect local wildlife and habitats and to manage these areas (in conjunction with the Essex Wildlife Trust) with the aim to maintain or enhance their value as far as possible. The 2015 SDP promotes *"the development of rich and varied habitats, seeking to integrate the airport within its rural setting and promoting access to the airport site".*

16.27 The Stansted Biodiversity Action Plan[1] was produced in December 2017 and sits alongside site specific Habitat Management Plans. These reinforce STAL's commitment to maximise the biodiversity value of the airport, provided that this does not attract birdlife in numbers which could increase the risk of interference to aircraft operations and contravene aviation safety requirements.

16.28 The nature conservation objectives set out in the 2015 SDP, the Biodiversity Action Plan and the Habitat Management Plans, include the following:

- Management and protection of protected areas;
- Regular maintenance of habitat creation and wildlife areas;
- Development of clear guidance for future airport development focussed on landscaping, ecological protection and habitat creation; and
- Work towards a policy of net biodiversity gain for future airport development and identify additional sites outside the airport boundary for ecological mitigation and improvement works.

16.29 An assessment of the different habitats across the airport was undertaken in June 2015 to determine the effectiveness of previous Habitat Management Plans, which had been in place for six years. This review established that the habitats around the airport are typically in good condition, with the plans successfully maintaining or enhancing biodiversity value. It is therefore proposed to continue with the current management, with slight adjustments to allow for increased mature vegetation and the inclusion of further methods to promote optimum habitat. An ongoing assessment of habitat condition, species identification, and documentation of the management process is also taking place.

16.30 Pursuant to the Section 106 Agreement under the 25+ permission, STAL has already developed air quality monitoring stations at and around the airport and has established further monitoring sites within Hatfield Forest in consultation with The National Trust, which owns and manages the forest, NE and UDC. Nine diffusion tube monitoring sites are in place and planning consent has been received for the installation of a fixed air quality monitoring station adjacent to The National Trust's Hatfield Forest Estate Office. A 'Notice of proposal to carry out an operation on an SSSI' was submitted by STAL to NE in June 2017 to install the monitoring station; installation will take place following receipt of consent from NE.

16.31 With regard to the management of the risk of pollutants entering local watercourses and harming aquatic ecology, details are provided in ES Chapter 15 (Water Resources and Flood Risk). This assessment concludes that such risks are negligible and will not be impacted by the proposed development due to the implementation of pollution prevention measures and a new drainage strategy (see ES Appendix 15.2).

Summary and Conclusion

16.32 A PEA was commissioned by STAL following the initial scoping exercise and in response to NE's comments on the Scoping Report. This established that the surrounding designated sites of Hatfield Forest NNR and SSSI, Elsenham Woods SSSI and other designated and non-designated wildlife sites, are unlikely to be directly affected by the proposed development due to the distance from the airport and the pre-existing conditions at these sites.

16.33 As anticipated, the Phase 1 Habitat Survey of the airfield did not identify any areas of habitat diversity or high ecological value because the areas are predominantly grassland which is regularly mown and managed in order to minimise the wildlife attractant for birds and other mammals which could present a hazard to aircraft. However, it did identify one small area in the north east corner of the airfield (in the location of the new Echo stands) which has the potential for reptiles, and therefore further survey work was undertaken using artificial reptile refugia to establish whether reptiles inhabited the site. This established the presence of low numbers of common lizards and two specimens of GCNs on the site. An Ecological Mitigation Strategy has therefore been prepared to ensure that these species are not harmed during the construction of proposed development and that any specimens encountered will be subject to translocation to a suitable host site under licence from NE. Details of this strategy are provided at ES Appendix 16.2.

16.34 The PEA also found very limited potential for ground nesting birds, which are discouraged across the airport for safety reasons, through the active bird control and management of the airfield. However, as a precautionary measure, recommendations are made to clear any vegetation outside of the ground nesting bird breeding season.

Land and Soil (including Ground Conditions and Contamination)

16.35 As described in ES Chapter 5 (Development Programme and Construction Environmental Management) the proposed development will involve the hard-surfacing of around 7 ha of new airfield pavement, which is a relatively small area in the context of the whole airport (i.e. 957 ha).

16.36 The main construction works will involve the break out of redundant areas of concrete and soft stripping of airfield grass and soil; followed by the excavation and construction of new pavement areas and associated lighting pits, cable trenches and surface drainage collection systems. Most of the work areas are located on previously engineered/re-profiled ground which has already been disturbed to the proposed depth of the excavation (being approximately 750mm).

16.37 There is no evidence of previous contamination for the areas of land on which the proposed RAT, RET and new stands will be constructed. Moreover, as the extent and depth of excavation works will be limited, the likelihood of encountering historical contaminated ground or creating new pollution pathways is remote. For this reason, the topic of Ground Conditions and Contamination was scoped out of the EIA; a position endorsed by UDC in its Scoping Opinion, which stated (at paragraph 82):

"UDC considers that ground conditions do not need to be addressed and that it is unlikely that that the Envisaged Development will result in significant contaminating effects of soil or other material during construction and operational phases. There are existing pollution controls in place which are monitored and measured outside of the planning system. Ground Conditions and Contamination matters do not need further consideration for the reasons given in paragraphs 16.13-16.16 of the Scoping Report".

16.38 As described in ES Chapter 5, a Construction Environmental Management Plan (CEMP) will be developed and implemented by STAL and its appointed contractor which will be rigorously adhered to throughout the construction programme. The CEMP will include a variety of mitigation measures and procedures to avoid the risk of pollution or contamination occurring, as well as the testing, treatment and disposal/ recycling of all waste including excavated spoil.

16.39 Approximately 46,000 m3 of spoil will be generated by the excavation works for the new taxiways and aircraft parking stands. None of this material is expected to be contaminated, so it is proposed that the topsoil will be reused for landscaping or soil bunds at the airport, and other spoil will be used for the infilling of trench excavations. If additional soil cannot be utilised at the airport, STAL will identify a suitable 'host site' for this material to be stored for use elsewhere.

16.40 With regard to operational impacts, it is considered that there will be no additional risk of ground contamination because of the impervious nature of the hardstanding coupled with and existing pollution control measures, including oil interceptors within the airfield drainage system (see ES Chapter 15). As such, no further operational mitigation measures/ controls are necessary to cater for the proposed development.

16.41 In light of the above, it can be concluded that no significant effects on 'Land and Soil' will result from the proposed development during both its construction and operation.

Cultural Heritage

Archaeology

16.42 A considerable amount of information is already available on the history and archaeological potential of the airport and its surroundings. This includes records of archaeological finds from excavations that took place during previous phases of the airport's expansion and development. Considerable archaeological resources were uncovered during major earthmoving and civil engineering works, which took place at the airport during the late 1980s to accommodate the construction of aprons, taxiways, the terminal building and its associated infrastructure. Accordingly, as part of the 15+ planning application, a full archaeological assessment was undertaken between 1999 to 2004. Although these excavations did not cover the airfield, they still provide an indication of the archaeological remains that existed across the airport. The findings of this assessment were published[2,3], and, in summary, indicated:

"Evidence for medieval settlement, farming, and assarting has been revealed, along with the site of a medieval post-mill, probably built to process the crops for one of the manors."…

"The excavations also revealed evidence for the location of Stansted Park, and the nature and layout of the central hunting lodge in the late medieval and post-medieval periods".

16.43 This assessment concluded that there would be only a negligible impact on archaeology as long as standard mitigation measures were followed during the construction works. These mitigation measures were subsequently agreed with the UDC archaeological advisor, and were detailed within an Archaeological Watching Brief.

16.44 The 2015 SDP outlines STAL's commitments to protect the onsite archaeological heritage, as follows:

- Consider the need for further archaeological evaluation where a site is to be developed and implement appropriate mitigation measures;
- Retain appropriate specialist advice in advance of new developments; and
- Encourage local display and storage of artefacts or archaeological records relating to Stansted.

16.45 In the case of the proposed development only shallow excavations are required and these will take place largely within previously disturbed and engineered soils. Moreover, there are no known archaeological or heritage assets or other cultural heritage features within the construction areas. It can therefore be determined that there would be a negligible (or nil) impact on heritage and archaeological assets as a result of the construction activity and for this reason the topic was scoped out from any further, detailed consideration in the EIA. This was agreed with UDC by virtue of their Scoping Opinion which stated (at paragraph 83):

"UDC concludes that significant effects on designated heritage assets are unlikely to occur as a result of the Envisaged Development and therefore such matters do not need further consideration for the reasons given in paragraphs 16.17-16.19 of the Scoping Report".

16.46 As such, it is not considered that an archaeological evaluation or Watching Brief is necessary or appropriate in this instance.

Heritage Assets

16.47 The airport sits within a historic landscape of post-medieval settlements and field boundaries. In addition, two Grade II listed buildings are located within the airport site: the Bury Lodge Hotel, a former $16^{th}/17^{th}$ century farmhouse, and the associated $15^{th}/16^{th}$ century barns to the east.

16.48 Due to the nature and airside location of the proposed development there is not expected to be any physical disturbance or impact on the setting of these heritage assets during either the construction or operational phases.

16.49 The proposed development is small in scale in the wider airport context, is entirely contained within the existing airport boundary and does not involve the erection of any tall or otherwise visually prominent structures. As such, it will not have any effect on the integrity or setting of the two listed buildings, which lie over 1km west and do not have direct views on to the part of the airfield where the new infrastructure is proposed.

16.50 A negligible effect has therefore been determined on heritage assets; a position which was endorsed by UDC's Scoping Opinion (as cited above).

Landscape (including Visual Impacts)

Construction

16.51 Construction activities associated with the proposed development will entail minimal disruption and will generally not be visible from outside of the airport boundary. In particular, the proposed development will not require the use of high-rise structures (e.g. tower cranes) during the construction and excavation phases. Construction vehicles will be based at a single main construction compound which will be located adjacent to the existing cargo facilities, as described in ES Chapter 5 (Development Programme and Construction Environmental Management). HGVs travelling to and from the site are unlikely to be noticeable and will not create a significant adverse effect on the landscape or visual amenity of local residents, as they will only travel on the main highway and will comprise a small fraction of the daily vehicle movements on these roads.

16.52 Construction lighting will be used at the four working sites during winter months and at night during the 12 month construction programme. However, as this lighting will be directional/ down-lit and will be located in the central part of the airfield (i.e. which has other airport light sources), it is not expected to be particularly noticeable beyond the airport boundary.

16.53 Accounting for the above it can be concluded that there will be negligible landscape and visual impacts from the construction works.

Operational

16.54 As outlined in the 2015 SDP, STAL seeks to ensure that, wherever possible, the visual impacts of buildings and ground level activities are mitigated through appropriate landscaping around the site. The airport is committed to undertaking appropriate landscape or ecological enhancements on the airport campus, or off-airport where this is not operationally suitable. The wooded belts on the periphery of the airport provide an effective level of screening and the visibility of the airport from local communities will be lessened as this planting continues to mature. The airport also seeks to manage the visual impact of any new buildings through careful design.

16.55 The proposed development comprises nine additional aircraft parking stands and two new taxiways all of which are confined to areas on the existing airfield. This new infrastructure is in keeping with the scale and appearance of existing infrastructure, there will be no discernible change or impact to the overall visual and landscape character or visibility of the airport in the surrounding countryside.

16.56 Overall, it can be concluded that no significant effects associated with the topic ‘Landscape’ will arise from the proposed development during both its construction and operation. This conclusion is accepted by UDC by virtue of their Scoping Opinion which stated (at paragraph 84):

“UDC concludes that effects of the Envisaged Development on the existing visual and landscape character are likely to be minimal. UDC considers that such effects as a result of the Envisaged Development do not need further consideration for the reasons given in paragraphs 16.20-16.21 of the Scoping Report.”

Waste

16.57 In UDC's Scoping Opinion (paragraph 85) the following is stated:

"UDC concludes that the impacts from identified construction and operational phase wastes are unlikely to be significant due to the existence of a waste management strategy".

16.58 However, at paragraph 86, UDC went on to say:

"UDC requires the following to be addressed in the proposed environmental statement:

- Associated infrastructure projects within the Airport must be assessed.
- The provisions of the Waste Management Plan must be described.
- Measures to enable the Airport to reach its target of 70% recycled waste by 2020 must be described".

16.59 This section therefore provides the requisite information requested by UDC, in respect of both the existing waste management practices and strategies in place at the airport and how these will be extended to both the construction and operational phases of the proposed development.

Construction

16.60 The reduction of construction waste is targeted within STAL's Waste Strategy 2014-2019 (of which more details are provided later in this chapter). A key objective of this strategy is to reduce and re-use construction waste wherever possible, as well as incorporating best practice and innovative methods of reducing waste at every opportunity. The 'waste hierarchy' is closely adhered to, whereby both construction and operational waste is managed in accordance with the' 4R' principles:

- Reduce;
- Reuse;
- Recycle; and
- Recovery.

16.61 In particular, suitable (i.e. non-hazardous) construction wastes will be stored on-airport, for reuse in the proposed development itself and/or future construction projects. For example, where practicable, all pavement and concrete arisings (from the breaking out of existing hardstanding in the work areas) will be re-used directly for construction purposes, potentially, as sub-base for the stands and taxiways.

16.62 Materials which cannot be re-used on site will be recycled and processed off-site using a suitably licensed facility. It is anticipated that between 85% and 90% of all construction waste taken off site will ultimately be recycled

16.63 As stated above, topsoil obtained from the excavations will be reused for landscaping or soil bunds at the airport, and other spoil will be used for the infilling of trench excavations. If additional soil cannot be utilised at the airport, STAL will identify a suitable 'host site' for this material to be stored for use elsewhere.

16.64 The proposed CEMP will further establish a range of specific waste management procedures and targets which the main appointed contractor will be required to meet, once appointed by STAL.

16.65 With these methods and objectives in place, waste from construction of the proposed development is considered to have a negligible environmental impact.

Operational Waste

16.66 STAL requires all new developments to incorporate appropriate waste management and recycling facilities, and resource efficiency is considered in procurement decisions. In addition, STAL continues to work with business partners across the airport campus to increase the segregation of wastes for recycling and proactively manages waste contractors to ensure legal compliance and high quality of service to all airport parties.

16.67 Most of the waste generated onsite is already recycled or composted and STAL is currently working towards a minimum target of 70% of operational waste to be recycled by 2020 as well as sending 'zero waste' to landfill, which is a concept described by the Carbon Trust as follows:

"The common interpretation of (zero waste to landfill) is that at least 99 percent of generated waste is diverted away from landfill. Which means that all waste produced is either reused, recycled, composted, or sent to energy recovery"[4].

16.68 As outlined in the Stansted Corporate Social Responsibility (CSR) Report 2015-16, the airport is actively working towards achieving and maintaining these targets year on year. In the year 2016-2017, 99% of the waste produced on site was recycled and/or recovered, with April to December 2017 having 100% of waste diverted from landfill. According to the most recent data available on waste from 2017, that target has been further exceeded meaning that zero waste to landfill has already been effectively achieved by the airport, based on the Carbon Trust definition.

16.69 Some examples of the recycling initiatives that are carried out at the airport include:

- In 2015/16, 374 tonnes of food waste were collected in compostable waste bags from the onsite retail partners and sent for composting;
- Plastic bottles and aerosols discarded by passengers at airport security are collected and recycled;
- Textile recycling bins for clothing discarded by passengers (to avoid charges for exceeding hand and check-in luggage weight allowances) are provided, as well as textile recycling for airport workers;
- Airlines' on-board recycling programmes are supported as part of the Sustainable Aviation work stream;
- New equipment was acquired to separate out high volumes of recyclables, including plastic bottle crushing machines and a waste sorting table; and
- Dry mixed recyclables are collected where separation is not possible; this is then sent offsite for sorting where most of the waste is recycled.

16.70 In 2017 the airport produced approximately 6,908 tonnes of waste (including hazardous waste; excluding cabin waste), corresponding to approximately 0.26 kg waste per passenger.

Stansted Airport Waste Strategy 2014-2030

16.71 STAL has set a long-term waste strategy in order to encourage a reduction in waste through: an investment in waste and recycling technology, monitoring and targeting of waste, and compliance with standards.

16.72 Waste reduction measures include:

- Engaging with terminal retailers to reduce waste and increase recycling;
- Raising the awareness of the environmental impacts of waste disposal;
- Investment in a bottle crushing machine;
- Auditing of third party waste and recycling; and
- Compliance with the airport's certified ISO14001:2015 Environmental Management System and other nationally recognised industry performance standards.

16.73 Within this strategy, the airport has also set objectives to be achieved in the 2014-2019 period. Some examples are to:

- Engage with airlines to help recover more recyclables from cabin waste;
- Seek closer energy from waste, materials recycling facilities and anaerobic digestion plants in order to reduce haulage distance and emissions;
- Composting of retail food waste and an imbedded plastic bottle recycling scheme;
- Involving all business partners in the reduction of waste throughout their supply chains;
- Through Sustainable Aviation work with other UK airports and major airlines to support the collection of all mixed dry recyclable materials collected on board the aircraft; and
- Greater communication with staff and passengers to reduce all unnecessary waste generation.

16.74 A new project is being trialled at the airport, in partnership with local food banks, to recycle passengers' pre-security surrendered/ restricted non-perishable food, drink and toiletry items. This involves volunteers checking and sorting these items, with re-usable goods being transported to food banks in neighbouring districts.

16.75 With these initiatives and objectives in place to reduce waste, it is anticipated that the proposed increase in passenger throughput and associated airport activity will not have a significant impact on the airport's waste output or recycling abilities. As such, waste from the operation of the proposed development is also considered likely to have a negligible environmental impact.

Major Accidents and/or Disasters

Overview

16.76 As with all airports, Stansted Airport adopts all possible precautionary measures to ensure the safety of construction and operations. The airfield is governed by a rigorous safety regime, licensed by the CAA. Therefore, the risk of a major aviation safety breach, accident or related disaster involving an aircraft because of the proposed development is determined to be negligible.

16.77 However, the following information is provided in order to clarify the following matters raised by UDC in its Scoping Opinion:

"UDC requires the following to be addressed in the proposed environmental statement:

- The following must be assessed. The likely significant effects arising from the following interactions:

  i. as between the Envisaged Development and relevant apparatus of Cadent Gas Network including such apparatus within the Public Safety Zones at each end of the runway and taking in to account any adjustments to the PSZs as a consequence of the increase in aircraft movements;

  ii. any potential for envisaged temporary and permanent lighting schemes to distract or confuse pilots.

- Any features or measures relied upon must be separately described and considered. UDC considers these matters will be of particular importance in relation to the risk of major accidents from the Envisaged Development on the environment and must be respectively particularized within the proposed environmental assessment".

Construction

16.78 Some construction work will take place while the runway is in operational use. However, strict operational controls will be imposed to ensure safe working practices and to avoid incursion of construction plant, vehicles and personnel into live aircraft manoeuvring areas. These will follow well established and robust control and management protocols.

As detailed further in ES Chapter 5 (Development Programme and Construction Environmental Management) the Obstacle Limitation Surfaces in place at the airport would also not be not be breached at any time during the construction phase, except when there is a temporary cessation of flights and in line with UK Civil Aviation Authority requirements. In addition, it is not proposed to use cranes during the construction stage. Thus the actual likelihood of an accident occurring as a result of the construction activity is minimal.

Operational

16.79 With regard to aircraft accident risk, it should be noted that the number of aircraft accidents worldwide is extremely low in comparison to other modes of transport and industrial activities. Public Safety Zones (PSZ's) are areas of land at the end of airport runways within which development is restricted in order to control the number of people on the ground at risk in the event of an aircraft accident. The basic policy objective for PSZ's is that there should be no increase in the number of people living, working or congregating in airport PSZ's and that over time that number should be reduced. Under the PSZ policy (Department for Transport (DfT) Circular 01/2010[5]), there are two zones that correspond to the 1 in 100,000 and the 1 in

10,000 risk contours. Within the 1 in 100,000 risk contour there is a general presumption against new or replacement development or changes of use that would result in an increase in the number of people, living working or congregating in the area. An inner area of risk is also defined within each PSZ immediately at the runway ends, which is formed by the 1 in 10,000 contour. In this inner zone no resident or working population is permitted.

16.80 Modern aircraft are generally safer than the older variants that they replace. In accordance with Government policy the PSZs will be reviewed by the CAA, normally every 5-7 years. The proposed development, or the Do Minimum scenario, does not increase the number of aircraft movements currently permitted. On this basis neither the Development Case nor the Do Minimum scenario are expected to change the extent of the current PSZs. Therefore, there will be no change to 'accident risk'.

16.81 It follows therefore that in respect of any Cadent Gas Network apparatus within the PSZs the proposed development has no material consequence on the existence and safe operation of this gas supply.

16.82 Existing bird control measures are in place at the airport to mitigate the risk of bird strike hazard. There are no major bird attractants or nesting sites (e.g. large bodies of water or mineral workings) in close proximity to the airport. As the proposed development does not alter the existing natural features in or around the airport, it is not considered that there will be any change to the existing number, type or movement patterns of birds in the area.

16.83 The airfield lighting installed as part of the proposed development will conform to CAA, EASA, ICAO and other international aviation standards which dictate the location, heights, brightness, type and pattern of lights around the aerodrome. There is therefore no risk of this lighting distracting or confusing pilots.

16.84 In regards to other potential 'major accidents and/or disasters' (e.g. terrorism incident, fire or explosion), like all modern airports Stansted Airport operates to very stringent standards of safety and security in accordance with UK and international regulations.

16.85 The airport suffers no exceptional climatic conditions that regularly affect its operations (e.g. extended periods of fog or high winds) and it currently offers an exceptional level of resilience during adverse weather conditions. In addition, the surrounding area is free of natural or physical obstructions that might impact on aircraft range or payload. The proposed development has no bearing on these existing controls.

16.86 In conclusion, the risk of 'major accidents and/or disasters' occurring at the airport in the construction and operational phases is negligible.

Conclusion

16.87 As detailed above, it has been determined that the proposed development will not give rise to any significant environmental effects with regard to the topics/ factors discussed within this chapter. This was endorsed by UDC through their Scoping Opinion dated 21st December 2017.

16.88 STAL will continue to monitor and, where necessary, improve upon its environmental performance in these areas in line with the 2015 SDP and through any subsequent revision to it.

References

1 London Stansted Airport (2017); Stansted Biodiversity Action Plan

2 Framework Archaeology (2008); From hunter gatherers to huntsmen – A history of the Stansted landscape

3 Framework Archaeology (2009); http://www.framearch.co.uk/stansted/index.html

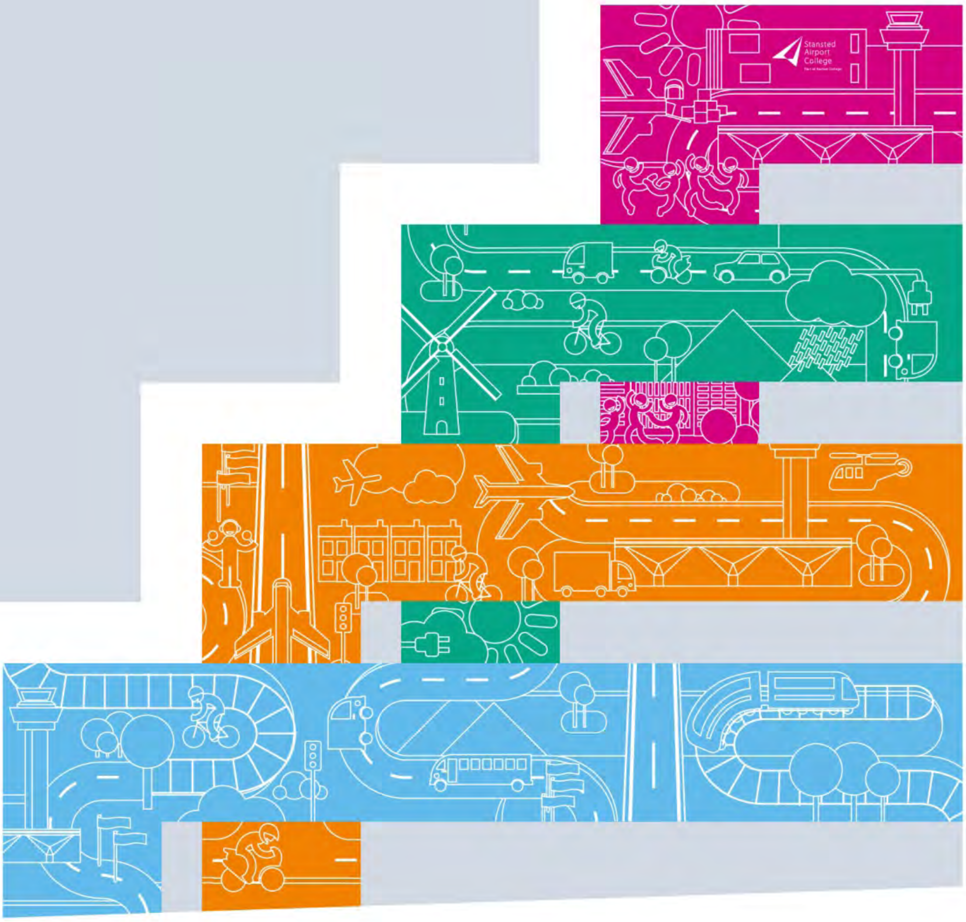
4 Carbon Trust (2017); What is 'zero waste to landfill'? Available at: <https://www.carbontrust.com/news/2017/03/what-is-zero-waste-to-landfill/>

5 Department for Transport (2010); DfT Circular 01/2010 Control of Development in Airport Public Safety Zones

TRANSFORMING LONDON STANSTED AIRPORT

35+ PLANNING APPLICATION

Chapter 17 Cumulative Effects



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17 CUMULATIVE EFFECTS

Introduction

17.1 Cumulative (or 'in combination') effects arise as either interactions between different types of environmental effects associated with just one project, or interactions between the effects of a number of unrelated projects in the same area.

17.2 Two types of cumulative effects have been considered within this ES:

- **Type 1** – The interactive effects resulting from the associated effects of individual components or activities of the proposed development on a sensitive receptor, for example noise, airborne dust or traffic effects on a single receptor / group of receptors; and
- **Type 2** – The combined effects of several schemes which may on an individual basis be insignificant (negligible or minor), but additively, have a significant (moderate or major) effect.

17.3 No significant Type 1 cumulative effects have been identified through the EIA process on the basis that no individual environmental impact is of more than minor significance (accounting for mitigation) and no single environmental receptor would be exposed to additive/ interactive effects above this threshold. Accordingly, Type 1 cumulative effects have been scoped out of further detailed consideration in this chapter. However, the Health Impact Assessment (HIA) contained in ES Appendix 14.1 (specifically in Annex 14.1.1) does consider, in broad terms, the influence of such interactive effects on peoples' 'quality of life'. No significant adverse effects are identified in this assessment.

17.4 A list of the consented, proposed or otherwise reasonably foreseeable Type 2 cumulative developments close to the airport have been identified by STAL and agreed with UDC. These are listed in Tables 17.1 and 17.2 and are shown on Figure 17.1.

17.5 These developments have been considered, where relevant, in each of the respective assessments presented in the preceding technical topic chapters of this ES (Chapters 6-15). Therefore, to avoid repetition, information on the potential combined effects of the proposed development with these schemes is not presented in detail within this chapter.

17.6 In all cases, the committed developments have been included in the traffic model (TEMPro) which predicts trip generation and the growth in vehicular traffic on the surrounding road network over an extended timeline up to and beyond 2028. The resulting data from this model, for both the Development Case and Do Minimum scenario, has been used in the modelling and prediction of other environmental effects including surface access noise, air quality and carbon emissions. Therefore, the addition of these schemes has already been factored into the future environmental baseline for the proposed development, on the assumption that they will be built out and occupied prior to the construction of the proposed development during 2021 / 2022. For other assessments (e.g. air noise, ground noise, air quality, and health and wellbeing) the location and existence of new residential populations and other sensitive receptors by 2023 – 2028, which will be introduced by the construction and occupation of these committed developments, has been mapped and accounted for in the impact assessments.

17.7 As illustrated in Figure 17.1, most cumulative developments are:

- At a considerable distance (>1 km) from the airport boundary;
- Located to the north or south of the runway orientation, with the majority being outside of the air noise footprint of the airport; and
- Would not have a 'line of sight' with the proposed development.

17.8 Accordingly, the potential for Type 2 cumulative environmental effects with the proposed development, either during the construction or operational phases, is very limited.

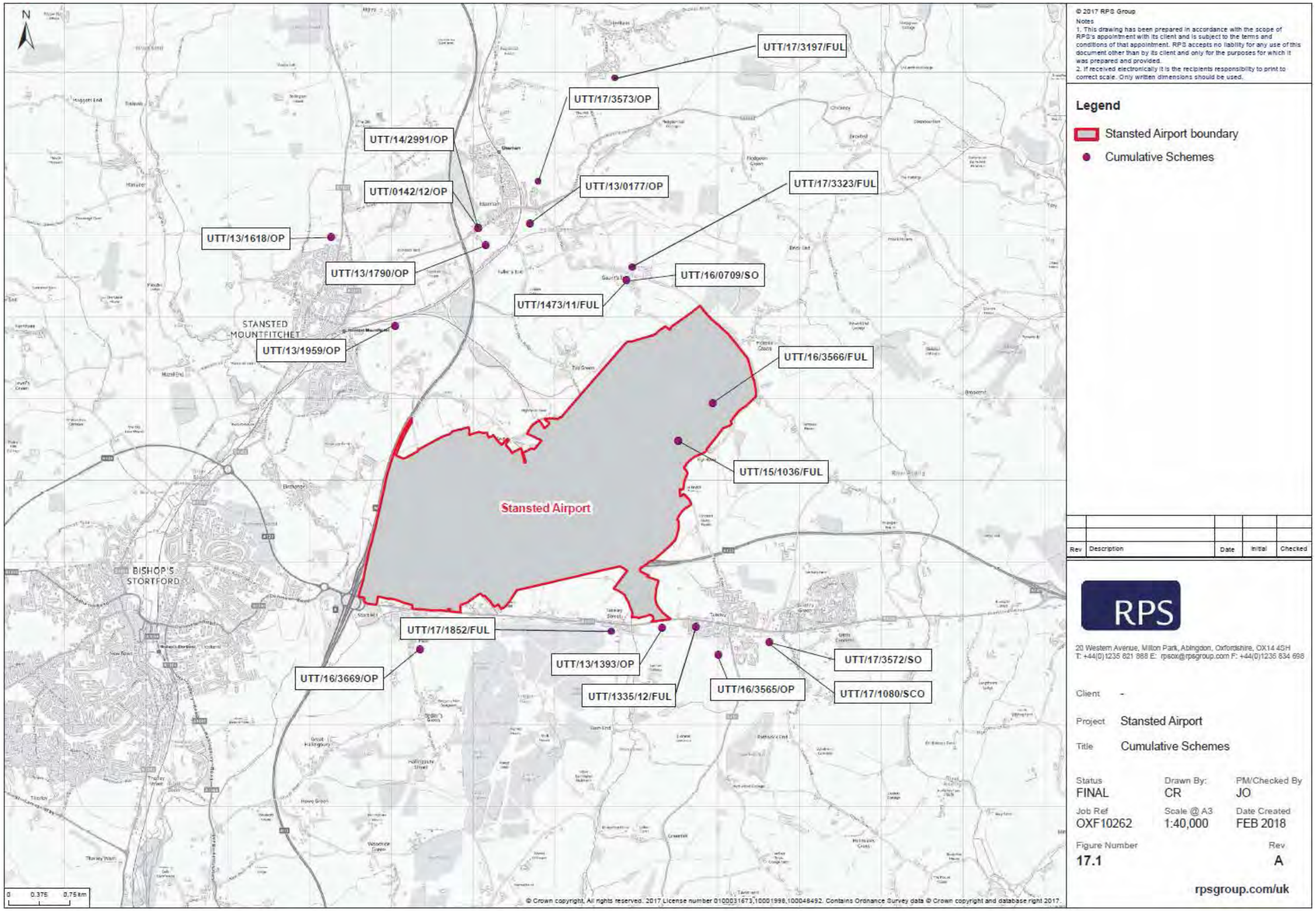


Figure 17.1: Location of committed developments

Selection of Cumulative Schemes

17.9 The 'screening criteria' adopted to identify the Type 1 cumulative schemes, as set out in the Scoping Report (see ES Appendix 2.1) were as follows:

- Residential developments over 30 units that are situated within 2 km of the airport boundary or else within the defined study area for each respective environmental topic discipline;
- Developments which could be 'EIA development' in their own right and which meet or exceed the relevant screening thresholds contained in the EIA Regulations; and
- Developments which have been granted planning permission, have received resolution to grant, or were determined before December 2017.

17.10 A total of 15 committed developments (see Table 17.1) were assessed as cumulative developments within the ES as these have been granted planning permission by UDC (as of December 2017), with a further five developments (see Table 17.2) that are still awaiting determination by UDC also considered. However, it should be noted that not all the committed developments meet the remaining two criteria listed above and, particularly, very few are 'EIA developments' and so the planning applications were not accompanied by an ES or other form of formal EIA. As such, it has been assumed that none of these developments would result in more than 'minor adverse' effects and that these effects would be mitigated through UDC attaching conditions to the granting of planning permission.

Table 17.1: Committed developments

UDC Reference Number	Scheme Location	Description of Committed Development
UDC ref: UTT/13/0177/OP	Land west of Hall Road, Elsenham	Erection of up to 130 dwellings with associated open space, play areas, land for educational use and other ancillary works.
UDC ref: UTT/0142/12/OP	Land north of Stansted Road, Elsenham	Residential development comprising of 155 dwellings, 55 extra care units, land for the provision of a multi-use community building, and associated on and off-airport infrastructure provision, following demolition and clearance of Essex Auto spray and associated residential property.
UDC ref: UTT/13/1393/OP	Land South Of Dunmow Road, Brewers End, Takeley, Bishops Stortford	Proposed residential planning application for erection of up to 100 dwellings, to include provision of 6.3 ha of public open space.
UDC ref: UTT/15/1036/FUL	Land adjacent to Enterprise House, Stansted Airport	Eight storey, 12,842 sqm (GEA) quality hotel consisting of a net accommodation area of 8,159 sqm, with ancillary restaurant and gym, vehicle parking and access.
UDC ref: UTT/16/3566/FUL	Gorefield Road, Stansted	A dedicated terminal facility for arriving passengers (34,384 sqm); an associated forecourt; and altered access and service roads.

UDC Reference Number	Scheme Location	Description of Committed Development
UDC ref: UTT/16/3669/OP	Land south-east of Great Hallingbury	Outline application with all matters reserved for 35 dwellings.
UDC ref: UTT/17/1080/SCO	Land West Of Canfield Road, Great Canfield, Essex	Proposed development of 210 dwellings, public open space, landscaping, sustainable drainage systems and access point from Green Lane.
UDC ref: UTT/13/1618/OP	Land At Walpole Farm, Cambridge Road, Stansted, Essex	Redevelopment of land to provide approximately 160 dwelling houses, up to 600 sqm of commercial (B1) floorspace, approximately 0.45 ha reserved for educational uses, seven full size allotments, paddock and community woodland area with associated open space, landscaping, access, parking and drainage.
UDC ref: UTT/1335/12/FUL	Land At Brewers End, Dunmow Road, Takeley, CM22 6QH	Erection of 41 dwellings (including affordable housing) with new vehicular and pedestrian access, associated infrastructure and landscaping.
UDC ref: UTT/14/2991/OP	Land at Elsenham Nurseries, Elsenham	Demolition of existing buildings and erection of 40 residential dwellings including open space and landscaping.
UDC ref: UTT/13/1790/OP	Land South Of Stansted Road, Elsenham, Bishops Stortford, Hertfordshire	Outline application for a development of up to 165 homes, open space and allotments. All matters reserved except for access.
UDC ref: UTT/17/3572/SO	Land west of Canfield Road, Great Canfield Road, Great Canfield, Essex CM22 6TD	Request for formal scoping opinion for the Environmental Statement to accompany an outline planning application for up to 135 dwellings.
UDC ref: UTT/1473/11/FUL	Tri Sail, Water Circle, Elsenham Meadows, Elsenham CM22 6DS	Demolition of existing office and car park. Construction of three interlinked buildings (7 storeys, 6 storeys, 5 storeys) containing 6,978 sqm of offices and 1,394 sqm floorspace of ancillary mixed retail, Café/restaurant and health/spa facilities with underground parking, landscaping and ancillary works. Creation of new access onto Hall Road & alterations to existing access (Green Street).
UDC ref: UTT/16/0709/SO	Tri Sail Development, Green Street, Elsenham Meadows, CM22 6DS	Request for a scoping opinion in respect of proposed Commercial Development (as described above).
UDC ref: UTT/13/1959/OP	Elms Farm, Church Road, Stansted, Essex, CM24 8PX	Outline application for the demolition of existing livery buildings and construction of a residential development with access from Church Road and comprising circa 53 new residential units together with flood alleviation works and land and landscape re-profiling. As well as wider proposals in the adjoining Stansted Park to improve public access

UDC Reference Number	Scheme Location	Description of Committed Development
		and management, including; the provision of 2.99 ha of public open space, community allotments, and new public footpath routes, cycleways and bridleways.

17.11 Table 17.2 includes those developments which have had planning applications submitted to UDC, but that are still awaiting determination. They are therefore more uncertain to proceed because they are not yet 'committed' developments and the planning applications could still be refused. As described below the EIA Regulations only require the consideration of cumulative schemes which are already "*approved*".

Table 17.2: Developments pending determination by UDC

UDC Reference Number	Scheme Location	Description of Application Pending Determination
UDC ref: UTT/17/3573/OP	Land to the north-west of Henham Road, Elsenham	Outline application with all matters reserved except for access for: up to 350 dwellings, 1 no. primary school including early years and childcare setting for up to 56 places, open spaces and landscaping including junior football pitch and changing rooms, access from B1051 Henham Road with associated street lighting and street furniture, pedestrian, cycle and vehicle routes. pedestrian and cycles link to Elsenham Station and potential link to Hailes Wood, vehicular and cycles parking; provision and/or upgrade/diversion of services including water, sewerage, telecommunications; electricity, gas and services media and apparatus, on-plot renewable energy measures including photo-voltaics, solar heating and ground source heat pumps, drainage works, sustainable drainage systems and ground and surface water attenuation features, associated ground works, boundary treatments and construction hoardings.
UDC ref: UTT/17/3197/FUL	Land south of School Lane, Henham	Residential development for 36 dwellings and associated roads and parking, together with public open space, play area and associated Sustainable Drainage along with infrastructure improvements to Henham and Ugley Primary School including car parking, drop-off / parking facility and playing field provision.
UDC ref: UTT/17/3323/FUL	De Salis Hotel, Green Street, Elsenham CM22 6DR	Expansion of De Salis Hotel by raising the existing pitched roof to allow conversion of the roof space to accommodate 31 additional bedrooms, construction of a new two storey building within central courtyard to accommodate new conference room, laundry and extension to existing restaurant, with an additional 16 bedrooms to the first floor area.
UDC ref: UTT/17/1852/FUL	Land adjacent to Coppice Close,	Residential development of 20 dwellings with associated vehicular access points off Dunmow

UDC Reference Number	Scheme Location	Description of Application Pending Determination
	Dunmow Road, Takeley, Hertfordshire	Road, open space, car parking and associated infrastructure.
UDC ref: UTT/16/3565/OP	Land to the west of Bonningtons Farm, Station Road, Hatfield Broad Oak CM22 6SQ	Outline application with all matters reserved, except for access for "Community led Mixed Use Development of up to 275 residential units, site for Primary School, Multi Use Games Area, Kick About Area, Flexible Neighbourhood Building (A1, A2,A3, A5, B1, D1 & D2 Uses), Car Park, Trim Trail and Dog Walking Circuit".

Legislation Context

17.12 The EIA Regulations state the following in regards to cumulative effects:

- Schedule 3(1): "*the characteristics of development must be considered with particular regard to… b) the cumulation with other existing development and/or approved development*";
- Schedule 3(3): "*The likely significant effects of the development on the environment must be considered in relation to criteria set out... with regard to the impact of the development on the factors specified in regulation 4(2), taking into account— (g) the cumulation of the impact with the impact of other existing and/or approved development*";
- Schedule 4(5): "*A description of the likely significant effects of the development on the environment resulting from, inter alia: the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources*";

  "The description of the likely significant effects on the factors specified in regulation 4(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development."

Assessing Cumulative Effects

17.13 There is no established EIA methodology to assess and quantify Type 1 or Type 2 cumulative effects on sensitive receptors. However, the European Commission (EC) produced guidelines[1] for assessing effect interactions *"which are not intended to be formal or prescriptive, but are designed to assist EIA practitioners in developing an approach which is appropriate to a project".*

17.14 These guidelines have been reviewed and an approach has been developed which uses the defined residual effects of the proposed development to determine the potential cumulative effects.

17.15 A review of the residual effects presented in this ES was undertaken against the resource / receptor or receptor groups. Only residual beneficial or adverse effects classified as being 'minor', 'moderate' or 'major' significance have been considered. Negligible effects have been excluded from the cumulative effects assessment as, by definition, they are considered to be imperceptible to a receptor or resource.

17.16 The assessment is divided into two parts to establish the cumulative effects that could arise from the proposed development has been split into two parts:

- The first section seeks to determine any impacts from **airport related developments**, such as those proposed under the Stansted Transformation Programme (STP); and
- The second section considers the **external developments** (as listed in Table 17.1 above) that have the potential to have cumulative effects.

17.17 As discussed above and in ES Chapter 2 (EIA Methodology), it is expected that the committed developments considered (see Table 17.1) will all be completed before the 2023 Transitional Year. These schemes have therefore been assessed as 'baseline receptors' within the ES and in the consideration of the operational effects of the proposed development. As no significant impacts have been identified, it can be concluded that there are no cumulative operational impacts (e.g. noise and air quality) either.

17.18 Alongside this, any potential cumulative construction impacts (e.g. from noise, dust and HGVs movements) from both Phases 1 and 2 of STP (see below) or from external developments, are unlikely to persist until the construction of the proposed development begins in mid-2021.

Impact Assessment

Airport Related Developments

17.19 This section considers the number and type of operational improvements that STAL is pursuing as extant or deemed (permitted development) planning permission. It provides a brief description of what these schemes involve, and whether any potential for cumulative environmental effects will result. As with most large airports, Stansted continually evolves in a dynamic environment with frequent and often continuous construction works taking place. These works are undertaken in accordance with strict environmental management and aviation safety controls and are therefore barely noticeable beyond the airport boundary.

Stansted Transformation Programme (STP)

17.20 The STP seeks to provide the airport with new infrastructure to meet forecast demand, make more efficient use of the single runway capacity and simplify all aspects of the passenger journey – improving service levels and the overall travel experience. It comprises three core phases, as set out below.

Airfield and Terminal Investment

17.21 The proposed development, as described in this ES, comprises ‘Phase 3’ of the wider capital investment programme for Stansted. Phases 1 and 2 are expected to be completed between 2017 and 2022, details of which are provided below.

Stansted Transformation Phase 1

17.22 This involves the provision of 30 additional check-in desks, 1,245 additional seats in the departures lounge, 2,370 sqm of new commercial floorspace, and eight remote aircraft stands to support the demand for additional based aircraft and overnight parking. The terminal works are all internal, whilst the additional stands are already approved as part of the 25+ (2008) planning permission.

Stansted Transformation Phase 2

17.23 This involves the development of a dedicated arrivals building containing immigration, baggage reclaim (and off load) and customs facilities. The building will have three levels and a gross floor area of approximately 35,000 sqm.

17.24 The existing terminal will then be converted into a designated departures building. It will feature additional check-in desks, a security area, an expanded departures lounge and an extended remote bussing facility.

17.25 The new arrivals building was granted planning permission by UDC (ref: UTT/16/3566/FUL) in April 2017, with construction expected to be completed before the construction of the proposed development begins in mid-2021.

17.26 These two phases have been considered as part of the Do Minimum ‘base case’ because they are expected to be implemented before the commencement of construction works for the proposed development.

Airfield: Runway Rehabilitation (part of Phase 3)

17.27 The repair, maintenance and relaying of runways is a process that takes place at all airports to ensure continued safe operations. It is expected that the resurfacing of the existing runway could take place in 2022-2023.

17.28 This timescale means that there is some potential for this work to overlap with the construction of the proposed RAT and RET. However, no significant cumulative effects are expected from this, due to the control measures and CEMP that will be in place to manage the potential environmental effects of both developments.

New Car Parks

17.29 New car parking spaces will be constructed during phases 1 and 2, to support the future demand for spaces close to the main terminal building. The following types of car parks are proposed, delivering up to 15,000 spaces:

- Two new 'meet and greet' surface car parks;
- Two short stay multi-storey car parks; and
- The extension of an existing surface car park.

17.30 A new staff car park will also be developed to cope with the increased number of employees working at the airport as a result of this growth.

17.31 The bulk of this employee growth is very likely to occur before construction on the proposed development begins as peak demand requirements for up to 35mppa will exist even without the proposed development. There is a possibility of some overlap during the construction phase.

17.32 Despite this, there is not expected to be any significant cumulative effects. This is because the construction of both projects will be completed using good practice construction methodologies, with CEMPs in place to monitor and mitigate any potential adverse effects that could arise such as from noise, HGV movements, waste, erosion, sedimentation and pollution.

Hampton by Hilton Hotel

17.33 A new 350 bed hotel was granted planning permission in 2015 (UDC ref: UTT/15/1036/FUL) and opened in 2017 on a site adjacent to Enterprise House. The development consists of an eight storey, 12,842 sqm (GEA) hotel consisting of a net accommodation area of 8,159 sqm. Ancillary restaurant and health/fitness facilities, vehicle parking and access, and a covered walkway link the hotel to the main terminal building.

17.34 This scheme has been completed and therefore it has been assessed as a baseline receptor and not as a cumulative development.

Surrounding Committed Developments

17.35 This section considers the committed developments in the wider area surrounding the airport. The schemes are listed in Tables 17.1 and 17.2, and shown in Figure 17.1, have been agreed for assessment with UDC following consultation and stipulated in their Scoping Opinion (dated 21st December 2017). The potential Type 2 cumulative effects of the proposed development in combination with these schemes have been considered for each of the ES topics in Table 17.3. Table 17.3 should be read in conjunction with the relevant ES topic chapters.

Table 17.3: Cumulative Impact Assessment Matrix

ES Topic	Residual Impact Concluded in ES	Combined Cumulative Effect	Comment
Surface Access and Transport	Negligible	Negligible	The TEMpro model used for the assessment included the potential impacts of the committed developments with regards to surface access and transport. This determined negligible impacts.
Air Noise	Negligible	Negligible	Because of the distance between the airport and the committed developments, air noise has been determined to be of negligible significance. Any potential impacts on committed residential developments have been considered within the air noise chapter.
Ground Noise	Negligible	Negligible	Because of the distance between the airport and the committed developments, ground noise has been determined to have a negligible significance. Any potential impacts on committed residential developments have been considered within the ground noise chapter.
Surface Access Noise	Negligible	Negligible	The TEMpro model used for the assessment included for the potential impacts of the committed developments with regards to surface access noise. This determined negligible impacts.
Air Quality	Negligible	Negligible	The TEMpro model used for the assessment included for the potential impacts of the committed developments with regards to air quality. This determined negligible impacts.
Socio-economic Impacts	Minor – Major Beneficial	Moderate Beneficial	The committed developments would have a positive effect on the airport because they would provide extra residential and commercial spaces to supply a workforce to the airport and increase its local customer base. The airport would also bring in inbound visitors which could create jobs and benefit the local economy. Greater investment is also likely in the areas served by the airport.
Carbon Emissions	Negligible	Negligible	The airport is carbon neutral for Scope 1 and 2 carbon emissions, and in light of the scale of the committed developments, these are not expected to have any significant effect on carbon. There are therefore not expected to be any combined significant effects on any single receptor.
Climate Change	Negligible	Negligible	The airport has adaptation and mitigation measures in place to ensure long-term resilience to the impacts of climate change. Committed developments are also expected to be designed to account for the impacts of climate change. No cumulative effects are therefore expected.
Public Health and Wellbeing	Negligible – Major Beneficial (socio-economic)	Negligible – Major Beneficial (socio-economic)	No residual effects have been identified for the proposed development or the committed developments, with the exception of a major beneficial effect resulting from the improvements to socio-economics from the proposed development. This would likely have a major beneficial combined cumulative effect, because of the positive socio-economic impact that would be had on the surrounding area.
Water Resources	Negligible – Minor Adverse	Negligible – Minor Adverse	Minor adverse impacts are expected to Affinity Water's off site infrastructure as a result of the proposed development. However, because of planned upgrades to this network, the long term combined effect with the committed developments is expected to be negligible.

Conclusions

17.36 Based on the assessment presented in Table 17.3, it has been determined that no adverse significant effects would result from the combination of the proposed development and the committed developments included for assessment. A moderate beneficial effect has been determined for socio-economics.

17.37 It is expected that most of these committed developments will be implemented by the time the construction work for the proposed development begins; as such, these schemes have been included as baseline receptors, rather than cumulative developments.

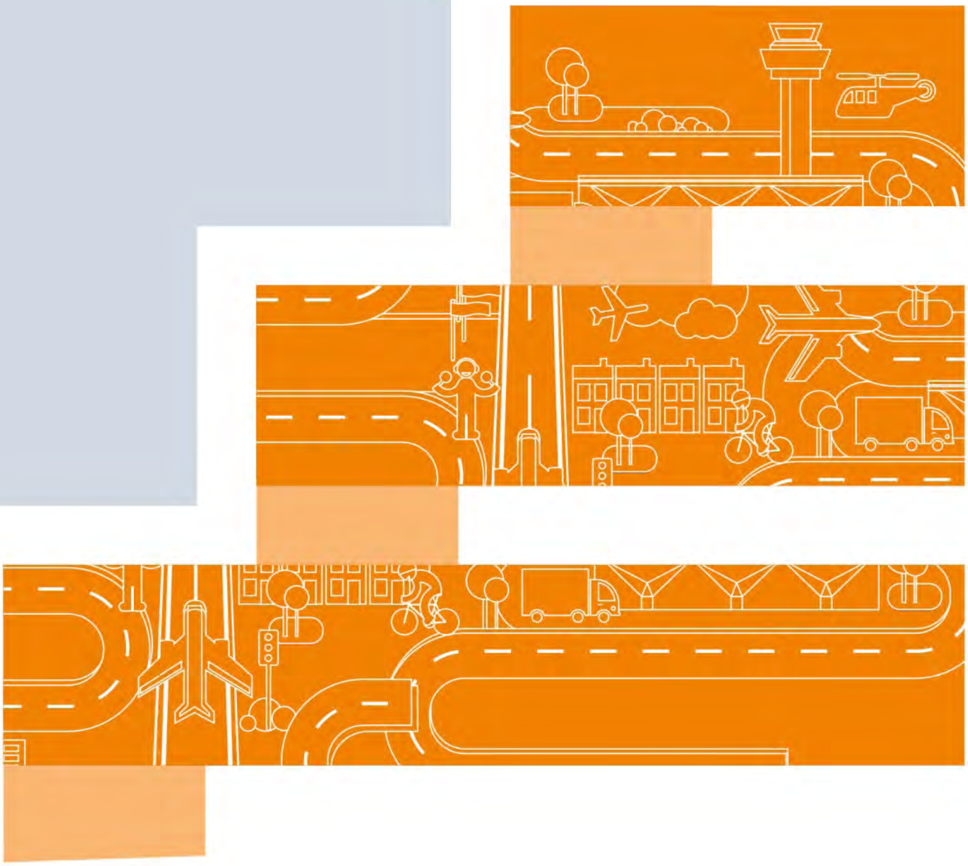
References

1 European Community, (1999); Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions.

TRANSFORMING LONDON STANSTED AIRPORT

35+ PLANNING APPLICATION

Chapter 18 Summary of Mitigation and Residual Effects



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18 SUMMARY OF MITIGATION AND RESIDUAL EFFECTS

Introduction

18.1 This chapter describes, in one place, the residual (remaining) environmental effects of the proposed development following implementation of mitigation measures and other commitments set out in the preceding technical ES Chapters 6-15. A summary of these is documented throughout this chapter.

18.2 A comprehensive EIA has been undertaken over an approximate 12 month period in order to assess the potential for significant environmental effects, both positive (beneficial) and negative (adverse) likely to arise from the proposed development. Mitigation and enhancement measures have also been identified where necessary. Environmental effects are predicted to occur due to the construction and operation of the proposed new aircraft parking stands and rapid access and exit taxiways (RAT and RET) which will improve runway utilisation, together with the proposed increase in annual passenger throughput to 43mppa and associated changes to the aircraft fleet mix.

18.3 The growth projections for the airport are based on a set of up-to-date air traffic forecasts by leading independent aviation specialists: ICF Aviation Services Group (ICF), as described in ES Chapter 4 (Aviation Forecasts). These forecasts show that Stansted is likely to reach its current passenger cap of 35mppa by 2023 and reach 43mppa by 2028. The forecasts also include the predicted changes in the split of passenger and cargo air transport movements (PATMs and CATMs) and other Non-ATM aircraft in both the Development Case and Do Minimum scenario. These data on fleet composition and aircraft movement numbers has been used in the modelling and assessment work undertaken as part of the EIA.

18.4 The technical, geographic and temporal scope of the EIA was determined in consultation with UDC, statutory bodies and other stakeholders and, ultimately, through the issue of a formal Scoping Opinion by UDC dated 21st December 2017. The EIA has therefore been a thorough and inclusive process which, if the planning permission is granted, will continue through to the formulation, approval and discharge of planning conditions at the project implementation stage.

18.5 The ES provides an objective and proportionate account of the main environmental effects of the proposed development, and identifies whether or not these effects are likely to be ‘significant’; whereby those comprising a ‘moderate’ or ‘major’ effect (after mitigation) are generally considered to be significant and material to the determination of the planning application, and those which comprise ‘negligible’ or ‘minor’ effects are not.

18.6 Pursuant to the EIA Regulations and the Government’s National Planning Guidance, the EIA encompassed those topics which were considered, during Scoping, to have the potential to give rise to significant environmental effects. However, this was a provisional judgement made in the absence of any definitive assessment findings at that time (e.g. the completion of the surface access traffic model, air quality and air noise modelling) and so the scope of the EIA was based on a precautionary approach and ‘worst case’ assumptions. Also, for the sake of completeness, a range of more peripheral environmental effects (such as carbon, climate change and water resources) were also included in the full EIA scope, albeit these were never considered likely to derive significant environmental effects from the proposed development.

18.7 ES Chapter 16 (Non-Significant Topics) provides further details of the environmental topics (or ‘factors’) which UDC agreed should be ‘scoped out’ of the EIA.

18.8 Notwithstanding its comprehensive coverage, the ES has not sought to identify or quantify every conceivable environmental effect of the proposed development, as that is neither the purpose nor the intent of the EIA Regulations.

Overview of Existing and Proposed Mitigation

18.9 As described in ES Chapter 2 (EIA Methodology), the likelihood of significant effects occurring during the construction and operation of the proposed development is dependent upon the availability and likely effectiveness of mitigation measures. These are measures designed to avoid, reduce, enhance, or compensate for the environmental and socio-economic effects identified in the impact assessments (i.e. depending on whether they are positive or negative).

18.10 The airport already operates under a comprehensive suite of environmental management and operational controls, comprising a combination of: industry, regulatory and legal requirements; existing planning conditions and obligations imposed under the 115+ (2003) and 25+ (2008) planning permissions; and STAL's own corporate policies including the commitments made in the 2015 SDP.

18.11 These controls would continue to apply to the operation of the airport in the future, without the proposed development. However, the 35+ project provides the opportunity to update many of these existing controls as well as introduce new and/or enhanced environmental mitigation and management measures (e.g. improvements to the SIGS) where these are deemed necessary, desirable and proportionate to the nature and scale of proposed development. In many cases, the existing measures in place at the airport will remain 'sufficient for purpose' and do not need to be adapted or supplemented to cater for the growth of the airport under the 35+ Project.

18.12 Each of the earlier technical topic ES Chapters 6-15 therefore distinguish between 'Incorporated (existing) Mitigation' and 'Further Mitigation' that STAL is proposing to commit to, if the planning application is approved by UDC. Some assessments (e.g. air quality) have not identified any further mitigation measures as being either necessary or appropriate, and others (e.g. air noise) have identified potential enhancements to existing schemes /controls which are not strictly necessary to mitigate the identified effects, but which may act to improve conditions for local residents and the environment compared to the baseline situation. As such, 'further mitigation' does not equate to 'essential mitigation' to achieve and negligible or otherwise acceptable residual environmental effect.

18.13 If permission for 35+ is granted by UDC, planning conditions and legal agreements (i.e. Section 106) may be used to secure the implementation and subsequent monitoring of the mitigation measures, together with other 'reasonable and related' planning controls which may be considered necessary. Moreover, STAL will continue to implement its existing environmental and community investment programmes and initiatives, which are included in the 2015 SDP, and to extend and enhance these to cater for the additional growth which would be allowed if planning permission is granted.

18.14 The mitigation measures and proposed enhancements identified in ES Chapters 6-16 are summarised in Table 18.1, although full details of these measures are provided in the respective topic chapters. The residual effects, identified in the right-hand column of Table 18.1, have been determined on the assumption that the mitigation measures are implemented in full.

Summary of Mitigation and Residual Effects

Table 18.1: Summary of Mitigation and Residual Effects

Topic	Phase	Summary of Impacts (DC vs. DM)	Proposed Mitigation/Enhancement	Residual Effects (with mitigation applied)
Chapter 6: Surface Access and Transport	Construction	**Minor** short term impacts are predicted on the highway network through a slight increase in delay to other traffic on construction routes. Impacts to pedestrians, cyclists, and public transport have been determined as **negligible.**	The use of a CEMP and a Construction Transport Management Plan (CTMP) is proposed. The measures included within these documents will be agreed with UDC and the relevant highways authority, to ensure that there is no adverse effect on local roads and byways.	**Negligible**
	Operational	**Minor negative** impacts are predicted on the highway network (J8 of the M11 motorway) due to increased traffic.	Potential works that would mitigate the impact of airport growth (in both the Development Case and the Do Minimum scenario) have already been identified, including a financial contribution to offsite highway improvements including to the M11 motorway, Junction 8. However, it is likely that a more extensive scheme will be brought forward by the highway authorities before 2028 and a financial contribution towards such a scheme, procured through a new S106 Agreement with UDC, may be appropriate.	**Negligible**
		Minor negative impacts are predicted to bus/coach services due to a reduced capacity/demand ratio.	Increased public transport (bus/ coach) capacity will be created through the introduction of additional services and routes, to reflect demand.	**Negligible**

Topic	Phase	Summary of Impacts (DC vs. DM)	Proposed Mitigation/Enhancement	Residual Effects (with mitigation applied)
		Minor negative impacts are predicted to some rail services (Stansted Express) due to a reduced capacity/demand ratio.	No infrastructure mitigation required. Continued commitment to Travel Plan initiatives, improved wayfinding and working with Train Operating Companies (TOCs) through the Stansted Area Transport Forum (SATF).	**Negligible to Minor Adverse**
		Negligible impacts are predicted on both cyclists and pedestrians.	None	**Negligible**
Chapter 7: Air Noise	Construction	n/a	n/a	n/a
	Operational	**<u>2028</u>** <u>Daytime (07:00 to 23:00)</u> A noise level difference of 0.5 to 0.6 dB is predicted which is not a discernible change and therefore **negligible** **<u>2028</u>** <u>Night-time 23:00 to 07:00:</u> A noise level difference of 0.1 to 0.2 dB is predicted which is not a discernible change and therefore **negligible** **<u>2023</u>** <u>Daytime (07:00 to 23:00):</u> A noise level difference of -0.3 to 0.4 dB is predicted which is not a discernible change and therefore **negligible** **<u>2023</u>** <u>Night-time 23:00 to 07:00</u>: A noise level difference of 0.1 to 0.3 dB is predicted which is not a discernible change and therefore **negligible**	Existing noise management and control measures will be retained and implemented in a manner which ensures that future noise levels do not exceed the limits indicated in the air noise assessment. Furthermore, to ensure that mitigation of noise keeps pace with the increase in flights, and reflects the best practices adopted at other UK airports, enhanced or newly adopted mitigation measures will include, *inter alia:* ▪ Night Noise Surcharges applied to noisier aircraft movements during the 8 hour night period; ▪ Tighter noise penalty limits to apply for the whole 8 hour night period; and ▪ Significantly enhanced SIGS which has three main elements:	**Negligible**

Topic	Phase	Summary of Impacts (DC vs. DM)	Proposed Mitigation/Enhancement	Residual Effects (with mitigation applied)
		The changes in noise levels identified would not be perceptible by humans.	- The removal of a householder financial contribution; - A three tiered offer reflecting the degree of noise exposure; and, - Increased grant payments.	
Chapter 8: Ground Noise	Construction	Construction noise has been determined to have a **negligible** impact in the context of the prevailing background noise levels, although there is the potential for night-time works to give rise to some minor noise disturbance.	No further mitigation is required for construction noise, beyond the measures that will be implemented as part of a CEMP and Code of Construction Practice (CoCP). These will include procedures for avoiding the use of the noisiest equipment at night, working with local residents and ensuring adherence to best practice.	**Negligible**
	Operational	No adverse effects have been determined for daytime noise, apart from a **minor adverse** effect experienced at Molehill Green, where noise levels of 0.1 dB over the threshold for negligible impacts (1 dB) were experienced. **No adverse impacts** were determined at any of the receptors with regards to night-time noise.	As no ground noise impacts of significance are predicted, no specific additional mitigation is required. However, the proposed enhancements to existing noise management and control measures, as described above, will also have a direct bearing on ground noise.	**Negligible**
Chapter 9: Surface Access Noise	Construction	Given the low number of construction vehicles predicted and high background traffic flows, a **negligible**/ imperceptible change in surface access noise is expected for this phase.	n/a	**Negligible**
	Operational	Against the Do Minimum scenario changes	As the predicted changes in road traffic	**Negligible**

Topic	Phase	Summary of Impacts (DC vs. DM)	Proposed Mitigation/Enhancement	Residual Effects (with mitigation applied)
		to surface access noise have been determined as less than 1 dB(A) at all receptors and therefore **negligible.** Comparing to the 2016 baseline, the changes in noise levels have been determined to be generally less than 3 dB(A) due to traffic level changes, except Round Coppice Road where a 3.8 dB(A) (minor adverse) increase has been determined. However, because the nearest receptor is over 150 m from the road, the impact has been deemed **negligible.**	noise levels are small and all impacts are negligible, there is no need for any further mitigation.	
Chapter 10: Air Quality	Construction	It is not anticipated that the scale and type of works associated with construction will result in any adverse air quality effects at any sensitive receptors in the study area. As such, the effects of the construction of the proposed development are assessed to be **negligible.**	The proposed CEMP will include measures to manage any potential air quality impacts (e.g. dust and HGV emissions) from the construction phase.	**Negligible** .
	Operational	<u>Human Receptors</u> In **2023** a negligible impact is predicted at all receptors, and therefore no significant effects are anticipated for air quality. In all the assessment scenarios for this year, predicted concentrations are below the air quality standard for NO_2 (40µg/m^3), except at one receptor in Bishop's Stortford (London Road) which is mainly influenced by non-airport traffic. Furthermore, the	No significant effects have been predicted for air quality and therefore no further mitigation is proposed, beyond the regular air quality monitoring that is undertaken around the airport, and measures detailed in the 2015 SDP.	**Negligible**

Topic	Phase	Summary of Impacts (DC vs. DM)	Proposed Mitigation/Enhancement	Residual Effects (with mitigation applied)
		change in concentrations between the two assessment cases for 2023 is only 0.1µg/m^3 and therefore there is a **negligible** impact due to the proposed development. By **2028**, no exceedances of the air quality standards for NO_2, PM_{10} or $PM_{2.5}$ are predicted at any receptor in the study area, including within Bishop's Stortford. The contribution of emissions from the proposed development remains very small – being a maximum of 1.0µg/m^3 of NO_2 and 0.1µg/m^3 of particulate matter (PM_{10}). Accordingly, **negligible** impacts are predicted at all receptors in 2028 due to the proposed development, and therefore no significant effects are anticipated for air quality.		
		Ecological Receptors Nitrogen (NOx) deposition rates at designated wildlife sites in proximity to the airport, including Hatfield Forest and Elsenham Woods, are predicted to remain below the critical level/air quality standard of 30µg/m^3 in 2023 and 2028. In 2028, the largest change in annual mean NOx concentrations due to the proposed development is predicted to be 0.4µg/m^3 and less than 1% of the lower critical load, meaning that no significant effects would be experienced at any of these designated	As no significant environmental effect on off-site ecological receptors has been identified, no specific mitigation is proposed. However, STAL will continue to undertake regular air quality monitoring on and around the airport and has recently installed monitoring equipment within the Hatfield Forest as part of a previous planning agreement.	**Negligible**

Topic	Phase	Summary of Impacts (DC vs. DM)	Proposed Mitigation/Enhancement	Residual Effects (with mitigation applied)
		sites. This equates to a **negligible** impact. The HRA screening exercise reported in the PEA (see ES Appendix 16.1) concludes that there will be **no significant adverse effect** on Epping Forest SAC.		
Chapter 11: Socio-Economic Impacts	Construction	The construction of the new airfield infrastructure will create a total of almost 300 construction jobs and support Gross Value Added (GVA) of £23.4 million over the 12 month construction period between 2021 and 2022. However, given the scale of forecast construction employment, in a regional context this is predicted to be **negligible.**	No mitigation is proposed.	**Positive**, but **Negligible** effect in a regional context.
	Operational	The proposed increase in the passenger cap to 43mppa will result in increased employment at the airport as well as additional employment and socio-economic benefits at the regional level. The increase in capacity will enable growth in services in terms of destinations served and frequency of flights, which will create benefits for the users of the airport and generate wider beneficial economic effects in the region and beyond. It will also enable new services to destinations important for business and high value in-bound tourism. The airport is predicted to support additional employment of 5,400 people in the 2028	No significant adverse effects have been identified during the assessment. However, to ensure the benefits of the proposed development are captured and maximised, the airport will continue to develop and enhance its existing initiatives including those set out in the 2015 SDP, which include: ▪ The Stansted Airport Employment and Skills Academy: By 2028 STAL's aim is to increase employment of local people in line with airport employment growth to 700 per year; ▪ The new Stansted Airport College will provide a purpose-built training facility for up to 500 young people per year	**Minor to Major beneficial residual effects**

Topic	Phase	Summary of Impacts (DC vs. DM)	Proposed Mitigation/Enhancement	Residual Effects (with mitigation applied)
		Development Case, of which approximately 3000 will be direct on and off airport jobs, and 2,400 will be indirect and induced jobs. Related to this additional employment it is estimated that the proposed development will generate a GVA benefit of £357 million to the local and wider economy compared to the DM scenario The combination of the above constitutes a net **major** beneficial effect.	to gain industry recognised qualifications and work experience around the airport; and ▪ Maintain and enhance the Airport Surface Access Strategy (ASAS) which will focus on connections to areas targeted for workforce recruitment including North London Boroughs and continue to provide the Airport Travelcard.	
Chapter 12: Carbon Emissions	Construction	The construction of new aircraft parking stands and taxiways will contribute an estimated 0.027 $MtCO_2e$. This represents 0.7% of Stansted's 2022 total annual emissions. Construction emissions would account for approximately 0.001% of the UK's 3rd carbon budget (2018 to 2022) and therefore constitutes a **negligible** contribution.	No specific mitigation required. However, the CEMP and CoCP will include measures to maximise energy efficiency and reduce carbon emissions.	**Negligible**
	Operational	There would only be a 4% increase in CO_2e between the Development Case and the Do Minimum scenario. As such, accounting for the additional 8 million (23%) more passengers by 2028, the carbon intensity per passenger improves considerably. Post 2028, total flight carbon emissions are predicted to continue to fall due to	No specific mitigation is required. Carbon reduction measures are detailed in the 2015 SDP, in the ASAS, and in conjunction with STAL's accreditation under the ACA scheme. Stansted Airport has already achieved carbon neutrality for direct and indirect carbon emissions through a combination of on-site energy management	As there are no quantified significance criteria for carbon, professional judgement has been used to assess a **negligible** residual effect.

Topic	Phase	Summary of Impacts (DC vs. DM)	Proposed Mitigation/Enhancement	Residual Effects (with mitigation applied)
		advancements in aircraft technology and other changes in the aviation sector (e.g. increased use of sustainable fuels). As such, flight emissions are projected to fall between 2.5MtCO_2e and 3.4MtCO_2e by 2050. Based on this, operational emissions are compatible with the UK meeting its targets for GHG emissions and CO_2 from aviation in 2050.	and offsetting strategies and this status will be maintained in the future. Post 2021, airlines flying from Stansted will be required to offset all growth in international flight carbon emissions by funding carbon-reducing activities and renewable energy projects in order to reduce direct carbon emissions.	
Chapter 13: Climate Change	Operational	The assessment of operational stage resilience has been informed by the airport's Climate Change Adaption Progress Report (CCAPR) which includes contingency plans to deal with extreme weather events. The assessment concludes that sufficient mitigation and monitoring measures are currently in place for climate hazards (e.g. low precipitation, abnormally high temperatures) and for the climate change impacts and risks identified.	No further mitigation measures are considered necessary in respect of in-combination climate change effects. Existing mitigation measures for climate change resilience are detailed in Stansted's 2015 SDP and the CCAPR. Some additional precautionary measures have been identified in this assessment in order to further reduce risks from high temperature, strong winds and high precipitation. A review and update of the CCAPR in due course is also recommended to take into account a passenger capacity of 43mppa.	No residual effects have been identified.
Chapter 14: Public Health and Wellbeing	Construction	Due to the negligible increase in traffic that would be experienced in the construction stage, a health impact has been determined.	No additional mitigation measures are proposed for the construction phase in respect to human health and wellbeing.	**Negligible**

Topic	Phase	Summary of Impacts (DC vs. DM)	Proposed Mitigation/Enhancement	Residual Effects (with mitigation applied)
		The health impact of construction employment is also negligible.		
	Operational	Impacts on public health and wellbeing were assessed for a number of factors, including socio-economic, surface access, air quality, noise, access to green space and physical activity, flood risk and water contamination, and governance. The findings are as follows: **Major beneficial** impacts from employment related benefits and other socio-economic impacts. **Negligible** impacts were determined from air quality, surface access, flood risk and governance. **Minor adverse** impacts (at worst) on quality of life and wellbeing due to a reduction in amenity of green space. **Negligible to Minor adverse** impacts from noise (on health and wellbeing).	The mitigation measures detailed above for other topics (including surface access, air noise and socio-economics) will help to avoid adverse effects on health and wellbeing and promote positive health outcomes. Further measures have been recommended to develop and enhance these initiatives, maximising the effectiveness for health and wellbeing. These measures have been recommended with reference to Hertfordshire and Essex's reported health needs and objectives. In summary they comprise suggested avenues by which the Community Fund can be used to benefit community health, on-airport measures to encourage healthy food options, and continued engagement with local health stakeholders.	**Major beneficial** residual effects have been predicted on health and wellbeing from the enhanced socio-economic effects identified. **Negligible** residual effects have been predicted through the air quality and surface access transport health pathways **Negligible (non-significant)** residual effects from noise is predicted assuming the enhanced SIGS and other controls are effective at reducing people's exposure to noise at home.
Chapter 15: Water Resources and Flood Risk	Construction	**Negligible** impacts are expected on fluvial flooding, water demand, and demand for foul water infrastructure during the construction stage.	Measures will be introduced in a CEMP to avoid contamination of water resources during construction. This will ensure that the risk of pollution incidents to water is minimised as far as reasonably possible.	**Negligible**

Topic	Phase	Summary of Impacts (DC vs. DM)	Proposed Mitigation/Enhancement	Residual Effects (with mitigation applied)
		Negligible to minor adverse effects from the potential contamination of water courses due to the high sensitivity of groundwater under the site. Prior to mitigation, there could also be a temporary, short term **minor to moderate adverse** effect on the drainage regime because of the high sensitivity of local water courses and effects to the local drainage network.	STAL's appointed Main Contractor would be responsible for ensuring compliance with this and avoiding pollution, as required by law. In addition, a localised surface water run-off management system will be employed by the contractor to enable contaminated pollutants to be treated before being discharged.	
	Operational	**Negligible** impacts have been determined from the potential contamination of water resources, future alterations to the drainage regime, and of increased risk from fluvial flooding.	Further upgrade works to the existing airport's drainage system (Pond C) are proposed in conjunction with the proposed development to ensure that it has capacity to store and treat the additional airfield drainage from the new stands and taxiways. The final configuration of this upgrade is to be confirmed.	**Negligible**
		Minor adverse impacts could be expected to potable water supply (provided by AW), prior to mitigation.	STAL will continue to liaise with AW to determine the requirement for, and timing of, any changes to the way in which the airport currently draws from the mains and/or off-site reinforcement works to their mains supply. Building on the water efficiency and conservation measures already identified and committed to by STAL in the 2015 SDP, additional measures and revised	**Negligible**

Topic	Phase	Summary of Impacts (DC vs. DM)	Proposed Mitigation/Enhancement	Residual Effects (with mitigation applied)
			targets will be explored and reported on in the next revision to the SDP, which is scheduled to occur before 2020 (i.e. in advance of the implementation of the proposed development).	
		Minor adverse impacts are also anticipated on demand for off-site foul water infrastructure, in light of reported capacity constraints (owned and operated by TWUL).	TWUL will determine any necessary upgrades to off-site foul water infrastructure and recharge through infrastructure charges. As such the effects from additional passengers and employees by 2028 are expected to be negligible.	
Chapter 16: Non-Significant Topics	Construction	<u>Various</u> **Negligible** impacts have been identified on ground conditions, archaeology and built heritage, landscape and visual impacts, waste, and major accidents and disasters, from the construction phase of the proposed development. This was to be expected, as these environmental factors were identified 'non-significant topics' in the Scoping Report, which was endorsed by UDC in their Scoping Opinion dated 21st December 2017.	The CEMP will include various environmental management procedures which will ensure no significant adverse impact arise in respect to these factors.	**Negligible**

Topic	Phase	Summary of Impacts (DC vs. DM)	Proposed Mitigation/Enhancement	Residual Effects (with mitigation applied)
		Ecology and Biodiversity **Negligible** impacts have also been identified in respect to on and off-airport ecology and biodiversity during the construction works. However, surveys undertaken between September and October 2017 found a 'low' population of common lizards and two Great Crested Newts (GCNs) at one location in the northern perimeter of the airfield where the additional Echo stands are proposed. As these species are protected by law, the construction works would not be allowed to ham them.	An Ecological Mitigation Strategy (ES Appendix 16.2) has been developed to safely remove and relocate specimens of common lizard and GCN that are detected on the Echo site prior to the commencement of the works. Their removal (or translocation) would be undertaken in accordance with the conditions of a licence from NE. They will be translocated to an off-site receptor site – Monks' Farm which is within the land ownership of STAL. This receptor site is currently under construction (to be completed late spring 2018) and will provide suitable habitat for a range of species including reptiles and amphibians.	**Negligible**
	Operational	Various **Negligible** impacts have been identified for each of the above 'non-significant' topics during the operational phase of the proposed development.	No further mitigation measures are considered necessary for any of these 'non-significant' topics as a consequence of the proposed development. However, the 2015 SDP includes various ongoing management measures and commitments for these environmental topics and, where appropriate, sets specific targets (e.g. for waste reduction and recycling etc.). Such measures are summarised in the corresponding sub-sections of ES Chapter 16 Non-Significant	**Negligible**

Topic	Phase	Summary of Impacts (DC vs. DM)	Proposed Mitigation/Enhancement	Residual Effects (with mitigation applied)
			Topics).	
		Ecology and Biodiversity **Negligible** impacts have been identified in respect to on and off-airport ecology and biodiversity from the operation of the proposed development. Air quality impacts on Hatfield Forest, other local SSSIs and Epping Forest SAC, are as described above.	No specific mitigation is required in respect of the negligible operational impacts of the proposed development on ecology and biodiversity. STAL's existing approach is to protect all local wildlife and habitats in proximity to the airport and to manage these areas (in conjunction with the Essex Wildlife Trust and/or the land owners) with the aim to maintain or enhance their value as far as possible. The Stansted Biodiversity Action Plan was produced in December 2017 and sits alongside site specific Habitat Management Plans referred to in the 2015 SDP. These reinforce STAL's commitment to maximise the biodiversity value of the airport, provided that this does not compromise operational requirements and aircraft safety.	**Negligible**

Conclusion

18.15 The continued growth of Stansted and the proposed development will support national and local economic objectives, meet the needs of local residents and businesses for air travel, and, consistent with Government aviation policy, make better and more efficient use of the existing runway. This growth will take place in a responsible manner, within the environmental limits of the airport (as detailed above and within the topic ES Chapters 6-16). Without the proposed development, growth at the airport will be constrained and the benefits of growth forgone.

18.16 The ES concludes that the adverse environmental effects of the proposed development will generally range in significance from negligible to minor adverse (i.e. not significant), and that that there will be some major beneficial effects to the local, regional and wider economy. No significant adverse effects have been identified which could not be adequately mitigated through appropriate environmental controls, including those already in place at the airport and incorporated through the previous planning permissions.

18.17 Due to the relatively small scale and localised nature of construction works being brought forward under the proposed development, the residual effects at this stage are all determined to be negligible to minor adverse (at worst). Specific construction effects will be managed through the implementation of a project specific CEMP, CoCP and other mitigation measures described in ES Chapter 5 (Development Programme and Construction Environmental Management) and within the subsequent technical topic ES Chapters 6-16.

18.18 Operational environmental effects have been assessed for an extended timeline from the 2016 Baseline Year through to the 2028 Principal Assessment Year. However, in accordance with convention and best practice standards, the EIA has focused on assessing the difference in environmental effects between the Do Minimum scenario without development scenario and the Development Case in 2028. This is the point at which the maximum passenger throughput (43mppa) and maximum number of aircraft movements (274,000) would be achieved and therefore represents the greatest difference in environmental effects between the Development Case and the Do Minimum scenario. However, additionally and where relevant, the differences in environmental effects between the Development Case and the Do Minimum scenario have also been determined for 2023. This ‘Transitional Year’ is the first year during which a noticeable divergence will occur between the ‘status quo’ of retaining the 35mppa limit and the additional growth stimulated by the removal of this cap.

18.19 In all assessment cases, no significant (i.e. moderate or major) adverse environmental effects have been identified. Moreover, those minor adverse effects that have been identified are capable of being further mitigated to a ‘negligible’ level, as set out in the table above.

18.20 A number of different mitigation strategies have been outlined within this ES, often building upon the good practice already adopted by the airport through the 2015 SDP and other corporate policies and initiatives The changes to technology forecast within the aviation industry is also anticipated to have a large influence on reducing the environmental impacts over time, including for air quality, noise and carbon emissions. With the industry as a whole moving towards adopting more efficient technologies, with lower emissions, greater fuel efficiency and quieter, larger seated capacity aircraft, the airport will be able to accommodate more passengers without increasing its existing flight limit of 274,000, or increasing its overall environmental footprint compared to that allowable through the full implementation of the 2008 25+ Planning Permission.

18.21 Overall, the impacts and residual effects identified within the ES are typically negligible in nature, once the proposed mitigation measures have been incorporated. Significantly beneficial residual effects have been identified in relation to socio-economic impacts of the proposed development, due to the positive influence it will have in facilitating additional investment, employment and tourism, as well as providing benefits to the end users of the airport. The proposed development is therefore in accordance with national policy for aviation, sustainability and growth, and is fully compliant with the EIA Regulations.