

Ch 1

Environmental Statement
Chapter 1 Introduction



Chapter 1: Introduction

Background

- 1.1 London Luton Airport Operations Ltd (LLAOL) is the operator of London Luton Airport (the Airport) and has a 32-year concession with London Luton Airport Limited (LLAL), which is a company wholly-owned by Luton Borough Council (LBC). The concession runs until 2031 and is now nearly half way through.
- 1.2 LLAOL is seeking planning permission to instigate the growth of the Airport in order to enhance the experience for passengers and provide additional capacity in line with Department for Transport (DfT) projections for passenger growth.
- 1.3 A planning application for the proposed development has been submitted to LBC and, under planning regulations in England, an environmental impact assessment (EIA) should be undertaken for a development of the nature and scale of the application proposed. LLAOL has prepared this environmental statement (ES) under the Town and Country Planning (Environmental Impact Assessment) Regulations 2011 (the Regulations) and submitted it to assist LBC in its determination of the planning application.
- 1.4 The ES reports the outcome of the EIA undertaken in respect of the proposed development. A non-technical summary (NTS) of the information contained in this ES is also available separately. As required by the Regulations the ES:
 - Describes the proposals and the area surrounding the proposed development site
 - Describes the existing environmental conditions in the area of the proposed development site
 - Draws conclusions about the effects that the proposals may have on the environment
 - Explains the measures that LLAOL has adopted or intends to adopt in order to mitigate any identified adverse effects.
- 1.5 A Planning Supporting Statement (PSS) and Design and Access Statement (DAS) have also been prepared to accompany the planning application. These documents cover the need for the scheme, the detailed planning proposals, the design of the scheme, a summary of the environmental issues and a policy appraisal.
- 1.6 In addition to the PSS and DAS, the planning application also includes a Sustainability Statement, which details how the Airport and the development proposals address the issue of sustainable development. Whilst there are overlapping topics between the Sustainability Statement and the ES, because of the objective approach required of an ES compared to the more comparative approach to considering sustainability, it is important that they are considered as individual (but related) topics.

Summary of the proposed development and historical context

- 1.7 In 2006, LLAOL prepared a draft masterplan for a large 30-million passenger airport, which involved a significant extension of the boundaries of the Airport. The 2006 masterplan was withdrawn and a revised masterplan document was published for public consultation by LLAOL in March 2012, for a scheme to increase passenger throughput at the Airport to 16 million passengers per annum (mppa) by 2028. This was wholly contained within the Airport boundary.
- 1.8 In parallel, LLAL undertook a public consultation exercise on a masterplan for a separate scheme to increase the passenger throughput at the Airport to 18 mppa by 2025, in advance of preparing its own planning application.
- 1.9 LLAOL and LLAL have subsequently agreed that only one application should be submitted and that this detailed planning application should be submitted by LLAOL. It has also been agreed that the planning application should seek consent to improve passenger facilities and extend the capacity of the Airport to 18 mppa.
- 1.10 A new illustrative masterplan has been produced and this is shown as figure 1.1. The current development proposals have been designed to meet forecast needs but in doing so, to take account of the physical capacity of the Airport site, airspace capacity and operational capacity.
- 1.11 The proposals will improve the existing infrastructure within the Airport boundary and make best use of existing infrastructure. The new infrastructure will improve passenger facilities and facilitate an increase in passenger capacity and throughput at the Airport. Therefore, whilst the planning application is for the new areas of built development on the Airport site, the development proposals and EIA also take account of the forecast changes in the capacity of the Airport.

Changes to passenger throughput

- 1.12 By 2030, the DfT has forecast that demand for travel through all of London's airports will have risen to 180 million passengers per annum (mppa). Within this market, the Airport is forecast to grow up to 17 mppa under the maximum use scenario. There is thus a need to provide a bigger and better airport at Luton to contribute to the provision of high quality passenger capacity for the London system. LLAOL seeks to play its full part in supplying that demand by providing capacity for 18 mppa.
- 1.13 The Airport handled 9.5 million passengers in 2011. This level of passengers, together with cargo, maintenance and general aviation flights gave rise to 90,760 daytime (06:00hrs (07:00hrs on Sundays) -23:00hrs) air traffic movements (ATMs) and 8,539 night-time (23:00-06:00hrs (07:00hrs on Sundays)) air traffic movements (ATMs) in 2011.
- 1.14 The existing infrastructure at the Airport, with minor amendments to the terminal, would enable an increase in passenger throughput up to approximately 12.4 mppa. This would not be sufficient to accommodate predicted growth in passenger numbers and the implementation of the development proposals will enable the Airport to grow its passenger throughput to 18 mppa by 2028.

Built development proposals

- 1.15 To enable an increase in passenger throughput and facilitate the resulting increase in ATMs, LLAOL is proposing as part of this planning application to develop the Airport's existing infrastructure in eight key areas, shown on figure 1.2. Full details of the Airport development proposals are provided in chapter 3 of this ES.
1. Dualling of the road from the Holiday Inn roundabout to the Central Terminal Area
 2. Improvements to the public transport hub adjacent to the terminal
 3. Construction of a multi-storey car park and pedestrian link on the western side of the existing Short Term Car Park (STCP)
 4. Extension to the Mid Term Car Park (MTCP) and Long Term Car Park (LTCP)
 5. Improvements to the terminal building involving internal reorganisation and minor extensions and building works
 6. Construction of a new pier (Pier B)
 7. Construction of a new taxiway parallel to Taxiway Delta
 8. Taxiway extensions and rationalisation of aircraft parking areas with new stands replacing and improving existing stands.
- 1.16 The Airport's hours of operation will remain unaltered and it will continue to adhere to its Night Noise Policy. This is summarised in chapter 2 of this ES and full details can be found in the Annual Monitoring Report available from Airport's web site <http://www.london-luton.co.uk/en/content/8/243/annual-monitoring-report.html>.

The applicant

- 1.17 The Airport opened as Luton Municipal Airport in 1938 and, following a period of use by the RAF during WWII, played a pivotal role in the growth of the inclusive tour holiday business during the 1950s and 60s. In the early 1990s it was the birthplace of the low-cost or 'no frills' phenomenon, firstly with Ryanair, and then with easyJet, which maintains its UK base at the Airport today.
- 1.18 In August 1998 LBC signed a public-private partnership deal, handing the operation, management and development of the Airport to LLAOL for a period of 30 years, expiring in 2028 (subsequently extended to 2031). This arrangement has resulted in significant investment in essential airport infrastructure allowing the Airport to successfully compete in the London market and better serve its local catchment.
- 1.19 In January 2005 LLAOL was acquired by Airport Concessions Development Limited (ACDL), a company owned by the Spanish companies Abertis Infraestructuras (90%) and Aena Internacional (10%).
- 1.20 Abertis is one of Spain's leading private transport and communications infrastructure management corporation. It is made up of more than 60 directly managed or associate companies operating in the motorways, telecommunications infrastructure, airports, car parks and logistics sectors. Abertis Airports has business interests in 29 airports in eight countries, predominantly in Europe and the Americas.

- 1.21 The objective of Abertis is to meet the need for quality infrastructure for the mobility of people, tangible goods and information; a goal which is the focus of the day-to-day work of its more than 11,000 employees across the world.
- 1.22 Aena Internacional is the international business arm of Aena, the Spanish national airport and air traffic control organisation, which owns and operates 47 airports and two heliports across the Iberian Peninsula, with management involvement in a further 27 airports. Aena is the world's leading airport operator in terms of passenger numbers with some 200 mppa using its airports. Aena also has operations in Central and South America.

Environmental Impact Assessment (EIA)

- 1.23 EIA is a process for ensuring that the likely significant effects of a new development on the environment are fully understood and are taken into account before the development is allowed to proceed.
- 1.24 European and domestic legislation requires the promoter of the project, in this case LLAOL, to collect information and present it as an ES in support of the planning application. In its role as local planning authority, LBC will be the recipient of the planning application in this instance. The EIA is thus an integral part of the planning application process.
- 1.25 The Town and Country Planning (Environmental Impact Assessment) Regulations 2011 implement the requirements of the EU Directive (97/11 EEC), amending the original Directive (85/337/EEC) '*on the assessment of the effects of certain public and private projects on the environment*' (now consolidated in Directive 2011/92/EU). The Regulations define proposals according to whether they are Schedule 1 or Schedule 2 projects.
- 1.26 Schedule 1 projects are those for which the submission of an ES is mandatory. Schedule 2 projects require EIA if they are likely to have significant effects on the environment by virtue of factors such as their nature, size or location.
- 1.27 The Airport is of a type listed under Schedule 1 of the EIA Regulations because it has a basic runway length of more than 2,100 metres. The proposed development is of a type listed under Section 13(a) of Schedule 2 to the EIA Regulations because it represents a "*change to or extension of development listed in Schedule 1...*" and it is in excess of the relevant threshold for Airport developments (1 hectare), as listed in Schedule 2 of the EIA Regulations.
- 1.28 LLAOL has not submitted a request for a Screening Opinion to LBC because the scale and nature of the development proposals are considered to require the submission of an EIA as part of the planning application for the proposed development at the Airport. A request for an EIA Scoping Opinion was submitted by LLAOL to LBC in August 2012 and this is considered in more detail within chapter 5 of this ES.
- 1.29 The EIA assesses the likely significant effects of the Airport, following the proposed changes, rather than only the changes themselves in isolation.

The planning application process

- 1.30 LLAOL has prepared and submitted this document and supporting appendices, which together constitute an ES under the 2011 EIA Regulations. Because an ES accompanies the application, the council has a 16-week determination period in which to decide whether to grant planning permission. During this period the council must be satisfied that it has sufficient information on which to confirm the results of the EIA.
- 1.31 This period, which is twice the normal length of time for determination of minor non-EIA planning applications, can be extended by written agreement between the authority and the applicant. The council may also determine the application well within this time frame.
- 1.32 The council will undertake a comprehensive review of the application, taking account of all of the information submitted by LLAOL in the form of the planning application, PSS, DAS, Sustainability Statement, ES and technical appendices (including the Transport Assessment).
- 1.33 The council will also consider the views of a range of statutory consultees, organisations such as the Environment Agency, Natural England and the Highways Agency whose views the council must take into account before making a decision whether to grant planning permission. In addition, the council will seek the views of the general public and any other organisations wishing to comment.

The consultant team

- 1.34 Terence O'Rourke Ltd (TOR) has undertaken the coordination of the planning application and EIA, the preparation of the ES and preparation of the cultural heritage assessment. Assessments of other environmental issues have been undertaken by specialist consultancies as follows:
- Air quality – Air Quality Consultants
 - Noise and vibration – Bickerdike Allen Partners
 - Natural heritage – RSK and Arup
 - Landscape and visual impact – Arup
 - Health impact assessment - Arup
 - Water environment – Jacobs
 - Economic and employment impact – Halcrow
 - Traffic and transport – URS.

The structure of the environmental statement

- 1.35 The ES comprises two main sections. The first five chapters provide background information and a context to the application, with the remaining chapters addressing the specific likely significant environmental effects associated with the proposed site and development.
- 1.36 A glossary is included at the end of the ES to explain essential terminology used in the text. The technical appendices listed below have been produced to provide

detailed information on the EIA process and specific environmental issues relevant to this EIA:

- Appendix A – Scoping
- Appendix B – Air quality and climate
- Appendix C – Cultural heritage
- Appendix D – Economic and community
- Appendix E – Ground conditions
- Appendix F – Landscape and visual impact
- Appendix G – Natural heritage
- Appendix H – Noise and vibration
- Appendix I – Traffic and transportation
- Appendix J – Water environment and flood risk
- Appendix K – Approach to LLAOL modelling.

- 1.37 The non-technical summary (NTS) of the ES, which forms the frontispiece of this document, is also available from TOR at the address below as a separately bound document.

Further information

- 1.38 Copies of this ES and the technical appendices have been sent to LBC and a range of statutory and non-statutory consultees.

- 1.39 The full ES and its technical appendices may be inspected during the statutory advertised consultation period at the LBC offices the address of which is provided below. All application documents are also available for view on the LLAOL website: www.london-luton.co.uk.

- 1.40 Comments should be addressed to the council at the following address:

Ms Wendy Rousell
Airport Planning Officer
Luton Borough Council
Town Hall
George Street
Luton
Bedfordshire
LU1 2BQ

- 1.41 We request that comments are also be copied to TOR at the address below.

Ann Bartaby
Terence O'Rourke Ltd
Everdene House
Deansleigh Road
Bournemouth
Dorset
BH7 7DU

T: 020 3664 6755
F: 01202 430055
E: maildesk@torltd.co.uk

- 1.42 Additional copies of the ES (paper copy or DVD) and any further information about the project may be obtained during the consultation period at a reasonable charge to reflect printing, production and distribution costs (£200 for a paper copy and £10 for a CD copy), by contacting TOR at the address above.

Ch 2

Environmental Statement
Chapter 2 Site description



Chapter 2: Site description

Introduction

- 2.1 The Airport is located approximately 45 kilometres north of London and covers a site of approximately 245 hectares on the south eastern edge of the borough of Luton. The southerly boundary of the Airport closely follows the boundary between Luton and the district of South Bedfordshire, and the easterly boundary follows the boundary between the counties of Hertfordshire and Bedfordshire, and between the Borough of Luton and the district of North Hertfordshire, as shown on figure 2.1. The proposed development site lies predominantly within the Borough of Luton.
- 2.2 The site is predominantly level on a raised chalk plateau at the northern end of the Chiltern Hills. Most of the site is between 150 metres and 160 metres Above Ordnance Datum (AOD), and 60 metres above the River Lea (Lee), which flows to the west of the site. The site's highest point is approximately halfway along the runway.
- 2.3 The local topography drops steeply close to the ends of the runway, with a gradient of approximately 1:12.5 beyond the western end, and approximately 1:17 beyond the eastern end. The general topography of the area to the south and east of Luton consists of a series of generally parallel ridges and valleys that run from north west to south east.

Current land uses and operations

- 2.4 The Airport is primarily a passenger airport with a mix of principally low cost scheduled operators, and charter services. There is a smaller proportion of general aviation (including business) and cargo operations. Around this core operation are a number of directly or indirectly related operations and services, all of which occupy space within or near the site. A disused landfill is located within the north eastern area of the site, which straddles the site boundary and extends into the adjacent public recreation area.
- 2.5 Current land uses on the site can be categorised into five main types, which are described in the following paragraphs:
- Central Terminal Area (CTA)
 - Aprons, taxiway and runway
 - Airport and airline support facilities and other airport related facilities
 - Passenger and staff car parking
 - Drainage infrastructure.

Central Terminal Area (CTA)

- 2.6 The CTA shown in figure 2.2 encompasses public areas in the immediate vicinity of the Airport terminal and includes the following land uses:
- The arrivals and departure terminal and associated buildings
 - The transport interchange

- The Short Term Car Park.

- 2.7 Road access to the CTA is via Airport Way, as it emerges from the underpass beneath Taxiway Alpha, see figure 2.3.
- 2.8 The transport interchange comprises a number of areas, including passenger set down; a taxi rank; bus bays for the shuttle bus service to Luton Parkway rail station and the long-term and mid-term car parks, other bus and coach services; and vehicle turning space.
- 2.9 Short-term car parking is located to the south of the departures terminal building. Further information is provided on car parking provision later in this chapter of the ES.

Arrivals terminal

- 2.10 The arrivals terminal building, commonly referred to as the Old Terminal Building (OTB), dates from 1966, and was originally designed to operate as an arrivals and departures terminal. It covers approximately 18,100 m² across all floors and provides catering and retail facilities, lounges, international and domestic baggage reclaim, customs and other arrivals facilities. A proportion of the ground floor of the building is fallow, whilst above this area are offices used by LLAOL.

Departures terminal

- 2.11 The departures terminal, commonly referred to as the New Terminal, opened in October 1999 and the first floor departures lounge was fitted out in 2005. It covers approximately 35,600 m² on all floors and provides catering and retail facilities, 60 check-in desks, departure lounges and baggage handling facilities.

Immigration and link buildings

- 2.12 The two terminal buildings are linked together by a two-storey structure. The ground floor is an open concourse leading to large revolving doors, which serve as the main exit for arrivals passengers. The first floor contains the security, passenger search and metal detection units, through which all passengers must pass prior to entering the departure lounges.
- 2.13 To the rear of the link building is the immigration building. Passport control is located here and all international arriving passengers are required to pass through this area before moving into the baggage reclaim area of the arrivals terminal.

Walkway and pier

- 2.14 Running parallel to the north western façade of the arrivals terminal is a two-storey walkway. This provides access to the aircraft stands from the departures lounges and back to baggage reclaim, via the immigration building.
- 2.15 A two and a half storey pier, Pier A, runs perpendicular to the north east corner of the departures terminal and provides similar access to the aircraft stands located here, see figure 2.2.

Other land uses

2.16 Other land uses located in the central area of the Airport include:

- The Air Traffic Control tower (ATC)
- Navigation House, which houses LLAOL's offices
- Hangar 89, a large maintenance hangar used by easyJet
- A fixed base operation (FBO) used by RSS Enterprises (formerly Ocean Sky), a private business aviation operator.
- easyLand, which was formerly used by easyJet as offices but is now largely vacant.

Aprons, taxiway and runway

2.17 A large area of the Airport is utilised for the ground movement of aircraft. This area comprises the runway, the aprons that contain the aircraft stands and the taxiways, which connect the aprons to the runway. The runway is 2,160 metres long, 46 metres wide, and borders the southern edge of the Airport. The eastbound runway is designated as 'runway 08' and the westbound is designated as 'runway 26'.

2.18 There are currently five taxiways, see figure 2.3:

- Taxiway Alpha runs southward from the Airport Way underpass, then parallel to the runway, and joins the runway approximately 300 metres from its eastern end
- Taxiway Bravo connects Taxiway Alpha to the runway at a point approximately 400 metres from its western end
- Taxiway Charlie connects Taxiway Alpha to the runway at its midpoint
- Taxiway Delta runs perpendicular to the runway; it connects Taxiway Alpha to the cargo terminal in the north east corner of the Airport, the East Apron and the Harrods Aviation hangars
- Taxiway Echo links the western and eastern aprons around the northern end of the CTA.

2.19 The four main apron areas are, see figure 2.3:

- The western apron, connected to the runway via Taxiway Alpha
- The eastern apron, connected to the runway via Taxiway Delta
- The southern apron, connected to the runway via taxiways Alpha, Bravo and Charlie
- The northern apron, connected to the runway via Taxiway Delta.

2.20 The western and eastern aprons provide stands for passenger aircraft as well as stands and parking areas for aircraft. The southern apron is used mainly for business aviation purposes. The northern apron is used by aircraft accessing the Cargo Centre and by business jets accessing Harrods Aviation's hangars.

2.21 In total there are 33 operational stands currently devoted to commercial operations plus two stands at the cargo centre. At present Pier A serves eight of these, but only seven have contact gates.

- 2.22 Land on either side of the runway is maintained as open grassland in accordance with Civil Aviation Authority (CAA) regulations. Navigation equipment and approach lights are located within and outside the airport boundary.
- 2.23 Located off Taxiway Alpha, to the east of Taxiway Delta, is an area of apron used as an engine run up bay, see figure 2.3. A jet stream deflector and a large earth bund surround this area. Aircraft engine testing is regularly undertaken in connection with the maintenance and servicing work undertaken on site.

Support facilities and other airport related facilities

- 2.24 The site contains a wide range of office buildings, maintenance hangars and other service facilities, which either directly support the airport and airline operations, or take advantage of the markets created by presence of the Airport. These activities are mainly within the northern part of the site, see figure 2.3.
- 2.25 At 48 metres high, the Air Traffic Control (ATC) tower is the site's most prominent feature. It is located close to the CTA and commands a clear 360° view of the site and environs.
- 2.26 Fire and emergency services are located off the junction of taxiways Alpha and Bravo, and have easy access to the runway and all other parts of the Airport in case of emergency. There is a fire training ground located in the eastern corner of the site.
- 2.27 Maintenance hangars are located along the edges of the western apron area. The main occupiers are:
- Gulfstream, Hangar 125
 - Signature Flight Support, Hangars 102 and 62
 - Thomsonfly, Hangar 61,
 - Monarch Aviation and MAEL, Hangars 60, 127 and 9,
 - RSS Enterprises, Hangar 7 and 8
 - EasyJet, Hangar 89
 - Harrods Aviation, Hangars 201 and 202, which are located to the east of Taxiway Delta.
- 2.28 There are other smaller hangars accessed from the northern apron, these serve a range of general aviation uses.
- 2.29 Gulfstream, Signature Flight Support, RSS Enterprises and Harrods Aviation all serve the corporate and business aviation market, in which respect the Airport is a major UK facility. Their activities include both passenger handling and aircraft maintenance. Business aviation passengers tend not to make use of the main terminal. Instead they usually either board aircraft from or disembark directly to private vehicles on the apron; or pass through special lounges within the FBOs.
- 2.30 Cargo operations are managed from the Cargo Centre (also known as Hangar 200), which is located on the northern edge of the northern apron. Cargo operations comprise both dedicated air freight services and use of the holds of passenger aircraft.

2.31 There are numerous other facilities, located around the Airport including:

- Offices used by LLAOL
- Offices occupied by airlines, concessionaires and tenants
- Flight catering facilities
- Aviation fuel storage tanks
- Ground transport and general maintenance workshops.

Drainage

2.32 Surface water is drained from the runway, taxiways and aprons via:

- Sewers to Thames Water's foul water network
- Six soakaways, direct to groundwater.

2.33 The drainage system is discussed in more detail in chapter 14 of this ES.

Surface access routes

Local transport corridors

2.34 The valley of the River Lea forms a transport corridor with the main London - East Midlands - Sheffield railway line passing within it, and the M1 motorway passing along its western fringe. East Midlands Trains and First Capital Connect (including Thameslink) railway services currently serve Luton's main railway station, which is approximately 2.6 kilometres from the Airport. Luton Airport Parkway station is 1.6 kilometres south of Luton station, and approximately 1.5 kilometres from the Airport. Luton Airport Parkway station is also currently served by East Midlands Trains and First Capital Connect, with connections for London, the south coast, the Midlands and the North of England

2.35 The M1 provides a direct link to Luton for coach and car travellers from London and the Midlands, and is linked to the Airport by the A505, which has been upgraded by the East Luton Corridor (ELC) project. To the west of the M1, the A5 provides further links to the Midlands and London. The A505 also links the Airport with Hitchin, Stevenage, Letchworth, the A1(M) and East Anglia to the east.

Landside access

2.36 The main surface access is from the A505 via Airport Way (see figure 2.4); this takes incoming traffic to the CTA via the underpass beneath Taxiway Alpha. This access route has been upgraded as part of the ELC project, and provides a dual carriageway road link from J10 of the M1, to a new roundabout adjacent to the Holiday Inn Express Hotel.

2.37 The Airport can also be accessed via Frank Lester Way, which forms a junction with Eaton Green Road, the public highway running along the outside of the northern boundary of the Airport, see figure 2.4. Although open to the general public, the Frank Lester Way access is intended mainly for use by employees living to the north of the Airport and by locally based service companies.

2.38 The Airport's principal internal road network comprises:

- Airport Way, which enters the Airport from a roundabout with Kimpton Road and Vauxhall Way and links to the CTA via the Taxiway Alpha underpass
- Percival Way which links Airport Way to Frank Lester Way
- Frank Lester Way, which links to the public highway at Eaton Green Road
- President Way which extends from Percival Way to the Cargo Centre, Harrods Aviation's hangars and Car Parks B and E.

2.39 There are no direct rail links to the Airport, but a regular shuttle bus service is provided between the Airport's transport interchange and Luton Airport Parkway railway station. Other less frequent services run between Luton's main railway station and the interchange.

Airside access

2.40 Vehicle access to airside areas is strictly controlled and only authorised vehicles are able to access the network of roadways that run on and around the runway, aprons and taxiways, see figure 2.3. These roads are used by airfield maintenance staff, airport security and vehicles servicing aircraft on stands e.g. fuel, catering and baggage vehicles.

Passenger and staff car parking

2.41 Parking facilities for passengers and staff are provided in a number of locations around the site. They provide short-term, mid-term and long-term facilities, the difference being proximity to the terminals and relative pricing structure. In total there are 6,719 passenger spaces and 4,730 staff spaces. The main passenger car parks are shown on figure 2.5 and comprise:

- Short Term Car Park, located to the south of the departures terminal, accommodates 1,059 spaces
- Mid Term Car Park, located in the south west corner of the Airport, accessed directly from the roundabout on Airport Way, accommodates 2,301 spaces. Passengers are transported to the terminals by shuttle bus
- Long Term Car Park, located to the east of Taxiway Delta on the disused landfill, accommodates 3,359 spaces. Passengers are transported to the terminals from the Long Term Car Park by shuttle bus. Planning permission has been granted for an additional 980 long-stay parking spaces, although this development has not yet commenced.

2.42 Staff car parking is provided throughout the site, with each of the main offices, hangars, workshops and other facilities having allocated areas for staff parking. There are also two general employee car parks, one located adjacent to Navigation House and the other near to the south stands.

Surrounding land uses

Sites related to the airport

2.43 A number of facilities related to the airport's operations are located on sites close by. These include:

- The Ibis Hotel
- The Holiday Inn Express Hotel
- The Ramada Encore Hotel
- The Airport Executive Park, situated on both sides of President Way, providing offices for a range of companies operating at the Airport
- Other office, service, cargo, workshop and light engineering functions located on sites north of Percival Way.

Other surrounding land uses

2.44 To the north of the Airport is the main urban area of Luton, which forms a part of the Luton-Dunstable-Houghton Regis conurbation. It is characterised by substantial areas of housing on the northern continuation of the Chiltern plateau and in the valley of the River Lea to the north west, see figure 1.1 in chapter 1 of this ES. The area immediately north of the site includes Wigmore Place, an office development located on the northern side of Eaton Green Road.

2.45 North east of the site, between the Airport and the Wigmore housing area, is the Wigmore Valley Park, part of which is a restored landfill site. It consists of a derelict sports pavilion, playing fields and recreation grounds. Part of this area is designated as a County Wildlife Site (CWS). Beyond the Wigmore Valley Park is Century Park, an area of 43 hectares with outline planning permission for a range of office, warehousing, manufacturing and service functions.

2.46 The areas of land to the east and south of the site are predominantly in agricultural use, mostly arable. In addition there are a number of small, isolated settlements including Breachwood Green, Tea Green, St Paul's Walden and King's Walden.

2.47 To the north west of the A505 are several sites previously used either directly by Vauxhall Motors or by their suppliers. Since the car manufacturing plant closed in 2000, the main site (now referred to as Napier Park), which extends to some 22 hectares, has been subject to a planning application for mixed-use development, including residential units, office accommodation, general industrial accommodation, a hotel, multi-storey car park and retail facilities. The application was granted outline planning permission by LBC in March 2006. The remaining plant, which represents approximately half of the original Vauxhall Motors site, is still in use for van assembly by IBC vehicles.

2.48 Further to the north west and west are the business districts, including Capability Green, and further areas of residential development.

2.49 To the south west of the site is the Luton Hoo estate, which includes a historic garden and house, recently renovated to a hotel.

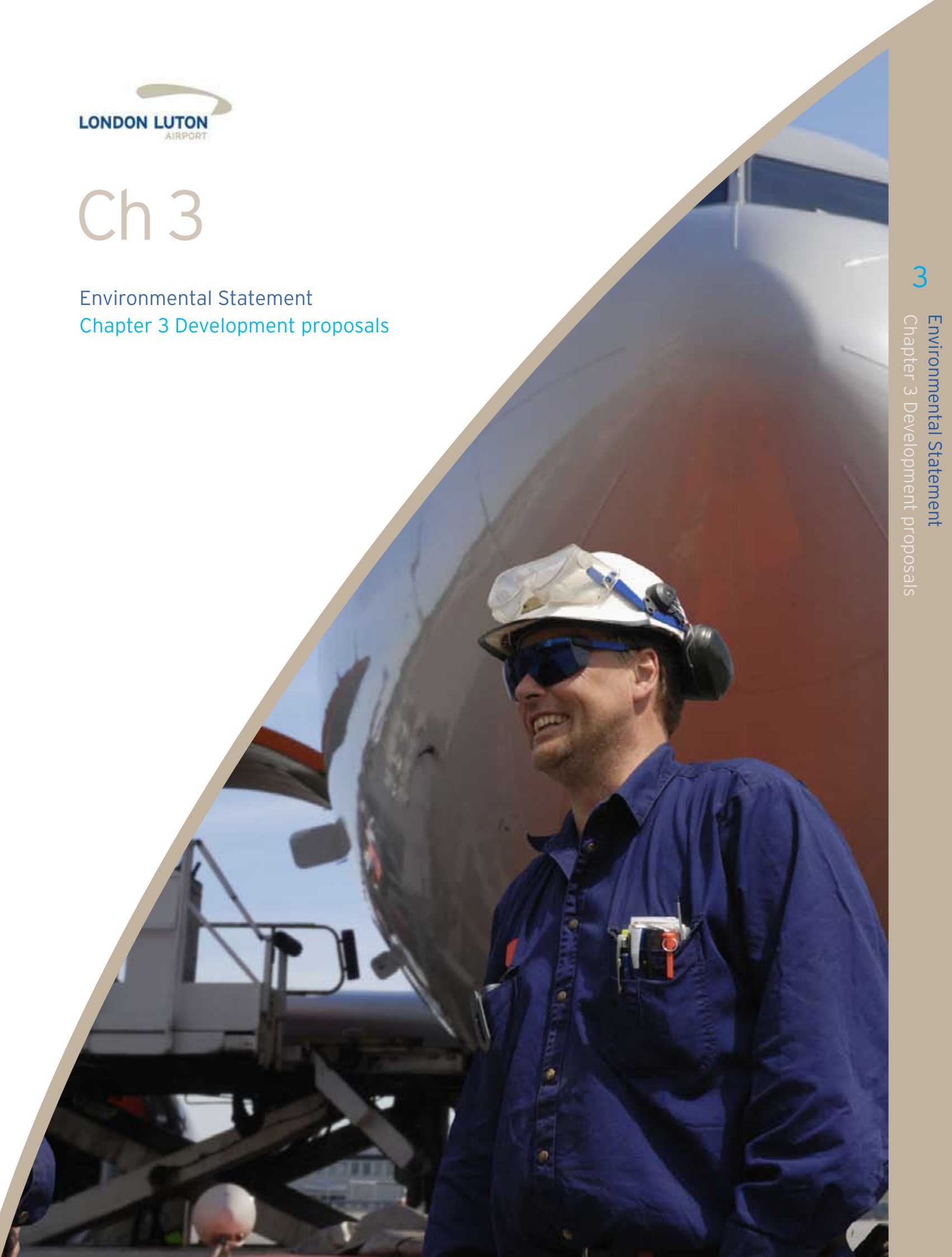
- 2.50 Further west between the M1 and the A5, are a number of smaller settlements including Markyate, Caddington, Woodside and Slip End. Beyond Luton, Harpenden is approximately 6 kilometres to the south, Stevenage and Hitchin are approximately 10 kilometres to the east and Letchworth is approximately 15 kilometres to the east.

Hours of operation

- 2.51 The Airport is licensed by the CAA for 24-hour operations under its Public Use Aerodrome Licence issued in accordance with the Air Navigation Order (1995). The Airport's terminals are therefore open 24-hours a day, seven days a week, and Air Traffic Movements (ATMs) occur both night and day.
- 2.52 In addition to complying with international limits on the maximum noise levels produced by aircraft using the Airport, a Night Noise Policy is also operated, with the aim of further restricting night-time noise levels. The policy defines night-time as 23:30-06:00 hrs Monday to Saturday and until 07:00 on Sundays.
- 2.53 During the night-time there are additional restrictions placed on the maximum acceptable noise levels of aircraft that can use the Airport. A landing and navigation fee surcharge is also levied on aircraft using the Airport during the night-time period. The size of the surcharge increases with aircraft noise levels generated, up to the maximum accepted level.
- 2.54 There are exceptions to this policy, relating to emergencies and delayed flights. There are also separate conditions relating to training flights. In 2011 9% of the Airport's ATMs occurred during the night-time period. A copy of the Night Noise Policy can be obtained from the Airport web site: www.london-luton.co.uk.

Ch 3

Environmental Statement
Chapter 3 Development proposals



Chapter 3: Development proposals

Introduction

- 3.1 The development proposals are driven by LLAOL's desire to continue improving the Airport's passenger experience, to increase capacity in order to ensure the continued development of the Airport and to be as good a neighbour as it can be.
- 3.2 The development proposals described within this chapter of the ES will provide the opportunity to significantly upgrade the terminal facilities with a mixture of extension and rationalisation, together with relatively modest physical changes airside. The entrance road into the Airport and circulation around the Central Terminal Area (CTA) will be improved, and there will be additional car parking capacity. Overall, this will deliver very significant improvements in customer service and resource-efficient provision of additional capacity.
- 3.3 The scheme of proposed improvements has sought to make the best use of the existing infrastructure.
- 3.4 The proposed improvements will smooth the flow of passengers through the Airport, make wayfinding easier and provide more seating to enhance passenger comfort. The new arrangements provide more contact stands and more waiting space for those departing from the Airport. New, more efficient equipment within the security area will help reduce the current queues that can form at certain parts of the system and increase capacity.

Structure of this chapter of the ES

- 3.5 An EIA should include assessment of all elements of the development proposed to determine whether there would be potential for significant environmental effects. The description of changes to a site that should be the subject of an EIA is commonly brought together within a single chapter of the ES and that is the purpose of this chapter.
- 3.6 The EIA has included assessment of proposed built development (e.g. the taxiway extensions) and the environmental effects of resultant changes in the way that the Airport will operate following the improvements (e.g. increased passenger throughput).
- 3.7 The planning application boundary is shown in figure 3.1. As described in chapter 1 of this ES, there are eight key component parts to the planning application:
 - Dualling of the road from the Holiday Inn roundabout to the Central Terminal Area
 - Improvements to the public transport hub adjacent to the terminal
 - Construction of a multi-storey car park and pedestrian link on the western side of the existing Short Term Car Park (STCP)
 - Extension to the Mid Term Car Park (MTCP) and Long Term Car Park (LTCP)
 - Improvements to the terminal building involving internal reorganisation and minor extensions and building works
 - Construction of a new pier (Pier B)
 - Construction of a new taxiway parallel to Taxiway Delta

- Taxiway extensions and rationalisation of aircraft parking areas with new stands replacing and improving existing stands.

3.8 Each of these components is described in greater detail within the first part of this ES chapter, with plans to illustrate key aspects of the development proposals. The operational changes to the Airport arising from the infrastructure improvements are then described, followed by a summary of the construction processes that will be required and the proposed construction programme. There is also a section at the end of the chapter to describe other development that is taking place within the Airport boundary and nearby, where this may have potential for cumulative impact with the LLAOL development proposals.

Dualling of the Airport access road

- 3.9 Construction of the East Luton Corridor (ELC) has made substantial improvements to the access into the Airport. It has smoothed the flows of traffic from the M1 motorway and provides an excellent gateway to the Airport.
- 3.10 The new section of dual carriageway is required to improve access into the CTA from the Holiday Inn roundabout and its approach roads. The road improvement works will improve access, legibility, safety and to improve flows on the road network around the Airport.
- 3.11 The proposed road works shown on figure 3.2 will comprise improvement of Airport Way to a dual two-lane 7.3 metre wide carriageway from Holiday Inn roundabout up to the CTA. This is a total length of approximately 600 metres. The proposed speed limit along Airport Way will be 30 mph. The inbound carriageway will follow the alignment of the existing Airport Way and the new outbound carriageway will be constructed adjacent to the existing road on its southern side.
- 3.12 The new outbound carriageway will pass under Airport Taxiway Alpha through the spare southern portal of the existing bridge structure. No alterations to the existing bridge structure are required to accommodate the new carriageway.
- 3.13 A new all-movements traffic signal-controlled junction will be provided on Airport Way to give access to the MTCP. This new junction will be at the same location as the existing MTCP access junction.
- 3.14 A new junction will also be provided within the CTA to facilitate access to a reconfigured Public Transport Hub (PTH), the proposed Drop Off Zone (DOZ) and STCP. This junction includes for a slip-lane off Airport Way for buses, taxis, staff and service vehicles to access the PTH, offices and terminal area. Egress from the CTA will be facilitated by a traffic signal-controlled junction at the end of Airport Way prior to entering the DOZ and STCP area.
- 3.15 Existing surface water from Airport Way predominantly drains to a Thames Water surface water sewer running approximately east to west along the road. A short section of the road immediately to the east of the Percival Way roundabout adjacent to the Holiday Inn hotel drains to the ELC network, west of the roundabout. It is proposed that the prevailing means of road drainage will be maintained and that the increase in surface water runoff associated with the proposed dualling would be mitigated through the use of oversized pipes and / or tanked storage to provide

additional storage capacity. Further information on the proposed approach to surface water drainage is provided later in this chapter.

Improvements to the public transport hub

- 3.16 Improvements are proposed to the PTH adjacent to the terminal, as shown on figure 3.3. The current layout of bus stops will be amended to provide a total of 18 dedicated bus parking bays forming an arc fronting the terminal building. Buses will drive into bays and reverse out of the bays and each will have a raised pavement area for passengers. The proposed changes to the PTH will reduce potential for conflict between buses and pedestrians and the curved nature of the reconfigured concourse in front of the terminal will provide an improved pedestrian environment.
- 3.17 Connection will be provided between the pedestrian concourse in front of the terminal and the STCP via a new pedestrian bridge structure. The pedestrian link will comprise three walkway cores containing lifts, located at the STCP, multi-storey car park and terminal concourse. The main walkway link between the STCP and the terminal concourse will be a maximum of 100 metres in length and 20 metres wide. The link between the multi-storey car park and the main walkway will be a maximum of 50 metres in length and 15 metres wide. The maximum height of the structure will be 14.5 metres to reflect the height of the multi-storey car park. The maximum gross external floor space of the structure will be 2,500 m².

Proposed improvements to the terminal building

- 3.18 The purpose of the proposed terminal improvements is to enhance customer experience, which will be achieved in four key ways:
- Providing additional capacity in security and immigration
 - Providing additional capacity in the departures lounge areas for seating and circulation and a reconfiguration of the existing retail and commercial areas
 - Rationalising the internal layout of the terminal building in order to make passenger routes through the building as direct as possible, substantially improving the passenger experience
 - Ensuring the smooth return of hold baggage to passengers in a timely manner.
- 3.19 The proposed works to extend and enhance the existing terminal building will bring together the various existing building elements into a single cohesive structure forming a focal point within the CTA. All of the frontages of all parts of the terminal will have a similar look and feel. The resultant single terminal structure will offer a highly flexible facility which internally will greatly improve the passenger experience by rationalising the passenger flows and removing where possible the crossover of departing and arriving passengers. The reasons that these improvements are needed include:
- Increased processing times at passenger screening in response to Home Office Terrorist Threat Levels and to enhanced security standards
 - Changes to inbound border controls
 - Changes in passenger and baggage behaviour (for example, checking-in at home and less hold baggage)

- An underprovision of space in some areas (for example at check-in where increased use of technology has reduced the need for some physical check-in desks)
 - Earlier check-in times increasing the demand for services.
- 3.20 The proposed improvements to the terminal building are indicated in figure 3.4. The most significant physical improvements to the terminal building are firstly, the construction of a new pier for boarding and disembarking and secondly, a two-storey extension at the front of the building which extends to the southern façade of the existing new terminal building.
- 3.21 The new pier, which will be a two-storey structure that will be approximately the same height as the existing pier, will serve arrivals and departures by upgrading four existing remote stands to contact stands. It will be connected to the departures terminal by an enclosed walkway and four new remote stands will be created by the provision of four new pre-board and bussing zones.
- 3.22 The pier will contain 5,381 m² of floor space comprising segregated movement corridors for arriving and departing passengers, waiting areas for access directly to aircraft on the contact stands or to buses accessing the remote stands. There will be toilet facilities and some small food and beverage units within the pier structure. Elevations of the Pier B structure are shown in figure 3.5.
- 3.23 The extension of the building at the front of the current access to the arrivals area will provide 5,296 m² of additional floor space. This space will house the main entrance / exit lobby for the whole terminal building, with an extension to the retail area above. It is important to note that this extension will infill an existing void rather than extending the existing profile of the terminal structure overall. Elevations of the terminal building are shown in figure 3.6.
- 3.24 Other new proposed construction comprises:
- A new two storey corridor from the existing departures terminal building to the proposed new southern pier (Pier B)
 - Infill to the existing northern pier (Pier A) to provide a new pre-board waiting zone at the lower level. As currently, the pier will provide movement corridors and waiting areas. Two small retail and vending areas are also proposed with a total area of 75 m²
 - Infilling of the area between the departures terminal building and the immigration hall to provide additional retail, departure and office space and a fire escape staircase, amounting to an additional 1,380 m² of space
 - A short bridge to access one of the stands on the northern side of the terminal with existing space converted to a pre-board waiting zone, thereby upgrading the facilities servicing this contact stand
 - The immigration hall will be reconfigured and extended to the side of and above the existing area, with an additional 1,548 m² of space provided.
 - A pedestrian link to the new multi-storey and STCP with a total area of 1,681 m².
- 3.25 The total amount of new usable floor space (excluding the pedestrian link) to be created is 18,191 m². The existing total gross usable internal floor area for the terminal building is approximately 69,133 m². The proposed total gross internal floor area for the development is approximately 87,324 m² which equates to a 26.3% increase.

- 3.26 Internal reorganisation will be facilitated by making better use of the 'old' terminal building, which currently contains some unused, fallow areas. The construction of the extension in front of the terminal building will considerably improve the ability to integrate the existing three structures, which to date have not functioned as a single entity. Further details are provided in the submitted planning application drawings.
- 3.27 On the ground floor, the check-in desks will remain generally in their existing location on the eastern side of the 'new' terminal building. Security provision will be increased with 20 new passenger screening lanes provided at the heart of the new integrated terminal building.
- 3.28 The 'old' terminal building will contain the baggage reclaim area with eight international baggage reclaims (some new and some reconfigured) and one domestic baggage reclaim. The peripheral areas of the 'old' building at this level will provide areas for departing passengers to wait and six new bussing gates.
- 3.29 At first floor level, there will be some office reorganisation and additional departure lounges. The main retail area will be reconfigured and a new duty free area will be provided.
- 3.30 Overall the infilling and rationalisation is intended to improve the passenger experience by creating more legible routes through the stages of arriving at the terminal building, passing through security checks and moving through the retail / resting areas to departure gates. Similarly, routes for arriving passengers, moving through immigration and baggage reclaim will be more direct and rational.

Taxiway extensions and rationalisation of aircraft parking areas

- 3.31 The purpose of the proposed improvements to the aircraft manoeuvring and parking areas is to further improve efficiency and the routing of aircraft to and from the runway and to rationalise the aircraft parking aprons and areas of underused hardstanding.
- 3.32 The requirements for taxiway and aircraft parking space are based on different classes of aircraft, referred to as International Civil Aviation Organisation (ICAO) codes. To aid interpretation of this section of the ES, and other subsequent sections, table 3.1 provides some key dimensions and example aircraft.
- 3.33 The rationalisation of the aircraft parking aprons will make maximum use of existing pavement areas and provide some additional Code C aircraft stands. The addition of extended parallel taxiways together with improved operational processes (Airport Collaborative Decision Making – ACDM) will improve the efficient use of the airfield infrastructure and reduce taxiing and holding times. This will improve the environmental performance of the airfield, through reduced queuing and holding times, and the business efficiency of LLAOL's airline customers.

ICAO Annex 14	Wingspan	Outer main gear wheel span	Example aircraft
Code C	24 metres up to but not including 36 metres	6 metres up to but not including 9 metres	Boeing 737 Airbus A320
Code D	36 metres up to but not including 52 metres	9 metres up to but not including 14 metres	Boeing 767 Airbus A300
Code E	52 metres up to but not including 65 metres	9 metres up to but not including 14 metres	Boeing 747 Airbus A330
Code F	65 metres up to but not including 80 metres	14 metres up to but not including 16 metres	Airbus A380 Antonov AN-124

Table 3.1: ICAO aircraft codes

- 3.34 The existing parallel taxiway will be extended at both ends of the runway, as shown on figure 3.7. At the western end of the runway the parallel taxiway will be extended by 600 metres and will be connected to Taxiway Bravo. The new section will be referred to as Taxiway Hotel. At the eastern end of the runway, the new section of taxiway (to be called Taxiway Golf) will be 350 metres in length and will be connected to Taxiway Alpha. The new sections of taxiway will be 23 metres in width with 45 metre radii on curves, providing a total new area of hardstanding of approximately 14,650 m² for Taxiway Hotel and approximately 9,050 m² for Taxiway Golf.
- 3.35 In addition to the construction of Taxiway Hotel, the junction of Taxiways Alpha, Bravo and Hotel will be extended on its western and southern sides. This will increase the size of this junction by 2,500 m² and will enable provision of a new stand on the South Apron. In addition to the extension of the junction, works in this area will also include approximately 3,100 m² of reconstructed airfield pavement and 2,300 m² of overlaid airfield pavement.
- 3.36 A new taxiway will be constructed parallel with the existing Taxiway Delta. This new link will be referred to as Taxiway Foxtrot and will connect to Taxiway Alpha at its southern end and Taxiway Delta at its northern end, opposite the East Apron. There will also be another junction with Taxiway Delta approximately half way along Taxiway Foxtrot. This taxiway will be approximately 23 metres in width and 480 metres in length with a total additional area of 11,040 m².
- 3.37 The existing aircraft parking apron areas will be modified to optimise the number of stands that can be provided. This will be undertaken by remarking the stands and by constructing some additional areas of pavement.
- 3.38 The South Apron, on the southern side of the STCP, will be extended slightly on both sides to be able to accommodate six Code C remote stands. This is an increase of two from the current apron. The area of extension will be approximately 5,900 m² at the western end of the apron and approximately 2,200 m² at the eastern end of the apron.
- 3.39 Additional strips of hard standing will be provided on the eastern side of the existing East Apron to allow this area accommodate eight Code C or five Code C and two Code D aircraft, all on contact stands once the new pier has been constructed. These new areas of hard standing will be approximately 8 metres by 78 metres each, providing a total additional area of hard standing of 1,135 m².

- 3.40 Areas to the north of Taxiway Echo, which are currently either underused or used exclusively for cargo and maintenance, will be brought into mixed-use for general aviation, cargo and commercial aviation, including existing general aviation operators.
- 3.41 New areas for mixed aviation use and an additional new aircraft stand will be on an area of new hard standing approximately 21,710 m² in extent. Construction of these stands will require some localised lowering of ground levels to ensure that surface gradients from Taxiway Echo are in accordance with CAA standards.
- 3.42 There will also be a small extension to the existing aircraft stand on the West Apron. This area of new hard standing will be approximately 4,125m², with 35 m² of reconstructed pavement and 175 m² of new airside road.

Car parking

- 3.43 Additional car parking is proposed within the Airport estate in the form of a new multi-storey car park structure on the part of the existing STCP. This new structure will be approximately 75 metres in width and 150 metres in length and will be a maximum of four storeys (a maximum of 14.5 metres in height). The new car park will include up to 1,500 multi-storey spaces and 1,000 surface parking spaces, which would represent a net increase of 1,441 spaces over and above the existing 1,059 spaces.
- 3.44 The construction of Taxiway Hotel will require the removal of existing spaces from the existing MTCP. The planning application will therefore also include an extension to the MTCP to replace these lost spaces and provide additional new capacity. This will represent a net increase of 212 spaces over the existing total in the MTCP. Vertical and horizontal alignment of the extension, surfacing, lighting and drainage will be directly comparable to the existing car park.
- 3.45 A Certificate of Lawfulness (Ref 09/00139/LAWP) was granted in March 2009 for a 980-parking space extension to the Airport Long Term Car Park (LTCP). This car park is situated to the north east of the terminal building adjacent to the Wigmore Valley Park and the consented extension to the LTCP is shown in figure 3.10. This extension will not be implemented, and a variation on this layout is included within this planning application, as shown on figures 1.1 and 1.2 of this ES. The minor change in the shape of the car park extension is to accommodate necessary separation from the new Taxiway Foxtrot.
- 3.46 The change in car parking resulting from the proposed development is summarised in table 3.2.

Car park location	Current provision	2028 provision	Change
Short Term Car Park	1,059	2,620	+ 1,561
Mid Term Car Park	2,301	2,513	+ 212
Long Term Car Park	3,359	4,496	+1,137
Totals	6,719	9,629	2,910

Table 3.2: Summary of changes to car parking

Changes to the operation of the Airport

Additional capacity

- 3.47 In light of increasing demand for aviation within the London system, the provision of additional facilities and capacity, together with LLAOL's ongoing commitment to improving levels of customer service, will serve to enhance passenger experience at the Airport. The airside works and operational changes will allow better use to be made of the runway. The proposed extensions to the taxiways parallel to the runway facilitate easier access to and egress from the runway. In summer 2011, a sustained capacity of 30 air traffic movements per hour and a peak capacity of 34 air transport movements per hour were declared. The new taxiways will increase the declared sustained rate of aircraft movements per hour to 36 and the peak rate to 40 per hour.
- 3.48 Projected growth in passengers and air traffic movements are set out in table 3.3. The annual number of aircraft movements would increase from the level of approximately 112,000 in 2013 to approximately 157,000 by 2028. It is estimated that within this 40% growth in total aircraft movements it will be possible to achieve a 73% increase in commercial passenger movements as LLAOL seeks to optimise the use of all aspects of the Airport's infrastructure. The percentage increase of passenger movements will be greater than the percentage increase of aircraft movements over the period due to a small and gradual increase in average aircraft size.

Year	Million passengers per annum	Air traffic movements (000's)
2013	10.3	112
2014	10.8	116
2015	11.2	118
2016	11.7	121
2017	12.1	124
2018	12.6	128
2019	12.9	130
2020	13.4	132
2021	14.3	137
2022	14.8	141
2023	15.4	144
2024	15.8	146
2025	16.6	150
2026	17.3	154
2027	17.7	156
2028	17.8	157
2029	17.8	157
2030	17.8	157
2031	17.8	157

Table 3.3: Upper end passenger and associated air traffic movement unconstrained demand forecasts for the Airport (2012)

- 3.49 The number of passengers that are predicted to be associated with this increase in capacity is up to 18 mppa, compared with the 2011 passenger throughput of 9.5 mppa.
- 3.50 The peak Airport hours are currently between 06.00 and 08.59. The current patterns of activity at the Airport are described in chapter 2 of this ES. In 2011, approximately 71% of passengers were carried on aircraft based at the Airport, whilst the remaining 29% of passengers were carried on non-based aircraft (which fly in from other airports). Between 35 and 40% of total daily passenger departures occur during this morning peak. These departures are predominantly Luton-based aircraft making their first departure of the day. A degree of shift in the balance between based and non-based aircraft between peak and off-peak activity is anticipated as the flight schedule develops, with new routes being added and frequency on existing routes being increased as demand grows.
- 3.51 This results in growth in off peak hours being slightly greater than growth in peak hours and is known as “peak spreading”. The expectation is also for a gradual shift to around 65% of aircraft based at the Airport and around 35% based elsewhere over the next 15 years.
- 3.52 The other planned improvements to the aircraft parking stands, the terminal building and the access into the Airport can all accommodate this level of aircraft, movements and resultant passenger throughput.

Jobs and the economy

- 3.53 The Airport already makes a significant contribution to the local economy. The proposed development will increase levels of direct and indirect employment associated with the operation of the Airport and the increase in passenger throughput will increase the economic value of the Airport, both to the local and regional economy and the revenue generated for local and central government.
- 3.54 A detailed assessment of economic and employment impacts has been undertaken and is included as technical appendix D to this ES. The results of the assessment are presented in chapter 9 and suggest that the development proposals would create in the order of 3,050 additional new full-time equivalent jobs. It is also predicted that the development proposals will directly generate £1.7 billion in added annual value to the local economy compared to the current value of approximately £1 billion.

Public safety zone

- 3.55 A ‘public safety zone’ (PSZ) exists around the Airport for the protection of those living, working or congregating in this area. Within this area, certain types of development may be limited or prevented. In accordance with LBC’s scoping opinion, LLAOL has commissioned National Air Traffic Services (NATS) to prepare an assessment of potential changes to the PSZ, to ensure that third party risks are managed in an acceptable manner.
- 3.56 This assessment, which is included as a report within the planning application (NATS, July 2012) has confirmed that the 10^{-4} risk contours for the 18 mppa development scenario are smaller than the current 10^{-4} risk contours and that the area of the PSZ is also within the current PSZ area.

The construction phase

Phasing of the proposed development

- 3.57 The work will be undertaken within three main phases and the principal components of each phase are set out below.
- 3.58 The first phase of work which is planned to be completed by the end of 2017 will include the new road access and remodelled CTA and STCP, extension of the long term car park, the extension to the parallel taxiway at the eastern end of the runway the extension and remodelling of the terminal building, the construction of Pier B and some infill to Pier A.
- 3.59 The second phase of work which is planned to be completed by the middle of 2019 will include the extension to the south apron and Taxiway Foxtrot.
- 3.60 The third phase of work which is planned to be completed by the middle of 2026 will include the multi-storey car park, the extension to the parallel taxiway at the western end of the runway, the stands on the northern apron, the final infill to Pier A and the first floor retail area in the terminal extension.

Areas of demolition works

- 3.61 An existing building, number 56 (shown on figure 3.9) will require demolition to allow construction of the new areas for mixed aviation use to the north of Taxiway Echo. Hangar 56 is approximately 28 metres wide by 25 metres deep and 7.85 metres tall at its apex. It is predominantly constructed on a steel frame with steel cladding. This building is currently used for airside baggage handling vehicle maintenance and this use will be re-provided as part of the proposed development. It is planned that demolition of this building will take place early in 2014, preceding the commencement of construction for this area of the north apron. The existing site layout plan (figure 2.3) shows another building adjacent to Hangar 56 (Hangar 55) on the area required for new mixed aviation uses. Hangar 55 will not require demolition as part of the development proposals as it has already been demolished as part of the recently consented RSS Enterprises Fixed Base Operations; the cumulative impacts of which are assessed later in this ES.
- 3.62 A second building, number 104 (shown on figure 3.9) will require demolition to allow construction of the new aircraft stands at the western end of Taxiway Echo. This building is approximately 37 metres in length (J-shaped), 9 metres in width and 6.2 metres in height. It is predominantly constructed from red brick with uPVC cladding and is currently used for office accommodation and training. This use will be re-provided as part of the proposed development. It is planned that demolition of this building will take place early in 2017, preceding the commencement of construction for this area of works.
- 3.63 The third building that will require demolition is number 130, shown on figure 3.9. This building is approximately 24 metres wide by 8 metres deep and 6.2 metres in height. It is predominantly constructed from red brick and is currently used for offices, storage and as a base for the Airside Operations department at the Airport. This use will be re-provided as part of the proposed development. It is planned that demolition of this building will take place in the second quarter of 2015, preceding the commencement of construction for this area of the west apron.

Key elements of construction works

Dualling of the Airport access road

- 3.64 The construction of the Airport access road will take place 'off-line' as far as possible because the new carriageway will predominantly be constructed to the south of the existing carriageway. It is planned that the construction of the proposed Airport Way improvements will be split into the following key areas of works:
- Area 1: Airport Way from north of Taxiway Alpha Underpass through to the CTA Junction
 - Area 2: Taxiway Alpha Underpass, southern portal carriageway works
 - Area 3: Access road to Emergency Gate 6
 - Area 4: Airport Way from the Holiday Inn roundabout through to the south side of Taxiway Alpha Underpass.
- 3.65 Works are expected to commence adjacent STCP, in Area 1. Service diversions along the access road leading to the easyLand building, which include communications cables, power cables and water, need to be completed before the earthworks cut in Area 1 can commence.
- 3.66 When the service diversions have been completed and the temporary access into the STCP is operational construction works will commence in Area 1. After site clearance has been undertaken the earthworks cut on the south side of Airport Way, Area 1, will be carried out.
- 3.67 On completion of the earthworks, construction of the off-line carriageway in Area 1 will be progressed. These works will include installation of drainage, pavement construction including kerbing and installation of ducts for road lighting and traffic signals.
- 3.68 It is expected that the Airport Way improvements on the south side of the Taxiway Alpha Underpass will run concurrently with the works on the north side. The first operation will be the diversion of the access road to Emergency Gate 6, Area 3. This includes the diversion of a foul water main, which currently runs along the existing access road.
- 3.69 On completion of the works to Area 3 and site clearance along Airport Way, the earthworks operations in Area 4 will commence. This will include construction of either a steepened earthworks slope with installation of soil nails or construction of a retaining wall between the underpass and the access to the MTCP. The earthworks to Area 4 will also include formation for the new carriageway between the MTCP and the Holiday Inn Roundabout and construction of the modified balancing pond / soakaway at the Holiday Inn Roundabout.
- 3.70 On completion of the earthworks, construction of the off-line carriageway in Area 4 will be progressed. These works will include installation of drainage, pavement construction including kerbing and installation of ducts for road lighting and traffic signals.
- 3.71 The programme for the new carriageway construction through the south portal of Taxiway Alpha Underpass, Area 2, will be coordinated with the construction works to Areas 1 and 4.

3.72 During the above works access along the existing Airport Way and into the MTCP will be maintained at all times.

3.73 The majority of the improvement works along Airport Way will be carried out offline (i.e. without directly affecting traffic flow), however, the carriageway tie-ins at the Holiday Inn Roundabout, MTCP Junction and the CTA Junction will require single lane running under traffic signal control. These operations and required traffic management will be coordinated to minimise the impact on the operation of the Airport (i.e. overnight/off-peak). Reference should be made to the planning application drawings for details.

Proposed improvements to the terminal building

3.74 Prior to any works taking place that may have an influence on the passenger environment; phasing and temporary routes will be agreed between contractors, the Airport and retailers. With respect to the sequencing of internal works to the terminal, where existing functions are to be relocated such as passenger screening lanes, the new accommodation will be completed prior to relocating equipment in order to ensure that the operation of the Airport is not adversely affected.

3.75 For the extension to the terminal link building, a temporary entrance will be formed to the new terminal building for departing passengers and arriving passengers will be directed through the old terminal building to ensure that they avoid areas of construction works. Hoarding will be erected around the construction areas to allow the safe removal of existing revolving doors, windows and cladding. Site surveys will be undertaken to confirm the location of services and then foundations and new underground services will be installed. The next stage of the construction process will be to install the structural steel frame and floors to the extension, followed by the walls and roof cladding. Once the envelope of the extension is complete, internal services and partitioning will be installed and the fit-out of the new retail units will take place. Once complete, passengers will be re-directed through the new Airport entrance, which will allow for the decanting of existing retail units in preparation for other internal improvements to the terminal building.

3.76 The majority of the internal proposed improvements to the terminal building will follow a number of key construction stages. Where necessary, hoarding will be erected to create a safe working environment and services will be decommissioned. If necessary, asbestos surveys will be undertaken prior to demolition or structural changes taking place. New structures (e.g. walls and ceilings) will be constructed and where fit-out and relocation of equipment (e.g. baggage reclaim) is required; this will be the final stage before commissioning the improved areas of the terminal.

3.77 All airside works will be undertaken in accordance with detailed method statements and risk assessments agreed with the CAA. The key elements are described below.

3.78 For works to the existing Pier A and Walkway A, the adjacent aircraft stands will be temporarily closed so that working areas can be accessed by the contractor. All airside vehicle movements will also be re-directed to avoid construction areas. Hoardings will be erected around the construction site and where necessary, secure weatherproof hoardings will be erected inside existing structures to provide a safe and secure environment for passengers, employees and contractors. Demolition and removal of existing structures will take place followed by foundation construction for new stairs and stair cores. Following preparation of ground and plinths walls, the cladding, curtain walling, ground and first floor slabs will be

installed. Internal finishes will be the final stage prior to opening the improved facilities to the public.

3.79 Construction of the new Pier B and its walkway will also require temporary closure of the adjacent aircraft stand. To minimise disruption to the operation of the Airport, it may be the case that some existing stands are temporarily re-marked. Following the erection of internal and external hoarding, existing sections of cladding on the terminal will be removed ready to accommodate the new walkway. Foundations for the pier will be formed, followed by formation of lift shaft walls and erection of the structural steel frame for the pier and walkway. Following preparation of ground and plinths walls, the cladding, curtain walling, ground and first floor slabs will be installed. Internal finishes will be the final stage prior to opening the improved facilities to the public.

3.80 For the construction of the Immigration Hall first floor extension, northern infill and reconfiguration of the first floor departure lounge, the key construction stages will be comparable to the other terminal works, with a steel-frame structure being erected on new foundations. Following completion of cladding and internal fit-out, works to relocate the UK Border Agency (UKBA) offices will take place, following which the existing UKBA facilities will be demolished. Hoardings will then be erected around the existing first floor retail units that will have been decanted following completion of the extension to the terminal link building and these will then be demolished to allow for extension of the first floor departures lounge.

Taxiway extensions and rationalisation of aircraft parking areas

3.81 The construction of the taxiway extensions and aircraft parking areas will commence with clearance of existing structures, pavement surfaces and vegetation in areas of works and, where necessary, realignment of the airside / landside boundary fencing. Bulk excavations will be required to allow sufficient depth of construction and where there are existing services, these will be diverted. Excavations up to 900 millimetres depth will be required for construction of the new taxiways and up to 620 millimetres depth will be required for the apron areas.

3.82 Once the site areas are prepared, the fill operations will take place including installation of pit and duct systems, drainage infrastructure, reinforced earth structures and retaining walls. Pavement construction will then follow and this will comprise a geotextile membrane, a drainage blanket approximately 150 millimetres thick comprising compacted crushed granular material, a lean concrete¹ layer approximately 150 millimetres thick and then 320 millimetres of pavement quality concrete (PQC) for the surface of rigid pavement areas.

3.83 Where flexible pavement is required, for example on the parallel taxiways the proposed construction will comprise geotextile, a drainage blanket approximately 150 millimetres thick, a lean concrete layer approximately 500 millimetres thick, a base course approximately 150 millimetres thick, and 100-millimetre thick surface course. The construction of these areas will be completed with the installation of above ground lighting and required pavement markings.

3.84 There is potential to use recycled materials from on site demolition and excavation of existing pavement. This is likely to take the form of crushed concrete and where this is identified as being possible it is planned that the contractors would use a

¹ Concrete with a low ratio of cement to aggregates

concrete crushing plant situated in the relevant site compound to generate material suitable for use as sub-base or base. This material would most likely be used in the construction of the new taxiways, the new areas for mixed aviation to north of Taxiway Echo and main apron extension works in order to minimise the time the material would need to be stockpiled.

- 3.85 There will be areas of airside construction where excavation (cut) is required to achieve required ground levels and other areas where fill is required. The balance of cut and fill has been calculated for all areas of apron and taxiway construction (excluding Taxiway Foxtrot) and it is predicted that there will be a surplus of material of approximately 34,240 m³ that would require off-site disposal.

The construction of Taxiway Foxtrot

- 3.86 The construction of Taxiway Foxtrot will require a specific approach because of the interaction of parts of the construction works with an area of former landfill. Pavement construction over the landfill area will comprise a geotextile membrane, a 300-millimetre thick lower sub-base and 150 mm thick upper sub base (comprising Type 1 material²), a lean concrete layer approximately 175 millimetres thick, a high-density polyethylene (HDPE) barrier membrane and then 325 millimetres of pavement quality concrete (PQC) for the surface of rigid pavement areas.
- 3.87 It has been calculated that approximately 25,600 m³ of extracted material from the construction of Taxiway Foxtrot would require off-site disposal. Further information on the assessment of ground conditions associated with the construction of Taxiway Foxtrot are provided within chapter 10 of this ES.

Proposed strategic drainage works

- 3.88 The existing means of site drainage is via a network of drains and piped drainage and the majority of the surface water drainage on the site is managed by six soakaways within the Airport boundary. The CTA, part of the south stands and the western areas of the Airport site drain to a surface water sewer along Airport Way. Surface water from new areas of impermeable surfaces within the Airport will continue to follow the same pattern and means of drainage as the current site.
- 3.89 The dualling of Airport Way will result in an increase in the total area of hardstanding draining westwards to the Thames Water sewer. A small section of the road at its western extent drains to the East Luton Corridor scheme. The amount of hardstanding draining to this area will be reduced. It is proposed that attenuation storage in the form of oversized pipes will be provided to limit the runoff from the part of the development draining to the Airport Way outfall.
- 3.90 The surface water runoff from the proposed terminal building extensions will discharge via building rainwater drainage systems into proposed carrier drains (where required) before discharging into existing stormwater systems. It is proposed that offline (i.e. adjacent to pipes rather than in line with the pipe network) attenuation storage will be provided to reduce runoff rates from the terminal building extensions. Runoff rates will be limited to a low greenfield runoff rate in the order of 1 to 3 l/s/ha (as a minimum) for events up to the 1-in-100 year storm event, with a 20% allowance for climate change. Underground storage tanks (or stormcells) will be provided offline within the roundabout to the south of the terminal building.

² A granular material with a maximum permitted top size of 63mm, graded down to dust

- 3.91 The proposed drainage systems for the taxiways will incorporate lined combined filter drains (overlaid with permeable macadam) on either side of the taxiway pavement edge. The drains for Taxiways Foxtrot and Golf will discharge into the existing stormwater system, which ultimately discharges into the Central Soakaway. The drains for Taxiway Hotel will discharge into two separate existing stormwater systems, which ultimately discharge into the Runway West Outfall and the Airport Way Outfall. It is proposed that offline attenuation storage will be employed to reduce runoff rates from the taxiway extensions. Runoff rates will be limited to a low greenfield runoff rate in the order of 1 to 3 l/s/ha for events up to the 1-in-100 year storm event, with an allowance for climate change (20%). Underground storage tanks (or oversized pipes) will be provided adjacent to the taxiway extensions, outside the cleared and graded area.
- 3.92 The proposed drainage systems for the aircraft stands/apron extensions will incorporate hexagonal 'Gatic-type' slot drains at appropriate locations on the aircraft-bearing hard standing areas. Where required, lined combined filter drains will be provided at the edge of the hard standing areas to collect any runoff from areas not drained by the slot drains. The runoff will discharge into the existing stormwater systems and ultimately into existing soakaways / surface water sewers. It is proposed that both offline and inline attenuation storage (as appropriate) will be employed to reduce runoff rates. Runoff rates will be limited to a low greenfield runoff rate in the order of 1 to 3 l/s/ha for events up to the 1-in-100 year storm event, with an allowance for climate change. Underground storage tanks (or oversized pipes) will be provided adjacent to the proposed aircraft stands/apron extensions. Where new areas of infrastructure are not part of the first-flush system, interceptors will be incorporated into the new drainage infrastructure.
- 3.93 Details of the proposed drainage strategy are provided in technical appendix J.

Proposed foul drainage works

- 3.94 The terminal building's existing sanitary plumbing discharges into two systems, one to the south of the terminal that drains by gravity and one to the north of the terminal that discharges to a pumping station. Four foul water drainage areas have been identified for the purposes of the foul water drainage strategy:
- Area 1: Old and new terminal building north and link building A
 - Area 2: Old terminal building south and walkway A south
 - Area 3: New terminal building south and link building A extension
 - Area 4: Pier B.
- 3.95 Area 1 will discharge to the existing foul water pumping station, while areas 2, 3 and 4 will discharge to the external foul water drainage system via gravity. It is considered that the existing foul water pumping station will not have sufficient storage capacity to handle the increased flow rate from area 1. A larger pumping station is therefore proposed. The existing foul water drainage adjacent to area 4 is deemed to be for contaminated surface water from the first flush of surface water interceptors. Rather than discharging foul water from area 4 into this system, a new drain will be provided under the STCP to connect to the existing foul water drainage system to the south of area 4.
- 3.96 A survey of the existing external foul water drainage system will be undertaken and the local water authority will be contacted to establish whether the additional flows

can be accepted in the existing public sewer. Further details of the proposed foul water drainage strategy are provided in technical appendix J.

Other utilities works

- 3.97 The construction of new hardstanding on the eastern end of the West Apron and the new areas for mixed aviation use to the north of Taxiway Echo will necessitate the relocation of two electricity substations.

Known cumulative development within the Airport boundary

Extension to the long-stay car park

- 3.98 The consented extension to the LTCP is shown in figure 3.10. As discussed above, this will not be implemented in the form shown on figure 3.10 but this has been included as current context.

Signature Fixed Base Operation

- 3.99 Signature currently operates its Fixed Base Operation (FBO) from a location on the western side of the Airport, adjacent to Percival Way and between Taxiway Alpha and the fuel depot (see figure 3.10). The existing FBO comprises two hangars (numbers 63 and 102), which are approximately 12 metres in height, and an FBO building, approximately 5.5 metres in height, with integrated passenger facilities and car parking. There is an existing area of apron adjacent to the hangars, which is used for aircraft stands and provides access onto Taxiway Alpha.
- 3.100 A planning application was submitted by Signature for a new FBO in May 2012. The FBO will comprise a new two-storey building on the existing site, which will be approximately 15 metres in height along with associated external car parking, circulation and apronage for aircraft parking. The FBO building will include a new reduced-size facility for Ground Service Equipment (GSE) with a screened external compound and new forecourt facility with canopy to cover a VIP parking area and walkway to the main entrance to the FBO. The existing hangars and FBO building will require demolition along with an existing support building that is attached to one of the existing hangars.
- 3.101 The new facilities adjacent to the Cargo Centre will comprise a hangar of approximately 4,800m² with an overall height of approximately 23 metres (replacing the hangars on the existing site), a relocated open-air Cargo Compound Facility (hard standing) on the southern side of the hangar and relocation of the existing Gate 9 Security Exit. The current use of this part of the Airport is as hard standing (apronage) for aircraft parking in conjunction with the Cargo Centre. Only limited demolition is therefore required, including a section of 4-metre high fencing, a disused veterinary centre, an earthwork berm, removal of portacabins and relocation of below ground services.
- 3.102 The proposed Signature development will not increase the intensity of flight operations or aircraft movements but rather is intended to provide improved facilities for clients, passengers and aircraft. The improved facilities will be provided at two locations on the Airport: a new FBO on the existing site and a new hangar structure adjacent to the Cargo Centre on the north-eastern side of the Airport. Planning

permission was granted for the Signature FBO in August 2012 and the location of the proposed development areas is shown in figure 3.10.

RSS Enterprises Fixed Base Operation

- 3.103 Planning permission was granted in March 2012 for a change of use at the existing RSS Enterprises (formerly Ocean Sky) FBO, which is situated on the northern side of Taxiway Echo, and this development is now in progress.
- 3.104 The RSS Enterprises development proposal has been granted planning permission for a change of use of the ground floor of Britannia House (Building 135), which is situated to the north of Taxiway Echo, to private FBO, internal and external alterations and additions, revised access, car parking and landscaping arrangements and associated ancillary works. The new FBO will provide floor space no greater than the existing, being less than 500m², and will operate under the same conditions as the existing facility.
- 3.105 The alterations proposed will simply enclose the ground floor of the building with the provision of an extended reception and lounge area to the south west elevation. The enclosure of the existing external space within the ground floor will provide facilities for a comprehensive client service; reception, meeting room and arrivals and departure areas including VIP lounge. The operation also houses crew lounges and operations rooms together with ancillary support facilities.
- 3.106 No changes are proposed to the first and second floor accommodation, which will remain in use as offices for RSS Enterprises.
- 3.107 Externally, on the southern side of Frank Lester Way, the proposals include the demolition of office building 72 to facilitate the provision of 25 car parking (to replace those lost as a result of the enclosure of the ground floor of Britannia House).
- 3.108 Existing hard standing to the west of Britannia House and south of buildings 72 and 104 will be replaced with an improved area of concrete hard standing, to be used as private jet apron. This area will be linked to the FBO and the east apron by a new asphalt road, with security gates. Passengers will be transferred from the aircraft to the FBO via this road. New security fencing will be provided between airside operations and landside operations.
- 3.109 To the east of Britannia House, Building 55 will be demolished. The existing apron will be resurfaced with a new concrete surface and extended to include the majority of plot 55, providing an improved apron available for the parking of private aircraft and Code C commercial aircraft. Security fencing will be provided between airside and landside operations.

Significant known committed development in the vicinity of the Airport

- 3.110 In April 1996, LBC resolved to grant outline planning permission (subject to completion of a section 106 agreement) for the development of business / industrial / warehousing and ancillary uses on land at Wigmore Employment Area (Century Park) (ref: L/19596/B/O).

- 3.111 A separate section 73 application (ref: 99/01083/FUL) was submitted on 21 October 1999 to vary conditions attached to the consent in order to extend the timescale for the submission of reserved matters and subsequent implementation. LBC's planning committee resolved to grant consent for that application on 22 December 1999, again subject to the completion of a section 106 agreement.
- 3.112 The application was later reported back to the planning committee on 21 October 2009, alongside an ES, which was submitted to LBC in February 2009 (an ES was not required as part of the original planning application). The ES was submitted to consider the environmental impacts of application 99/01083/FUL and was given the application reference 09/00197/OUTEIA. The committee reaffirmed its approval of its decision in 1999 regarding application 99/01083/FUL and also agreed the ES, subject again to the satisfactory completion of a s106 agreement with the following Heads of Terms:
- Developer contribution towards improvement to the highway infrastructure
 - Improvements to the public right of way network in the locality
 - Contributions to infrastructure provision in accordance with LBC's supplementary planning document 'Planning Obligations' (September 2007)
- 3.113 The applications were subsequently approved on 7 July 2010, following completion of the section 106.

Proposed access to Century Park

- 3.114 The officer report to committee (October 2009) states that the indicative plan submitted in support of the 1999 outline application shows two potential access roads to the land; the 'Southern' Access Road across (and beneath) LLA and the 'Northern' Access Road (surface only) running from Frank Lester Way along President Way, through the Cargo Centre and then along the western and southern edges of Wigmore Valley Park.
- 3.115 The report also states that the access routes are the subject of separate applications and that the application before the committee relates only to the development of the land within Wigmore Employment Area, not the two options for vehicular access. It states at paragraph 75 that *"the applicants have previously sought and been granted, a separate permission for an access across the airport, this is subject to a separate s106."*
- 3.116 The submitted ES, however, refers to the principal design and development considerations, including "to ensure no vehicular access to Eaton Green Road for either construction or operational purposes (except for buses, pedestrians, cyclists and in emergencies)" and *"to provide primary access via Airport Way served by the upgraded East Luton Corridor and then via a tunnel-based solution across the Airport following the principles established by the Local Plan."* It is on this basis that the EIA has been undertaken.
- 3.117 Paragraph 81 of the officer report concludes on the issue of access that:

"The access to the site still has to be formally agreed and will be the subject of further s106 agreements, involving the Airport Operator as well as LBC. This application does not give agreement to any routes of access to the site."

- 3.118 Therefore, while there is an extant planning consent for the development of Century Park, the principal issue of achieving a vehicular access to the site requires approval by LBC before any development can take place. Should a final decision be taken to progress an option other than that set out within the 2009 ES (a tunnelled link under the Airport), it is likely that a revised EIA would be undertaken. The feasibility of accommodating access to Century Park has been examined and a corridor has been safeguarded as part of the LLAOL development proposals (shown on figure 1.1).

Ch 4

Environmental Statement
Chapter 4 Alternatives considered



Chapter 4: Alternatives considered

Background

- 4.1 Schedule 4 of the Town and Country Planning (Environmental Impact Assessment) Regulations 2011 requires that an ES should contain an *“outline of the main alternatives studied by the applicant and an indication of the main reasons for his choice, taking into account the environmental effects.”*
- 4.2 Consideration of alternatives within EIA commonly focuses on three principal forms of alternative:
- Alternative sites
 - Alternative development forms
 - Alternative processes.
- 4.3 The Airport has been established in its current location as a passenger airport since 1938. The nature of the proposed development is improvement of the existing facilities and experience for passengers and for this reason, no specific alternative sites assessment has been undertaken in relation to this EIA.
- 4.4 The nature of the development is such that there are no specific processes (eg manufacturing processes) or substantially different construction techniques to consider alternatives for. The alternatives that have therefore been considered in the preparation of the masterplan and the ES are associated with the form of the proposed development.
- 4.5 The masterplan for the site has evolved over a period of time and has been informed by the site context, Civil Aviation Authority (CAA) design requirements, operational requirements within and adjacent to the site and a range of infrastructure constraints on and adjacent to the site. Alternatives between iterations of the masterplan have been relatively subtle, because of the influence of existing built infrastructure such as the terminal, runway and taxiways / apron areas.
- 4.6 Consideration of alternative design options focused on the terminal building, the layout of taxiways and areas of apron, and the landside area adjacent to the terminal buildings.
- 4.7 There have been four main alternatives considered for the layout of specific areas of the terminal. These alternatives focused on ways to optimise the provision and internal layout of key sub-systems within the terminal (e.g. check-in, security, passenger facilities) in order to improve both operational efficiency and passenger experience.
- 4.8 The physical change between each option affects how the sub-systems perform both individually and together, which in turn influences the overall operational efficiency of the terminal and the experience of passengers. However, the difference in environment impact between each option is considered to be negligible. The options are described in the section below.

- 4.9 There have been two main alternative layouts for taxiways and aprons, the first was based on a previous proposal to facilitate a capacity of 16 mppa and the second is the proposed layout to facilitate a capacity of 18 mppa. Both options and their respective environmental effects are described later in this chapter.
- 4.10 There have been two main iterations of the layout of landside facilities adjacent to the terminal buildings, one included in the published masterplan document in March 2012 and the second in the updated masterplan, which was published in September 2012.

Terminal layout options considered

Background to the design of the terminal / design iterations

- 4.11 The design of the terminal is a result of various concept development plans, which looked at different iterations of key sub-systems and how they would interact with the existing structure. Many of the terminal elements such as the piers and link walkways are based on a 'form follows function' philosophy and their placement on the site and size are dictated by the constraints of the location of existing aircraft parking stands, taxiways and other airport infrastructure.
- 4.12 Changes in the Airport's security requirements since 2006 and in airline operational procedures, such as increased online check-in, have refocused the Airport's main operational constraint from the check-in area to passenger screening areas. With this in mind, the initial concept plans for the terminal concentrated on the design of the passenger screening facility with a view to providing a greater number of processing lanes and improving the overall passenger experience.
- 4.13 A number of options have been developed and considered by LLAOL. Small changes in layout can have a significant impact on the operational performance of the Airport. Therefore, while the physical change between each option can appear quite subtle, benefits associated with each respective option can be significant. The majority of these options do not have any significant environmental advantages or disadvantages but the alternatives that have been considered for the terminal layout are described below, noting their perceived advantages and disadvantages.

Terminal option 1

- 4.14 The initial concept, shown on figure 4.1a, was based on using the existing central terminal footprint. Design options from previous projects had highlighted the limitations of extending the passenger screening facility on the first floor of the terminal and it soon became apparent that it should be relocated to the ground floor, which could provide a more flexible space.
- 4.15 Option 1 attempted to fit the passenger screening facility by straddling Link Building A, the New Terminal Building and the Old Terminal Building while maintaining large areas of the existing landside retail units. A combined entrance and exit lobby was located on the southern wall of the New Terminal Building.

Advantages:

- This option would not require major changes to the CTA and would help to reduce potential construction impacts and materials use
- Some additional screening lanes would be accommodated on the northern side of the New Terminal Building, which would result in an operational benefit
- The Old Terminal Building would be used for additional arrivals facilities. Similarly this is predominantly an operational benefit

Disadvantages:

- Double sided passenger screening between the arrivals and departure areas is not ideal from an operational perspective because it could cause possible crossover of departing and arriving passengers

Terminal option 2

- 4.16 As an alternative to option 1 the passenger screening facility was located within the existing Old Terminal Building, which provided a clear space with large spans and would allow a much simpler phasing of the works, as shown on figure 4.1b.

Advantages:

- This option would also not require major changes to the Central Terminal Area (CTA) and would help to reduce potential construction impacts and materials use
- Passenger screening could be formed without major disruption to existing terminal operations

Disadvantages:

- Major crossover issues of departing and arriving passengers
- No additional arrivals baggage reclaim opportunities available
- Poor passenger experience due to elongated travel distances.

Terminal option 3

- 4.17 Following the results of options 1 and 2, a decision was made to review the possibility of infilling the space between the Old Terminal Building and the New Terminal Building to form a more flexible space within which the sub-systems could be located. The resultant option 3 is shown as figure 4.1c.

Advantages:

- Creates a more flexible terminal footprint
- Passenger screening can be located close to associated sub-systems such as check-in
- The Old Terminal Building can be used for arrivals only
- Minimised crossover of departing and arriving passengers.

Disadvantages:

- This option would require major changes to the CTA, with the associated construction impacts and materials use
- Greater disruption to passengers during the construction phase as opposed to Option 2
- Greater capital expenditure.

Terminal option 4

- 4.18 This layout was an evolution of option 3 and became the base plan for the current planning design (see figure 4.1d). The arrivals layout was amended to accommodate additional baggage reclaim belts.

Advantages:

- As option 3 plus -
- Additional baggage reclaim units available with a more streamlined arrivals process to maximise the passenger experience

Disadvantages:

- As option 3.

- 4.19 Whilst options 3 and 4 require substantial changes to the CTA these are considered as part of wider positive changes to the CTA, including re-design of the public transport area and pedestrian areas adjacent to the terminal, which are discussed later in this chapter.

Layout of taxiways and apron areas

- 4.20 There have been two main alternatives considered for the layout of taxiways and apron areas.

16 mppa taxiway and apron layout

- 4.21 The first, shown as figure 4.2 was based on providing capacity of up to 16 mppa. This layout included new parallel taxiways at either end of the runway and additional areas of apron to the north, east and south of the terminal building. The total additional area of new hard surfacing was approximately 60,000 m².
- 4.22 In addition to the materials required to construct the new sections of hard surfacing (e.g. aggregates, lean concrete, pavement quality concrete and geotextile) and the associated transport effects, the construction of the additional areas of hard surfacing would result in an increase in surface water runoff, with the associated requirement for management to prevent on-site flooding.
- 4.23 There were no significant ecological habitats or species that would have been directly affected by the construction of the areas of new hard surfacing but the potential for disturbance of breeding skylark was identified for the construction of

the new parallel taxiways. This would have required mitigation in the timing of construction works.

- 4.24 Whilst baseline assessment suggest it was unlikely that there would have been any significant adverse effects associated with archaeology or ground conditions associated with the excavations required for the new areas of hard surfacing there was potential for hitherto unknown archaeology and areas of contamination to be encountered during construction.

18 mppa taxiway and apron layout

- 4.25 The proposed layout for 18 mppa and the planning application is shown on figure 4.3 and the principal difference between the proposed layout for taxiways and apron areas between the 16 mppa and 18 mppa is the addition of the new Taxiway Foxtrot, to the east of Taxiway Delta. The new taxiway will work in conjunction with the new parallel taxiways to increase flexibility and efficiency of aircraft movement to and from the runway. The construction of the new taxiway will also facilitate construction of a future Century Park access road as aircraft will be able to divert aircraft from Taxiway Delta to Taxiway Foxtrot during the construction phase of the road.
- 4.26 The proposed area of aircraft parking on the South Apron is also larger than for the 16 mppa layout and the total area of new hard surfacing for the 18 mppa proposals is approximately 8,100 m² (an increase of 3,950 m² over the 16 mppa layout).
- 4.27 The construction of Taxiway Foxtrot will be on an area of former landfill and hence presents the potential to encounter waste materials and contamination during excavations. Specific site investigation has been undertaken on the area of the landfill potentially affected (reported in chapter 10 of this ES) and this has shown that there is potential for much of the waste material from the construction of Taxiway Foxtrot to be processed on site and re-used within the construction works. Remaining wastes that cannot be re-used on site will be transported off site for appropriate disposal.
- 4.28 The additional area of hard surfacing associated with the 18 mppa development layout will require proportionally more attenuation with respect to surface water flooding but the construction of the taxiway on the former landfill site will ensure that there is no potential for adverse effects to archaeology from this infrastructure.

Layout of the landside area adjacent to the terminal buildings and short term car park

- 4.29 The layout of the landside area adjacent to the terminal buildings is a key element of the development proposals as this part of the CTA includes the PTH, DOZ, delivery bays and STCP.
- 4.30 Improvements to this area of the site are required in order to provide an improved passenger environment and to improve facilities in order to manage the proposed increase in passenger throughput. Changes are also required as a result of the proposed infill between the Old and New Terminal Buildings, because this will occupy land currently used by public transport.

- 4.31 A key principle of the design process for this area of the site was to reduce congestion during busy periods, which was principally associated with the need for all traffic approaching the CTA to utilise the existing roundabout.

Option 1

- 4.32 The first main alternative layout is shown on figure 4.4a and enabled the existing CTA roundabout to be avoided by any vehicles accessing the DOZ and STCP. This option developed the principle of a circular route around the STCP so that the main flow of traffic approaching the CTA would be able to flow more freely without any significant junctions between the Taxiway Alpha underpass and the car park.
- 4.33 All vehicles using the STCP and DOZ would enter the car park on its southern side and would exit on the north western side of the car park directly on to the new section of westbound dual carriageway on Airport Way. In a second phase, the circular access road around the STCP would be extended to increase the capacity of the car park in future years. Provision had been retained within this layout for a future road link to the Century Park development to the east of the Airport.
- 4.34 Traffic needing to access further into the CTA including buses, taxis, delivery vehicles, emergency vehicles and operational Airport traffic would be able to leave Airport Way via a new dedicated slip road before the STCP and the public transport area would be reconfigured to run approximately west to east. Vehicles leaving the CTA would re-join the circular route around the STCP before connecting with Airport Way in a westerly direction.
- 4.35 The proposed layout would reduce congestion approaching the CTA, which will reduce travel times and reduce emissions associated with queuing vehicles. The improved flow along Airport Way will improve access for buses and this may result in increased patronage.

Option 2

- 4.36 The developed layout shown in figure 4.4b is the same as the version described in chapter 3 of this ES, and included within the planning application. This option adopts the principles of the circular route around the STCP and limited access for public vehicles into the main CTA established in Option 1. The DOZ has however been segregated from the STCP to enable drop off closer to the terminals and reduce potential interaction between vehicles and pedestrians.
- 4.37 The STCP has been designed to allow a phased expansion in capacity, with an increase in surface car parking initially being followed by construction of the multi-storey car park on the western side as passenger capacity increases.
- 4.38 The public transport area has been re-designed and includes 18 dedicated bus bays that passengers will be able to access directly from the Airport concourse without the need to cross any areas of highway. An overbridge has also been incorporated between the STCP and the Airport concourse to allow passengers to move between these areas in safety.

- 4.39 The environmental benefits associated with the Option 2 layout are as for Option 1 and provision has been retained for future road connection to the Century Park development to the east of the Airport.

Ch 5

Environmental Statement

Chapter 5 Environmental issues and methodology



Chapter 5: Environmental issues and methodology

Introduction

- 5.1 This chapter explains the identification of the environmental issues considered within this ES and outlines the overall approach taken to the EIA. Specific methodologies for each of the specialist studies are given in the relevant topic chapters.

The scope of the EIA

- 5.2 Scoping is the identification of the range of significant issues likely to arise as a result of the proposed development. Scoping also ensures that important issues are addressed in detail, whilst those of lesser relevance are considered accordingly. This exercise allows effort to be concentrated on potentially significant effects and avoids unnecessarily complicated examination of minor ones.
- 5.3 TOR undertook a scoping exercise and produced an EIA scoping report in July and August 2012. This document, which was submitted to LBC on 21 August 2012, provided a summary of the proposals, identified the likely significant environmental effects to be addressed within the EIA and scoped out issues that did not require consideration.
- 5.4 The following factors influenced the breadth of the scoping exercise, and so the EIA:
- The scale and nature of the project
 - The physical characteristics of the proposals
 - Site characteristics
 - Neighbouring land uses
 - Environmental designations.
- 5.5 Copies of the EIA scoping report accompanied the request for an EIA scoping opinion made to LBC. A number of statutory bodies and non-statutory organisations were also consulted (table 5.1).

LBC – Natural and Built Environment Team	Hertfordshire County Council
LBC – Highway Engineering	Central Bedfordshire Council
LBC – Environmental Protection	Stevenage Borough Council
LBC – Sustainable Environment Team	Dacorum Borough Council
Natural England	St Albans and City District Council
Environment Agency	North Hertfordshire District Council
Highways Agency	Chilterns Conservation Board
LADACAN	Friends of the Earth
English Heritage	Woodland Trust
National Planning Casework Unit	The Wildlife Trust
Table 5.1: Scoping consultees	

- 5.6 A copy of the EIA scoping report (including details of the scoping methodology) and the responses from consultees can be found in technical appendix A.

Potentially significant issues identified during scoping

- 5.7 A summary of key issues raised is provided in table 5.2 and these are set out in full in technical appendix A.

Topic	Key issues identified in scoping report
Air quality and climate	<ul style="list-style-type: none"> • Aircraft emissions during take off and landing • Aircraft emissions on the ground • Particulates and dust generation during construction • Road vehicle emissions during operation (staff and visitors) • Contribution of the proposed development to climate impacts
Community, economic and social effects	<ul style="list-style-type: none"> • Impact on the local economy • Impact on employment opportunities during construction • Impact on employment opportunities during operation • Impact of aircraft movements on local environmental amenity
Cultural heritage	<ul style="list-style-type: none"> • Impact on archaeology at the Airport • Impact on the setting of listed buildings and designed landscapes / registered parks • Impact on the setting of conservation areas • Impact on the setting of scheduled monuments
Ground conditions	<ul style="list-style-type: none"> • Potential for health effects due to contact with contaminants during and post-construction • Mobilisation of contaminants during construction • Potential to cause contamination during operation
Landscape and visual impact	<ul style="list-style-type: none"> • Changes in land cover • Changes in the local landscape character • Changes in local landscape and townscape quality • Changes to sensitive views into the site
Natural heritage	<ul style="list-style-type: none"> • Loss of habitats associated with the new infrastructure • Disturbance to protected species during construction • Disturbance to birds during construction • Indirect effect on local wildlife sites during construction
Noise and vibration	<ul style="list-style-type: none"> • Increase in noise from construction activities • Increase in noise and vibration from aircraft in the air • Increase in noise from ground activity • Increase in noise from road traffic
Traffic and transport	<ul style="list-style-type: none"> • Impact on highway and junction capacity during construction • Impact on highway and junction capacity during operation • Changes in the total and daily pattern of travel to and from the Airport for all modes of transport
Water environment	<ul style="list-style-type: none"> • Impact on surface water hydrology • Potential increase in flood risk • Impact on surface water and groundwater quality

Table 5.2: Potentially significant issues identified during scoping

- 5.8 LLAOL has commissioned an assessment of third party risks associated with proposed growth of the airport, including any associated potential changes to the public safety zone (PSZ), and this is included within the community and economic chapter of this ES. The findings of a health impact assessment (HIA) are also

reported within the community and economic chapter of this ES, with the full HIA report included within technical appendix D.

- 5.9 Two environmental aspects have not been included within the scope of the EIA (land use and waste) because no significant environmental effects were envisaged based on the proposed scale, nature and location of development at the Airport, and the nature of the changed operations at the Airport compared with known baseline conditions.
- 5.10 Potential direct effects on land use were not included within the scope of the EIA on the basis that the range of operational activity will be compatible with the existing operation of the Airport. In addition, the improvement of facilities at the Airport has already been deemed acceptable in principle in land uses terms, through the process undertaken by LBC to adopt the Luton Airport Development Brief as Supplementary Planning Guidance (SPG) in September 2001. Where there are indirect effects on land use associated with economic impacts of the proposed development, these will be addressed within the community, economics and social chapter of the ES.
- 5.11 Waste is currently managed by the Airport and it is intended that the proposed development will manage additional operational waste in accordance with the ongoing waste strategy. On this basis, no significant impacts associated with waste management are envisaged. Whilst waste will not be specifically assessed within the EIA, a Site Waste Management Plan (SWMP) will be submitted as part of the planning application.
- 5.12 Sustainability issues and opportunities, such as water use and energy efficiency, are examined in the Sustainability Statement submitted in support of the planning application.

Cumulative effects

- 5.13 Potential for cumulative effects has been considered within this ES in relation to three major developments agreed with LBC. These developments are:
- The mixed use development at Century Park, to the east of the Airport
 - The proposed improvements to Junction 10a of the M1, located to the west of the Airport
 - The proposed Sundon Rail Freight Depot, located to the north west of Luton, adjacent to Junction 11a of the M1.
- 5.14 A specific section has been provided within relevant ES issue chapters assessing the potential for significant cumulative effects between the proposed Airport development and these other local developments. Assessment of cumulative impacts is limited by the extent of information that is available on third-party development projects.

Assessment methodology

- 5.15 In the context of an EIA, an environmental effect is considered to be an alteration (positive or negative) to some aspect of the environment that occurs as a result of a

development. It is essential that the EIA methodology is comprehensive and focused. It must predict and measure the degree of impact and identify mitigation requirements. The method used should be objective, consistent and adaptable, and as free from analytical bias as possible.

- 5.16 It is important that the assessment methodology distinguishes between the sensitivity of potential receptors and the type and size of change that will affect them, either directly or indirectly. It is also important that the ES is clear and effective in communicating the results of the assessment to the determining planning authority, the general public and professionals involved with appraising the development proposals.

Guidance and best practice

- 5.17 The methodologies used for the assessment of specific issues are discussed in the relevant chapters of this ES. Where appropriate, use has been made of published guidance and information on best practice, including the Department of the Environment, Transport and the Regions' *Environmental Impact Assessment: a guide to procedures* (DETR, 2000) and Circular 02/99. The guidance has been considered in conjunction with the EIA Regulations.

Determining the significance of effects

- 5.18 The evaluation of effect significance is fundamental to the EIA process. The degree of an effect determines the resources that should be deployed in avoiding or mitigating an adverse effect, and identifies the actual value of a positive effect.
- 5.19 The degree of an effect is determined within this ES by the interaction of two factors: the magnitude, scale or severity of the effect or change, and the value, importance or sensitivity of the environmental resource being affected. This is then used to determine whether an effect is significant in the context of the EIA Regulations.
- 5.20 As far as possible, standard words have been used to define degrees of effect (i.e. 'very substantial', 'substantial', 'moderate', 'slight' and 'negligible'), but not so rigorously as to stifle flexibility or particular individual requirements. If the degree of effect is 'moderate' or above then the effect is considered to be significant. Slight or negligible effects are not considered to be significant.
- 5.21 Sensitivity and magnitude categories have been developed for the majority of the environmental topics, based on a combination of best practice guidance and expert judgement. These are provided in the specialist topic chapters. Any assumptions made during the assessment process have been reported in the text. Figure 5.1 shows the general matrix used to determine the degree of each identified effect, and thus whether it is significant. This matrix has been developed by TOR and is used in the assessment of the various environmental impacts to enable meaningful comparisons to be made.
- 5.22 The assessment of the potential effects also takes account of timescale, permanence and whether the effects are adverse or beneficial, as appropriate (for example, 'a long term but reversible, substantial, significant adverse effect').

- 5.23 The EIA has assessed the likely environmental effects of the Airport, following the proposed changes, rather than only the changes themselves in isolation.

Identification of mitigation measures and residual effects

- 5.24 Where appropriate, the results of the assessment of significance have helped to guide the mitigation measures proposed. At the end of each of the environmental assessment chapters, where relevant, there is a 'residual effects' table, which summarises the significant beneficial and adverse environmental effects remaining after mitigation. This includes a measure of the confidence placed in the prediction of each potential residual effect, such as 'absolute', 'reasonable' or 'limited' and distinguishes between certain and circumstantial effects.

General format of the environmental issue chapters

- 5.25 The remaining chapters in this ES address each of the environmental issues identified as 'potentially significant' during the scoping process. Each chapter is generally structured as follows:
- Introduction
 - Legislation and policy
 - Methodology
 - Baseline
 - Potential effects
 - Mitigation measures
 - Cumulative effects
 - Residual effects.
- 5.26 Where there is additional and/or supporting information that is deemed too specialist or detailed for the ES, it can be found in the various technical appendices, a list of which is given in chapter 1 of this ES.

Ch 6

Environmental Statement
Chapter 6 Air quality



Chapter 6: Air quality and climate

Introduction

- 6.1 This chapter describes the likely significant air quality and climate change effects associated with the proposed development at the Airport. It considers effects during both the construction and operational phases. The assessment has been carried out by Air Quality Consultants Ltd (AQC) on behalf of LLAOL.
- 6.2 A detailed description of the proposed development is provided in chapter 3 of this ES. In terms of this air quality assessment, the most pertinent features of the proposals are:
- Dualling of the Airport Approach Road, from the Holiday Inn Roundabout to the Central Terminal Area
 - Improvements to the terminal building involving a new pier, internal reorganisation, and minor extensions
 - Taxiway extensions and rationalisation of aircraft parking areas with new stands, and improvements to existing stands
 - Provision of additional passenger and staff car-parking facilities, including the erection of a new multi-storey car park.
- 6.3 The development proposals will seek to increase passenger throughput from the current level (approximately 9.5 mppa) to approximately 18 mppa by 2028. These proposals will increase the number of aircraft movements and the volume of Airport-related traffic on the local road network. This assessment provides information on existing air quality conditions in the vicinity of the Airport, and the predicted future air quality, with and without the proposed development. The report has been prepared taking into account all relevant local and national guidance and regulations, and follows a methodology agreed with LBC.

Scope of study

- 6.4 The scope of the study was agreed in consultation with Luton Borough Council. The assessment focuses on two pollutants with respect to potential human health effects, namely nitrogen dioxide and fine particles (both PM₁₀ and PM_{2.5}), as these are the pollutants of greatest concern. Consideration is also given to the potential effects of odour nuisance, and climate change effects associated with emissions of carbon dioxide (CO₂). Emissions of dust arising during the construction works are dealt with separately within this assessment.
- 6.5 There are unlikely to be any significant effects arising from emissions of benzene, 1,3-butadiene, carbon monoxide, lead or sulphur dioxide. It is widely acknowledged that problems with these pollutants are only likely to occur in the vicinity of specific industrial processes, and exceedences of the health-based standards do not occur even in the vicinity of major airports such as Heathrow (Department for Transport, 2006). They have therefore been scoped out of the assessment.

- 6.6 In addition to public health, there is also a need to protect the natural environment (sensitive ecosystems) from the adverse impacts of acidification and the deposition of pollutants. However, there are no sensitive ecosystems with special designations under EC Directives, e.g. Special Protection Areas (SPAs); Special Areas of Conservation (SACs); Sites of Community Importance (SCIs), or candidate Special Area of Conservation (cSACs) within 10 kilometres of the Airport boundary, or nationally designated Sites of Special Scientific Interest (SSSIs) within 2 kilometres of the Airport boundary, and any operational effects on sensitive vegetation have been scoped out. Table 6.1 sets out the references and data sources used in preparing this assessment.

ACI (2011) Airport Carbon Accreditation: Documentation and Guidance
BRE (2003) Controlling particles, vapour and noise pollution from construction sites. BRE Bookshop, London.
Carslaw, D., Beevers, S., Westmoreland, E. and Williams M (2011) Trends in NOx and NO2 emissions and ambient measurements in the UK. Available at: uk-air.defra.gov.uk/reports/cat05/1108251149_110718_AQ0724_Final_report.pdf
CLG (2012) National Planning Policy Framework
DECC (2008) Climate Change Act 2008.
DECC (2011) UK Climate Change Sustainable Development Indicator: 2009 Greenhouse Gas Emissions, Final Figures, February 2011.
Department for Transport (2006). Project for the Sustainable Development of Heathrow. Final Report
Defra (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, June 2007.
Defra (2009) Local Air Quality Management Technical Guidance 2009.
Defra (2012) Defra Air Quality Information Website: http://www.defra.gov.uk/environment/quality/air/air-quality/
Defra (2011) Guidelines to Defra/DECC GHG Conversion Factors for Company Reporting
Environment Agency (2011) H4 Odour Management
EPUK (2010) Development Control: Planning for Air Quality, 2010 Update
European Union (2008). Ambient Air Quality and Cleaner Air for Europe (2008/50/EC).
IAQM (2009) Position on the Description of Air Quality Impacts and the Assessment of Their Significance, November 2009.
IAQM (2011) Guidance on the assessment of the impacts of Construction on Air Quality and the Determination of their Significance
ICAO (2010) Carbon Emissions Calculator Version 3, August 2010
ICAO (2011) Airport Air Quality Manual. [Online], Available: http://www.icao.int/icao/en/env2010/Publications.htm
London Luton Airport (2011) Community Engagement Annual Report http://www.london-lutoninthecommunity.co.uk/uploads/docs/LLA_CES_Review_2011_small.pdf
Luton Borough Council (2006) Luton Local Plan 2001-2011
Luton Borough Council (2011) Local Transport Plan LTP3
Luton Borough Council (2011) Annual Progress Report
Stationery Office (2000) Air Quality Regulations, 2000, Statutory Instrument 928.
Stationery Office (2002) Air Quality Regulations, 2002, Statutory Instrument 3043.
Stationary Office (2010) The Air Quality Regulations 2010.
Stationary Office (2009) Aviation Greenhouse Gas Emissions Trading Scheme Regulations Statutory Instrument No. 2301

Table 6.1: References and data sources

Legislation and policy

Air quality strategy

- 6.7 The Air Quality Strategy (Defra, 2007) provides the policy framework for air quality management and assessment in the UK. It provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment. It also sets out how the different sectors, industry, transport and local government, can contribute to achieving the air quality objectives. Local authorities are seen to play a particularly important role. The strategy describes the Local Air Quality Management (LAQM) regime that has been established, whereby every authority has to carry out regular reviews and assessments of air quality in its area to identify whether the objectives have been, or will be, achieved at relevant locations, by the applicable date. If this is not the case, the authority must declare an Air Quality Management Area (AQMA), and prepare an action plan, which identifies appropriate measures that will be introduced in pursuit of the objectives.
- 6.8 The objectives defined in the Strategy are linked to the air quality Limit Values set at a European level in the Ambient Air Quality Directive 2008/50/EC (European Union, 2008).

Planning policies

- 6.9 The National Planning Policy Framework (NPPF) (CLG, 2012) introduced in March 2012 now sets out national planning policy for England in one place. It replaces previous Planning Policy Statements, including PPS23 on Planning and Pollution Control. The NPPF contains advice on when air quality should be a material consideration in development control decisions. Existing, and likely future, air quality should be taken into account, as well as the EU limit values or national objectives for pollutants, the presence of any AQMAs and the appropriateness of both the development for the site, and the site for the development.
- 6.10 The NPPF places a general presumption in favour of sustainable development, stressing the importance of local development plans, and states that the planning system should perform an environmental role to minimise pollution. One of the twelve core planning principles notes that planning should “contribute to...reducing pollution”. To prevent unacceptable risks from air pollution, planning decisions should ensure that new development is appropriate for its location. The NPPF states that the effects of pollution on health and the sensitivity of the area and the development should be taken into account.
- 6.11 The need for compliance with any statutory air quality limit values and objectives is stressed, and the presence of AQMAs must be accounted for in terms of the cumulative impacts on air quality from individual sites in local areas. New developments in AQMAs should be consistent with local air quality action plans.
- 6.12 The NPPF also addresses the key role that planning plays in helping to secure reductions in greenhouse gas emissions, and requires local authorities to adopt proactive strategies to mitigate and adapt to climate change, in line with the objectives and provisions of the Climate Change Act 2008.

- 6.13 The Climate Change Act (DECC, 2008) sets the UK target for reducing emissions of greenhouse gases. This has been set as an 80% reduction of 1990 levels by 2050 (i.e. from about 800 million tonnes to 160 million tonnes CO₂ equivalent (mtCO₂e)).
- 6.14 The control of greenhouse gas emissions within the aviation sector falls principally on the airline operator (as opposed to the airport) under the Aviation EU Emissions Trading Scheme (EU ETS), which has been transposed into UK legislation under the Aviation Greenhouse Gas Emissions Trading Scheme Regulations (Statutory Instruments No. 2301, 2009). This requires all UK aircraft operators included in the ETS, and allocated to the UK for regulation, to submit an application for an emissions plan to their UK regulator, setting out how they will monitor their annual CO₂ emissions.

Local policies

- 6.15 The Luton Local Plan 2001-2011 (Luton Borough Council, 2006) sets out the Council's detailed policies and specific proposals for the development and use of land. Policy ENV15 deals with pollution and states:
- “Planning permission will not be granted for development that is likely to generate (or be subject to) levels of pollution that threaten public health or safety, or jeopardize the quality of the environment. This policy applies to pollution from air, land and water, from any source, including noise, vibration, light, heat, radiation, leakage, dust, fumes, smoke emissions or explosion”.
- 6.16 The Local Plan has now expired, except for saved policies. Policy ENV15 does not fall within these saved policies and thus no longer forms part of the statutory Luton Local Plan.
- 6.17 Under the Planning and Compulsory Purchase Act 2004, local planning authorities are required to produce a Local Development Scheme (LDS) as part of the Local Development Framework (LDF) process. However, the Localism Act, which was enacted in November 2011, removes the need for the LDF to be prepared, in favour of a more localised, community-based scheme. The Core Strategy, which was under development by the Luton and Central Bedfordshire Joint Technical Unit, has now been withdrawn, and a timetable for the preparation of the Local Development Scheme has been agreed.
- 6.18 There are thus no current local planning policies relating to air quality.

Air Quality Action Plan

- 6.19 LBC has declared an Air Quality Management Area (AQMA) for exceedences of the annual mean nitrogen dioxide objective, at properties in the vicinity of Junction 11 of the M1 motorway (junction with the A505 Dunstable Road). As the exceedence is directly related to traffic on the M1, the Council has integrated its Air Quality Action Plan into the Local Transport Plan LTP3 (Luton Borough Council, 2011). Policy 19 of the LTP relates to Improving Air Quality and states:

“Where AQMAs are declared as a result of traffic sources from a trunk road, we will work closely with the Highways Agency to develop and implement an appropriate Air Quality Action Plan for reducing air pollution within those AQMAs. In order to ensure that no new AQMAs are declared in Luton we will require an Air Quality Assessment for all development proposals that:

- Result in increased congestion, or change in traffic volumes and/or speeds;
- Significantly alter the traffic composition in an area, such as bus stations, lorry parks and new road layouts;
- Include new car, coach or lorry parks;
- Adversely affect sensitive areas or areas nearing air quality threshold limits;
- Would be close to known sources of air pollution and which would include Relevant Receptors e.g. housing, schools, hospitals”.

Assessment criteria

Health criteria

- 6.20 The Government has established a set of air quality standards and objectives to protect human health. The ‘standards’ are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The ‘objectives’ set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. The objectives for use by local authorities are prescribed within the Air Quality Regulations, 2000, Statutory Instrument 928 (Stationary Office, 2000) and the Air Quality (England) (Amendment) Regulations 2002, Statutory Instrument 3043 (Stationary Office, 2002).
- 6.21 The objectives for nitrogen dioxide and PM₁₀ were to have been achieved by 2005 and 2004 respectively, and continue to apply in all future years thereafter. The PM_{2.5} objective is to be achieved by 2020. Measurements across the UK have shown that the 1-hour nitrogen dioxide objective is unlikely to be exceeded where the annual mean concentration is below 60 µg/m³ (Defra, 2009). Therefore, 1-hour nitrogen dioxide concentrations need only be considered if the annual mean concentration is above this level.
- 6.22 More recently, health criteria have been introduced for PM_{2.5}. The 2007 Air Quality Strategy sets out both an exposure-reduction approach and a “backstop” annual mean objective for PM_{2.5}. The former is an objective focused on reducing average exposures across the most heavily populated areas of the country, and is not directly applicable to individual schemes. It is supported by the “backstop objective” or concentration cap to ensure a minimum environmental standard.
- 6.23 The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Defra explains where these objectives will apply in its Local Air Quality Management Technical Guidance (Defra, 2009). The annual mean objectives for nitrogen dioxide and PM₁₀ are considered to apply at the façades of residential properties, schools, hospitals etc.; they do not apply at hotels. The 24-hour objective

for PM₁₀ is considered to apply at the same locations as the annual mean objective, as well as in gardens of residential properties and at hotels. The 1-hour mean objective for nitrogen dioxide applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets.

- 6.24 The European Union has also set limit values for nitrogen dioxide, PM₁₀ and PM_{2.5}. Achievement of these values is a national obligation rather than a local one (European Union, 2008). The limit values for nitrogen dioxide are the same levels as the UK objectives, but applied from 2010 (The Air Quality Standards Regulations 2010 (Stationary Office, 2010)). The limit values for PM₁₀ and PM_{2.5} are also the same level as the UK statutory objectives, but applied from 2005 for PM₁₀ and will apply from 2015 for PM_{2.5}. The Directive also includes a national exposure reduction target and a target value for PM_{2.5}, but these are not directly applicable to individual schemes. The relevant air quality criteria for this assessment are provided in table 6.2.

Air Quality Objectives			
Pollutant	Concentration measured as	Obligation	To be achieved by
Nitrogen dioxide	1-hour mean	200 µg/m ³ not to be exceeded more than 18 times a year	31 December 2005
	Annual mean	40 µg/m ³	31 December 2005
Fine particles (PM ₁₀)	24-hour mean	50 µg/m ³ not to be exceeded more than 35 times a year	31 December 2004
	Annual mean	40 µg/m ³	31 December 2004
Fine particle (PM _{2.5})	Annual mean	25 µg/m ³	2020
	3-yr running annual mean	15% reduction in concentrations measured at urban background sites	Between 2010 and 2020
EU Directive Limit and Target Values			
Nitrogen dioxide	1-hour mean	200 µg/m ³ not to be exceeded more than 18 times a year	01 January 2010
	Annual mean	40 µg/m ³	01 January 2010
Fine particles (PM ₁₀)	24-hour mean	50 µg/m ³ not to be exceeded more than 35 times a year	01 January 2005
	Annual mean	40 µg/m ³	01 January 2005
Fine particle (PM _{2.5})	Annual mean	Target value of 25 µg/m ³	01 January 2010
	Annual mean	Limit value of 25 µg/m ³	01 January 2015
	Annual mean	Stage 2 indicative Limit value of 20 µg/m ³	01 January 2020
	3-year Average Exposure Indicator (AEI)	Exposure reduction target relative to the AEI depending on the 2010 value of the 3-year AEI (ranging from a 0% to 20% reduction)	Between 2010 and 2020
	3-year Average Exposure Indicator (AEI)	Exposure concentration obligation of 20 µg/m ³	2015

Table 6.2: Relevant air quality criteria

Construction dust criteria

6.25 There are no formal assessment criteria for dust arising from construction activities. In the absence of formal criteria, the approach developed by the Institute of Air Quality Management (IAQM)¹ has been used (IAQM, 2011). This approach divides the activities on construction sites into four types to reflect their different potential impacts (i.e. demolition, earthworks, construction and trackout) and then takes a phased approach to the assessment:

- *STEP 1:* Screen the need for a detailed assessment
- *STEP 2:* Assess the risk of dust effects occurring
- *STEP 3:* Identify the need for site specific mitigation
- *STEP 4:* Define effects and their significance.

6.26 The significance for each activity is determined using professional judgement, taking account of the factors that define the sensitivity of the surrounding area and the overall pattern of potential risks. The overall significance of the effects arising from the construction phase of a proposed development is based on professional judgement but takes into account the significance of the effects for each of the four activities.

6.27 Full details of this approach are provided in technical appendix B to this ES.

Descriptors for air quality impacts and assessment of significance of operational health-based effects

6.28 There is no official guidance in the UK on how to describe the nature of air quality impacts, nor how to assess their significance. The approach developed by the Institute of Air Quality Management (IAQM, 2009), and incorporated in Environmental Protection UK's guidance document on planning and air quality (EPUK, 2010), has therefore been used. This involves three distinct stages: the application of descriptors for magnitude of change; the description of the impact at each sensitive receptor; and then the assessment of overall significance of the scheme.

6.29 The definition of impact magnitude is solely related to the degree of change in pollutant concentrations, expressed in microgrammes per cubic metre, but originally determined as a percentage of the air quality objective. Impact description takes account of the impact magnitude and of the absolute concentrations and how they relate to the air quality objectives or other relevant standards. The descriptors for the magnitude of change due to the scheme are set out in table 6.3, while table 6.4 sets out the impact descriptors. These tables have been designed to assist with describing air quality impacts at each specific receptor. They apply to the pollutants relevant to this scheme and the objectives against which they are being assessed.

¹ IAQM is the professional body for air quality practitioners in the UK

Magnitude of Change	Annual Mean NO ₂	No. Days with PM ₁₀ > 50 µg/m ³	Annual Mean PM _{2.5}
Large	Increase/decrease ≥4 µg/m ³	Increase/decrease ≥4 days	Increase/decrease ≥2.5 µg/m ³
Medium	Increase/decrease 2 - <4 µg/m ³	Increase/decrease 3 or 4 days	Increase/decrease 1.25 - <2.5 µg/m ³
Small	Increase/decrease 0.4 - <2 µg/m ³	Increase/decrease 1 or 2 days	Increase/decrease 0.25 - <1.25 µg/m ³
Imperceptible	Increase/decrease <0.4 µg/m ³	Increase/decrease <1 day	Increase/decrease <0.25 µg/m ³

Table 6.3: Definition of impact magnitude for changes in ambient pollutant concentrations

Absolute Concentration ^b in Relation to Objective/Limit Value	Change in Concentration ^c		
	Small	Medium	Large
Above Objective/Limit Value ^d	Slight	Moderate	Substantial
Just Below Objective/Limit Value ^e	Slight	Moderate	Moderate Adverse
Below Objective/Limit Value ^f	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value ^g	Negligible	Negligible	Slight Adverse

Table 6.4: Air quality impact significance criteria ^a

- a Criteria have been adapted from the published criteria to remove overlaps at transitions.
- b The 'Absolute Concentration' relates to the 'With-Scheme' air quality where there is an increase in concentrations and to the 'Without-Scheme' air quality where there is a decrease in concentrations.
- c Where the Impact Magnitude is Imperceptible, then the Impact Description is Negligible.
- d Above: > 40 µg/m³ of annual mean NO₂ or PM₁₀, or > 35 days with PM₁₀ > 50 µg/m³.
- e Just below: 36 – <40 µg/m³ of annual mean NO₂ or PM₁₀, or 32 – <35 days with PM₁₀ > 50 µg/m³.
- f Below: 30 – <36 µg/m³ of annual mean NO₂ or PM₁₀, or 26 – <32 days with PM₁₀ > 50 µg/m³.
- g Well below: < 30 µg/m³ of annual mean NO₂ or PM₁₀, or < 26 days with PM₁₀ > 50 µg/m³.

6.30 The IAQM guidance is that the assessment of significance should be based on professional judgement, with the overall air quality impact of the scheme described as either 'insignificant', 'minor', 'moderate' or 'major'. In drawing these conclusions, the factors set out in table 6.5 should be taken into account. The professional experience of the consultants undertaking this assessment is set out in technical appendix B to this ES.

Number of people affected by increases and/or decreases in concentrations and a judgement on the overall balance.
The magnitude of the changes and the descriptions of the impacts at the receptors i.e. using the findings based on Tables 6.3 and 6.4.
Whether or not an exceedence of an objective or limit value is predicted to arise in the study area where none existed before or an exceedence area is substantially increased.
Whether or not the study area exceeds an objective or limit value and this exceedence is removed or the exceedence area is reduced.
Uncertainty, including the extent to which worst-case assumptions have been made
The extent to which an objective or limit value is exceeded, e.g. an annual mean NO ₂ of 41 µg/m ³ should attract less significance than an annual mean of 51 µg/m ³
Table 6.5: Factors Taken into Account when Determining Air Quality Significance

Odours

- 6.31 In considering the potential for odour effects, an important distinction should be drawn between the occasional detection of an odour and a loss of amenity due to odour, the latter generally being associated with persistent and long-lived problems.
- 6.32 Guidance note H4 Odour Management, published by the Environment Agency, provides a useful approach to quantifying odour effects (Environment Agency, 2011). Odour concentrations are measured in European odour units (OU_E/m³). The odour concentration at the detection threshold is 1 OU_E/m³.
- 6.33 Guidance Note H4 suggests that there is a likelihood of unacceptable odour pollution occurring where the 98th percentile of 1-hour mean odour concentrations exceeds 1.5 OU_E/m³ for the most offensive odours, 3 OU_E/m³ for moderately offensive odours and 6 OU_E/m³ for less offensive odours.
- 6.34 The perception of the offensiveness of odours is highly subjective, but airport-related odours cannot reasonably be classified as most offensive (a category which includes decaying animal remains and septic effluent). For the purpose of this assessment it is assumed that airport-related odours fall within the moderately offensive category (which includes livestock rearing and food processing).

Methodology

Consultation

- 6.35 The assessment follows a methodology agreed with LBC (Claire Jaggard) via telephone discussions and email correspondence.

Baseline conditions

- 6.36 Information on existing air quality has been obtained by collating the results of monitoring carried out by LLAOL and LBC. This covers both the study area and nearby sites, the latter being used to provide context for the assessment. The background concentrations across the study area have been defined using the national pollution maps published by Defra (2012). These cover the whole country on a 1x1 kilometre grid.

Construction effects

- 6.37 Potential effects during construction may arise from emissions from construction traffic and on-site plant, and emissions of dust associated with the demolition and construction activities.
- 6.38 Locations sensitive to dust emitted during construction will be places where members of the public are regularly present. Residential properties and commercial operations close to the construction works will be most sensitive to construction dust. Any areas of sensitive vegetation or ecology that are very close to the dust sources may also be susceptible to some negative effects.
- 6.39 It is very difficult to quantify emissions from construction activities and it is thus common practice to provide a qualitative assessment of potential effects, making reference to the assessment criteria set out in technical appendix B.

Sensitive receptors

- 6.40 Sensitive receptors during the construction phase will be restricted to properties within the appropriate distance bands as set out in the technical appendix B.
- 6.41 Sensitive receptors during the operational phase are places where members of the public might be expected to be regularly present over the averaging periods of the objectives/limit values. For the annual mean and daily mean objectives/limit values that are the principal focus of this assessment, sensitive receptors will generally be residential properties, schools, nursing homes etc.
- 6.42 A total of 16 sensitive receptors have been selected for the operational assessment, as shown in table 6.6, and figure 6.1. These receptors have been selected to identify locations closest to Airport sources and to roads within the local network, which are likely to experience a significant change with the proposed development, and effectively define the study area. The focus is on potential effects arising from the proposed development on sensitive locations off-site, i.e. outside of the Airport boundary; exposure to members of the public within the Airport boundary is unlikely to be significant. The nearest main residential area to the Airport abuts the northern boundary along Eaton Green Road. In addition, a number of isolated properties, mostly farmhouses, are located to the south and to the east of the Airport boundary. Residential properties are generally sparse in the immediate vicinity of the western boundary of the Airport, as this area, around Airport Way, is largely given over to light industry.

Receptor	O.S. Ref	Description
R1	511915, 220279	Somerries Farm
R2	512083, 220180	Somerries Lodge
R3	512965, 220526	Chiltern Hall
R4	513155, 220684	Dane St Cottages
R5	513757, 221604	Winch Hall House
R6	514764, 221354	Lye Hill (east of runway)
R7	512884, 222271	Malthouse Green
R8	511968, 222105	Eaton Green Road
R9	511610, 221898	Eaton Green Road
R10	511782, 222008	Eaton Green Road
R11	510104, 223083	Junction of Hitchin Rd/Vauxhall Way
R12	509334, 219034	Junction of Airport Way/London Rd
R13	510180, 220073	Park St Lodges, The Luton Drive
R14	510966, 221889	Vauxhall Way
R15	510339, 222860	Vauxhall Way
R16	510406, 221171	Ketton Close (north-west of Airport Boundary)

Table 6.6: Description of sensitive receptor locators

Assessment scenarios

- 6.43 The proposed development is expected to reach full projected capacity of 18 mppa by 2028. Without the proposed development the Airport is forecast to reach about 12.4 mppa (with 128,000 ATMs) by 2028. In order to take account of the potential uncertainties with, and changes to, road transport emissions over this time, for the purpose of this assessment, a scenario has also been included that assumes the 'without scheme' capacity (12.4 mppa) and the operational capacity (18 mppa) will be attained by 2017, which represents a worst-case scenario. Assumptions for the phasing of construction are included in chapter 3 of this ES.
- 6.44 The following scenarios have been considered:
- 2011 Baseline
 - 2017 Without Scheme (12.4 mppa + forecast 2017 road traffic flows)
 - 2017 With Scheme (18 mppa + forecast 2017 road traffic flows)
 - 2028 Without Scheme (12.4 mppa + forecast 2028 road traffic flows)
 - 2028 With Scheme (18 mppa + forecast 2028 road traffic flows).
- 6.45 Predictions of nitrogen dioxide, PM₁₀ and PM_{2.5} concentrations have been carried out for all scenarios. For the 2017 and 2028 scenarios, traffic growth associated with all committed developments up to the relevant year has been included; consideration of cumulative effects has thus been directly accounted for. A further 2017 sensitivity test has been carried out for nitrogen dioxide that involves assuming no reduction in emission factors for road traffic from the baseline year. This is to address the issue recently identified by Defra (Carslaw et al, 2011) that road traffic emissions have not been declining as expected (see later section on Uncertainty). Nitrogen dioxide concentrations in 2017 with and without the scheme are thus presented for two scenarios: 'with emissions reduction' and 'without emissions reduction'.

- 6.46 Additional predictions have been carried out to quantify potential odour effects from ground-based aircraft operations, for all scenarios.

Modelling methodology

- 6.47 The predictions have been carried out using the ADMS-Airports model. This model incorporates a jet module specifically designed to represent the dispersion of emissions from moving aircraft, and was selected by the Project for the Sustainable Development of Heathrow (PSDH) for use at Heathrow Airport.
- 6.48 The model requires the user to provide a variety of input data, which describe the pollutant emissions arising from the proposed scheme, the meteorological conditions, and the background contribution (i.e. the contribution to pollutant concentrations from all sources not explicitly included in the model).
- 6.49 Pollutant emissions will arise from a number of Airport-related sources, and the following were taken into consideration in this assessment:
- Aircraft main engines operating within the Landing and Take-off (LTO) Cycle, Auxiliary Power Units (APUs) and engine testing
 - Ground Support Equipment (GSE)
 - Airport boiler plant
 - Fire training ground
 - Staff and passenger vehicle movements within the car parks
 - Road traffic on Airport landside roads and on the local road network.
- 6.50 The approach to quantifying emissions from the Airport sources has been based on generally accepted methodologies, and, as far as was practicable, follows the sophisticated or advanced approach recommended by the International Civil Aviation Organisation (ICAO) in its *Airport Air Quality Manual* (ICAO, 2009). For all airside sources, emissions of PM were assumed to represent both the PM₁₀ and PM_{2.5} fractions, based on the expected size distributions.
- 6.51 A full description of the modelling methodology and input data assumptions is provided in technical appendix B.

Model verification

- 6.52 The process of model verification refers to a comparison between the predicted and locally-measured pollutant concentrations. Model verification may, or may not, result in an adjustment of predicted results depending on the outcomes and/or the source types being considered.
- 6.53 The model verification process is described in detail within technical appendix B.

Uncertainty in road traffic modelling predictions

- 6.54 There are many components that contribute to the uncertainty of modelling predictions. The model used in this assessment is dependent upon the data that

- have been input, which will have inherent uncertainties associated with them. There are then additional uncertainties, as the model is required to simplify real-world conditions into a series of algorithms. An important stage in the process is model verification, which involves comparing the model output with measured concentrations (see above). Because the model has been verified and adjusted, there can be reasonable confidence in the prediction of current year (2011) concentrations.
- 6.55 Predicting pollutant concentrations in a future year will always be subject to greater uncertainty. For obvious reasons, the model cannot be verified against future year measurements, and it is necessary to rely on a series of projections as to what will happen to aircraft and road vehicle emissions, traffic volumes and background pollutant concentrations. Recently however, a disparity between the road transport emission projections and measured annual mean concentrations of nitrogen oxides and nitrogen dioxide has been identified by Defra (Carslaw et al, 2011). This applies across the UK, although the effect appears to be greatest in inner London; there is also considerable inter-site variation. Whilst the emission projections suggested that both annual mean nitrogen oxides and nitrogen dioxide concentrations should have fallen by around 15-25% over the past six to eight years, at many monitoring sites levels have remained relatively stable, or have even shown a slight increase. This pattern is mirrored in the local monitoring data assembled for this study, as set out below.
- 6.56 This disparity led to a detailed review of the road traffic emission factors and fleet mix for UK conditions, and in July 2012, Defra issued a revised Emissions Factors Toolkit (ETFv5.1.3). The new EFT utilises revised nitrogen oxides emissions factors derived from COPERT 4 (v8.1), and also incorporates revised vehicle fleet composition data (Defra, 2012). The new EFT goes some way to addressing the disparity between air quality measurements and emissions, but does not fully address it, and it is recognised that the forecast reductions may still be optimistic in the near-term (i.e. the next five years or so).
- 6.57 The reason for the disparity is thought to relate to the on-road performance of modern diesel vehicles. New vehicles registered in the UK have to meet progressively tighter European type approval emissions categories, referred to as "Euro" standards. While the nitrogen oxides emissions from newer vehicles should be lower than those from equivalent older vehicles, the on-road performance of some modern diesel vehicles is often no better than that of earlier models (Carslaw et al., 2011). The best current evidence is that, where previous standards have had limited on-road success, the 'Euro VI' and 'Euro 6' standards that new vehicles will have to comply with from 2013/15 will achieve the expected on-road improvements, as, for the first time, they will require compliance with the World Harmonized Test Cycle, which better represents real-world driving conditions and includes a separate slow-speed cycle for heavy duty vehicles.
- 6.58 As noted above, the new forecast reductions in nitrogen oxides emissions may still be optimistic in the near-term. To account for this uncertainty, a sensitivity test has been conducted assuming that the future (2017) road traffic emissions per vehicle are unchanged from 2011 values. The predictions within this sensitivity test are likely to

be over-pessimistic, as new, lower-emission Euro VI and Euro 6 vehicles will be on the road from 2013/15; by 2017 it is forecast that there will be a roughly 60-70% penetration of Euro VI HDVs (which are the most polluting vehicles) and a roughly 25-30% penetration of Euro 6 LDVs. These new vehicles are expected to deliver real on-road reductions in nitrogen oxides emissions

- 6.59 It must also be borne in mind that the predictions in 2017 are based on worst-case assumptions regarding the increase in traffic flows such that all committed developments that may have an impact on the study area will be operational. This will have overestimated the effects, which will, in part, offset any potential underestimation as described above.

Odours

- 6.60 There is no straightforward way to quantify the potential odour effects associated with airport operations. A number of studies have attempted to draw comparison between an expansion in airport operations and the number of complaints that are received, but these have generally proved inconclusive. A commonly-applied approach in some airport assessments is to base the odour assessment on the change in aircraft-related VOC emissions. However, there is no evidence to correlate total aircraft-related VOC concentrations with the human perception of odours, and given that airport-odours are unlikely to be related to total VOCs, any such correlation is expected to be very weak.
- 6.61 For the purpose of this study, odour unit concentrations have been predicted, using a reported odour emission rate for aircraft engines during "idle" thrust settings (on-stand and taxiing). A full description of the approach is described in technical appendix B.

Climate change emissions

- 6.62 There is no established way to estimate greenhouse gas emissions arising from airport operations. The Airports Council International (ACI, 2011) suggests that inventories can reasonably focus on emissions of carbon dioxide (as they are expected to represent some 95% of GHG emissions). It also recommends that emissions be categorised into three scopes and reported separately:
- Scope 1: emissions from sources, which are owned or directly controlled by the airport operator (such as space heating, fleet vehicles, Ground Support Equipment and ground maintenance etc.)
 - Scope 2: emissions from the off-site generation of electricity (and heating or cooling) purchased by the airport operator
 - Scope 3: emissions from airport-related activities from sources not owned or controlled by the airport operator. Scope 3 emissions include aircraft emissions within the LTO cycle, vehicles and GSE operated by third parties. It also includes surface access transport and emissions within the aircraft cruise cycle.
- 6.63 This assessment has focused on Scope 1, Scope 2 and components of Scope 3 emissions; in the case of the latter, a distinction has been made between emissions

arising from ground-based aircraft activities (e.g. taxiing and APU use) and emissions arising during take-off and landing (over which the airport has little, if any control).

- 6.64 For Scope 1 emissions, information on total gas use (kWh), and total diesel use (litres) (for power, space heating, GSE and vehicles) for 2011 was provided by LLAOL. For Scope 2 emissions, information on total electricity use (kWh) was provided by LLAOL for 2011. In both cases, the conversion factors used to calculate carbon dioxide emissions were consistent with those adopted by the Airport² in the 2011 Community Engagement Annual Report (LLA, 2011). These are generally higher than those recommended in Defra guidelines (Defra, 2011b) – see comparison in table 6.7, and will have overestimated the impacts.

Fuel Type	Assumed	Defra guideline
Electricity (kWh)	0.5410	0.52114
Gas (kWh)	0.1836	0.18322
Diesel (litres)	2.7620	Red diesel (2.7667) Retail station biofuel blend (2.5530)

Table 6.7: Comparison of CO₂ conversion factors (kg CO₂)

- 6.65 Emissions of carbon dioxide from ground-based aircraft operations (taxiing and APU use) have been calculated from the total fuel use data calculated using the approach set out in paragraph 6.49 above, and detailed within technical appendix B. A conversion factor of 3.157 kg CO₂ per kg aviation fuel was used (ICAO, 2010).
- 6.66 For the future case scenarios, emissions of carbon dioxide from Scope 1 and Scope 2 components have been simply scaled up in line with the projected increases in passenger movements per annum. Scope 3 emissions have been calculated directly from aircraft fuel use.

Baseline conditions

- 6.67 LBC has investigated air quality within its area as part of its responsibilities under the LAQM regime. The first round of Review and Assessment was completed in March 2003 and concluded that there were likely exceedences of the annual mean nitrogen dioxide objective close to the M1 motorway, in the vicinity of Junction 11 (junction with A505 Dunstable Road), and an AQMA was subsequently declared. The second round of Review and Assessment in 2004 concluded that the zone of exceedence was much wider than had originally been thought, and in March 2005, the AQMA boundary was extended to include a total of 431 dwellings. The AQMA is located about 6 kilometres north-west of the Airport.
- 6.68 The Council's Review and Assessment reports have consistently identified no exceedences of the PM₁₀ objectives (Luton Borough Council, 2011)

²The Airport has adopted static conversion factors between 2010 and 2011 to track progress on CO₂ reductions

- 6.69 The Council operates one automatic monitoring site at Challney Community College, located approximately 180 metres from the M1 motorway, to the north of Junction 11. This site measures both nitrogen dioxide and PM₁₀. An additional automatic monitor is located within the Airport boundary and is operated by LLA; this site records PM₁₀ concentrations. The data over the period 2007-2011 are shown summarised in tables 6.8 and 6.9.
- 6.70 The Council also operates a network of nitrogen dioxide diffusion tubes; in 2011 there were 14 sites in operation. These sites are principally located within the AQMA, and in the vicinity of the Airport, with one site at Caddington Road (approx' 3.5 kilometres due west of the Airport, and close to the M1 carriageway). The Airport operates a further 13 nitrogen dioxide diffusion tube sites, although it is important to note that these are located in and around the Airport boundary where there is no relevant public exposure to the annual mean objective. A summary of the data over the period 2007-2011 is shown in table 6.10.

Site No.	Site Type	Location	O.S. Grid Ref	2007	2008	2009	2010	2011
Annual Mean Concentrations (µg/m³)								
LN01	Urban Background	Challney Community College	505570 222754	35	35	36	34	35
No. Hours > 200 µg/m³								
LN01	Urban Background	Challney Community College	505570 222754	14	5	0	0	0

Table 6.8: Summary of Automatic Nitrogen Dioxide Concentrations (2007-2011)

Data capture >75% in all years. Data up until 2011 have been taken from the LBC 2008 and 2011 Progress Reports. Data for 2011 provided from the Herts & Beds AQ Network at <http://www.hertsbedsair.net/>

Site No.	Site Type	Location	O.S. Grid Ref	2007	2008	2009	2010	2011
Annual Mean Concentrations (µg/m³)								
LN01	Urban Background	Challney Community College ^a	505570 222754	23	18	20	18	21
LA01	Background	London Luton Airport ^b	511871 221142	23	21	20	14	17
No. Days > 50 µg/m³								
LN01	Urban Background	Challney Community College ^a	505570 222754	12	3	2	0	10
LA08	Background	London Luton Airport ^b	511871 221142	10	4	5	0	2

Table 6.9: Summary of Automatic PM₁₀ Concentrations (2007-2011)

Data capture >75% in all years. Data up until 2011 have been taken from the LBC 2008 and 2011 Progress Reports. Data for 2011 provided from the Herts & Beds AQ Network at <http://www.hertsbedsair.net/> (a) All data are VCM corrected TEOM concentrations; (b) Data measured using an unheated BAM with concentrations corrected by a factor of 0.83.

Site	Site Type	Location	O.S Grid	2007	2008	2009	2010	2011
Luton Borough Council Sites								
LN15	Roadside	Armitage Gardens	505520 222407	-	-	33.9	32.3	29.5
LN16	Roadside	Belper Rd	505492 222607	-	44.8	42.2	38.4	35.9
LN17	Roadside	Wyndham Rd	505324 222812	-	41.3	36.8	39.5	40.5
LN18	Roadside	Copperfield	505014 223538	-	25.6	30.0	-	27.6
LN19	Background	Challney Comm Coll. ^a	505570 222754	-	34.8	35.0	33.6	34.4
LN22	Background	Mistletoe Hill ^b	511341 221864	-	-	22.8	24.4	23.8
LN23	Roadside	Eaton Green Road (1) ^b	511377 221814	-	-	33.3	35.1	37.0
LN24	Background	Barnston Close ^b	511902 222144	-	-	26.7	25.8	25.3
LN25	Roadside	Eaton Green Road (2) ^b	511893 222068	-	-	29.1	30.7	32.5
LN26	Background	Keeble Close ^b	512109 222234	-	-	21.8	23.2	22.0
LN27	Roadside	Eaton Green Road (3) ^b	512134 222198	-	-	28.0	29.3	29.5
LN28	Kerbside	Caddington Rd ^c	507798 219832	-	-	-	46.3	47.4
London Luton Airport Sites								
LA01	Background	Terminal Patio	511847 221336	35.6	-	-	46.8	40.7
LA02	Kerbside	Airport Approach Rd	511586 220978	31.2	33.1	35.8	41.2	38.1
LA03	Background	R'way Threshold (W)	511156 220437	26.4	23.8	24.1	27.9	28.4
LA04	Background	R'way Threshold (E)	513634 221198	18.6	19.9	19.6	21.9	20.8
LA05	Background	Runway Apron	511703 221320	42.9	44.8	46.6	50.2	45.5
LA06	Kerbside	President Way Jct	511645 221679	34.3	35.6	40.0	40.4	36.9
LA07	Intermediate	Terminal Car Park	512181 221352	27.4	27.7	27.6	33.9	30.5
LA08	Background	BAM Collocated	511871 221142	32.1	30.8	31.0	35.7	32.6
LA09	Background	Stagenhoe Bottom Farm	517637 222554	11.0	11.8	13.4	14.6	12.8
LA10	Background	Grove Farm Slip End	507623 217724	12.3	13.1	14.5	16.9	14.1
LA13	Rural	Delmerend Lane	508426 214366	16.0	13.3	15.7	20.2	15.7
LA14	Kerbside	Stand 60 - Airport	511861 221579	13.9	38.4	36.0	38.8	38.6
LA15	Kerbside	Eaton Green Road	511899 222051	40.8	-	-	33.0	36.4

Table 6.10: Annual Mean Nitrogen Dioxide Concentrations – Diffusion Tube Monitoring

Data capture >75% in all years. LBC data bias-adjusted using local collocated factor. LLA data bias adjusted using national database. Data up to 2010 taken from LBC 2011 and 2008 Progress Reports. Data for 2011 provided from the Herts & Beds AQ Network at <http://www.hertsbedsair.net/> (a) Concentration reported is the average of the three collocated tubes (LN19-LN21) (b) Commenced March 2009 (c) Commenced March 2010.

- 6.71 Nitrogen dioxide concentrations measured at the LBC automatic site have not exceeded either the annual mean or the 1-hour mean objectives in any year, and measured PM₁₀ concentrations at both automatic sites are well below the annual mean and 24-hour mean objectives.
- 6.72 Annual mean nitrogen dioxide concentrations measured at the LBC diffusion tube sites were generally well below the objective in 2009-2011. There was a marginal exceedence at Wyndham Road in 2011, and more substantial exceedences at Caddington Road in 2010 and 2011, but neither of these sites is close to the Airport, or those sections of the road network affected by Airport operations.
- 6.73 There are also recorded exceedences of the annual mean nitrogen dioxide objective at the LLAOL sites (Terminal Patio and Runway Apron), but there is no relevant public exposure at these locations.
- 6.74 In addition to these locally measured concentrations, estimated background concentrations in the study area have been obtained from the national maps for 2011, 2017 and 2028. In the case of nitrogen oxides and nitrogen dioxide, two sets of future-year backgrounds are presented for 2017 to take into account uncertainty in future year vehicle emission factors. A full description of the approach used is described in technical appendix B. The mapped background concentrations are well below the objectives.

Effects during construction

- 6.75 A description of the construction works is provided in chapter 3 of this ES. A small number of existing buildings would need to be demolished to allow construction of the new areas for mixed aviation use, the new aircraft stands, and re-provision of Airport Operations. The construction works associated with the improvements to the terminal building, the modifications to taxiway extensions and aircraft parking areas, and the dualling of the road to the central Terminal Area, would be complete by the end of 2026. All demolition and construction areas are remote from any residential properties, and there are no sensitive receptors within 350 metres of the site boundary. There are also no sensitive receptors within 100 metres of the carriageway of roads (within 500 metres of the site entrance) which will be used by construction traffic.
- 6.76 Based on the IAQM criteria it may therefore be concluded that a detailed assessment is not required, and the risk can be considered as *negligible*.

Effects during operation

Modelled baseline conditions

- 6.77 The predicted annual mean nitrogen dioxide, PM₁₀ and PM_{2.5} concentrations for the 2011 baseline and the 2017 and 2028 Without Scheme scenarios, are shown in tables 6.11 to 6.13. The future 2017 baseline for nitrogen dioxide covers the two

scenarios: with the official reductions in vehicle emission factors and without these reductions. Table 6.14 describes the predicted 98th percentile of 1-hour mean odour unit concentrations. For the future year scenarios, the model runs included sensitivity tests using three years meteorological data (2009-2011). The results reported in this chapter are for the worst-case meteorological year in each case; a full set of results is provided in technical appendix B.

- 6.78 The predicted annual mean nitrogen dioxide concentrations for each scenario are described as contour plots in technical appendix B.

2011 Baseline

- 6.79 For the existing 2011 baseline, there are two predicted exceedences of the annual mean nitrogen dioxide objective at R9 (Eaton Green Road) and R11 (junction of Hitchin Road and Vauxhall Way). All other predicted annual mean concentrations are well below the objective.
- 6.80 All predicted concentrations of PM₁₀ and PM_{2.5} are well below the objectives/limit value. All of these results are broadly consistent with the outcomes of the Council's reviews and assessments, although the Council has identified no exceedences of the annual mean nitrogen dioxide objective at Eaton Green Road or at the Hitchin Road/Vauxhall Way junction; this may imply that the model is over-predicting at these locations.
- 6.81 The predicted 98th percentiles of 1-hour mean odour unit concentrations are all well below the recognised odour thresholds. These results are consistent with the absence of odour complaints in the vicinity of the Airport.

2017 baseline with "official" emissions reduction

- 6.82 Assuming that vehicle emissions decline in line with official forecasts, there are predicted to be no exceedences of the annual mean nitrogen dioxide objective at any location in 2017. All predicted concentrations of PM₁₀ and PM_{2.5} are well below the objectives/limit value.
- 6.83 The predicted 98th percentiles of 1-hour mean odour unit concentrations remain well below the recognised odour thresholds, despite the increase in air traffic movements.

2017 baseline with no emissions reduction

- 6.84 Assuming that vehicle emissions do not decline after 2011, predicted annual mean nitrogen dioxide concentrations are higher in 2017, primarily due to the increase in traffic on the local road network. The predicted exceedence at R11 remains, and there is an additional exceedence at R9.

2028 baseline

- 6.85 There are predicted to be no exceedences of the annual mean nitrogen dioxide objective at any location in 2028. All predicted concentrations of PM₁₀ and PM_{2.5} are well below the objectives/limit value.
- 6.86 The predicted 98th percentiles of 1-hour mean odour unit concentrations remain well below the recognised odour thresholds, despite the increase in air traffic movements.

	Existing (2011)	Without Scheme (2017)		Without Scheme (2028)
		With emissions reduction	Without emissions reduction	With emissions reduction
R1	26.3	23.2	25.0	20.8
R2	24.1	21.2	22.4	19.0
R3	24.1	21.2	22.3	19.1
R4	19.4	17.2	18.3	15.4
R5	22.4	19.2	20.0	17.2
R6	16.7	13.9	15.0	12.2
R7	21.6	17.7	20.2	15.3
R8	30.2	24.4	29.7	19.5
R9	40.7	33.7	39.6	27.7
R10	31.9	25.7	31.7	20.1
R11	42.4	37.0	47.9	25.3
R12	31.1	25.1	29.7	21.1
R13	28.0	22.8	27.7	19.0
R14	27.8	20.6	26.9	17.3
R15	31.0	24.3	30.8	19.3
R16	22.7	18.6	21.2	16.6
Objective	40	40	40	40

Table 6.11: Predicted annual mean baseline concentrations of nitrogen dioxide ($\mu\text{g}/\text{m}^3$)

	Existing (2011)		Without Scheme (2017)		Without Scheme (2028)	
	Annual Mean	No. Days > 50 µg/m³	Annual Mean	No. Days > 50 µg/m³	Annual Mean	No. Days > 50 µg/m³
R1	18.5	2	17.2	1	16.6	1
R2	17.5	1	16.1	0	15.5	0
R3	17.5	1	16.1	0	15.5	0
R4	17.4	1	16.4	0	15.9	0
R5	17.5	1	16.1	0	15.6	0
R6	17.1	1	16.0	0	15.6	0
R7	16.7	1	15.5	0	15.1	0
R8	18.5	2	17.3	1	16.9	1
R9	21.7	6	19.7	3	19.2	2
R10	18.9	2	17.7	1	17.3	1
R11	20.5	4	19.5	3	19.1	2
R12	20.0	3	18.3	2	17.8	1
R13	18.8	2	17.6	1	17.1	1
R14	20.2	4	18.7	2	18.1	2
R15	19.3	3	18.0	1	17.6	1
R16	17.6	1	16.3	0	15.9	0
Objective	40	35	40	35	40	35

Table 6.12: Predicted annual mean baseline concentrations of PM₁₀ (µg/m³) and the number of days PM₁₀ > 50 µg/m³

	Existing 2011	Without Scheme (2017)	Without Scheme (2028)
R1	13.2	11.8	11.3
R2	12.6	11.2	10.6
R3	12.6	11.2	10.6
R4	11.9	10.8	10.4
R5	12.3	10.9	10.3
R6	11.4	10.3	9.9
R7	12.0	10.8	10.4
R8	13.3	12.0	11.5
R9	15.7	13.6	13.0
R10	13.5	12.2	11.7
R11	14.5	13.2	12.6
R12	14.5	12.7	12.2
R13	13.3	11.9	11.5
R14	13.7	12.2	11.7
R15	13.7	12.3	11.9
R16	12.6	11.3	10.9
Limit Value	25	25	25

Table 6.13: Predicted annual mean baseline concentrations of PM_{2.5} (µg/m³)

	Existing 2011	Without Scheme (2017)	Without Scheme (2028)
R1	0.18	0.39	0.39
R2	0.15	0.35	0.35
R3	0.14	0.30	0.30
R4	0.14	0.28	0.28
R5	0.12	0.18	0.18
R6	0.05	0.08	0.08
R7	0.21	0.30	0.30
R8	0.33	0.47	0.47
R9	0.33	0.48	0.48
R10	0.34	0.50	0.50
R11	0.06	0.09	0.09
R12	0.02	0.05	0.05
R13	0.04	0.09	0.09
R14	0.01	0.03	0.03
R15	0.07	0.11	0.11
R16	0.08	0.11	0.11

Table 6.14: Predicted 98th percentile of 1-hr mean odour unit concentrations (OU_E/m³)

Baseline climate change emissions

- 6.87 Table 6.15 sets out the baseline total emissions of carbon dioxide arising from airfield operations. There is no change in emissions of carbon dioxide between 2017 and 2028, as the number of passenger movements and ATMs is assumed to remain constant.

	CO ₂ (kt CO ₂)		
	Scope 1	Scope 2	Scope 3
2011 Baseline	0.30	1.84	47.43
2017 "Without Scheme"	0.39	2.40	58.31
2028 "Without Scheme"	0.39	2.40	58.31

Table 6.15: Baseline carbon dioxide emissions (airport operations)

- 6.88 Whilst total carbon dioxide emissions increase between 2011 and 2017/2028, the emissions expressed as tonnes/mppa decreases slightly from 2011 (5.22 kt/mppa) to 2017/2028 (4.92 kt/mppa) and is related to the change in aircraft fleet composition.

Effects during operation (2017)

- 6.89 Tables 6.16, 6.17 and 6.18 set out the predicted concentrations of nitrogen dioxide, PM₁₀ and PM_{2.5} in 2017, "Without Scheme" and "With Scheme" at the identified receptors. These tables also describe the impacts at each receptor using the impact descriptors given in table 6.3. For nitrogen dioxide, results are presented for two scenarios in 2017 to reflect current uncertainty in Defra's future-year vehicle emission factors. For the future year scenarios, the model runs included sensitivity tests using three years meteorological data (2009-2011). The results reported in this chapter are

for the worst-case meteorological year in each case; a full set of results is provided in technical appendix B. The predicted annual mean nitrogen dioxide concentrations for the 2017 With Scheme scenarios are described as contour plots in technical appendix B

Location	With Emissions Reduction (2017)			Without Emissions Reduction (2017)		
	Without Scheme	With Scheme	Impact Descriptor	Without Scheme	With Scheme	Impact Descriptor
R1	23.2	23.4	Negligible	25.0	25.3	Negligible
R2	21.2	21.4	Negligible	22.4	22.6	Negligible
R3	21.2	21.4	Negligible	22.3	22.5	Negligible
R4	17.2	17.2	Negligible	18.3	18.4	Negligible
R5	19.2	20.0	Negligible	20.0	20.8	Negligible
R6	13.9	14.2	Negligible	15.0	15.3	Negligible
R7	17.7	18.1	Negligible	20.2	20.7	Negligible
R8	24.4	25.8	Negligible	29.7	31.6	Negligible
R9	33.7	35.2	Negligible	39.6	41.5	Slight Adverse
R10	25.7	27.4	Negligible	31.7	33.9	Slight Adverse
R11	37.0	37.9	Slight Adverse	47.9	48.9	Slight Adverse
R12	25.1	25.1	Negligible	29.7	29.8	Negligible
R13	22.8	22.9	Negligible	27.7	27.9	Negligible
R14	20.6	20.6	Negligible	26.9	26.9	Negligible
R15	24.3	25.0	Negligible	30.8	31.7	Negligible
R16	18.6	18.8	Negligible	21.2	21.4	Negligible
Objective	40	40	40	40	40	40

Table 6.16: Predicted annual mean concentrations ($\mu\text{g}/\text{m}^3$) of nitrogen dioxide (NO_2) in 2017 “Without Scheme” and “With Scheme”

- 6.90 The predicted annual mean nitrogen dioxide concentrations With Scheme are below the objective at all receptors with emission reduction, but exceed the objective at R9 and R11 without emissions reduction. These receptors are in locations previously identified with exceedences in 2011, and the scheme is not causing any new exceedences. Without emissions reduction, the scheme is predicted to cause the exceedence to remain at R9, whereas the objective is predicted to be achieved Without Scheme, but the magnitude of change is small, and as previously stated the model is likely to be over-predicting at this location.
- 6.91 The magnitudes of change between “Without Scheme” and “With Scheme” are all *imperceptible* or *small* and the impacts are *negligible* or *slight adverse* at all receptors.

6.92 In terms of PM₁₀ and PM_{2.5}, no exceedences of the objectives are predicted, the magnitudes of change are all *imperceptible* or *small* and all of the impacts are *negligible*.

Location	Annual Mean			No. Days > 50 µg/m³		
	Without Scheme	With Scheme	Impact Descriptor	Without Scheme	With Scheme	Impact Descriptor
R1	17.2	17.3	Negligible	1	1	Negligible
R2	16.1	16.1	Negligible	0	0	Negligible
R3	16.1	16.2	Negligible	0	0	Negligible
R4	16.4	16.4	Negligible	0	0	Negligible
R5	16.1	16.2	Negligible	0	0	Negligible
R6	16.0	16.0	Negligible	0	0	Negligible
R7	15.5	15.6	Negligible	0	0	Negligible
R8	17.3	17.7	Negligible	1	1	Negligible
R9	19.7	20.1	Negligible	3	4	Negligible
R10	17.7	18.1	Negligible	1	1	Negligible
R11	19.5	19.7	Negligible	3	3	Negligible
R12	18.3	18.3	Negligible	2	2	Negligible
R13	17.6	17.6	Negligible	1	1	Negligible
R14	18.7	18.7	Negligible	2	2	Negligible
R15	18.0	18.2	Negligible	1	2	Negligible
R16	16.3	16.3	Negligible	0	0	Negligible
Objective	40	40		35	35	

Table 6.17: Predicted annual mean concentrations (µg/m³) of PM₁₀ in 2017, and number of days PM₁₀ > 50µg/m³, "Without Scheme" and "With Scheme"

Location	Without Scheme	With Scheme	Impact Descriptor
R1	11.8	11.9	Negligible
R2	11.2	11.2	Negligible
R3	11.2	11.3	Negligible
R4	10.8	10.9	Negligible
R5	10.9	10.9	Negligible
R6	10.3	10.4	Negligible
R7	10.8	10.9	Negligible
R8	12.0	12.2	Negligible
R9	13.6	13.9	Negligible
R10	12.2	12.4	Negligible
R11	13.2	13.3	Negligible
R12	12.7	12.7	Negligible
R13	11.9	11.9	Negligible
R14	12.2	12.2	Negligible
R15	12.3	12.5	Negligible
R16	11.3	11.3	Negligible
Limit value	25	25	

Table 6.18: Predicted concentrations of PM_{2.5} in 2017 "Without Scheme" and "With Scheme"

- 6.93 Table 6.19 sets out the predicted 98th percentile of 1-hour mean odour unit concentrations in 2017, "Without Scheme" and "With Scheme" at the identified receptors.

Location	Without Scheme	With Scheme
R1	0.39	0.41
R2	0.35	0.38
R3	0.30	0.32
R4	0.28	0.32
R5	0.18	0.25
R6	0.08	0.10
R7	0.30	0.33
R8	0.47	0.46
R9	0.48	0.49
R10	0.50	0.49
R11	0.09	0.11
R12	0.05	0.06
R13	0.09	0.11
R14	0.03	0.04
R15	0.11	0.13
R16	0.11	0.16

Table 6.19: Predicted 98th Percentile of 1-hour Mean Odour Unit Concentrations (OU_E/m³) in 2017 "Without Scheme" and "With Scheme"

- 6.94 Predicted 98th percentiles of 1-hour mean odour unit concentrations are generally higher With Scheme³, but all levels remain well below recognised thresholds.

Climate change emissions

- 6.95 The estimated change in carbon dioxide emissions associated with the proposed scheme in 2017 is shown in table 6.20.

	CO ₂ (kt CO ₂)		
	Scope 1	Scope 2	Scope 3
2017 "Without Scheme"	0.39	2.40	58.31
2017 "With Scheme"	0.57	3.49	80.31

Table 6.20: Carbon dioxide emissions 2017 (airport operations)

- 6.96 Whilst total carbon dioxide emissions increase with the proposed development, the emissions expressed as tonnes/mppa decreases slightly from Without Scheme (4.92 kt/mppa) to With Scheme (4.68 kt/mppa).

³ Some predicted concentrations are marginally lower due to the realignment of the aprons and the locations of the emissions sources.

Effects during operation (2028)

- 6.97 Tables 6.21, 6.22 and 6.23 set out the predicted concentrations of nitrogen dioxide, PM₁₀ and PM_{2.5} in 2028, "Without Scheme" and "With Scheme" at the identified receptors. These tables also describe the impacts at each receptor using the impact descriptors given in table 6.3.
- 6.98 For the future year scenarios, the model runs included sensitivity tests using three years meteorological data (2009-2011). The results reported in this Chapter are for the worst-case meteorological year in each case; a full set of results is provided in technical appendix B. The predicted annual mean nitrogen dioxide concentrations for the 2028 With Scheme scenario are described as contour plots in technical appendix B.

Location	Without Scheme	With Scheme	Impact Descriptor
R1	20.8	20.9	Negligible
R2	19.0	19.1	Negligible
R3	19.1	19.2	Negligible
R4	15.4	15.4	Negligible
R5	17.2	17.9	Negligible
R6	12.2	12.2	Negligible
R7	15.3	15.5	Negligible
R8	19.5	20.3	Negligible
R9	27.7	28.6	Negligible
R10	20.1	21.1	Negligible
R11	25.3	25.8	Negligible
R12	21.1	21.2	Negligible
R13	19.0	19.1	Negligible
R14	17.3	17.3	Negligible
R15	19.3	19.7	Negligible
R16	16.6	16.8	Negligible
Objective	40	40	

Table 6.21: Predicted annual mean concentrations (µg/m³) of nitrogen dioxide (NO₂) in 2028 "Without Scheme" and "With Scheme"

- 6.99 There are no predicted exceedences of the objective with or without the scheme, at any location. The magnitudes of change between "Without Scheme" and "With Scheme" are all *imperceptible* or *small*, and the impacts are *negligible* at all receptors.
- 6.100 In terms of PM₁₀ and PM_{2.5}, no exceedences of the objectives are predicted, the magnitudes of change are *imperceptible* or *small*, and all of the impacts are *negligible*.

Location	Without Scheme	With Scheme	Impact Descriptor	Without Scheme	With Scheme	Impact Descriptor
R1	16.6	16.7	Negligible	1	1	Negligible
R2	15.5	15.6	Negligible	0	0	Negligible
R3	15.5	15.6	Negligible	0	0	Negligible
R4	15.9	16.0	Negligible	0	0	Negligible
R5	15.6	15.6	Negligible	0	0	Negligible
R6	15.6	15.6	Negligible	0	0	Negligible
R7	15.1	15.2	Negligible	0	0	Negligible
R8	16.9	17.3	Negligible	1	1	Negligible
R9	19.2	19.6	Negligible	2	3	Negligible
R10	17.3	17.7	Negligible	1	1	Negligible
R11	19.1	19.3	Negligible	2	3	Negligible
R12	17.8	17.8	Negligible	1	1	Negligible
R13	17.1	17.1	Negligible	1	1	Negligible
R14	18.1	18.1	Negligible	2	2	Negligible
R15	17.6	17.8	Negligible	1	1	Negligible
R16	15.9	15.9	Negligible	0	0	Negligible
Objective	40	40			40	

Table 6.22: Predicted annual mean concentrations ($\mu\text{g}/\text{m}^3$) of PM_{10} in 2028, and number of days $\text{PM}_{10} > 50\mu\text{g}/\text{m}^3$, “Without Scheme” and “With Scheme”

Location	Without Scheme	With Scheme	Impact Descriptor
R1	11.3	11.3	Negligible
R2	10.6	10.6	Negligible
R3	10.6	10.7	Negligible
R4	10.4	10.4	Negligible
R5	10.3	10.4	Negligible
R6	9.9	10.0	Negligible
R7	10.4	10.5	Negligible
R8	11.5	11.7	Negligible
R9	13.0	13.2	Negligible
R10	11.7	11.9	Negligible
R11	12.6	12.7	Negligible
R12	12.2	12.2	Negligible
R13	11.5	11.5	Negligible
R14	11.7	11.7	Negligible
R15	11.9	12.0	Negligible
R16	10.9	10.9	Negligible
Limit value	25	25	

Table 6.23: Predicted concentrations of $\text{PM}_{2.5}$ in 2028 “Without Scheme” and “With Scheme”

6.101 Table 6.24 set out the predicted 98th percentile of 1-hour mean odour unit concentrations in 2028, “Without Scheme” and “With Scheme” at the identified

receptors. Predicted concentrations are generally higher With Scheme⁴, but all levels remain well below recognised thresholds.

	Without Scheme	With Scheme
R1	0.39	0.41
R2	0.35	0.38
R3	0.30	0.32
R4	0.28	0.32
R5	0.18	0.25
R6	0.08	0.10
R7	0.30	0.33
R8	0.47	0.46
R9	0.48	0.49
R10	0.50	0.49
R11	0.09	0.11
R12	0.05	0.06
R13	0.09	0.11
R14	0.03	0.04
R15	0.11	0.13
R16	0.11	0.16

Table 6.24: Predicted 98th Percentile of 1-hour Mean Odour Unit Concentrations (OU_E/m³) in 2028 "Without Scheme" and "With Scheme"

Climate change emissions

- 6.102 The estimated change in carbon dioxide emissions associated with the proposed scheme in 2028 is shown in table 6.25.

	CO ₂ (kt CO ₂)		
	Scope 1	Scope 2	Scope 3
2028 "Without Scheme"	0.39	2.40	58.31
2028 "With Scheme"	0.57	3.49	80.31

Table 6.25: Carbon dioxide emissions 2028 (airport operations)

- 6.103 Whilst total carbon dioxide emissions increase with the proposed development, the emissions expressed as tonnes/mppa decreases slightly from Without Scheme (4.92 kt/mppa) to With Scheme (4.68 kt/mppa).

Significance of Operational Air Quality Impacts (2017)

- 6.104 The operational air quality impacts with regard to the health-based criteria are judged to be insignificant. This professional judgement is made in accordance with the methodology set out in paragraphs 6.28-6.30, taking into account the factors set out in table 6.5, and also taking into account the uncertainty over future projections of traffic-related nitrogen dioxide concentrations in 2017, which may not decline as rapidly as expected. The latter has been addressed by giving consideration to both

⁴ Some predicted concentrations are marginally lower due to the realignment of the aprons and the locations of the emissions sources.

sets of modelled results for nitrogen dioxide; those with and without reductions in traffic emissions. It is to be expected that concentrations will fall in the range between the two sets of results, although by 2017 the impacts are likely to be closer to the 'with reduction' results.

- 6.105 More specifically, the judgement that the air quality impacts will be insignificant takes account of the assessment that concentrations are predicted to be marginally above the annual mean nitrogen dioxide objective at only one receptor (based on no road traffic emissions reduction) and the impacts are all negligible. The assessment has also included a number of worst case assumptions. A summary of the analysis is shown in table 6.21.

Factors	Outcome of Assessment
Number of people affected by increases and/or decreases in concentrations and a judgement on the overall balance.	The proposed development would lead to an increase in pollutant concentrations across the study area, but the majority of people would only experience changes that are defined as negligible.
The magnitude of the changes and the descriptions of the impacts at the receptors i.e. using the findings based on tables 6.3 and 6.4.	The magnitudes of the changes are imperceptible at all receptors, and the impacts are all negligible.
Whether or not an exceedence of an objective or limit value is predicted to arise in the study area where none existed before or an exceedence area is substantially increased.	The proposed development would not cause any new exceedences of the objectives, and would not affect the existing AQMA.
Whether or not the study area exceeds an objective or limit value and this exceedence is removed or the exceedence area is reduced.	Exceedences of the annual mean objective are predicted at two receptors in the baseline year (2011) and in 2017 (without emissions reduction) – this prediction includes a number of worst-case assumptions on emissions reduction and operational capacity of the Airport. The scheme would not cause any new exceedences to occur.
Uncertainty, including the extent to which worst-case assumptions have been made	The model has been validated for the 2011 baseline year, and the uncertainty associated with road traffic emissions has been explicitly considered in a sensitivity test. A worst case assumption has been made regarding full operational capacity by 2017. Forecast traffic flows include all committed developments.

The extent to which an objective or limit value is exceeded, e.g. an annual mean NO₂ of 41 µg/m³ should attract less significance than an annual mean of 51 µg/m³

Marginal exceedences are predicted at two receptor locations in 2011. Annual mean nitrogen dioxide concentrations are predicted to be around 48 µg/m³ in 2017 (with or without the scheme) but only based on a number of worst case assumptions regarding no emissions reduction and full operational capacity of the Airport.

Table 6.21: Factors Taken into Account when Determining Air Quality Significance

- 6.106 With regard to potential odour impacts, although the predicted 98th percentiles of 1-hour mean odour unit concentrations increase with the proposed development, levels remain well below recognised threshold criteria. It is therefore concluded that the odour impacts are insignificant.

Significance of Operational Air Quality Impacts (2028)

- 6.107 The operational air quality impacts with regard to the health-based criteria are judged to be insignificant. This professional judgement is made in accordance with the methodology set out in paragraphs 6.28-6.30, taking into account the factors set out in table 6.5.
- 6.108 More specifically, the judgement that the air quality impacts will be insignificant takes account of the assessment that concentrations are predicted to be below the objectives at all receptors and the impacts are all negligible. The assessment has also included a number of worst case assumptions. A summary of the analysis is shown in table 6.22.

Factors	Outcome of Assessment
Number of people affected by increases and/or decreases in concentrations and a judgement on the overall balance.	The proposed development would lead to an increase in pollutant concentrations across the study area, but the majority of people would only experience changes that are defined as negligible.
The magnitude of the changes and the descriptions of the impacts at the receptors i.e. using the findings based on tables 6.3 and 6.4.	The magnitudes of the changes are imperceptible at all receptors, and the impacts are all negligible.
Whether or not an exceedence of an objective or limit value is predicted to arise in the study area where none existed before or an exceedence area is substantially increased.	The proposed development would not cause any new exceedences of the objectives, and would not affect the existing AQMA.
Whether or not the study area exceeds an objective or limit value and this exceedence is removed or the exceedence area is reduced.	There are no predicted exceedences of the objectives across the study area.

Uncertainty, including the extent to which worst-case assumptions have been made	The model has been validated for the 2011 baseline year, and the uncertainty associated with road traffic emissions has been explicitly considered in a sensitivity test. A worst case assumption has been made regarding full operational capacity by 2017. Forecast traffic flows include all committed developments.
The extent to which an objective or limit value is exceeded, e.g. an annual mean NO ₂ of 41 µg/m ³ should attract less significance than an annual mean of 51 µg/m ³	There are no predicted exceedences of the objectives across the study area.

Table 6.22: Factors Taken into Account when Determining Air Quality Significance

- 6.109 With regard to potential odour impacts, although the predicted 98th percentiles of 1-hour mean odour unit concentrations increase with the proposed development, levels remain well below recognised threshold criteria. It is therefore concluded that the odour impacts are insignificant.

Significance of climate change impacts (2017 and 2028)

- 6.110 There are no standard criteria that can be used to assess the significance of climate change emissions from individual airports. Emissions of carbon dioxide take place predominantly at altitude, and not just within the ceiling height defined in the LTO cycle. The wider scale impacts are thus relevant at the national and global scales, and they relate to emissions over a wider area than the Airport. It is therefore appropriate to consider the emissions from the airport within the national context.
- 6.111 The overall impact of emissions from the Airport can be placed into context by reference to the lower half of table 6.23, which sets out the total UK emissions. These are based on 2010, which is the most recent year for which final national statistics have been published.
- 6.112 Although the proposed development would increase carbon dioxide emissions above the baseline, the increment to UK emissions represents an extremely small change. In addition, the incremental change in 2028⁵ associated with the proposed development represents only a tiny proportion of the UK reduction target of 640 mtCO₂e between 1990 and 2050.

⁵ Only the 2028 scenarios are shown, as these are the same as the 2017 scenarios which assume 12.4 mppa and 18 mppa for the Without and With Scheme scenarios.

	CO ₂ (kt CO ₂)			
	Scope 1	Scope 2	Scope 3	Total
2011	0.30	1.84	47.43	49.57
2028 "Without Scheme" ^a	0.39	2.40	58.31	61.10
2028 "With Scheme" ^a	0.57	3.49	80.31	84.37
With Scheme increment above 2011 baseline	+0.27	+1.65	+32.88	+34.80
With Scheme increment above Without Scheme	+0.18	+1.09	+22.00	+23.27
2010 UK Total	-	-	-	495,800 ^b

Table 6.22: Comparison of airport CO₂ emissions with UK total

a 2017 and 2028 emissions identical as full operational capacity is assumed in 2017.

b Reported by the Department of Energy and Climate Change 2012.

http://www.decc.gov.uk/en/content/cms/news/pn12_033/pn12_033.aspx

Mitigation

Construction impacts

6.113 Although the impacts of the construction activities are judged to be negligible, measures to mitigate dust emissions would be implemented during the demolition and construction phases of the development. Guidance is available from the Building Research Establishment on controlling dust from construction sites (BRE, 2003), and the following measures would be applied as appropriate:

- Water-suppression to minimise dust during demolition activity
- Use of water-sprays to ensure that any unpaved routes across the site are maintained in a damp condition when in use
- Use of consolidated surfaces close to residential areas
- Imposition and enforcement of a 5 mph speed limit on unpaved ground
- Minimising any dust generating activities on very dry or windy days
- Sheeting of all lorries carrying materials on and off site
- Locating and/or covering of stockpiles as far from sensitive locations as possible, and provision of appropriate hoardings
- Wherever practicable, off-road plant to use Ultra-Low Sulphur Diesel and be equipped with exhaust after-treatment
- Regular cleaning of all paved areas on-site
- Use of a jet-spray vehicle and wheel wash for all vehicles leaving the site
- Regular use of a water-assisted dust sweeper on the access and local roads, as necessary, to remove any material tracked out of the site
- Use of water suppression during any cutting of stone or concrete.

6.114 Where mitigation measures rely on water, it is expected that only sufficient water will be applied to damp down the material. There should not be any excess to potentially contaminate local watercourses.

Impacts on human health

- 6.115 The assessment has shown that the impacts are judged to be insignificant.
- 6.116 Measures to reduce emissions from the road transport sector are primarily being delivered through the introduction of increasingly stringent emissions standards at the European level.
- 6.117 Mitigation measures to further minimise local air quality impacts will be addressed via the Airport Surface Access Strategy (ASAS). This commits the Airport to:
- Work with partners to deliver sustainable transport solutions
 - Work with stakeholders, including public transport operators and transport authorities, to ensure a coordinated approach
 - Build on the Airport's function as a regional interchange centre to further improve public services
 - Set challenging targets for reducing dependence on the private car
 - Identify specific actions to encourage greater use of public transport and more sustainable travel behaviour.

Odour impacts

- 6.118 The assessment has demonstrated that odour impacts are insignificant. The Airport has committed to eliminating the use of APUs on stand, which will reduce hydrocarbon emissions from the apron area. This will further minimise any odour impacts.

Climate change

- 6.119 For those sources defined within Scope 1 and Scope 2, carbon dioxide emissions were reduced by 3.1% (768 tonnes) from 2010 to 2011, by reductions in diesel, electricity and gas usage (LLA, 2011). The Airport is further committed to reducing carbon dioxide emissions from these sources and has appointed British Gas for Business to conduct a three year Carbon Management Plan to reduce emissions associated with energy consumption. The Airport will continue to implement measures to reduce carbon dioxide emissions, particularly within the realm of Scope 1 and Scope 2 sources, and it is expected that the Airport will save 3,000 tonnes of carbon by December 2013, compared with 2010.
- 6.120 The proposed works will be designed to current building regulations and the design will use a holistic approach to energy efficiency. This will include cladding and curtain walling systems with low U-values, the refurbishment and renewal of sections of existing plant equipment, especially in the Old Terminal Building, and the use of high efficiency lighting. The forecast Scope 1 and Scope 2 emissions in 2028 are thus likely to have been overestimated.
- 6.121 For those emissions within Scope 3A, there is limited, direct action that the Airport can take. However, the turnover of aircraft fleets by the principal airline operators at the Airport is relatively high, and there are continual improvements being made to the

fuel efficiency of new engines. The forecast Scope 3 emissions in 2028 are thus likely to have been overestimated.

- 6.122 The overall effects of carbon dioxide emissions are judged to be minor adverse.

Cumulative impacts

- 6.123 A number of other developments are scheduled during the period of the construction works of the proposed development e.g. Junction 10a improvements, Century Park and the Sundon Rail Freight Depot. Given the distance of these developments from the construction activities at the airport, and the distance of sensitive receptors, it is not considered likely that any cumulative impacts would occur.
- 6.124 Cumulative impacts associated with the operation of the proposed development are only related to the potential impacts of increased road traffic generation by other committed developments. As the traffic associated with committed developments has been included within the future baseline scenarios, cumulative impacts have been fully accounted for within the assessment.

Residual effects

- 6.125 The potential effects of dust emissions during construction have been considered, and are considered negligible due to the absence of nearby sensitive receptors. Nonetheless, a series of mitigation measures in line with current best practice have been proposed. Any resulting residual effects will be negligible and temporary.
- 6.126 Concentrations of nitrogen dioxide, PM₁₀ and PM_{2.5} associated with Airport operations and associated road traffic have been predicted across the study area. The effects are negligible and are considered to be insignificant.
- 6.127 Predicted concentrations of 98th percentile of 1-hour mean odour units are well below recognised thresholds for odour nuisance.
- 6.128 A summary of the predicted effects, the proposed mitigation measures, and the residual effects is described in table 6.23
- 6.129 The proposed development will not materially affect the Council's Air Quality Management Area, nor will it interfere or conflict with measures in the Air Quality Action Plan. It is concluded that the proposed development is consistent with the NPPF, and it is not anticipated that there will be any air quality constraints.

	Initial effect	Proposed mitigation	Residual effect
Construction			
Construction dust	Insignificant, localised	Mitigation measures in line with current best practice	Insignificant, localised and medium term
Operation			
Airport and traffic emissions (NO ₂ and PM ₁₀)	Insignificant	Mitigation will be primarily delivered through increasingly stringent road transport emissions standards. The Airport's Surface Access Strategy will also serve to reduce use of the private car.	Insignificant
Odours	Insignificant	LLA has committed to eliminate the use of APU on stand which will reduce emissions of hydrocarbons	Insignificant
Climate change	Minor adverse	LLA has committed to a series of actions to reduce CO ₂ emissions within Scope 1 and Scope 2 sources. Continued improvements to the fuel efficiency of new aircraft engines are expected to deliver substantial improvements by 2028.	Insignificant

Table 6.23: Summary of initial effects, mitigation measures and residual effects

Ch 7

Environmental Statement
Chapter 7 Cultural heritage



Chapter 7: Cultural heritage

Introduction

- 7.1 This chapter considers the impacts of the proposed development at the Airport on the historic environment, including designated and undesignated heritage assets such as archaeological remains, historic buildings and areas and designed landscapes.

Legislation and policy

National policy

- 7.2 National policy recognises the value and significance of cultural heritage, the public interest in the preservation of particular assets and sets out mechanisms to ensure that it is taken into account in planning decision making. Sites and features of identified interest are protected by the Ancient Monuments and Archaeological Areas Act 1979 as amended, and within the Town and Country Planning (Listed Buildings and Conservation Areas) Act 1990.
- 7.3 National planning policy guidance on conserving and enhancing the historic environment is contained within the National Planning Policy Framework (NPPF), which replaces PPS5 Planning for the Historic Environment (although it has been confirmed that the PPS5 Practice Guide remains relevant until replaced by new guidance). The NPPF sets 12 core planning principles for sustainable development and one relevant to this assessment is that heritage assets should be conserved in a manner appropriate to their significance, so that they can contribute to quality of life now and in the future.
- 7.4 Detailed national policies on development management concern the need to clearly define the significance of any potentially affected site or area, the pre-application information requirements for any proposals, including for archaeological field evaluation, and the principles to be considered in determining any proposal for change potentially affecting heritage assets. There is an overall requirement to gather sufficient information to ensure an adequate understanding of the significance of an asset before any decisions affecting its future are made. A key concept in the NPPF is that of proportionality; that the information required, efforts to preserve, and degree of public benefits necessary to offset any harm or loss of an asset should be based on an understanding of its significance.

Local policy

- 7.5 The relevant saved policies in the Luton Borough Council Local Plan 2001 - 2011 are ENV6 which states that the preferred method of conserving archaeological features is preservation in situ, and that when this is not justified, and development is likely to result in adverse impacts, provision should be made for appropriate excavation and recording; ENV7 which requires development proposals to conserve the architectural and historic character of listed buildings; and ENV8 which requires development proposals affecting conservation area to be of an appropriate design

and seeks to ensure landscape features contributing to the setting of conservation areas are preserved.

- 7.6 The site is bordered by the district boundaries of Central Bedfordshire to the south west and North Hertfordshire to the east. The relevant saved policy of the South Bedfordshire Local Plan Review (adopted January 2004) is BE7 Historic parks and gardens, which refers to Luton Hoo, to the south east of the Airport, and seeks to encourage its conservation, enhancement and restoration. Planning permission will not be granted for development that causes unacceptable harm to the character and appearance of such areas and their settings. The relevant saved policy of the North Hertfordshire District Council Local Plan (No. 2 with Alterations originally adopted in April 1996) is policy 16 which identifies areas of archaeological significance where preliminary evaluation of any potential archaeological remains may be required before decisions to permit or to refuse development proposals..

Methodology

- 7.7 The desk-based study assesses the cultural heritage of the site and its environs as they appear in existing information through designation, the national or local archaeological record, documentary sources or other studies. The Central Bedfordshire Historic Environment Record (HER)¹ and, Hertfordshire online HER via the heritage gateway, was consulted to ascertain the scale to which archaeological features are known to survive within the site area, and for a 1.5 kilometre study area surrounding the site boundary.
- 7.8 The data sources consulted are outlined in table 7.1. All heritage assets (both designated and undesignated) are illustrated on figure 7.1, and are listed in the gazetteer in technical appendix C1.

Aerial Photograph: Environment Agency. LIDAR coverage of Hertfordshire.
Bowyer, M., 1983, Action Stations: Bedfordshire, P. Stephens Publications
Burleigh, G., and Stevenson, M., 2000, A decade of archaeological fieldwork in North Hertfordshire, 1989-1999.
Burleigh, G., and Went, D., 1990, Humberside to Buncefield pipeline preconstruction archaeological survey report: Winch Hill Farm/Darleyhall, Herts.
Cameron, K. 1961, English Place-Names, Batsford London
Central Bedfordshire Council Historic Environment Record
Darvill, T., 1996, Prehistoric Britain from the air, Cambridge
Davis, M.J. et al., 2004, Mitigation of construction impact on archaeological remains, English Heritage
Debois Landscape Survey Group, 2003 Luton Hoo, Bedfordshire; a history of the landscape
Denver Construction Services Ltd, 2002-03, Ground investigations for passenger walkway, pier and northeast development, prepared for London Luton Airport Operations Ltd.
English Heritage , 2011 The setting of heritage assets: English Heritage guidance
Hudspith, R., 2008, Fieldwalking survey on land east of Luton, North Herts. Manshead Archaeology Society
IfA, 1999 (revised 2010), Standard and Guidance for Archaeological Desk Based

¹ The HER information was received on 19/03/2012 from the Central Bedfordshire Council Historic Environment team.

Assessments

- Lambrick, G. & Hind, J., 2005, Review of Cultural heritage coverage in Environmental Impact Assessments – Planarch 2
- Landmark Envirocheck ® Reports refs. 11852601-1-2 and EC266214-1-1
- Luton Borough local plan 2001-2011, 2006
- Ordnance Survey maps, all editions, from one inch 1889-91 edition to modern day
- Pevsner N, 1968, Buildings of England; Bedfordshire, Huntingdon and Peterborough
- Pullen, R., and McOmish, D., 2010, Brickkiln Wood, Offley, Herts: analytical earthwork survey and landscape context. archaeological survey.
- Semmelmann, K., and Saunders, K., 2005, Tankards barn, Tea Green, Offley, Herts: historic building record & archaeological monitoring report.
- Sheldon, S., and Barber, A., 2008, Proposed urban expansion, land east of Luton, Herts: archaeological evaluation. Cotswold Archaeology
- Smith, T.P., 1983, 'Somerles Castle', in the Archaeological Journal, Vol. III, 35-51.
- Stanger Science and Environment, February 1999, 'Environmental Evaluation – New Valet and Storage Parking Scheme', prepared for London Luton Airport Operations Ltd
- Taylor, C., 1987, Fields in the English Landscape, Alan Sutton
- Terence O'Rourke Ltd 2005, Cultural Heritage Desk Top Assessment of Runway Replacement Options for London Luton Airport
- URS, July 2005, Luton Airport Expansion optioneering: Ground condition and land contamination evaluation
- Wessex Archaeology, 1996, The English Rivers Palaeolithic Project. Report no.1, 1994-1995: the Thames Valley and the Warwickshire Avon
- West, S., 1997, Luton Golf Centre, Wandon End, Kings Walden, Herts; an interim archaeological evaluation report. field evaluation. RNO 105
- Williams, A. and Martin, G.H. (eds.), 1992, Domesday Book: A complete translation, Penguin
- Winter, M. and Saunders, G. 2009, East Luton Corridor, Luton, Bedfordshire: Archaeological Monitoring Report. Report no. 561. Heritage Network Ltd
- www.bgs.ac.uk/geoindex for geological background of the site and area.
- www.digital-documents.co.uk
- <http://list.english-heritage.org.uk/mapsearch.aspx> The national heritage list for England

Table 7.1: Data sources consulted

- 7.9 The chapter makes use of the visual envelope, ZVI, viewpoint photographs and photomontages produced for the landscape and visual effects assessment in chapter 11 of this ES. A number of the representative viewpoints illustrate localised effects in detail. The most relevant to this assessment are viewpoints 12, and 13 for the assessment of particular assets and viewpoints 5, 7, 8 and 9 for the wider area (figures 11.9 to 11.11). The methodology for production of these images is outlined in the landscape chapter. All photographs are taken from publicly accessible locations. The assessment also cross-refers where necessary to the assessment of noise (chapter 12 of this ES). The parameters for the EIA are set out in chapter 3 of this ES.

Scope of work

- 7.10 The intention of the assessment is to provide a description of the likely value, extent, state of preservation and potential significance of heritage assets within the development site and the wider study area that could potentially be affected by the proposals. It includes considerations of all nationally and locally identified buildings,

areas and their settings, and of the overall historic character of the area. The archaeological element of the study was undertaken with reference to the Institute for Archaeologists' Code of Conduct and appropriate standards.

Scoping opinions

- 7.11 The response to EIA scoping issued by Luton Borough Council on 1 November 2012 confirmed that reference should be made to the Central Bedfordshire and Luton Historic Environmental Record and historic environmental record search to include Hertfordshire. Comments were provided by English Heritage directly by email on 20 July 2012 and stated that the assessment should include consideration of effects on the two major assets at Someries Castle and Luton Hoo, and should specifically cover effects from noise, vibration and changes to air quality as well as from potential visual changes through new built development.

Limitations of the study

- 7.12 The conclusions of this assessment are limited by the extent and quantity of existing information on the cultural heritage resource. Its usefulness in predicting the actual archaeological resource is therefore restricted and the complete survival of archaeological deposits across undeveloped areas of the proposals site cannot be fully quantified. It is notable that very few concentrated sites or findspots are located in and around Luton, or within the Airport boundary. This may be the effect of urbanisation and construction of the Airport, which suggests the area may be devoid of any elements of historic significance, or could equally be due to the lack of archaeological site investigations in the area. The water retentive soils of the study area do not always reveal cropmark features so the potential of aerial photographs to show new, as yet undiscovered, archaeological sites in the study area is considered low. The collection of aerial photographs held by Bedfordshire County Council were consulted as part of a previous desktop assessment at the Airport by Terence O'Rourke Ltd (2005) and no definite features were seen within or traversing the current boundary.

Assessment of significance

- 7.13 The broad criteria developed for measures of the importance or sensitivity of the resource affected, and the magnitude of/or scale of the change are shown on figures 7.2 and 7.5 respectively. The generic definitions of the significance of potential effects can then be generated by feeding the two resultant sets of criteria into the potential significance matrix (figure 7.4). Effects of more than a moderate degree are classed as significant effects for the purposes of this assessment.
- 7.14 In order to assess the potential effects on cultural heritage of the proposed development, the chapter first makes an overall assessment of the components, qualities and level of importance or value of all heritage assets in the study area including above and below ground archaeology and structures and their settings.
- 7.15 The issue of setting concerns the potential contribution of surrounding land to the significance of any single asset or group of assets. *The setting of heritage assets: English Heritage guidance* (2011) seeks to enable a consistent approach to assessment of setting and the range of historic, visual or functional relationships of an asset to the surrounding land area. These include both physical attributes and

perceptual values, depending on the nature of an asset and its present surroundings. Potentially significant views can be deliberately designed or incidental, or the result of later changes. The importance of the surrounding land or particular views or vistas to the significance of a feature or building, and to how it is understood and appreciated, can therefore vary greatly.

- 7.16 The assessment of value, coupled with reference to national guidance relevant policy statements and best professional practice, allows a judgement to be made of the importance of significance of identified impacts on the asset. The focus is the inherent value and importance of the historic asset itself, which is clearly separated in the assessment from any public amenity value particular sites may have, or potential contribution to tourism or other interests.
- 7.17 The judgement of the magnitude of change likely to occur as a result of development is based on available information on the proposed development; immediate and direct changes such as ground disturbance for construction, the removal of existing structures, routes or trees, any changes to drainage and changes to the land form or from the addition of new structures and transport networks or changes to views of or from heritage features, or perceptions of their priority in the landscape.

Baseline conditions

- 7.18 This section outlines the designated and undesignated assets in the 1.5 kilometre study area as recorded in the Central Bedfordshire HER (CBHER) and Heritage Gateway (Hertfordshire online HER). These assets are shown on figure 7.1. There are no designated heritage assets on the Airport site itself. The study area includes a single scheduled monument, the ruins of a medieval magnate's residence and associated 16th and 17th century formal garden remains of Someries Castle to the south of the main runway, and Luton Hoo registered historic park and gardens to the south east of the Airport. There are a total of 54 records within the study area. The baseline information is presented in chronological order from the Palaeolithic period to recent times. The data collated, where available, has been placed into broadly accepted chronological periods.

Geological conditions

- 7.19 The underlying solid geology of the area is mapped as Upper Chalk of the Cretaceous era, overlain by Clay-with-Flints and brickearth deposits. Several intrusive investigations, see chapter 10 of this ES, allow a broad statement of the on-site stratigraphy.
- 7.20 The developed extent of the Airport is predominantly covered with a thin layer of Made Ground, which varies in depth between 0.1 metre and 1.4 metres below ground level (bgl). This layer comprises tarmac, concrete/rubble hardcore, mixed soil with ash, brick and clinker or clay with sand, ash and brick. The extent and composition of the Made Ground is highly variable in the north eastern corner of the site, where a former landfill site has been capped by between 1-3 metres of

material. Infill material has been recorded within this area to range in depth from 5 to 13.5 metres bgl.²

- 7.21 The Made Ground overlies Quaternary drift deposits Clay-with-Flints with varying depths on site between 1.45 metres to over 16.5 metres bgl. This deposit is present across the whole extent of the existing CTA. The solid geology underlying the Clay-with-Flints is chalk and is known to vary from 1.45 metres bgl to below the deepest Clay-with-Flints.

Prehistoric: Palaeolithic to Iron Age

- 7.22 There is one known Palaeolithic findspot in the study area (TOR 8). A single flint handaxe was discovered during a survey project carried out by Wessex Archaeology in 1995³. It was discovered in a brickearth deposit overlying gravel, on a dry valley setting immediately north of Dane Street Cottages.
- 7.23 The Mesolithic evidence mainly comprises surface scatters of flint implements (TOR 37) usually revealed after ploughing such as those recorded to the east of Ashcroft High School (TOR 38). Fieldwalking recovered worked flints including two Mesolithic blade fragments and Neolithic/Bronze Age flint tools, cores, hammer stones and retouched flakes together alluding to prehistoric activity on land to the east of Luton⁴. There are no such findspots within the Airport.
- 7.24 There is no evidence for Neolithic or Bronze Age settlements in the study area or the wider landscape. It is possible that the surface finds discovered in the course of fieldwalking (TOR 48) and a Neolithic pit (TOR 52), may be tentative indicators of settlements in this area from these periods.
- 7.25 A 2008 evaluation report⁵ suggests the area to the east of Luton, around Mangrove Green and Cockernhoe, may have potential for Neolithic activity. A Boulder Clay plateau dominates geological soil conditions across the area to the east of Luton, producing areas of raised relief with chalky-clay soils which in the region have led to intensive exploitation from the late Neolithic/early Bronze Age and with permanent farming settlements evidenced by the mid to late Bronze Age.
- 7.26 The evaluation identified archaeological deposits on land east of Luton in the vicinity of Mangrove Green and Cockernhoe, with evidence dating from the Middle Neolithic through to the modern period. Prehistoric activity was sparsely represented across the site and was limited to isolated pits and ditches, probably indicative of agricultural activity.
- 7.27 Areas adjacent to river valleys have been shown as the most favourable locations for settlements in the Iron Age in the county. The presence of the extensively landscaped park and garden of Luton Hoo obscures clear landscape assessment in the valley of the River Lea. The railway line and Lower Harpenden Road cut through this valley, which undoubtedly destroyed sites along their route. Only one findspot (TOR 6) can be tentatively dated to this period.

² Denver Construction Services Ltd 2002-3 and URS 2005

³ Wessex Archaeology 1996, 12

⁴ Hudspith 2008

⁵ Cotswold Archaeology 2008

Early historic to medieval period

- 7.28 The Romano-British period is well represented in this region, with one of the main arterial road routes, Watling Street, running to the south west of Luton centre, and the city of Verulamium (St. Albans) 7 kilometres to the south. The settlements in the study area at this time were likely to have consisted of farmsteads in the hinterlands between established trading towns.
- 7.29 A chance discovery of a coin hoard of over a thousand coins on the Luton Hoo Estate in 1864 (TOR 21) perhaps indicates the presence of a prestigious building somewhere in the Luton area. The presence of a well-appointed Roman building somewhere in the vicinity has also been conjectured from building materials, a large quantity of Romano-British tile fragments and a samian sherd, recovered during fieldwalking by the Luton Archaeological Society near Brickkiln Wood⁶. Evaluation of the area found a concentration of activity was apparent to the immediate south east and north west of Brickkiln Wood, including Roman clay extraction pits and adjacent areas of hardstanding, associated with finds of tile, pottery, animal bone and tesserae. However, there was no evidence to indicate tile production took place immediately within the areas examined⁷. Further to this, fieldwalking west of Cockernhoe village produced two mortaria fragments, with further Romano-British coarseware sherds from a field south west of Mangrove Green⁸.
- 7.30 These sites to the north east of the Airport clearly show that the area around Cockernhoe, Brickkiln Wood and Winch Hill were exploited and settled during the Romano-British period.
- 7.31 A number of findspots suggest ephemeral Roman activity in the wider study area (TOR 36) and some minor Roman features were discovered within the Airport boundary during construction of an electricity station and lighting control centre in 1960 (TOR 42).
- 7.32 Settlement pattern evidence from the regions of Bedfordshire and Hertfordshire indicates that the river gravels were zones favoured by the Anglo-Saxons⁹. The town of Luton originated in the 6th century after the Saxons conquered Bedfordshire. The name 'Hoo' is a Saxon word more commonly used in the east of England, meaning spur of a hill. The name Luton probably originates from the fact that the first Anglo-Saxon settlement in the area was a large farmstead or 'tun' by the River Lea¹⁰. Unfortunately, little archaeological research has been carried out on the Saxon origins of Luton. This may be a result of the rapid urbanisation of the area in the 20th century, as well as a significant area being landscaped in the 18th and 19th century in the Luton Hoo park. The majority of known sites in the vicinity are graves and cemetery sites including a burial identified at a site at Kings Walden that has been interpreted as a burial landscape of probable Bronze Age date that attracted secondary burials during the Anglo-Saxon period¹¹. An Anglo-Saxon burial is recorded to the north east of Winch Hill Farm (TOR 9) where a single female skeleton was uncovered in 1913 by workmen approximately six feet below the

⁶ Hudspith 2008

⁷ Cotswold Archaeology 2008

⁸ Hudspith 2008

⁹ BCAS 1999, 19

¹⁰ Cameron 1961

¹¹ Cotswold Archaeology 2008

surface. Four bronze brooches, a pair of bronze tweezers, as well as other evidence pertaining to an earlier cremated burial dated the finds to the late 7th century.

- 7.33 By the time of the Domesday Survey (1086) the town is referred to as *Loitone* and had a population in the region of 800 people. A market is recorded in 1086, and an annual fair had been established by 1212, with another granted in 1338. In 1221 the town was noted as a borough. The town was badly damaged by fire in 1336 but prosperity had returned by the 17th century with the establishment of the town as a centre of straw plait manufacture. The North Hertfordshire Historic Landscape Characterisation suggests the presence of dense woodland in the locality during the 11th century gradually being opened up with further colonisation and settlement in the 12th and 13th centuries, resulting in patterns of isolated settlements, small hamlets and small 'green' and 'end'-named villages as occur at Mangrove Green and Wandon End¹².
- 7.34 The most significant element of the landscape dating to the medieval period is the remains of what is referred to as Someries Castle (SM20458, TOR 5). This is the remains of the late medieval magnate's house (of domestic rather than military character) begun by Sir John Wenlock in 1448, with a second building phase from 1460. It consists of the surviving gatehouse and chapel forming part of the north west range of a large courtyard house, with below ground remains of the other ranges, and the adjacent earthworks of a formal garden of the 16th and 17th centuries. Evidence of an earlier manor on the site may also survive below ground. Although the roof has gone, the walls of the chapel and gatehouse survive almost to full height. The area occupied by the main block of the residence is defined by a raised platform containing low, irregular earthworks to the north east of the formal garden which survives as a rectangular earthwork enclosed by a bank and ditch, and contains a central square mound.
- 7.35 The house was the earliest brick building in the county, and one of the earliest surviving of this type in England, and is important for the study of the development of construction techniques in brick. After Wenlock's death at the Battle of Tewkesbury in 1471 it was not completed. Leland describes the building in around 1540 as "*A faire place with in the Paroche of Luton caullyd Somerys, the which house was sumptuously begon by the lord Wennelok but not finischid. The Gate House of Brike is very large and faire. Part of the residew of the new Foundations be yet scene and part of the Olde Place standeth yet. It is set on a Hille not far from St. Anne's Hill.*"
- 7.36 An inventory of 1606 records the house as containing 20 rooms in use plus associated farm buildings including a dovecote¹³, and the hearth tax returns record 23 hearths there in 1671, making the house one of the largest in the county¹⁴. Much of the building was pulled down in 1742 by the Napier owners of the Luton Hoo estate and the material was used in the construction of the adjacent farmhouse and cottages at Someries Farm. Lancelot 'Capability' Brown later made use of the ruins of the gatehouse and chapel as a viewcatcher in the layout of the expanded landscape park at Luton Hoo, enhanced by the planting of Bush Pasture on the slopes below.

¹² Cotswold Archaeology 2008

¹³ Smith 1983, 43

¹⁴ *ibid.*

- 7.37 To the north of the Airport boundary, the village of Wandon is a recognised deserted medieval village. It is mentioned in Domesday as comprising six households with three virgates, which represents a notional 90 acres in size. There are no clearly defined remnants of the village on aerial photographs of the area and the site is now a golf driving range. A contemporary ditch containing 11 medieval pottery sherds was discovered during an archaeological evaluation exercise at Wandon End in 1997. This was the only feature uncovered during the evaluation. The area also suggested former medieval settlements to the north west of the Airport at Crawley Green (TOR 34) and to the south at Chiltern Green (TOR 7). At Brickkiln Wood to the north of Wandon, lynchets and other earthworks survive from a pre-woodland field pattern. The relict field system may represent medieval enclosed open fields or an earlier pre-existing Romano-British field system (TOR 53).
- 7.38 Activity during this period within the Airport boundary can be attested to by the site of the former Hospital of St Mary Magdalene, founded before 1170 AD and dissolved c. 1540 AD (TOR 43). The hospital is thought to have been founded by Thomas Becket and was located to the east of Spittlesea Wood, an area now occupied by the Airport. Further activity in the area can be found to the west of the Airport (TOR 33) at the probable site of the Tower and Chapel of St. Anne which was discovered in 1910 in the allotment gardens at the back of the vicarage, in the area called St Anne's Hall, when 12th and late 16th century stonework was uncovered. The building was dismantled in the 18th century.

Post-medieval to modern day

- 7.39 The main element of the historic environment dating to the post-medieval period in the study area is the grade-I listed country house of Luton Hoo, and its landscape park (registered grade II*) (TOR 10). The estate at Luton Hoo is documented since a deed showing occupation by Robert de Hoo in 1245. From the early 16th century there were several rapid changes in ownership of the estate at Luton Hoo, until 1601 when it was acquired by Robert Napier, the second son of Alexander Napier, 6th Lord Merschiton. During their ownership of Luton Hoo the Napier family created the basis of the present house and park, assembling and consolidating the estate. A house was built during the 17th century and a park was in existence by 1619. In 1764 the 4,000 acre estate, including a park of 365 acres, was bought by John Stuart, 3rd Earl of Bute, who began a programme of improvement, with a new house designed by Robert Adam and the enlarged park landscaped by Capability Brown.
- 7.40 Luton Hoo was partially destroyed by fire on several occasions and remained a mixture of the old Napier house and the Adam wings to the south and east until 1825 when the old portions were demolished and the house was completed to designs by Robert Smirke. It was remodelled in the 1850s for John Shaw Leigh and again in 1903 for Sir Julius Wernher. The house is on the edge of the hilltop, surrounded by the landscape park created at the same time as the design by Adam, facing the valley of the River Lea and the two lakes to the east, and the hillside beyond. The slopes to the east of the park are the dominant feature in the setting of the park, with important woodland clumps (Bush Pasture, George Wood and Hardingdell Wood) framing and terminating the view from the east front of the house. Someries Castle appears as a viewcatcher alongside the woodland blocks

on the hills above the lake that was the key element of the design. This view is also important from points along the main entrance drive to the house from the north.

- 7.41 The 2nd edition of the Ordnance Survey map dated 1899-1900 (figure 7.5) shows the area dominated by the park at Luton Hoo, which is skirted by two roads running north to Luton and the railway at the eastern boundary. The Park Town area of Luton is developing to the north along Park Road leading to the main northern entrance to the park. Despite the removal of many of the field boundaries, the wider area retains much of the structure of the historic landscape in the lanes, the main areas of woodland and the individual farmsteads such as Someries, Copt Hall, Tinkers Hall (renamed Chiltern Hall) and the hamlets at Chiltern Green and Perry Green. There are smaller areas of parkland at Lawrence End with its approach avenues, and at East Hyde to the south.
- 7.42 The section of the study area within North Hertfordshire district has been the subject of a historic landscape characterisation programme. The study focused on the shift in the rural landscape through the analysis of field boundary divisions represented on available cartographic and aerial photograph sources from the district. The survey places emphasis on the contribution that past historic processes have made to the character of the landscape as a whole, not just selected 'special sites' and contributes to a wider landscape assessment.
- 7.43 The brick industry has long been associated with Bedfordshire, thanks to the vast deposits of clay in the region. For much of the 20th century, the brick companies in the county employed huge numbers of people, particularly after the Second World War when major construction created a huge demand for bricks. The industry has long since declined, having been replaced by new technologies and products, but evidence of the past industry remains within the study area (TOR 35, TOR 44).

The built historic environment

- 7.44 The buildings on the statutory list of buildings of architectural or historic interest in the area (see figure 7.1 and technical appendix C1) are mainly of agricultural origin, reflecting the predominant historical land use. Many are brick and timber frame of 16th or 17th century origin, and from the 18th century there are several smaller country houses with their surrounding parkland. All are grade II unless otherwise stated.
- 7.45 To the north of the Airport boundary are a number of former farmsteads of 16th and 17th century date, vernacular form and brick and timber frame construction. Closest is Winch Hill Farmhouse (TOR 14) c.1600 (this building is included in the buildings at risk register for North Hertfordshire), others are Wandon End Farmhouse (TOR 15) which is of 16th century origin and Cassels Cottage (TOR 51). Wandon End House (TOR 16) is a formal early 18th century brick house and Wigmore Hall Farmhouse (TOR 47) is an early 19th century house with a hipped welsh slate roof. To the east of the Airport boundary at Diamond End is Woodside Cottage (TOR 17) an 18th century timber frame house with weatherboarding and stuccoed brick. The classical brick country house at Lawrence End (TOR 18) and stables, with coachhouse and attached garden walls (TOR 19) date from 1841. Chiltern Green Farmhouse (TOR 20) is early 17th century brick and timber frame.

- 7.46 More important is the grade II* building that lies to the east in Breachwood Green (TOR 24). The building is situated on Chapel Road and is a late medieval open hall house of early 17th century date. This building, referred to as 'The Old Homestead' is one of several distinctive structures along the western side of Chapel Road.
- 7.47 There is one designated conservation area just outside the study area. Within Luton Hoo historic park and garden is the conservation area of Luton Hoo Home Farm, which incorporates the distinctive hexagonal flower garden.
- 7.48 In the 1880s, the development site was farmland, with one residence and outbuildings named Falconer's Hall (TOR 46). Falconer's Hall was built towards the end of the 16th century by William Crawley. The buildings depicted on the 1888 Ordnance Survey are two converted cottages, with the land part of Eaton Green Farm.
- 7.49 Luton Corporation proposed the creation of an airport in 1934, purchasing land to the south of the town at Eaton Green Farm (TOR 1). Construction began in 1936 and the 373-acre (151-hectare) aerodrome was officially opened on 16 July 1938 by Kingsley Wood, Secretary of State for Air. The Airport had been in use before the official opening, both for flying and by aeroplane manufacturer Percival Aircraft Ltd, which had relocated from Gravesend to a 10-acre site next to the Airport in October 1936. From the beginning, in addition to serving local requirements, the new airport was also intended to act as "London's terminal airport on the northern boundary" as a support for the main London airport at Croydon.
- 7.50 During the Second World War there was an RAF flight school at Luton. The Airport was also a prisoner of war camp for German soldiers (TOR 45). Other traces of activity during the Second World War have since been demolished and are now only visible as earthworks (TOR 41). The aircraft producers Napier's and Percival are the names associated with the Airport in the early years of its operation. Spittlesea Hospital (TOR 40) and wood were situated on the western edge of the site overlooking Vauxhall Motor Works including its War Memorial (TOR 32) on the opposite side of Eaton Green Road.
- 7.51 The British Aircraft Corporation (later to be British Aerospace) acquired Percival and its facilities in the 1950s when it was obvious that the Airport would be expanding. A new control tower was opened 1952. The 1950s and 1960s saw the birth of the affordable holidays travel market, which brought a period of growth and prosperity to the Airport. Increase in demand led to a concrete runway being laid in 1960, which was later extended to the length of c. 7,086 ft (2,160 metres) in 1964¹⁵. The growth of the inclusive tour market at Luton was such that in 1969 a survey revealed that a fifth of all holiday flights from the UK departed from the Airport. By 1972 Luton had become Britain's most profitable airport¹⁶.
- 7.52 Since 1974, the footprint of the Airport site has not increased significantly, but a number of buildings have increased in size, there are several hangars as well as additional taxiways. The current departures terminal was developed in 1998, which incorporated an expansion and upgrade of the existing buildings on site and re-levelling of the runway. The 1960 Ordnance Survey map for the site shows a sand

¹⁵ Bowyer 1983

¹⁶ *ibid.*

pit located in the north east of the site. This pit was excavated and subsequently operated as Luton Borough Council's dump for the disposal of household waste (known as Eaton Green Road landfill site). The majority of the site was closed to public disposal by the 1980s.

- 7.53 The landfill area has been the subject of a number of site investigations in recent years to ascertain the level of and extent of contamination (see chapter 10 of this ES)¹⁷. The landfill on site is currently overlain by between 0.6 and 2.9 metres of gravely clay capping material comprising brick, flint and chalk. Beneath the capping layer, fill depths have been reported up to 13.5 metres bgl and are highly variable, both in composition and extent. The eastern end of the current runway was significantly extended in 1998 as part of the levelling works for the runway. As part of these works, significant quantities of natural ground were reworked to build up the area surrounding and incorporating the eastern end of the runway. In a similar manner, the area to the west of the existing hangars was historically terraced and levelled requiring the reworking of natural chalk.

Assessment of importance

- 7.54 Based on the baseline data outlined above, the receptors listed in table 7.2 have been identified and their sensitivity determined in accordance with figure 7.2.

Receptor	Sensitivity of receptor
<i>On site</i>	
Archaeology; on site	Low
<i>Study area</i>	
Listed buildings	High-medium
Somerles Castle SM	High
Luton Hoo historic parkland	High

Table 7.2: Sensitive receptors

Archaeology

- 7.55 No features or sites of national, regional or local importance are known within the areas of the site being considered for development. However, areas that show an absence of archaeological sites ('blank areas') within the site might not be an accurate reflection of the true below ground resource.
- 7.56 To the south of the Airport boundary are wide-open green spaces currently utilised as farmland with small, nucleated settlement groups of no more than three dwellings (e.g. Chiltern Green). Besides the extant remains of the house and gardens at Somerles Castle to the immediate south west, the majority of archaeology refers to chance surface finds discovered during fieldwalking (TOR 6 and 8). These finds are tentative indicators of possible settlement locations in the general vicinity, as very little archaeological investigation has taken place in the area. To the east (North Hertfordshire), fieldwalking and evaluation have indicated settlements datable to the Romano-British period in the area around Cockernhoe, Brickkiln Wood and Winch Hill.
- 7.57 To the west and north is the urban area of Luton, where little if any archaeological context remains. The same survival of archaeological evidence can be inferred for

¹⁷ URS 2005

the land within the Airport boundary as there have been significant excavations in the 20th century to landscape, maintain and create the runway, taxiways, hangars, terminal buildings and associated structures.

- 7.58 An archaeological monitoring report¹⁸ was carried out for a programme of improvements to the road access to the Airport from the south west known as the East Luton Corridor.
- 7.59 The assessment found no artefacts of archaeological significance to warrant collection or further investigation (i.e. only modern material was recovered). As is likely within the development site, recent activity is likely to have disturbed any underlying archaeology. The monitoring of the road corridor works observed artefacts including broken concrete and modern plastics, indicating a recently disturbed stratigraphy that was characteristic along the length of the road corridor.

Built heritage

- 7.60 There are no national designations within the site. The relatively few listed buildings in the study area are predominantly clustered around villages such as Breachwood Green and Wandon End to the east. These are of high-medium importance. There are a few designated conservation areas and a number of listed buildings outside the study area centred in and around the historic town centre of Luton. Luton Hoo registered park and garden lies to the south west of the site, beyond the railway, and is considered to be of high importance. Within Luton Hoo historic park and garden is the conservation area of Luton Hoo Home Farm.

Potential effects

- 7.61 The proposed development could be a source of impacts on the cultural heritage values and significance of the site and the surrounding area through:
- Ground disturbance for construction activities in previously undisturbed areas
 - The new built form, its scale, extent, appearance and character
 - Changes to the visual qualities of the site
 - Changes to the pattern of use of the Airport, e.g. the frequency and number of aircraft movements, both on the ground and in the air, and the associated changes in noise etc.
- 7.62 The proposed development is described in detail in chapter 3 of this ES. The main components of the scheme are the dualling of the Airport Way from the Holiday Inn roundabout to the Central Terminal Area (approximately 600 metres of road); changes to public transport facilities around the terminal; extensions to the existing terminal buildings and a new pier; extensions to the taxiways at each end of the runway to create a new 600-metre section at the western end (Taxiway Hotel) and a 400-metre section at the eastern end (Taxiway Golf); a new taxiway (Taxiway Foxtrot) on the eastern side of the Airport; changes to aircraft stands; an extension to the Mid Term Car Park and a new four storey multi-storey car park on the present Short Term Car Park. Three existing buildings are to be demolished to enable the scheme.

¹⁸ Heritage Network Ltd 2009

- 7.63 The development proposals are intended to increase passenger numbers from the 2011 figure of 9.5 mppa to up to 18 mppa by 2031. The additional sections of taxiway will allow a larger number of aircraft to operate from the Airport and will enable quicker throughput of aircraft using the runway. This will increase the declared sustained rate of aircraft movements per hour and peak rate per hour from the 2011 figures of 30 and 34 to 36 and 40 in 2031.

Effects during construction

Archaeology

- 7.64 The baseline information indicates that an intrusive archaeological investigation will not be necessary given the previously developed nature of the site.
- 7.65 The construction activity will involve groundworks, which could have an impact on below ground archaeological remains, where they exist. An evaluation in association with a proposed urban expansion on land east of Luton (Sheldon and Barber, 2008) indicated that where archaeological deposits were present they typically survived at depths of between 0.4 metres and 0.6 metres below the existing ground surface. The areas proposed for taxiway extensions at either end of the runway are currently undeveloped grassed areas. Significant quantities of land have been the subject to clearance and grading in the areas immediately surrounding the runway, so little if any 'original' ground is believed to be present in these affected areas.
- 7.66 The dualling of Airport Way is again within close proximity of existing built development in the form of the existing road, nearby car parks and taxiway. Previous monitoring of road improvements to the East Luton Corridor¹⁹ showed the disturbed nature of the ground in close proximity to the road and suggested similar conditions for this part of the road.
- 7.67 None of the known archaeological sites would be affected by the current proposals. The risk of impacts from the development would come from the possible damage caused by the construction process to any unanticipated below ground archaeological features. Such features have thus far not been identified and are not recorded in the HER database. No effects on archaeology during construction are predicted.

Built heritage and designed landscape

- 7.68 No element of the development proposals will have a direct physical impact on any buildings of value or significance. No effect on the built heritage resource is predicted as a result of the construction process.

Effects post-construction

- 7.69 The issue during operation is the potential change to setting either through the presence of the new built form or through changes to patterns of activity at the Airport as a result of the proposed increase in aircraft movements. Setting is only one aspect of the significance of any asset but is potentially crucial especially for designed landscapes for which composed views can be described as part of the fabric of the asset.

¹⁹ *ibid.*

- 7.70 The assessment makes use of the conclusions and cross refers to figures from other chapters in the ES; chapter 6 on air quality, chapter 11 on LVIA, and chapter 12 on noise and vibration.

Archaeology

- 7.71 The scheduled monument at Someries Castle is located c.180 metres to the south of the Airport boundary and c.410 metres from the edge of the runway. The contribution of the surrounding land to the value of the monument varies depending on direction. Someries is on the old road that ran across the high ground between Luton and Kimpton and is set on a vantage point above the Lea valley to the west. The reasons for the original locational choice remain legible. The relationship to the valley is reinforced by the later field boundaries that follow the alignments set by the courtyard house and formal garden. This orientation was exploited in the later incorporation of the ruins into the Brownian landscape at Luton Hoo and in the designed views to the east (for a period there was also a drive directly to the ruins across the link between the upper and lower lakes). The surrounding building group of Someries Farm (TOR 4) and barns, Someries Cottages and Someries Lodge is a longstanding element in the setting, it is probable that they are on the sites of earlier farm buildings and they were built in part using material from the late medieval house so share the character of the 15th century brick. The ruins are visually integrated into this group, their gardens and the context of modern agriculture. Potentially related archaeological sites are the site of a medieval and later rabbit warren across the lane (TOR 30), and several fragmentary boundaries (TOR 29).
- 7.72 The Airport forms the backdrop to the north of the monument, see figure 11.11a taken on the lane approaching the group at Someries. The range of buildings are visible across the open runway (especially the control tower at approximately 48 metres high and the orange Hangar 89), as are the movements of aircraft on the runway, particularly at the western end. Figure 12.8 shows the building group at Someries falls within the predicted 63 dB(A) noise contour. Although the farm buildings and trees provide some screening across much of the monument itself the Airport remains a significant element even when not visible. The Airport forms the edge of the urban area and there are no transitional areas as the expanse of the open runway and grassed areas merge into the open landscape of modern farming to the south.
- 7.73 Though the Airport is a major presence to the north of the monument its contribution to setting is neutral rather than adverse; although it is not relevant to the evidential, historic or aesthetic values of the monument these remain legible and the value as setting of the land to the south and west is maintained. Currently aircraft noise both in the air and on the ground is present but is not dominant or character-defining.
- 7.74 The proposed built development is not a significant addition to the building group at the Airport. Figure 12.2 shows the ZTV for the largest component, the four-storey car park at 14.5 metres height, and the photomontage (figure 11.12) shows the building is an insignificant addition when seen from the south on the approach to Someries and does not extend the building group at the Airport. No effects are predicted through a change to setting as a result of the additional built development.

- 7.75 The additional passenger numbers and flights will result in a general increase in the presence of the Airport slowly over time. The intensity of use and exposure times at the western end of the runway closest to the monument will change, with an increase in visible aircraft manoeuvring on the ground and associated noise. The noise assessment shows that in this area alongside the runway there is little predicted change in area covered by the noise contours or in qualitative effect, or in distribution of noise over the course of the day.
- 7.76 The intensification of activity does not increase the presence of the Airport in setting to the point that it becomes the dominant characteristic and it does not undermine the contribution of the land to the south and west to the significance of the monument. The present character of the land to the north of the monument will be maintained. A small change is predicted to the monument through the change to setting though an increase in the impression of airport activity, predominantly through noise and visible aircraft on the ground. The sensitivity of the receptor is considered to be high and with the small predicted change an effect of slight to moderate effect significance is predicted for the EIA.

Built heritage and designed landscape

- 7.77 The listed buildings are widely dispersed through the study area. The closest to the Airport is Wigmore Hall Farmhouse on Eaton Green Road to the east (TOR 47). The building is now part of a hotel and the surroundings are built up and dominated by airport uses (figure 11.9a), the proposals will not result in change to the setting of the listed building and no effects are predicted. The former Vauxhall offices on Kimpton Road (TOR 3) are again part of a mixed and highly developed area and the setting is not an important element of its value. No effects are predicted from the built development or increased activity at the Airport.
- 7.78 Elsewhere in the study area are scattered listed buildings of agricultural origin at Winch Hill, Wandon End, Tea Green and Cockernhoe (TOR 14, 15, 16, 26, 50, 51). The viewpoint photographs at Tea Green and at Wandon End (figures 11.9d and c) illustrate the distant views of the Airport, identifiable by the control tower. No effects are predicted through the additional built development and the noise assessment confirms no significant change in noise levels. No effects are predicted. The Airport is not visible from the listed buildings at Diamond End, Lawrence End and Chiltern Green to the south (TOR 17 - 20) and no effect is predicted.
- 7.79 There is a cluster of listed buildings at Breachwood Green to the east (TOR 22 - 26). The relationship to the Airport is illustrated in VP9 at Colman Road (figure 11.10a). No change is predicted from the additions to the building group at the Airport, and chapter 12 confirms no material change to noise, hence no significant effect is predicted.
- 7.80 The house at Luton Hoo falls just outside the study area, though the northern part of the park and the approach drive are within 1.5 kilometres and the closest point at the north east corner of the park is c.150 metres from the Airport boundary, with the runway itself at c.500 metres. The house has recently been converted and is now a 5-star hotel. The hotel preserves the building that had formerly been at risk and there has been some restoration of the parkland although much is in separate ownership (e.g. the walled garden to the south). The golf course is a longstanding element of the landscape to the west of the house (it was established in the early 20th century). VPs 13 (figure 11.11b) illustrates the view towards the Airport from

close to the house and from a point on Luton Drive.

- 7.81 The nature of the asset means visual concerns are integral to the value of Luton Hoo. The main designed views from the house are based on the geometry of the principal rooms of the Adam house on the eastern side, looking across the lake and towards the slopes above the River Lea. The original design by Capability Brown (this was later amended and simplified but is still the basis of the park) made use of the landscape beyond the park boundaries and the woodland blocks of Bush Pasture, George Wood and Hardingdell Wood.
- 7.82 The control tower is visible from close to the ha-ha at the edge of the pleasure grounds and the area named as Airport Lawn. The present extent of this lawn is the result of changes in the 1890s, and again c1910 to allow the creation of the arboretum. This view to the north east to the escarpment now occupied by the Airport has been obscured by tree planting of the arboretum and Tank Drive.
- 7.83 In its scoping response English Heritage mentions the view of the Airport from the A1081 around the north east of the park. Unlike the other views this is not part of original design, but is incidental through the building of the road. The elevated section of the road allows views of the margin of the park and the lodges on Luton Drive, as well as the trees of Lower Kidney Wood and along Lower Harpenden Road, but the road creates a strong separation of the park and the built development of Luton.
- 7.84 The additional built development at the Airport does not change the built development potentially visible from within the park or in incidental views. No effects are predicted from the additions to the buildings at the Airport. The increase in aircraft movements associated with the increase in passenger numbers will result in an increase in noise, visible aircraft in the air and in the overall presence of the Airport that has the potential to change the balance of uses in the surroundings of the house and the northern part of the park to the point that it influences its cultural heritage value. The northern part of the park falls within the noise contours, and the A1081 runs along the park boundary. The setting of this part of the park therefore contributes little to its value, and the contrast in character is strong. The noise assessment confirms that the house at Luton Hoo remains around the 54 dB(A) contour with the proposed development and that there would be no significant change in noise levels at the house.
- 7.85 A negligible change is predicted to the parkland and house at Luton Hoo through the change to setting though an increase in the impression of airport activity, predominantly through noise and visible aircraft in the air. The receptor is of high value and with a negligible magnitude of change results in an effect of slight significance.

Receptor	Sensitivity of receptor	Magnitude of change	Degree of effect
On site			
Archaeology; on site	Low	Negligible	Negligible
Study area			
Somerles castle; SM	High	Small	Slight to moderate
Luton Hoo house and registered parkland	High	Negligible	Slight
Listed buildings	High to medium	Negligible	Slight to negligible

Table 7.3: Potential impact on cultural heritage issues

Mitigation

- 7.86 It is normally advisable to recommend areas of intact original ground within a site proposed for infrastructural development to be investigated for preserved archaeological features during the course of the works. Site-specific investigations to ascertain the archaeological resource within the Airport boundary are considered unnecessary for a number of reasons. Firstly, the use of geophysical survey to locate anomalies or sites in areas affected by infrastructural development would not provide accurate results because of the high concentration of modern services across the site, which would affect the accuracy of the readings. Secondly, the information from the various geotechnical site investigations assessed does not indicate potential archaeological strata or 'original' ground in areas proposed for development. Thirdly, the disturbance required in the demolition and clearance of Falconer's Hall to create suitable levels for the original grass runway and associated taxiways, followed by the construction of the asphalt and concrete replacements, has left little or no potential for prehistoric sites or features.
- 7.87 A written scheme of investigation detailing an archaeological watching brief across any areas of the proposal site that have not been previously affected by development at the Airport could be applied to ensure appropriate levels of recording and mitigation of any potential impact caused by the groundwork intrusions.
- 7.88 In the unlikely event that features of archaeological interest are uncovered, further appropriate surveys and investigations will be undertaken. In the first instance, Central Bedfordshire's archaeology officer will be informed and the methodology for appropriate archaeological investigations will be discussed and agreed.
- 7.89 Any agreed archaeological investigation at the site will be, by its very nature, a destructive process, but the benefit to the current body of knowledge for this area will be effectively filled through the material and artefact assemblage uncovered.

Cumulative effects

- 7.90 There are no known significant effects on archaeology associated with the proposed LLAOL development at the Airport. The potential for hitherto unknown remains has been identified and subject to the nature of any finds within the Airport site, and any identified at the three potential cumulative developments, there is

potential for cumulative effects. Until work commences on site it is not possible to determine whether any cumulative archaeological impacts would be significant.

- 7.91 With respect to the potential cumulative impact on monuments the only significant impact identified for the Airport development is in relation to the setting of the scheduled monument at Someries Castle. This is the result of increased activity at the Airport rather than the effect of the visibility of additional built development. A combination of the lack of any historic or functional links to the land, and the effects of distance, landform, vegetation and built development between Someries Castle and the proposed developments at Junction 10a and Sundon Rail Freight Depot suggest that there is no potential for cumulative impact with these developments.
- 7.92 The proposed development at Century Park, beyond the Airport to the north east, is considered more likely to have a potential cumulative effect and this may be visible from the scheduled monument. The existing context of development at the Airport and southern edge of Luton is a longstanding element of the setting of Someries Castle and additional built development at Century Park is unlikely to significantly alter the extent or proximity of built development visible across the open runway. No significant cumulative effect is predicted between the Airport and the Century Park development.

Residual effects

- 7.90 No significant residual effects on on-site archaeology are predicted. The single residual effect is the slight to moderate effect at the monument at Someries Castle. Table 7.4 summarises the residual effects.

Topic	Significant residual effects	Importance of receptor	Magnitude of change	Duration	Nature	Degree of effect	Level of certainty
Cultural heritage	Someries Castle SM	High	Small	Permanent	Adverse	Slight/moderate	Reasonable

Table 7.4: Residual effects

Ch 8

Environmental Statement Chapter 8 Ecology and nature conservation



Chapter 8: Ecology and nature conservation

Background

- 8.1 RSK and ARUP were commissioned to undertake ecological surveys to assess the potential natural heritage effects of the development proposals at the Airport. The detailed reports of the surveys undertaken are reproduced in technical appendix E. RSK produced an assessment of the original proposals in early 2010. This chapter of the ES presents a summary of the assessment and its findings, supplemented with species-specific survey information from the ARUP surveys.
- 8.2 This chapter provides a summary of national and local planning policies pertaining to natural heritage issues. Baseline information on the ecological interest of the site is provided including details of the survey methodologies used. The importance of the receptors is identified during the baseline assessment and the impact of the proposals on these receptors is then assessed.
- 8.3 The key issues identified for assessment in the EIA scoping report were disturbance and loss of habitat for protected species.

Legislation and policy

The Conservation of Habitats and Species Regulations 2010

- 8.4 These regulations make it an offence to deliberately capture, kill, disturb or injure any European protected species. It is also an offence to take or destroy the eggs of a European protected species, or damage or destroy a breeding or resting place of such an animal.
- 8.5 The term 'disturbance' includes any disturbance which is likely to impair an animal's ability to survive, breed or reproduce, or to rear and nurture their young, hibernate, migrate or significantly affect the local distribution or abundance of the species concerned.
- 8.6 These Regulations require an appropriate assessment where a plan or project affects a European protected site and is likely to have significant effects on the integrity of the site.

Wildlife and Countryside Act (1981, as amended) and Countryside and Rights of Way Act (2000)

- 8.7 The Wildlife and Countryside Act (WCA) sets out the legal protection afforded to all wild animals and plants. All wild birds, their eggs and nests are protected along with specified mammals, plants, fish, reptiles and amphibians. It is an offence to kill, injure, sell or take protected species; or intentionally, or recklessly, damage, destroy or obstruct their places of shelter. Birds listed on Schedule I of the Act are afforded an additional level of protection above that provided to all wild birds. The Countryside and Rights of Way Act (CROW) strengthens protection for SSSIs and provides a further basis for the conservation of biological diversity.

Natural Environment and Rural Communities (NERC) Act 2006

- 8.8 The NERC Act requires the publication of a list of species and habitats of principal importance for the conservation of biodiversity in England. A total of 56 habitats and 943 species are included in the Section 41 lists. The inclusion of species and habitats on these lists is used by local authorities in implementing their duties under this Act to have regard for the conservation of biodiversity when carrying out their normal functions.

Protection of Badgers Act 1992

- 8.9 The Act protects badgers from cruelty including injury, killing and disturbance.

EU Water Framework Directive (WFD), 2000

- 8.10 The Water Framework Directive aims to enhance the status and prevent further deterioration of aquatic ecosystems and to reduce pollution of water bodies. It will replace the Freshwater Fish Directive by the end of 2013.

Luton Local Plan 2001 – 2011

- 8.11 The local plan sets out Luton Borough Council's detailed policies and specific proposals for the development and use of land. These guide the council in making its day-to-day planning decisions. The local plan has now expired and is being replaced by the local plan 2011 – 2031, however the majority of policies were saved and are still valid. The principal local policy with reference to this chapter of the ES is *ENV5: Protection and enhancement of nature conservation*.
- 8.12 This policy states that planning permission will not be granted for development that fails to enhance or create wildlife habitats or sites of geological interest, where this is appropriate and feasible; or would have an adverse effect on sites of national and local nature conservation, biodiversity or geological interest.

Local Biodiversity Action Plans (LBAPs)

- 8.13 The UK Biodiversity Action Plan (UKBAP) describes the UK's biological resources and sets out a national strategy for the conservation of biodiversity. This is addressed at the local level by the production of LBAPs. These address biodiversity issues specific to particular areas within the UK. The Bedfordshire and Luton Biodiversity Partnership has 13 Habitat Action Plans (HAPs) and a number of Species Action Plans (SAPs) comprising its LBAP.

Methodology

- 8.14 This assessment follows the principles set out in the Guidelines for Ecological Impact Assessment (EclA) published by the Institute of Ecology and Environmental Management (IEEM) in 2006. It involves the following key stages:
- A background data search to obtain archival records of sites and species, and to gain information to focus the field surveys
 - Identification of ecological receptors and determination of their ecological value,

- through field surveys
- Identification of the potential impacts to these ecological resources and assessment of whether there would be any significant impacts on the integrity and/or conservation status of the resources
- Incorporation and evaluation of ecological enhancement and mitigation measures to avoid or reduce impacts, and compensation measures for any residual significant impacts; and assessment of the overall significance of ecological impacts arising from the proposals.

Background data search

- 8.15 A search was made for statutory designated sites (internationally and nationally important sites for ecology) and non-statutory designated sites (those that are important in a local context) within 2 kilometres of the development site boundary. A search was also made for records of noteworthy species within 2 kilometres (figure 8.1), extending to 5 kilometres for bat records. A list of sources, consultees and the information obtained from them is provided in table 8.1.

Information obtained	Source of information
Bat species records	Hertfordshire Biological Records Centre
Designated site citations	Natural England website
Designated site information	Bedfordshire and Luton Biodiversity Recording and Monitoring Centre
Designations and legal protection of noteworthy species	Joint Nature Conservation Committee (JNCC) website
Details of species and habitats listed on the Bedfordshire and Luton LBAP	Local BAP website
Information on broad and priority habitats and species action plans for the UK	UK Biodiversity Action Plan (UKBAP) website
Noteworthy species records	<ul style="list-style-type: none"> • Bedfordshire and Luton Biodiversity Recording and Monitoring Centre • Hertfordshire Biological Records Centre • National Biodiversity Network website
Satellite imagery	Google Maps

Table 8.1: Sources of background information and consultees

- 8.16 The desk study also included a review of previous surveys undertaken at the Airport by Ecological Survey & Assessment (ECOSA) between February and June 2006, which were updated as required (see field survey methodology section). Additional references and sources of information used in the preparation of the RSK assessment are listed in technical appendix E.

Field survey methodology

Extended phase 1 habitat survey

- 8.17 An extended Phase 1 habitat survey was undertaken by RSK on 22nd March 2012 to record the habitats present on site and the potential for the site to support protected species. The survey followed the Phase 1 Habitat Survey approach (Joint Nature Conservation Committee 2003) as extended for use in EIA (Institute of Environmental Assessment 1995). This involves the following elements.

- Habitat mapping using a set of standard colour codes to indicate habitat types

- on a Phase 1 habitat map
- Description of features of ecological or nature conservation interest, or suitable for protected species, in notes relating to numbered locations on the Phase 1 Habitat Map (figure 8.2), called 'target notes' (figure 8.3).

- 8.18 Basic Phase 1 habitat survey methods are described in detail in guidance from the Joint Nature Conservation Committee (JNCC 2003)¹. Limits to the achievable reliability of the method are discussed in Cherrill & McClean (1999)². There are no firm guidelines to specify what extended Phase 1 Habitat Survey involves, but the Institute of Environmental Assessment (1995) suggests that it simply involves more extensive and detailed target notes and plant species listing.
- 8.19 Plant species were listed for the survey area as a whole. Subjective estimates of the relative abundance of species in selected habitat parcels were added to the plant species list using a modified DAFOR scale. The DAFOR scale ranks species according to their relative abundance in a given parcel of land as follows: d – dominant, a – abundant, f – frequent, o – occasional, r – rare. In addition, the following prefixes are used: l – locally, v – very. The terms 'abundant' and 'rare' are used by convention, and apply only to relative abundance within the recorded area. It does not mean that species are 'rare' in the general sense.

Badger

- 8.20 A badger survey was undertaken in April 2012. The survey followed the guidelines in Harris et al (1991) and was within the optimal seasonal period to undertake surveys of this nature.

Bats

- 8.21 Bat surveys were undertaken between 12th April and 12th June 2012. The surveys were undertaken in accordance with the Bat Conservation Trust's Good Practice Guidelines (March 2012). A walk over survey and a tree assessment (a visual assessment of trees for the potential to support bats) was undertaken in April. Four bat activity surveys were undertaken, three dusk and one dawn survey. These surveys focused on areas identified in the walk over survey as having potential to support roosting bats as well as walked transects.

Birds

- 8.22 A survey of breeding birds on site was conducted between May and June 2012. The survey used was an adaptation of the standard Common Bird Census methodology. Four visits were made between 11th May and the 6th June, with visits undertaken between 5am and 10am.

Reptiles

- 8.23 A reptile survey was carried out between 11th May and the 19th June 2012. Seventy-six refugia were laid in areas of potentially suitable habitat and these were visited ten times. In these areas the densities of refugia were at least equal to the recommended densities for surveys (Froglife, 1999).

¹ Joint Nature Conservation Committee (2003). *Handbook for Phase 1 Habitat Survey – a Technique for Environmental Audit* (revised reprint). Joint Nature Conservation Committee, Peterborough.

² Cherrill, A. & McClean, C. (1999). Between-observer variation in the application of a standard method of habitat mapping by environmental consultants in the UK. *Journal of Applied Ecology*, **36**, 989-1000.

Great crested newt

- 8.24 A presence / absence survey was conducted for breeding great crested newts between 27th March and 29th May 2012. The survey methodologies employed followed those set out in the great crested newt mitigation guidelines (Natural England, 2001). Visits were made on four occasions to each suitable water body, two visits were between mid-April and mid-May. Four survey techniques were employed, egg searches, bottle trapping, torch surveys and refugia searches.

Invertebrates

- 8.25 Invertebrate surveys were conducted on five days between 16th May and 14th August 2012. In order to survey a wide range of taxonomic groups and habitats a range of sampling techniques were used including sweep netting, beating and suction sampling, as well as visual searches.
- 8.26 Full details of the survey methodologies employed and the results of the work can be found in technical appendix E.

Assessment of significance

- 8.27 The IEEM guidance (2006) has been followed in assigning importance or value to a feature and in the assessment of the significance of effects. The value of a feature is assigned by IEEM to seven levels, from 'international' to 'within the immediate zone of the proposal only'. To provide consistency with the approach used in other chapters of this ES, table 8.2 explains how the IEEM levels relate to the general Terence O'Rourke Ltd approach to assessment described in chapter 5 of this ES. In accordance with the IEEM guidance and its examples, the values set out in table 8.2 are modified as appropriate, given local circumstances and context. The justification for selecting the level of significance is given for each feature in the assessment, but some comments on what is a comparatively recent method of assessment are given in the following paragraphs.
- 8.28 A nature conservation designation does not necessarily imply a level of impact significance. For example, if a county wildlife site is identified for the population of a particular species of bird, that population is considered to be of county importance; however, other features of the site may be less important. Similarly, legal protection at a national level, or the presence of a priority species or habitat in the UK BAP, does not always imply national importance. For example, in the case of badger, this species is afforded legal protection to prevent illegal culling rather than due to its scarcity. The mitigation required to meet legal obligations is provided as separate advice for protected species.

IEEM guidelines	Terence O'Rourke Ltd approach
International	High
UK	High
National (i.e. England)	High to medium
Regional	Medium
County / Metropolitan area	Medium
District / Unitary Authority / City / Borough	Medium
Site, Local or Parish	Low

Table 8.2: Comparison of the IEEM and Terence O'Rourke Ltd approach for assessing the importance / value of a receptor

- 8.29 For each ecological feature, the effects of the proposed activities during and after construction are assessed and the type of impacts are characterised according to their magnitude. The effect of the impact on the function of the ecosystem (its integrity), the quality and extent of the habitat or the population size of the species is predicted and an estimate made of the degree of uncertainty in the prediction. Mitigation measures, if applicable, are described and the residual effect after these measures have been taken into account is predicted as accurately as possible.
- 8.30 In order to provide an assessment of effects that is comparable with other chapters of this ES, a degree of significance is given to each impact following protocols developed by Terence O'Rourke Ltd. Significance has been derived from two measures: the importance of receptors (figure 8.4) and the magnitude of change (figure 8.5). These two sets of criteria are used together in the significance matrix (figure 8.6) to derive the generic definitions of the significance of potential effects. Where there is doubt over the appropriate level of significance, for example where there is uncertainty about the full extent of the local resource (habitat area or population size), this is stated and as a precaution the higher level of significance of effect is applied.
- 8.31 The IEEM guidelines suggest that an effect is either ecologically significant or not, whereas the Terence O'Rourke Ltd approach is an extension of this approach and ascribes a level of significance. The two approaches are compared in table 8.3.

IEEM guidance	Terence O'Rourke Ltd approach
Significant	Very substantial
	Substantial
	Moderate
Not significant	Slight
	Negligible

Table 8.3: Comparison of the IEEM and Terence O'Rourke Ltd approach for assessing potential significance of effects

Baseline conditions

Statutory and non-statutory sites

- 8.32 There are no statutory designated sites (e.g. Sites of Special Scientific Interest) within 2 kilometres of the Airport boundary.
- 8.33 There are 21 non-statutory designated sites within 2 kilometres of the site boundary. There are 15 County Wildlife Sites (CWS), some of which are also designated as Ancient Semi-Natural Woodlands (ASNWs) or Plantation Ancient Woodland Sites (PAWS). An additional six sites are designated as ASNW or PAWS. These statutory sites are shown in figure 8.7 and a more detailed description is given in technical appendix E.
- 8.34 The closest of the non-statutory designated sites to the Airport is the Winch Hill Wood CWS and ASNW. This is a small area of secondary woodland that lies outside the Airport boundary fence and is dominated by downy birch. This site, along with other non-designated sites including George Wood and Withstocks

Wood to the south of the Airport (both ASNW and PAWS sites), is considered to be of low ecological value.

Habitats present within the Airport site

- 8.35 Habitat types identified within the Airport boundary by RSK are shown on figure 8.2. The Airport largely contains mesotrophic grassland on level made-ground. The sward is intensively managed by mowing to maintain a grass height just sufficient to deter flocks of most bird species, around 15 to 20 cm. Less intensively managed grassland, ruderal vegetation and scrub only occur towards the Airport fences on earth banks at the edges of the made ground, and in more extensive areas of vacant land away from the runway and taxiways in the eastern part of the Airport.
- 8.36 The soils are mostly neutral loams and clays, but the underlying chalk is incorporated in places leading to calcicolous tendencies in the vegetation. Apart from a few ponds, mostly dry at the time of the RSK survey, the area lacks water features. Trees are generally unacceptable near to the runway and taxiways, and occur within Airport fences only close to the easternmost boundary, though one small area of woodland outside Airport fences is included in the survey area. The area accordingly contains habitats and vegetation types of the following kinds:
- Extensive areas of mown mesotrophic grassland around the runway and taxiways. This is generally species-poor with low cover of broad-leaved herbs. There are areas of rough mesotrophic grassland mostly of the *Arrhenatheretum* type in various places towards Airport fences, especially in the eastern part of the Airport. There are also areas of amenity-turf among buildings in the northern part of the Airport. These areas of grassland have a low ecological value, which is considered to be of site level ecological value only
 - Limited areas of calcicolous grassland on earth banks, and more extensive transitions from calcicolous grassland to mesotrophic grassland. This grassland is a UK BAP Priority Habitat Type and although the areas on the Airport site are not considered to be of good quality because of their managed and disturbed status, they are still considered to be of local ecological value
 - Ruderal vegetation and ruderal scrub including nettle-bed vegetation on disturbed banks and earth mounds, mixed early-succession ruderal vegetation on disturbed banks and earth mounds, ephemeral ruderal vegetation in newly disturbed areas, bramble scrub, and semi-ruderal scrub. These areas of habitat have a low botanical value, but certain areas hold significant invertebrate interest (see below). Botanically these areas are considered to be of site level ecological value only
 - Thorn scrub and secondary woodland are present throughout the site and along the site boundaries but are considered to be of local ecological value
 - There are seven ponds with water-margin vegetation of very limited extent. Ponds are a UK BAP Priority habitat and are listed on the Luton LBAP. Three of the ponds on the site were dry at the time of the survey and two are used to collect water from the fire training area; they are heavily polluted. Of the two remaining ponds, one had very low water levels and the other is brick walled, lined with concrete and appeared to be stagnant at the time of the RSK survey.

None of the ponds present on the Airport site are of greater than site level ecological value.

Protected vertebrates

Badger

- 8.37 No active badger setts were identified within the site during either the Arup or RSK surveys undertaken in 2012. The RSK survey recorded two holes in an embankment near the north eastern boundary of the site (animal note 15 on figure 8.3), which appear to have been created by badgers. No other signs were found to indicate any current badger use and the presence of rabbit droppings around the holes suggests they are now used by rabbits only.
- 8.38 Both surveys recorded evidence that badgers currently use the eastern part of the site for foraging, with a badger run and four latrines found near the south east of the site and a badger push (access under a fence) recorded on the north east side of the site. The Airport site is considered to be of site level ecological value for badger.

Bats

- 8.39 Bat species records within 5 kilometres of the Airport are shown on figure 8.8. There are numerous buildings on site located north of the Airport runway around the CTA. The majority of these buildings will be unaffected by the proposed works. However, three buildings will be demolished as part of the development proposals (see figure 3.9). None of the buildings are considered to support roosting bats.
- 8.40 The ARUP tree survey identified six trees with the potential to support roosting bats and one group of trees, all on the eastern side of the site. These trees were subject to further survey work and a small common pipistrelle roost was identified in one of these trees (T5). A minimum of four common pipistrelles were recorded emerging from this roost, which was considered to be a summer roost for male bats.
- 8.41 In addition to the trees covered in the ARUP surveys RSK identified four ivy-clad young oaks in a line of trees situated on Airport Way verge south of the Holiday Inn. Due to their age and location (they are situated next to a busy roundabout and surrounded by hard standing and Airport buildings) they would offer minimal interest for roosting bats. These four trees therefore have low potential for roosting bats.
- 8.42 Transect surveys recorded three species of bat foraging on the site: common pipistrelle, soprano pipistrelle and serotine. Common pipistrelle was the most frequently recorded species during the surveys, with only occasional records of soprano pipistrelle and serotine. Given the lack of habitat diversity within the site it is not surprising that the range of species recorded is limited, with over 95% of records being of Britain's most widespread and numerous species.
- 8.43 Common pipistrelles were recorded foraging and commuting along many of the landscape features and habitats on the eastern side of the Airport. It should be noted that survey activity was concentrated in this eastern area; comparable survey data for other areas of the Airport is not available.
- 8.44 The transect surveys identified the trees and scrub along the north eastern / eastern boundary of the Airport, including the ancient woodland area in the eastern corner, the four water bodies and the grassland habitat either side of the track running

parallel to the eastern boundary as areas favoured by foraging bats. The Phase I survey shows that areas of similar habitat are present within the Airport boundary. Further large expanses of foraging habitat are available to the south, east and west of the site, which is less disturbed by air traffic.

- 8.45 Soprano pipistrelle is a UKBAP species. The UK population is currently believed to be stable but a target of the BAP is to increase the population index of this species by 35% of the 2005 baseline level by 2020. Given the low numbers of bats recorded using the eastern part of the Airport the site is considered to be of local ecological value for this species.

Nesting birds

- 8.46 The ARUP survey recorded a range of species, both breeding and non-breeding, using the Airport. A large proportion of the species recorded as breeding or potentially breeding on site are associated with scrub or woodland habitats. The site supports high densities of breeding skylark (approximately 25 pairs per km²) associated with the rough grassland areas around the runways and taxiways. Breeding meadow pipit also use these areas. Skylark is a UKBAP species.
- 8.47 The UKBAP for skylark aims to halt the decline in numbers by 2010 (maintaining the Breeding Bird Survey (BBS) index at 2003 levels) and then increase breeding numbers up to 2015. It also seeks to maintain the range of skylark (maintaining the percentage of occupied BBS squares recorded in 2003).
- 8.48 The densities of breeding skylark recorded breeding within the Airport indicate the current site management is maintaining high quality habitat for this species. Due to the density of breeding population, the Airport is considered to be of county level ecological value for skylark.
- 8.49 Meadow pipit is a widespread breeder in suitable habitats in Bedfordshire. As with skylark the Airport supports high densities of breeding meadow pipit and the breeding population is considered to be of county level importance.

Reptiles

- 8.50 The ARUP reptile survey recorded no evidence of reptiles in suitable habitats in the eastern and western parts of the site. An anecdotal record of slowworm (*Anguis fragilis*) in the south western part of the site came from Airport staff. The 2012 work updated surveys carried out by ECOSA in 2006 during the months of April through to June. Despite extensive reptile refuges being used (350 felt tiles) in a number of areas of suitable habitat, no reptiles were found. The Airport is considered to be at most of site level ecological value for reptiles.

Great crested newt and other amphibians

- 8.51 Survey work undertaken in 2012 recorded no great crested newts within the site. Previous surveys in 2006 undertaken by ECOSA did not record great crested newts. It is considered that this species is absent from the site and no further assessment is required.
- 8.52 The ECOSA surveys carried out on both of these ponds in 2006 found smooth newt (*Triturus vulgaris*) in the pond at Animal Note 6 and smooth newt, common toad (*Bufo bufo*) and common frog (*Rana temporaria*) in the pond at animal note 9 on figure 8.3.

- 8.53 The ARUP survey also recorded smooth newt breeding in two ponds and tadpoles and spawn of common toads in one pond within the Airport boundary. The common toad is a UKBAP species. Declines in many toad populations have been recorded across southern, central and eastern England between 1985 and 2000. The common toad population is considered to be of local value.

Invertebrates

- 8.54 The ARUP invertebrate report (in technical appendix E) concluded that the woodland areas at the Airport are of county importance for invertebrates. The open grassland habitats are also considered to be of county value. A significant proportion of the habitats surveyed are unaffected by the proposals. Area 7 (open grassland), shown on figure 8.9, is the only area with significant invertebrate interest that is potentially affected by the proposals. Species of interest identified on the site are summarised in the following paragraphs.
- 8.55 The large Mirid bug (*Lygus pratensis*) was formerly confined largely to heathland sites in southern England. It has undergone a dramatic range expansion and is considered to no longer merit its Red Data Book status. Similarly the beetle *Atomaria scutellaris*, has undergone a comparable dramatic range expansion and is found in a wide range of habitats. It too is now considered not to merit inclusion in the Red Data Book.
- 8.56 The flea beetle (*Longitarsus parvulus*) has recovered from a decline in population to become a common and ubiquitous beetle in much of England. This recovery has been linked to an increased frequency of flax as an arable crop, but it now utilises a wider range of food plants. It is considered that it is no longer deserving of its nationally scarce (Na) status.
- 8.57 Roesel's bush-cricket (*Metrioptera roeseli*), another nationally scarce species (Nb) was recorded from Area 7. This species has undergone a well-documented range expansion in recent years. It is clearly no longer deserving of its status as a nationally scarce species.
- 8.58 The nationally scarce (Nb) planthopper *Asiraca clavicornis* was recorded during the survey. This species is found in short grassland swards, on dry sandy or chalky substrates, with areas of bare ground. The range of this species has declined substantially with recent records confined to the Thames Estuary. It is also known from the Suffolk Brecklands. The nymph recorded from Area 7 may be the first record for Bedfordshire.
- 8.59 Two scarce ground beetles were recorded: *Ophonus ardosiacus* and *Ophonus schaubergerianus*. Both species feed predominantly on seeds and are found in weedy places in southern England. *O ardosiacus* has undergone a range and population expansion in recent decades, whilst *O schaubergerianus* appears to have declined, although identification difficulties mean its true status is difficult to determine.
- 8.60 A single Bombardier beetle (*Brachinus crepitans*) was recorded from Area 7, as well as in numbers in Area 6. This species is now almost entirely confined to coastal areas in south eastern England. This species is a parasitoid of other carabid beetles and occurs in open habitats with bare and disturbed ground and abundant ruderal plants. The records from the Airport appear to be the first records for Bedfordshire.

- 8.61 *Microplontus campestris*, a nationally scarce weevil, was recorded on oxeye daisy. This species is widespread but local across England and Wales, usually found in calcareous or neutral soils where oxeye daisy is present.
- 8.62 The weevil, *Calosirus terminatus*, which is associated with wild carrot, was recorded. It occurs less extensively than its host plant, being largely in coastal locations in southern England, but its range also extends into Wales and Scotland. The record from Luton may be the first for Bedfordshire.
- 8.63 A small Opomyzid fly, (*Geomyza subnigra*), was recorded from Area 7. Only described to science in 1992, it has been recorded at 15 widely scattered sites from southern England to central Scotland. Adults have been taken around the roots of false oat-grass and tufted hair-grass tussocks.
- 8.64 The matrix of patches of different habitats creates a wide range of suitable niches for invertebrates. The herb-rich grassland (with oxeye daisy and wild carrot), in a mosaic of bare and disturbed ground mixed with rabbit-grazed and longer swards, sheltered by scrub has resulted in this area supporting an invertebrate community of county importance. The importance of this area for invertebrates is at variance with the area's botanical value which is of site importance only (see paragraph 8.34)

Context of permitted development and invertebrate habitat

- 8.65 Approximately 40% of the area identified as Area 7 in the invertebrate reports falls within the footprint of the existing permitted car park extension of the long-term car park E. The ARUP survey work during 2012 has identified an invertebrate assemblage of county importance in Area 7. LLAOL has scheduled the development of this car park extension for 2013. In response to the identification of the importance of this area for invertebrate LLAOL has unilaterally undertaken to provide appropriate replacement habitat for these invertebrates within its landholdings.

Summary of receptor sensitivity

- 8.66 The relative importance or sensitivity of ecological receptors within the study area is summarised in table 8.4.

Habitats and species	Sensitivity / importance in the context of this assessment
Non-designated sites	Local level
Mown mesotrophic grassland	Site level
Calcicolous grassland	Local level
Ruderal vegetation and ruderal scrub	Site level
Thorn scrub and secondary woodland	Local level
Ponds	
Badger and reptiles	Site level
Bats and common toad	Local level
Skylark and meadow pipit	County level
Invertebrates in Area 7	County level
Invertebrates across the remainder of the Airport	Site level
Table 8.4: Summary of receptor sensitivity / importance	

Potential effects

- 8.67 The nature of the proposed development (improvement to the existing facilities at the Airport) is such that the majority of potential effects to ecology and nature conservation are associated with the construction phase of the development. The potential for adverse ecological effects post-construction is considered unlikely, as it is not considered that increased road traffic and aircraft movements will lead to significant increases in disturbance effects. This impact assessment therefore focuses on potential effects associated with the construction phase of the proposed development.
- 8.68 Potential impacts on nature conservation resources associated with the construction of the proposed improvement works will include the following:
- Permanent loss of mesotrophic grassland for the parallel taxiway extensions
 - Permanent loss of trees adjacent to the Holiday Inn roundabout during construction of the dualled section of Airport Way
 - Temporary displacement of species
 - Fragmentation of habitats or severance of ecological corridors during construction
 - Temporary impacts on adjacent habitats (and the species that use them) for example through noise disturbance during construction
- 8.69 Where such impacts occur, mitigation measures will be adopted to help eliminate or offset impacts, as detailed below.

Non statutory designations

- 8.70 The Winch Hill Wood CWS and ANSW lies outside of the Airport boundary fence and will not be directly or indirectly affected by any of the proposed works. There will no significant effects at any level and no mitigation is required.

Habitats

Grassland

- 8.71 The proposed taxiway extensions will result in a permanent loss of mesotrophic grassland. At the western end of the runway the parallel taxiway will be extended by approximately 600 metres and at the eastern end by approximately 350 metres. Based on an assumption of an average width of 23 metres for the new taxiways, this equates to a loss of approximately 2.3 hectares of grassland. There are extensive areas of mesotrophic grassland available on the site, and this will only be a small percentage of the overall habitat resource (approximately 3.4 % based on the areas above). The impact therefore on this receptor has been assessed as not significant at any level.
- 8.72 No calcicolous grassland will be impacted by the proposed improvement works so it is therefore not considered further in the assessment.

Ruderal vegetation and ruderal scrub

- 8.73 The construction of Taxiway Foxtrot will result in losses of small areas of ruderal vegetation and ruderal scrub within Area 7 (figure 8.9). The loss of these vegetation communities is considered to be negligible due to the extent of similar habitats

within the Airport and the community comprises common and widespread species. The significance of the vegetation loss in terms of impacts on the invertebrate community is considered later in this section.

Trees, scrub and secondary woodland

- 8.74 No scrub or secondary woodland will be impacted by the proposed improvement works. However, the line of trees on the road verge (at target note 37 on figure 8.3) appear to be very close to the proposed dual road from Holiday Inn roundabout to the CTA. By virtue of the proximity of these trees to the dualling of Airport Way all of these trees will need to be removed. These trees have no significant ecological value but are notable because of the relative lack of trees on the Airport site, this is therefore considered to be an impact of large magnitude at site level, which is assessed as an impact of moderate significance.

Ponds

- 8.75 No ponds will be impacted by the proposed improvement works and there will be no significant effects on this habitat type.

Protected vertebrates

Badgers

- 8.76 No active setts have been identified on the site, and only limited foraging activity was evident in the far south eastern corner of the site. As most of the badger activity is more than 200 metres from the proposed work areas, the potential for disturbance to badgers during the proposed works is therefore very low. The impact to badgers as a result of the proposed works is therefore assessed as not significant at any level.
- 8.77 The two suspected badger holes identified near the north east boundary of the site are clearly currently disused. However, due to the timescales associated with the phasing of construction, an update of the status of badgers will be required in the proximity of Taxiways Foxtrot, Golf and Hotel. This work will be undertaken at least 6 months prior to works commencing in these respective areas if the previous survey work is more than 12 months old. This requirement reflects the fact that badgers are a relatively mobile species with fluid territorial boundaries in certain circumstances so patterns of occurrence can change over a short time frame.

Bats

- 8.78 The proposed improvement works will not have any significant effect on bat foraging areas due to the relatively small nature of the works and the large extent of alternative suitable habitat available on and close to the site. None of the areas of habitat identified as being particularly favoured by foraging bats in the eastern part of the Airport will be affected by the development proposals. There will be no effect on trees containing the common pipistrelle roost as a result of the development proposals. None of the buildings identified for demolition are considered to have the potential to support roosting bats. Overall, the impact on bats from the proposed improvements works will not be significant at any level.

Nesting birds

- 8.79 Skylark and meadow pipit are fully protected under the Wildlife and Countryside Act 1981 while they are nesting. It is an offence to kill, injure or take an adult, or to take, damage or destroy an active nest or its contents.

- 8.80 Areas of mesotrophic grassland with potential for use by nesting skylark will be removed as part of the construction of the new taxiways Foxtrot, Golf and Hotel. If undertaken within the nesting season (March to July), these works have potential to disturb nesting skylark and in addition to being an offence under the Wildlife and Countryside Act 1981, this potential for direct effects to birds would be considered to be an impact of large magnitude and substantial significance.
- 8.81 Disturbance to breeding skylark and meadow pipit could occur if works start in close proximity to nests during the breeding season. Direct impacts may be avoided but the proximity of construction activity may lead to birds being repeatedly flushed off nests, disruption to feeding activity, or abandonment of incubation. The numbers of skylarks potentially affected would be between 10-20% of the annual breeding population during each phase of development. It is considered that the potential disturbance would be an impact of medium magnitude and substantial significance.
- 8.82 Taking account of the amount of suitable breeding bird habitat within the Airport site, the loss of 2.3 hectares of grassland is not considered to be a significant impact in this respect.

Reptiles

- 8.83 No reptiles have been found on site and the areas of optimal reptile habitat such as ruderal vegetation and scrub will be unaffected by the proposed works. The proposed development will therefore have no significant effects on reptiles at any level and no mitigation is required at this stage.

Invertebrates

- 8.84 The development of Taxiway Foxtrot and the LTCP extension will result in the loss of invertebrate habitat that is currently of county importance. It is difficult to know if the insect assemblage will still of similar importance at the time of construction, especially given the ephemeral nature of many of the habitats these invertebrates rely on. The loss of habitat is relatively small in extent. It is considered that there would be an impact of small magnitude and moderate significance.

Mitigation

Native trees

- 8.85 Compensation for this loss will include new tree planting with a ratio of two trees planted for every one tree lost. The trees are of limited ecological value and proposals will lead to an overall increase in the number of trees within the Airport. The residual impact on these trees has therefore been assessed as a significant beneficial effect but only at a site level.

Bats

- 8.86 Four trees with a dense covering of ivy and situated on the road verge next to the Holiday Inn roundabout will require removal to facilitate the highways improvements. These four trees have low potential for roosting bats. The proposed mitigation measures are precautionary, but include a watching brief to be carried out during

felling works of these four trees by a licensed bat ecologist in the unlikely event that a bat is encountered.

Nesting birds

- 8.87 Any habitats that require removal and could be used by breeding birds, e.g. scrub and trees, will be removed outside the March-July (inclusive) bird nesting season. Any scrub not removed in this window would be checked by an ecologist prior to removal to ensure nesting birds are not present.

Badgers

- 8.88 The grassland and scrub within the Airport boundary is used by foraging badgers. There is a risk that badgers may become trapped in any exposed excavations. It is recommended that all excavations over 0.5 metres deep have an egress point to allow badgers to exit, and those over 2 metres deep should be covered, or fenced, at night to prevent badgers from falling in.

Amphibians

- 8.89 It is recommended that during the soil strip associated with the development of Taxiway Golf an ecologist is present to translocate any amphibians present. The works are close to breeding ponds and animals could be present in the rough grassland.

Invertebrates

- 8.90 The construction of Taxiway Foxtrot and the LTCP extension will result in the loss of some of Area 7, identified as an area of county importance for invertebrate populations. Work on this taxiway is scheduled to be completed by 2019, by which time the habitats and invertebrate populations in Area 7 may have changed. This area will be resurveyed the year before construction work commences to update the existing baseline. Any mitigation measures required to protect nationally rare or scarce invertebrates will be drawn up using this survey information.
- 8.91 LLAOL controls sufficient suitable land to provide appropriate invertebrate mitigation up to twice the area of habitat lost in Area 7 as a result of the construction of Taxiway Foxtrot and the LTCP extension. Based on the current survey appropriate mitigation would be the recreation of lost habitats (a mix of scrub, ruderal vegetation and mesotrophic grassland) with the creation of small mounds to provide south facing slopes, alongside areas of bare ground and spoil.
- 8.92 If the material is suitable the topsoil from Area 7 will be used to cover these mounds. If not, the mounds will either be left to colonise naturally or seeded. If seeded, certain key species such as oxeye daisy and wild carrot will be included in the specified seed mix.
- 8.93 If the remaining area between Taxiway Foxtrot and the LTCP still supports important invertebrates at the time of the taxiway construction LLAOL will continue to survey the area to ensure appropriate conditions for invertebrates are maintained. The extant scrub in this area may need to be removed for operational reasons.

However given the proximity of extensive areas of scrub in close proximity to this area this is not considered to be a significant impact requiring mitigation.

Breeding birds

- 8.94 The following mitigation strategy will eliminate the risk of injury or disturbance to nesting skylarks and meadow pipits associated with the construction of the new parallel taxiways:
- The grassland areas in question should be made unsuitable for nesting skylarks during the winter months through mowing. The sward should be kept short from February onwards, with the average height not exceeding 1cm during the period March to August
 - Any areas of grassland being used temporarily during construction i.e. storage areas or access tracks, should be managed as above. If this is not possible these areas will be checked prior to their use during construction by a suitably experienced ecologist to ensure there are no nests present on the ground
 - If works on the taxiways commence within the bird breeding season (this is currently only scheduled for Taxiway Foxtrot) searches for nests of breeding birds will be made within a 25-metre buffer around construction works. If active nests are found in this buffer zone appropriate no-work buffers will be implemented by the appointed ecologist and enforced while the nest is active by the works manager
 - If nests are found in any affected areas a suitable buffer area should be placed around the nest to minimise disturbance, no works can continue within this buffer until the chicks have fledged and the nest is unoccupied.

Enhancement

- 8.95 LLAOL has committed to the erection of 15 bat boxes on five suitable trees (3 per tree) to provide more roosting opportunities for common pipistrelles on the land within the Airport boundary.

Cumulative effects

- 8.96 The potential cumulative effect of the proposed development in conjunction with the developments at Century Park, Junction 10a and Sundon Rail Freight Depot has been considered.
- 8.97 With respect to the developments at Junction 10a and Sundon, these are considered to be sufficiently distant from the Airport that there would not be any significant potential for cumulative impacts on habitats or individual species. This EIA has confirmed that there are no significant predicted effects to any rare or protected species associated with the proposed development at the Airport and therefore the potential cumulative impacts to overall species numbers at the local level associated with the Junction 10a and Sundon developments is not considered to be significant.

- 8.98 The development at Century Park is considerably closer to the Airport. The ES submitted for the Century Park development (January 2009) included an extended phase 1 habitat survey which confirmed that there was potential for a moderate to minor impact on calcareous grassland, a minor to moderate impact on semi-improved grassland and a minor impact on hedgerows. Translocation was proposed within the ES for the calcareous grassland, which was predicted to reduce this impact to neutral.
- 8.99 Potential was identified for a range of protected species including badgers, bats, reptiles, great crested newt and breeding birds. At the time of the ES, specific assessment had only been undertaken for badgers, which confirmed that whilst there were setts within 30 metres of the development site, these would be at least 30 metres from areas of development works. The need for further surveys for bats, great crested newts and reptiles was identified in the ES.
- 8.100 The ES prepared for the Airport has confirmed that the loss of semi-improved grassland will not be significant at any IEEM level and that there will be no calcicolous grassland affected by the proposed development. Surveys undertaken by Arup have confirmed that there will be no significant effects to bats, reptiles or great crested newts and on this basis it is considered that there is not potential for significant cumulative effects to these species with the Century Park development.
- 8.101 No significant effects are anticipated on badgers are part of the proposals. There is no potential for the Century Park development to act cumulatively with these proposals and result in an adverse impact on badgers.

Residual effects

- 8.102 With the implementation of the mitigation measures proposed, there would be no significant residual effects to ecology and nature conservation.

Ch 9

Environmental Statement
Chapter 9 Community and economic



Chapter 9: Community and economic

Introduction

- 9.1 Halcrow was commissioned to undertake the economic and employment assessment of the proposed development. The findings of the assessment are summarised in this chapter and the full report is included in technical appendix D. In addition, Terence O'Rourke Ltd has examined the interaction between the local community and the Airport, including community engagement and the potential for effects on local environmental amenity.
- 9.2 A Health Impact Assessment (HIA) has been prepared by Arup and National Air Traffic Services (NATS) undertook an assessment of potential changes to the third party risks, including any associated potential changes to the Airport's public safety zone (PSZ). The findings are summarised in this chapter and the full reports are included in technical appendix D.

Legislation and policy

National policy

- 9.3 The government published *The Plan for Growth* in 2011, which recognises the need for improvements to the nation's infrastructure to facilitate economic growth. The updated *National Infrastructure Plan* (2011) includes proposals to develop a new strategy for coordinating public and private investment in infrastructure and to increase infrastructure spending through public and private sources. It also includes a commitment that the UK should retain its aviation hub status, but shows that aviation is the one area where performance has decreased since 2005 in terms of capacity, access and availability, service quality and reliability. In relation to the Airport, the plan assumes that it could handle 17 million passengers per annum by 2030 with maximum use of its current capacity.
- 9.4 The consultation document *Developing a Sustainable Framework for UK Aviation* was published by the Department for Transport in 2011. It recognises the significant role of aviation for the UK economy, but proposes that aviation policy should focus on improving the customer experience and standards of health and safety. It also emphasises the importance of regional airports, such as Luton, in accommodating the growth of air travel demand and the need to create the right conditions for them to flourish.
- 9.5 The *National Planning Policy Framework* (NPPF; 2012) sets out new guidelines for planning in the UK. Paragraph 7 identifies the economic role of the planning system as:
- "contributing to building a strong, responsive and competitive economy, by ensuring that sufficient land of the right type is available in the right places and at the right time to support growth and innovation; and by identifying and coordinating development requirements, including the provision of infrastructure"*.
- 9.6 In relation to building a strong, competitive economy, paragraph 18 states that:

“the government is committed to securing economic growth in order to create jobs and prosperity, building on the country's inherent strengths, and to meeting the twin challenges of global competition and of a low carbon future”.

- 9.7 Paragraph 19 of the NPPF goes on to state that:

“the government is committed to ensuring that the planning system does everything it can to support sustainable economic growth. Planning should operate to encourage and not act as an impediment to sustainable growth. Therefore significant weight should be placed on the need to support economic growth through the planning system”.

Local policy

- 9.8 The adopted Luton Local Plan (2001-2011) identifies the Airport as one of seven action areas selected for comprehensive treatment by public authorities or private enterprise. These areas are highlighted as areas of change and opportunity in Luton and the plan sets out the key priorities in guiding their future development. With regards to the Airport, the plan recognises the important contribution a successful airport can make to the regeneration and economic viability of Luton and the creation of new employment opportunities in the area, whilst noting the need to manage impacts in terms of housing and other related development pressures.
- 9.9 Luton Borough Council's *Luton Regeneration Strategy* (2004) sets six strategic economic objectives for the borough and notes that the Airport is a key driver behind the push for prosperity and job growth in the area. It also recognises the inward investment success that the Airport has supported. The council's *Luton Local Transport Plan 2011-2026* includes the aim to support Luton's growth as an international gateway in the context of growth at the Airport and ease of access to the Channel Tunnel Rail Link Terminus at St Pancras.

Methodology

Baseline

- 9.10 A desk-based study was undertaken to assess the economic and employment baseline conditions at the Airport and in the surrounding area. The study focused on the Airport's core impact area, which covers six local authorities: Luton, Central Bedfordshire, North Hertfordshire, St Albans, Dacorum and Stevenage. The existing relationship between the Airport and the local community was also examined, together with existing effects on local environmental amenity. The data sources and references used are set out in table 9.1.

Department for Transport, 1997, Third Party Risk Near Airports and Public Safety Zone Policy
Department for Transport, 2010, Department for Transport Circular 1/2010: Control of Development in Airport Public Safety Zones
Department for Transport, 2012, TEMPRO projections
Department of Business, Innovation and Skills, 2009, Occasional Paper No. 1: Research to Improve the Assessment of Additionality
Department of Communities and Local Government, 2010, English Indices of Deprivation
Department of Health, 2011, Health Profile 2011, Luton
English Partnerships, 2008, Additionality Guide Third Edition
HM Treasury, 2003, The Green Book Appraisal and Evaluation in Central Government
NOMIS website: www.nomisweb.co.uk
NOMIS, 2011, Annual Population Survey
NOMIS, 2003-2011, Business Register and Employment Survey / Annual Business Enquiry
NOMIS, 2012, Residence based earnings and workplace based earnings
ONS website: www.neighbourhood.statistics.gov.uk
Scott-Samuel et al, 2000, Merseyside Guidelines for Health Impact Assessment

Table 9.1: References and data sources

- 9.11 Receptors considered in the study include characteristics of the existing economy, such as employment rates, skills and levels of deprivation, local environmental amenity and the relationship of the Airport with the community. The sensitivity of the receptors was assessed with reference to the guidance in figure 9.1.

Health impact assessment

- 9.12 Broader effects of the proposed development on community and environmental amenity are incorporated within the HIA, which is included in full within technical appendix D. The scope of assessment has been agreed with the Luton Primary Care Trust (PCT) and LBC. The HIA uses a Virtual Advisory Group (VAG) to inform the assessment from a local level. The panel for the VAG has been agreed with the HIA specialist at LBC.
- 9.13 The HIA has been undertaken following this general systematic process:
- Definition of scope
 - Baseline data gathering
 - Linking health determinants with health effects
 - Assessment of health impacts
 - Review of existing mitigation to negate health impacts
 - Consideration of residual health impacts
 - Development of evidence based recommendations for any remaining impacts.
- 9.14 The following geographical areas are referred to in the HIA:
- National level: England
 - Borough level: Luton Borough
 - Ward level: e.g. Wigmore, Crawley and Farley
 - Lower Super Output Area level (LSOA)
 - Other specific communities, populations and areas may be referenced within the further assessment as and where necessary.

- 9.15 The community profile has been established using data from a range of published sources including:
- Community health profiles produced by the Department of Health and held by the Association of Public Health Observatories
 - Office of National Statistics (ONS)
 - The Indices of Multiple Deprivation.
- 9.16 Vulnerable community groups have been reviewed and noted where applicable to enable these groups of people to be easily referenced where required in the impact assessment.
- 9.17 The 'health determinant' categories to be assessed in the HIA are those that are most likely to be impacted by the development at the Airport given the context of construction and future operation. The following categories have been considered in the detailed assessment:
- Employment, economic effects, skills and training
 - Social capital and community cohesion
 - Air quality (including dust)
 - Noise and annoyance
 - Transport and travel
 - Public safety aspects of Public Safety Zone (PSZ).

Assessment of impact

- 9.18 Prior to assessing the effects of the proposals on the community and the economy, it is important to identify what constitutes a potential effect. In the context of this assessment, potential effects will be related to the employment created and supported by the Airport, the local income expenditure generated by the Airport, its companies and employees, the national government revenue generated by the Airport, changes to local amenity as a result of increased aircraft and traffic movements and potential effects on the Airport's relationship with the local community. Impact magnitude has been assessed with regard to the criteria in figure 9.2.

Economic and employment assessment

- 9.19 Halcrow undertook detailed econometric modelling to produce employment forecasts at the Airport for 2028, both with and without the proposed development, to identify the impact of the development on employment levels. This used a range of data to identify the key factors that determine the growth of employment at airports of a similar type and size to the Airport. An econometric function was then developed to express these key factors, which was used to project gross direct employment at the Airport and associated indirect and induced jobs in 2028. Full details of the econometric modelling are provided in technical appendix D.

Health impact assessment

- 9.20 The qualitative assessment describes the nature of the potential health effects and the direction of change. The assessment of potential effects has been undertaken using criteria adapted from those contained in the Merseyside Guidelines for Health Impact Assessment (Scott-Samuel et al, 2000), which classify impacts on the basis of their nature (positive / negative), degree of certainty (speculative or probable) and magnitude in the context of a defined community.

- 9.21 Potential changes in health-based statistics are not quantified, since these have a wide and complex range of contributory factors, many of which are not related to the proposed development. Health inequalities have been taken into account in the assessment. The approach, where possible, identifies the vulnerable community groups and areas of high deprivation and / or poor health, and assesses whether the development will have differential effects (either positive or negative) on these groups.
- 9.22 The assessment focuses on specific communities that will be most affected by the development, and considers the likely overall health and wellbeing effects resulting from cumulative impacts on these communities.
- 9.23 The assessment of impact within the HIA is as described below:
- The nature of the impact has been classified either as positive or negative
 - The measurability has been defined on a three point scale of qualitative, estimatable or calculable
 - The degree of certainty of the impact has been classified using the terms speculative, probable and definite:
 - Speculative effects occur where linkages between the determinant and health effects have been established but where a reasonable level of action is required to take up the opportunities available
 - Probable effects are generally those where linkages between the determinant and health have been established and where the effects do not require individuals, or organisations, to take a particular course of action
 - Definite effects are those that are considered to be inevitable.

Assessment of significance

- 9.24 There are no known published 'standard' criteria for determining the significance of effects on economic and community interests. In determining whether an effect on a receptor is significant, reference has been made to a wide range of criteria relating to the sensitivity of the receptor and the magnitude of change. These criteria have been combined to determine the degree of effect using the matrix shown in figure 9.3. Effects that are moderate or above are considered to be significant. It should be noted that the criteria used differ from those used by Halcrow in the economic assessment in technical appendix D, as they encompass both community and economic effects.

Public safety zone assessment

- 9.25 The PSZ and third party risk assessment was undertaken in accordance with guidance and policy set out in *Third Part Risk Near Airports and Public Safety Zone Policy* (Department for Transport, 1997) and *Department for Transport Circular 1/2010: Control of Development in Airport Public Safety Zones* (Department for Transport, 2010). Air traffic forecasts and operational assumptions provided by LLAOL were used to derive the mix of air traffic using the runway. The assessment was based on a directional split for the runway of 30% on runway 08 (eastbound runway) and 70% on runway 26 (westbound runway).

- 9.26 Both the 10^{-4} (1 in 10,000 per annum) and 10^{-5} (1 in 100,000 per annum) risk contours were calculated. The latter determines the size and shape of the PSZ. The contours identify the areas in which third parties would be subject to an individual risk (i.e. the risk of death per year from aircraft crashes to a nominal individual residing permanently at a particular location).

Baseline

Economy

Economic activity and unemployment

- 9.27 Luton forms a pocket of relative deprivation within the core impact area. It has lower levels of economic activity than the other districts / boroughs, with an economic activity rate of 74% between April 2010 and March 2011 compared to 80% in the core impact area. Luton also has lower economic activity levels than the East of England and England as a whole, while economic activity in the core impact area is higher than the regional and national averages. However, economic activity in Luton increased by almost 1% between 2008 and 2011, in contrast to the 1% decrease across the core impact area.
- 9.28 The unemployment rate in Luton was 8% in 2011; this was the same as the national average but above the core impact area, which had an unemployment rate of 6% (table 9.2). Luton had a lower rate of unemployment among young people aged 16 to 24 than the national average, but higher levels of unemployment in older age groups. Overall, the rate of unemployment in Luton has decreased from 11% in 2008/09, against regional and national trends of increasing unemployment.

Category	Luton		Core impact area		East of England		England	
	2009	2011	2009	2011	2009	2011	2009	2011
All people of working age	11%	8%	5%	6%	5%	7%	6%	8%
Aged 16-24	17%	14%	15%	20%*	14%	17%	16%	19%
Aged 25-49	10%	7%	5%	5%*	4%	5%	5%	6%
Aged 50-retirement	7%	6%	6%	4%*	3%	4%	4%	5%

Table 9.2: Unemployment rates

*Figures are estimated as data are not available for every local authority in the core impact area

Industry and employment profile

- 9.29 The industries that make up the economy in Luton and the core impact area have been changing over recent years. Data on the number of business units show that there has continued to be a decline in the manufacturing industry in Luton, with a 14% decrease in the number of manufacturing units from 2007 to 2011 (table 9.3). There has also been a large decline in public administration and defence over the same period, with a 56% reduction in Luton and a 24% reduction in the core impact area, which is likely to be associated with public sector cutbacks. However, Luton has seen a 19% increase in the number of units in the professional, scientific and technical sector and a 35% increase in the health sector. The core impact area has experienced smaller increases in several sectors.

- 9.30 The largest employment sectors in Luton are public administration, education and health, followed by distribution, hotels and restaurants. There is a greater proportion of people working in transport and communications in Luton than in the core impact area and fewer people working in banking, finance and insurance.
- 9.31 Occupation data from the annual population survey show that the largest occupational group in Luton is elementary occupations, such as cleaners and labourers, at 16% (table 9.4). The largest occupation group in the core impact area and England as a whole is professional occupations, such as healthcare workers, teachers and workers in the finance and information technology sectors.

Industry	Luton			Core impact area		
	2007	2011	Change	2007	2011	Change
Manufacturing	402	345	-14%	2,499	2,340	-6%
Construction	750	720	-4%	5,250	5,190	-1%
Motor trades	191	205	7%	1,256	1,230	-2%
Wholesale	345	315	-9%	2,185	2,095	-4%
Retail	732	720	-2%	3,966	3,840	-3%
Transport and storage	232	245	6%	1,405	1,340	-5%
Accommodation and food services	363	355	-2%	2,164	2,245	4%
Information and communication	339	365	8%	3,658	3,765	3%
Finance and insurance	125	110	-12%	841	955	14%
Property	163	170	4%	1,235	1,265	2%
Professional, scientific and technical	491	585	19%	6,019	6,830	13%
Business administration and support services	633	490	-23%	3,916	3,255	-17%
Public administration and defence	114	50	-56%	304	230	-24%
Education	153	150	-2%	1,119	1,075	-4%
Health	292	395	35%	1,641	1,950	19%
Arts, entertainment, recreation and other services	399	325	-19%	2,949	2,765	-6%
Total	5,750	5,545	-4%	40,433	40,370	0%

Table 9.3: Number of units in industrial sectors in Luton and the core impact area and change over time

Occupational group	Luton	Core impact area	East of England	England
Managers, directors and senior officials	7%	12%	11%	10%
Professional occupations	14%	21%	20%	19%
Associate professional and technical occupations	11%	15%	14%	14%
Administrative and secretarial occupations	12%	13%	12%	11%
Skilled trades occupations	13%	10%	11%	11%
Caring, leisure and other service occupations	11%	8%	9%	9%
Sales and customer service occupations	8%	7%	7%	8%
Process, plant and machine operatives	9%	5%	6%	6%
Elementary occupations	16%	10%	10%	11%
Table 9.4: Occupations of people in employment				

Skills and qualifications

- 9.32 The qualifications of the economically active population in Luton are, on average, lower than the core impact area and England as a whole. Almost double the proportion of working age people in Luton do not have any qualifications (12%) compared to the national average (7%). Only 27% of people in Luton are educated to NVQ level 4 or above, compared to 36% across England as a whole and 38% in the core impact area.

Income and deprivation

- 9.33 The average gross weekly earnings for both residence-based and workplace-based workers in Luton are lower than those in the core impact area and England as a whole (table 9.5). The average residence-based earnings are lower than workplace-based earnings in Luton, showing that many of the better paid jobs in Luton are taken by people living outside the area. This finding, together with the borough's lower than average skill and qualification levels, suggests that the skills and qualifications gap in Luton prevents residents from taking advantage of the best job opportunities. In comparison, in the core impact area residents are taking home higher wages than those that commute into the area to work. In addition, wages in Luton have not been increasing in line with England as a whole, and workplace-based wages have actually decreased since 2009 (table 9.5).

Area	Residence-based gross weekly earnings		Workplace-based gross weekly earnings	
	2009	2011	2009	2011
Luton	£522	£536	£597	£574
Core impact area	£669	£678	£568	£580
East England	£617	£637	£568	£580
England	£598	£617	£597	£616
Table 9.5: Average gross weekly earnings (NOMIS, 2012)				

- 9.34 The 2010 indices of multiple deprivation show that Luton is among the most deprived local authorities in the country. In comparison, the other local authorities in the core impact area are on average among the least deprived. On a ranking of one to 326, where one is the most deprived and 326 is the least deprived, Luton is ranked 60th, with St Albans ranked 316th, Dacorum ranked 266th, North Hertfordshire ranked 282nd and Stevenage ranked 158th.

Summary of sensitivity

- 9.35 Overall, given the above average levels of unemployment, lower levels of economic activity, lower skills and qualification levels and above average deprivation in Luton, employment and the economy are considered to be of high sensitivity to change.

Current economic impact of the Airport

Current employment at the Airport

- 9.36 All employment estimates are presented as full time equivalents (FTEs). One part time job is estimated to be 0.5 of an FTE, based on an analysis of the average hours worked by a part time worker using the NOMIS annual survey of hours and earnings. It is estimated that approximately 8,250 people were employed at the Airport in 2011 in the following sectors:

- Manufacturing: 1,350 jobs
- Wholesale, retail and repair of motor vehicles, motorcycles and personal and household goods: 750 jobs
- Hotels, restaurant and leisure: 300 jobs
- Air transport and supporting activities (including training): 3,550 jobs
- Other transport, storage and communication: 1,550 jobs
- Business services, public administration and other services: 750 jobs

Future baseline employment at the Airport

- 9.37 In the absence of the proposed development, there will still be changes in the wider community and economic environment. Projections by the Department of Transport (2012) indicate that the working age population of Luton is predicted to increase by 3.2% in the 10 years from 2010 to 2020 and by an additional 1.3% by 2026. The number of jobs in Luton is predicted to experience greater growth, with an 8.1% increase by 2020 and a further 2.8% increase by 2026. The core impact area is predicted to experience slightly larger increases, with a 4.7% increase in working age population by 2020 and another 3.1% increase to 2026, and increases of 8.4% and 2.9% in the number of jobs by 2020 and 2026 respectively.

- 9.38 It is predicted that in the absence of the proposed development, the Airport will reach a maximum capacity of 12.4 million passengers per annum by 2028. At that capacity, it is estimated that approximately 11,050 people will be employed at the Airport by 2028.

Current economic value of the Airport

- 9.39 The annual economic value of the Airport is calculated around two separate elements. The first is income injection into the local economy arising from the operations of the Airport, consisting of the following elements:

- Wages and salaries of workers
- Local income arising from direct business expenditure on goods and services
- Direct business profits likely to be invested back into the local economy

- Supply chain effects of local spending by businesses that receive direct income from the Airport's operations
- Induced income effects (i.e. the multiplier effect of spending on local goods and services by households that receive direct income from employment at the Airport).

9.40 The second element is government revenues that arise from the Airport's operations. These revenues include proceeds to central government from taxes paid by businesses and employees, income generated for local government from business rates, and income to central government from air passenger duty.

9.41 The total current income injection to the local economy is estimated at £788.7 million, while the total direct government income is estimated at £214.6 million. In total, therefore, the current annual economic value of the Airport is estimated to be £1,003 million.

Source	Income
Total income injection to the local economy	
Wages and salaries of workers (excluding tax and National Insurance)	£245.5 million
Direct business expenditure	£338.7 million
Direct profits accountable to the local economy	£8.8 million
Supply chain multiplier effect	£195.7 million
Sub-total	£788.7 million
Direct government income	
Taxes from businesses	£42.9 million
Taxes on wages (including social security)	£88.4 million
Business rates	£9.43 million
Air passenger duty	£73.9 million
Sub-total	£214.6 million
Total	£1 billion

Table 9.6: Current baseline annual economic value of the Airport

Future baseline economic value of the Airport

9.42 The future baseline (2028) economic value of the Airport is summarised in table 9.7 based on 2012 prices. Full details of how the figures were calculated are set out in Halcrow's report in technical appendix D. The total income injection to the local economy is estimated at £1,075 million, while the total direct government income is estimated at £284.4 million. In total, therefore, the current annual economic value of the Airport is estimated to be £1,359.4 million, which is an increase in economic value of £356 million compared to the current value of the Airport.

Source	Income
Total income injection to the local economy	
Wages and salaries of workers (excluding tax and National Insurance)	£332.4 million
Direct business expenditure	£463.9 million
Direct profits accountable to the local economy	£11.9 million
Supply chain multiplier effect	£266.8 million
Sub-total	£1.1 billion
Direct government income	
Taxes from businesses	£58.6 million
Taxes on wages (including social security)	£120.4 million
Business rates	£9.43 million
Air passenger duty	£95.9 million
Sub-total	£284.4 million
Total	£1.4 billion

Table 9.7: Projected future baseline annual economic value of the Airport

Wider economic benefits of the Airport

9.43 Evidence on the importance and wider economic benefit associated with the Airport was gathered through a survey of businesses within an area similar to the core impact area used in this assessment. The survey was undertaken by Halcrow on behalf of LBC in 2010. The key conclusions of the survey are as follows:

- 56% of companies stated that proximity to the Airport had at least some importance when they chose their present location
- 12% of the businesses surveyed either supplied the Airport or other businesses located at the Airport and 7% of the businesses surveyed used the Airport to transport freight
- A large proportion of the businesses surveyed (42%) used the Airport for staff travel and 38% of the businesses said that their visitors or suppliers use the Airport to visit them. A quarter of these businesses received visitors via the Airport on a regular basis every month
- Identifying the indirect relationship between the companies and the Airport is more difficult to quantify. Overall, 17% of businesses said that they perceived some form of indirect benefit from their proximity to the Airport. The proportion of businesses perceiving an indirect benefit was higher among businesses in the air transport and supporting activities sector (31%) and the distribution, land transport and telecommunications sector (26%)
- 20% of the companies surveyed thought that growth of the Airport would have a positive impact on their business, while only one company thought that it would experience a negative effect
- When asked to what extent they thought that the proximity of the Airport improved the business competitiveness of the local area, 17% of the companies thought the Airport's proximity improved competitiveness to a great extent and a further 58% thought it improved competitiveness to some extent. Furthermore, 63% of businesses thought that the Airport was an important driver for attracting inward investors to the region
- The majority of companies (72%) agreed that the Airport is an important asset for the local and regional economy (43% of companies strongly agreed). Almost

two thirds of businesses (60%) agreed that future growth of the Airport is vital to the growth of the local economy and competitiveness. Only 3% of businesses believed that the Airport has a negative effect on local businesses

- 9.44 Overall, the survey demonstrated that the Airport plays a very important role in the sub-regional economy in maintaining the area's competitiveness and its attractiveness as a business or investment location.

Current impact of the Airport on the local community

- 9.45 LLAOL has worked with the London Luton Airport Consultative Committee (LLACC) for many years to ensure that activities at the Airport are explained to representatives of the local community. Invitations are often extended to local residents and members of LLACC to visit the Airfield Environmental Office for a demonstration of the Aircraft Noise and Track Monitoring System, to discuss specific concerns and to view for themselves flight tracks of the Airport aircraft operations in their area.
- 9.46 The presence of a major international airport in close proximity to built up areas inevitably affects local environmental amenity, although the number of complaints received by the Airfield Environmental Office has been declining steadily for several years. In 2010, a total of 598 complaints relating to the Airport aircraft operations were received, an average of less than two complaints per day, compared to 1,637 complaints in 2006. Noise was cited as a main disturbance in 83% of complaints in 2010, and chapter 11 examines the impact of aircraft noise on local communities in detail. Other reported issues were aircraft being perceived as off-track (30% of complaints), frequency of operations (19%), low-flying aircraft (15%), vibration (1%) and air quality (1%).
- 9.47 In addition to the economic and employment benefits discussed above, the Airport supports a range of programmes as part of its commitment to the wellbeing of the community, including the Airport Community Trust Fund, which provides support for local community initiatives, a nominated charity of the year, and sponsorship of local community events. Further details of these programmes can be found in the sustainability statement submitted in support of the planning application.
- 9.48 The Airport Concession Agreement represents an additional source of income paid to LBC by the Airport. Since 1998, LLAOL has returned over £210 million to the council in Concession Agreement payments, with nearly £25 million paid in 2011 alone. The income from these payments provides a beneficial resource for the community, as it substantially reduces the amount that would otherwise need to be raised through council tax, is used to fund major building schemes in the town, and £10.9 million has been given to voluntary organisations.
- 9.49 Local amenity and the local community are considered to be receptors of high sensitivity.

Effects during construction

Economy and employment

- 9.50 The estimate of construction-related employment has been derived from the predicted expenditure for site works and development works, which is estimated at £105 million. The assessment has estimated the number of FTE jobs, where a permanent FTE is defined as an employment opportunity for at least 10 years. The number of gross new construction jobs has been calculated based on the total construction cost of the development and the average output per employee in the construction industry (based on the Annual Business Survey, 2011). A multiplier of 1.33 has been applied to take account of induced and indirect employment resulting from the construction phase of the development.
- 9.51 The proposed development is predicted to create 100 FTE jobs during construction. This will be an impact of small magnitude and a moderate, beneficial, significant effect.

Local community

- 9.52 The predicted effects of the proposed development on the local community during the construction phase of the Airport development, in advance of mitigation, are set out in the HIA in technical appendix D and are summarised in table 9.8. Direct employment from the construction phase is not included within table 9.8 as it has already been considered above as part of the employment impact assessment.

Potential change	Potential effect on health and wellbeing		
	Nature	Measurability	Degree of certainty
Risk of injury to the construction workforce	Negative	Estimatable	Speculative
Increased spending in the local economy during construction providing benefits to existing communities	Positive	Estimatable	Probable
Disturbance and impact on the enjoyment of existing outdoor space because of indirect effects from construction works	Negative	Qualitative	Speculative
Severance effects as a result of increased HGV movements	Negative	Qualitative	Probable
Effect of temporary construction workforce on local amenities and possible health related behaviours	Negative / positive	Qualitative	Probable
Increase in NO ₂ and PM ₁₀ arising from construction exhaust emissions	Negative	Estimatable	Definite
Dust 'nuisance' from construction activities	Negative	Qualitative	Definite
Noise from construction activities affecting local receptors and communities in proximity to the Airport	Negative	Estimatable	Definite
Potential impacts on construction workers arising from noise during construction activities	Negative	Estimatable	Definite

Table 9.8: Construction effects predicted through the HIA

- 9.53 Risks of injury to the construction workforce is considered to be negative. However risks are likely to be of low probability as the implementation of statutory health and safety measures are considered likely to mitigate this. It is assessed that should injury occur, it is probable that there would be an effect on health and wellbeing and that this effect would be 'calculable'. It is expected that construction employment will therefore give rise to a mixture of positive and negative effects, although the net effect is likely to be positive.
- 9.54 Additional roles beyond the immediate construction site, in service industries and trade supply industries, will result in health benefits beyond the site boundaries, thereby improving health and wellbeing further within the Borough of Luton and surrounding areas.
- 9.55 The impacts on health and wellbeing for receptors in the immediate vicinity of the Airport as a result of the proposed project are assessed to be predominantly negative during construction, although effects are anticipated to be of a small scale. Impacts are likely to result from temporary disturbance effects such as noise during construction, impacting on the enjoyment of outdoor public spaces, with a knock-on effect of reduced social interactions. Increased traffic movements leading to potential for increased congestion and severance effects may also impact on the desirability of journeys by car and foot to engage in social interactions. Examples of health outcomes could include increased social isolation, particularly amongst the more vulnerable sectors of society such as the young and the elderly. Severance effects are assessed as probable, as there is clear evidence linking increased road traffic to reduced social interaction.
- 9.56 Effects on health and wellbeing as a result of the possible presence of a temporary workforce in the local community during construction are assessed to be potentially both negative and positive, although effects are anticipated to be minor due to the scale of the workforce required and the fact that many of the workforce could be drawn from the local community. Negative health effects may include increased social isolation due to reduced social interactions resulting from the perceived threat of anti-social behaviour or perceived intimidation from large groups of construction workers using local amenities and services. This is likely to be restricted to more vulnerable individuals within the community such as the elderly. Conversely there is a potential for positive effects on mental health and wellbeing as a result of increased opportunities for social interaction and in the area as a result of the new temporary population.
- 9.57 The nature of the air quality effects on health has been assessed as negative, as PM_{2.5}, PM₁₀ and NO₂ have known links to respiratory disorders and in an HIA context any increase in levels should be classified as a negative impact, that can be identified through monitoring, and the impacts on respiratory health estimated. However, as detailed in the HIA and chapter 6 of this ES, the construction impacts on air quality can be appropriately mitigated and the residual effects are therefore negligible.
- 9.58 With respect to noise impacts, although assessed as 'definite' according to the Merseyside criteria, the scale of construction noise impacts considered are assessed to be of an insignificant level when being considered against the appropriate significance criteria set out in chapter 12 of this ES.

Effects post-construction

Economy and employment

- 9.59 This section presents the estimated economic of the proposed development in terms of employment supported and economic value created. The impact year is 2028, in accordance with the growth of air passenger movements that are forecast to peak in that year.

Employment

- 9.60 The impacts of the employment created by the proposed development have been calculated using the econometric model. The gross number of direct, on site jobs created at the Airport is estimated to be 13,350. A multiplier was then used to quantify the further impacts of the development through the creation of indirect and induced jobs. The HM Treasury multiplier of 1.33 for infrastructure projects at the sub-regional level was used, giving a gross number of indirect and induced jobs created by the proposed development of 4,400.
- 9.61 In order to calculate the actual additional number of jobs created by the development, the proportion of jobs that would have been created without the proposed development taking place (i.e. the number of jobs created in the future baseline of the Airport throughput growing to 12.4 million passengers per annum) was subtracted from the gross total jobs. This process is summarised in table 9.9.

Job type	2011 baseline	Future baseline jobs (2028)	With development (2028)	Additional jobs in 2028	
				Compared with 2011 baseline	Compared with 2028 baseline
Gross direct jobs	8,250	11,050	13,350	5,100	2,300
Gross indirect and induced jobs	2,700	3,650	4,400	1,700	750
Total	10,950	14,700	17,750	6,800	3,050

Table 9.9: Summary of post-construction employment creation

- 9.62 Table 9.9 shows that there will be a total direct increase of 3,050 jobs post-construction as a result of the proposed development compared to the 2028 future baseline level and an increase of 6,800 on the current baseline level. This is an increase of 21% on the future baseline projected employment shown in the table and an increase of 62% on the number of people currently employed at the Airport. The increase in employment is predicted to be a change of medium magnitude and a substantial, significant, beneficial effect.

Economic value

- 9.63 The estimate for the future economic value of the Airport's operations is calculated on the same basis as the current economic values. The estimate is based on the following assumptions:

- The current assumed sectoral breakdown of employment at the Airport prevails in 2028

- No account has been taken of the effect of inflation (i.e. average employee remuneration and per capita output for all industrial classifications in 2028 are expressed in current price levels)
- Levels of pre-tax profits, tax payable on profits, VAT and employer's National Insurance contributions as a percentage of business turnover in 2028 will be the same as those currently achieved by businesses at the Airport
- Personal income tax rates and the level of employees' contribution to National Insurance are the same as current levels
- Supply chain and induced income multiplier effects for the operations of the Airport in 2028 are assumed to be the same as the current estimates
- The rateable values of commercial properties within direct on site and direct off site boundaries of the Airport in 2028 are identical to current rates
- The per capita rates of air passenger duty for domestic, European and other international destinations for 2028 are expressed in current prices.

9.64 Based on these assumptions and the above employment forecasts for the proposed development, the total annual economic value of the Airport in 2028 is estimated to be £1.7 billion (table 9.10). This is a 70% increase on the current figure, which is a change of large magnitude and will lead to a very substantial, beneficial, significant effect.

Source	Income
Total income injection to the local economy	
Wages and salaries of workers (excluding tax and National Insurance)	£401.5 million
Direct business expenditure	£560.6 million
Direct profits accountable to the local economy	£14.5 million
Supply chain multiplier effect	£322.27 million
Sub-total	£1.3 billion
Direct government income	
Taxes from businesses	£70.8 million
Taxes on wages (including social security)	£145.4 million
Business rates	£9.4 million
Air passenger duty	£135.4 million
Sub-total	£361 million
Total	£1.7 billion
Table 9.10: Estimated annual economic value of the Airport in 2028	

Potential for wider economic benefits

9.65 The Airport may improve regional competitiveness by improving accessibility and encouraging firms to locate in the East of England region. The industries that are most likely to benefit from improvements in airport infrastructure are those that make greatest use of that infrastructure. However, the provision of the Airport itself is not sufficient to create advantage. More important are the range and frequency of international routes to those locations that are important to businesses, such as New York, the Far East and major European capital cities. Expanding the Airport would create opportunities for new routes. This is considered to be a moderate, significant beneficial effect.

Local community

Public safety zone

- 9.66 Both the 10^{-4} and 10^{-5} (PSZ) contours are predicted to increase slightly in length but decrease in area for the 18 mppa scenario compared to the 2002 contours that represent the baseline. The PSZs will be 8-14% longer than the baseline PSZs. However, the 2028 PSZs will be narrower than the 2002 contours, and the actual area of land occupied by the PSZs is predicted to decrease by 8% for runway 08 and by 12% for runway 26. This is largely attributable to the change in traffic mix modelled in the forecast 18 mppa scenario.
- 9.67 It has been assessed that effects on health and wellbeing of future pupils and teachers at a proposed new primary school on the former South Luton High School site are negative because the site lies within the PSZ and this is not something that can be mitigated due to the improbable nature of an aircraft accident, therefore representing an increased risk to third parties in the event of an aircraft accident. No significant adverse effects on public safety are predicted as a result of the proposed development. The full findings of the NATS assessment can be found in technical appendix D.

Health and community

- 9.68 The predicted post-construction health impacts associated with the proposed development are presented in table 9.11. As with the assessment of construction impacts, the effects of post-construction employment generation are not included within table 9.11 because these have been specifically considered above.
- 9.69 The operational impacts associated with air quality are assessed to be negligible to minor. Therefore an impact on health is not considered to be significant and mitigation is not required. All air quality impacts have been assessed as definite, since the potential effects will occur regardless of any action on the part of the affected people. Old people, young children and people with certain health problems will be the most vulnerable to any effects of air pollution. Dust is not expected to have any respiratory impacts, but severe 'nuisance' effects can cause stress and anxiety, although these impacts cannot be quantified within this study. Although assessed as 'definite' according to the Merseyside criteria, the scale of these impacts is considered to be predicted to be at a negligible level in comparison to the do-nothing scenario and the proposed development is not predicted to result in local air quality to exceeding objectives and limit values.

Potential change	Potential effect on health and wellbeing		
	Nature	Measurability	Degree of certainty
Wider economic benefits associated with the proposed development through increased trade and business both within and outside the region	Positive	Estimatable	Probable
Congestion on local roads as a result of increased Airport traffic	Negative	Qualitative	Probable
Disturbance and impact on the enjoyment of existing outdoor spaces due to increased Airport road traffic and air traffic movements	Negative	Qualitative	Speculative
Increase in charitable investments to organisations in the local area	Positive	Estimatable	Definite
Increase in NO ₂ , PM ₁₀ and PM _{2.5} concentrations arising from operational Airport effects	Negative	Estimatable	Definite
Increased noise effects from aircraft ground noise at existing properties	Negative	Estimatable	Definite
Increased road traffic noise associated with the operational development	Negative	Estimatable	Definite
Increased levels of active travel	Positive	Calculable	Probable
Reduction in the number of people within the updated PSZ for the proposed development	Positive	Calculable	Definite
Increased risk to pupils and other occupiers at a new proposed primary school within the PSZ	Negative / neutral	Estimatable	Definite

Table 9.11: Post-construction effects predicted through the HIA

- 9.70 In the context of the HIA, any increase in noise impacts is considered as a negative impact and in accordance with the Merseyside criteria has been assessed as definite, since the potential effects on health will occur regardless of any action on the part of the affected people. Although assessed as 'definite' according to the Merseyside criteria, the scale of all noise impacts considered (air noise, ground noise and road traffic noise) are assessed to be of an insignificant level when being considered against the appropriate significance criteria set out in the noise assessment in chapter 12 of this ES.
- 9.71 The proposed development will enable LLAOL to build on its existing community project work to ensure that the Airport continues to support the local community through a range of schemes and to provide scope for expanding this in the future. The amount paid to the council under the Concession Agreement will increase as a result of the proposed development, which will provide an opportunity for further contributions to local services. Overall, a small magnitude of change is predicted, which will be a moderate, significant beneficial effect.
- 9.72 Health impacts as a result of increased congestion on the local network are assessed as negative. Highway layout amendments, as part of the Airport access strategy, aim to mitigate the worst effects of the development related traffic, hence mitigating the impacts of congestion where possible. The health effects associated with congestion, and the subsequent air quality and noise impacts of such congestion, will be minimised.

Mitigation

9.73 The future noise control measures set out in chapter 12 of this ES that form part of the Airport's Noise Action Plan and the additional proposed noise mitigation measures will help to mitigate potential effects on local amenity as a result of increased aircraft noise. These include a new Quota Count system, noise insulation for the most affected properties, monitoring noise, continuing and introducing measures to manage noise, and continuing to engage with relevant stakeholders (such as air traffic control, airline operators, local residents, MPs, environmental health officers and the Consultative Committee) on a variety of issues. The Noise Action Plan will be updated not less than every five years, in accordance with current legislation.

Residual effects

9.74 The significant residual effects are summarised in table 9.12.

Topic	Significant residual effect	Receptor sensitivity	Impact magnitude	Nature	Duration	Degree of effect	Level of certainty
Community and economic	Generation of employment during construction	High	Small	Beneficial	Short term	Moderate	Reasonable
	Generation of employment post-construction	High	Medium	Beneficial	Long term	Substantial	Reasonable
	Increased value of the Airport to the local economy and local and central government	High	Large	Beneficial	Long term	Very substantial	Reasonable
	Wider economic benefits associated with the proposed development	High	Small	Beneficial	Long term	Moderate	Reasonable
	Increased contributions to local community projects and services	High	Small	Beneficial	Long term	Moderate	Reasonable

Table 9.12: Significant residual effects

Ch 10

Environmental Statement
Chapter 10 Ground conditions



Chapter 10: Ground conditions

Introduction

- 10.1 This chapter of the ES considers the ground conditions issues, including the potential for contamination arising from the proposed development, highlighting the known conditions on and adjacent to the site, main impacts, proposed mitigation measures and subsequent residual environmental effects. Potential and existing sources of ground contamination in and around the Airport have been examined, together with possible sensitive receptors, to determine the likelihood of any significant contamination effects arising from the proposed development.
- 10.2 The chapter is based on an assessment undertaken by WSP Environmental in 2006 and an intrusive investigation by Delta-Simons in 2012. WSP Environmental undertook a Phase I Geo-Environmental Desk Study in support of a previous and more extensive development of the Airport, which was ultimately not submitted for planning permission. The WSP assessment is still considered to be a relevant reference source of baseline information for this ES because the site context and land uses have not materially changed since that assessment was undertaken.
- 10.3 The full WSP Environmental Phase 1 report is presented in technical appendix F. It should be noted that the development proposals discussed within the technical appendix relate to the more extensive scheme that was considered in 2006; this chapter summarises the results of the report, but the impact assessment within this chapter of the ES considers the specific areas of works proposed within the current planning application.
- 10.4 Delta-Simons undertook an intrusive investigation on the area of former landfill on the eastern side of the Airport site in July 2012 and reported this information in a Preliminary Site Investigation Report dated 21st August 2012 (also provided in technical appendix F). The information provided within the Preliminary Site Investigation Report has been used within this chapter, with specific reference to baseline and potential impacts associated with the construction of Taxiway Foxtrot.

Legislation and policy

- 10.5 Relevant policy and legislation is summarised in table 10.1.

Policy/legislation	Requirements
The Environmental Protection Act 1990	<p>The Environmental Protection Act 1990 (EPA) defines, within England and Wales and Scotland, the fundamental structure and authority for waste management and control of emissions into the environment. The Act was intended to strengthen pollution controls and support enforcement with heavier penalties. Before the Act there had been separate environmental regulation of air, water and land pollution and the Act brought in an integrated scheme that would seek the "best practicable environmental option".</p>
Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance (April 2012)	<p>Part IIA of the Environmental Protection Act 1990 – which was inserted into that Act by section 57 of the Environment Act 1995 – provides a regulatory regime for the identification and remediation of contaminated land. In addition to the requirements contained in the primary legislation, operation of the regime is subject to regulations and statutory guidance.</p> <p>The main objective underlying the introduction of the Part IIA contaminated land regime was to provide an improved system for the identification and remediation of land where contamination is causing unacceptable risks to human health or the wider environment, assessed in the context of the current use and circumstances of the land.</p> <p>The statutory guidance relating to the implementation of Part IIA of the Environmental Protection Act (EPA) uses the concept of a “contaminant linkage”, whereby for land to be contaminated, each of the following has to be identified:</p> <ol style="list-style-type: none"> 1. A contaminant 2. A relevant receptor; and 3. A pathway by means of which either: <ol style="list-style-type: none"> a) that contaminant is causing significant harm to that receptor, or; b) there is a significant possibility of such harm being caused by that contaminant to that receptor. <p>Part IIA of the EPA 1990 defines the term ‘contaminated land’ as being</p> <p>“Any land which appears...to be in such a condition, by reason of substances in, on or under the land that:</p> <p>Significant harm is being caused, or there is a significant possibility of such harm being caused, or</p> <p>Pollution of controlled waters is being caused, or there is a significant possibility of such pollution being caused”.</p> <p>Section 78A(4) EPA 1990 Part IIA defines ‘harm’ as meaning:</p> <p>“...harm to the health of a living organism or other interference with the ecological systems of which they form a part and, in the case of man, includes harm to his property”.</p> <p>However, only significant harm, or the possibility of significant harm, being caused are to be considered.</p> <p>The term ‘contaminant’, is taken to mean:</p> <p>“a substance that is in, on, or under the land and which has the potential to cause significant harm to a relevant receptor, or to</p>

Policy/legislation	Requirements
	<p>cause significant pollution of controlled waters”.</p> <p>The guidance defines ‘risk’ as the combination of:</p> <ol style="list-style-type: none"> 1. The likelihood that harm, or pollution of water, will occur as a result of contaminants in, on or under the land. 2. The scale and seriousness of such harm or pollution if it did occur. <p>For a risk of pollution or environment harm to occur as a result of ground contamination, all of the following elements must be present:</p> <ol style="list-style-type: none"> 1. A contaminant, i.e. a substance that is in, on or under the land and that has the potential to cause significant harm to a relevant receptor, or to cause significant pollution of controlled waters. 2. A receptor, i.e. something which could be adversely affected by a contaminant. 3. A pathway, i.e. a route by which a receptor is or might be affected by a contaminant. <p>All three elements of a contaminant linkage must exist in relation to particular land before the land can be considered potentially to be contaminated under Part 2A, including evidence of the actual presence of contaminants.</p>
The Environment Agency’s Model Procedures for the Management of Land Contamination (Contamination Land Report 11) (2004)	Contaminated Land Report 11 (CLR 11) has been developed to provide the technical framework for applying a risk management process when dealing with land affected by contamination. The process involves identifying, making decision on, and taking appropriate action to deal with, land contamination in a way that is consistent with government policies and legislation within the UK. The document is consistent with the approach presented within the <i>Guidelines for Environment Risk Assessment and Management</i> published by the Department of the Environment and Health (2000).
The Water Resources Act 1991	The Water Resources Act 1991 (WRA) replaced the corresponding sections of the Water Act 1989. The WRA sets out the responsibilities of the Environment Agency in relation to water pollution, resource management, flood defence, fisheries, and in some areas, navigation. The WRA regulates discharges to controlled waters, namely rivers, estuaries, coastal waters, lakes and groundwaters.
The Groundwater (England and Wales) Regulations 2009	The Groundwater Regulations are an environmental protection measure that complete transposition of the Groundwater Directive (80/68/EEC) and provide enhanced protection for groundwater. Under the Regulations, the Environment Agency has responsibility for the enforcement of the Regulations and decisions of their scope and effect.

Table 10.1: Relevant regulatory and policy framework

- 10.6 The presence of contaminated materials on a site is generally only of concern if an actual or potentially unacceptable risk exists. Within the context of current UK Legislation, specifically Section 57 of the Environment Act 1995, the interpretation of a “significant risk” is termed to be one where:

“Significant harm is being caused or there is a significant possibility of such harm being caused, (where harm is defined as harm to health of living organisms, or other interference with the ecological systems of which they form a part and, in the case of man, includes harm to his property); and / or, pollution of controlled waters is being or is likely to be caused.”

10.7 The potential for harm to occur requires three conditions to be satisfied:

- i) The presence of substances that may cause harm, termed the ‘contaminant’.
- ii) The presence of a receptor that may be harmed, e.g. the water environment or humans, buildings, fauna and flora, termed the ‘receptor’.
- iii) The existence of a linkage between the source and the receptor, termed the ‘pathway’.

10.8 The three conditions comprise the basis of this approach in that without each of the three elements, contaminant, pathway and receptor, there can be no contamination risk. Therefore, the presence of measurable concentrations of contaminants within the ground and subsurface environment does not automatically imply that the potential for a significant contamination effect exists, since the contamination must be defined in terms of pollutant linkages and unacceptable risk of harm. The full pollutant linkage is illustrated in figure 10.1.

10.9 The nature and importance/sensitivity of both pathways and receptors, which are relevant to a particular site, will vary according to the intended use of the site, its characteristics and its surroundings.

10.10 Legislation and guidance on the assessment of contaminated sites acknowledges the need for a tiered risk based approach. Resulting reports generally contain a Tier 1 Assessment, which is a “Comparison of site contaminant concentrations against generic standards and compliance criteria including an assessment of risk using the source pathway target [receptor] model.”

10.11 Contaminated land assessments are based upon the Contaminated Land Exposure Assessment (CLEA) framework, originally released by the Department of Environment Food and Rural Affairs (DEFRA). More recently the technical guidance has been revised by the Environment Agency (EA). This framework primarily assesses risk to human health and has a series of Soil Guideline Values (SGV) for individual contaminants. If there are no relevant published SGV for a potential contaminant, current accepted practice is to use the following hierarchy of assessment values: former EA SGV; the 2009 Chartered Institute of Environmental Health (CIEH)/Land Quality Management (LQM) Generic Assessment Criteria (GAC); the guidance values produced by the Environmental Industries Commission (EIC), the Association of Geotechnical and Geoenvironmental Specialists (AGS) and Contaminated Land: Application in Real Environments (CL:AIRE) in December 2009; in house Human Health Generic Screening Values (HH-GSVs); and other non UK assessment criteria.

10.12 For controlled waters quality assessments, e.g. ground and surface water, there are no mandatory criteria; however, there are a number of guideline quality indicators in current use. For surface water, concentration limits called Environmental Quality Standards (EQS) have been assigned to dangerous substances to control occurrence and avoid harmful effects. The EQSs have been taken from the

European Dangerous Substances Directive, 76/464/EEC and daughter directives. For groundwater, permitted concentration values (PCVs) have been designed as standards for the supply of drinking water, as part of the UK Water Supply (Water Quality) Regulations 2000. Reference to assessment under the Water Framework Directive (2000/60/EC) (WFD) is included within chapter 14 of this ES.

Methodology

- 10.13 The baseline environmental and ground conditions are described with reference to the information sources listed in table 10.2.

British Geological Survey (BGS) 1:50,000 Solid and Drift Geology Map, Sheet 221, Hitchin
Historical Ordnance Survey Maps
Landmark Envirocheck
Delta-Simons Environmental Consultants Ltd (August 2012) Preliminary Site Investigation Report (ref. 12-0319.01) for London Luton Airport Ltd
WSP Environmental Ltd (April 2006) Phase I Environmental Assessment (ref. 12220076) for LLAOL

Table 10.2: Data sources

- 10.14 There are no known published standard EIA criteria for assessing the significance of effects that may arise from land contamination. Therefore, effects have been qualitatively assessed using professional judgment and reference to relevant guidance e.g. CLEA.
- 10.15 In determining the significance of the effects arising from the ground contamination conditions a variety of receptors were considered, including site users e.g. passengers, construction workers, and surface and groundwater resources. Categorising the importance of the receptors and the magnitude of any impact on them, enables the significance of any effects to be determined. The importance of a receptor is categorised in accordance with figure 10.1. The magnitude of each construction and operational impact is categorised in accordance with figure 10.2.
- 10.16 The significance of an effect is determined using: the 'determination of significance matrix' shown in figure 10.4, and the categories arrived at for the sensitivity of a receptor and the magnitude of the impact on it. Table 10.3 provides examples of conditions giving rise to significant effects.

Effect	Description
Substantial adverse	High risk site classification – acute or severe chronic effects to human health and/or animal/ plant populations predicted. Permanent reduction in the quality of a potable groundwater or surface water resource of regional importance e.g. principal aquifer, public water reservoir or borehole.
Moderate adverse	Medium risk site classification and proven (or likely significant) pollutant linkages with human health and/or animal/plant populations, with harm from long term exposure. Permanent reduction in the quality of a potable groundwater or surface water resource of local importance e.g. outer groundwater source protection zone.
Slight adverse	Low risk site classification and potential pollutant linkages with human health and / or animal / plant populations identified. Reversible reduction in the quality of groundwater or surface water resources used for commercial or industrial abstractions.
Negligible	Negligible risk site classification – No appreciable impact on human, animal or plant health, potable groundwater or surface water resources.
Slight beneficial	Risks to human, animal or plant health are reduced to acceptable levels. Local scale improvement to the quality of groundwater or surface water resources used for commercial or industrial abstraction.
Moderate beneficial	Significant reduction in risks to human, animal or plant health, to acceptable levels. Local-scale improvement to the quality of potable groundwater or surface water resources.
Substantial beneficial	Major reduction in risks to human, animal or plant health. Significant regional scale improvement to the quality of potable groundwater or surface water resources.

Table 10.3: Significant contamination effects

Baseline conditions

Ground conditions

- 10.17 The British Geological Survey (BGS) Map Sheet 221, Hitchin, indicates the Airport to be underlain by Clay-with-Flints over Upper Chalk. The map also indicates areas of worked ground within the site, one attributable to a former landfill in the east of the site, and areas relating to the developed areas associated with the Airport.
- 10.18 Previous site investigations (SIs) at the Airport have been split between those undertaken within the landfill on the eastern side of the site and those undertaken on other areas of the site. Records of seven SIs undertaken between 1998 and 2003 confirmed variability in the thickness of strata across the site not including the landfill area. Summary results of the geology from these SIs are presented in table 10.4.

Geological unit (where encountered)	Depth to the top of strata (m bgl)	Depth to base of strata (m bgl)	Thickness (m)
Topsoil	0	0.05 – 0.2	0 - 0.2
Made ground	0	0.1 – 2.1	0 – 2.1
Clay-with-flints	0 – 2.1	1.45 – base at 16.5	1.1 - unproven
Chalk	1.45 – 16.2	Base at 30	Not proven

Table 10.4: Summary of geology on non-landfill areas of the Airport site

- 10.19 The made ground across the majority of the Airport is described as various hard standing overlying reworked Clay-with-Flints, with fragments of brick, concrete and ash. Clay-with-Flints is present across the non-landfill areas of the site, and where made ground is absent, the Clay-with-Flints are present close to the surface. The Clay-with-Flints strata varies in thickness but extends from a minimum of 1.45 metres below ground level (bgl) to over 16.5 metres bgl. Correspondingly, the shallowest chalk was encountered at 1.45 metres bgl, but in other areas the top of the chalk is substantially deeper, below the Clay-with-Flints.
- 10.20 The Delta-Simons intrusive investigation in 2012 targeted the area of the landfill in which the Taxiway Foxtrot is proposed. The ground conditions identified in this area of the site comprised the following:
- A capping layer generally between 0.6 and 2.9 metres bgl, however, this layer was absent in places, comprising gravelly clay (the gravel consisting of brick, flint and chalk). Also within the lower levels of this layer were fragments of plastic, fabric and metal. The approximate composition of this layer is: 60-70% fines; 25-40% aggregates; <5% textiles, wood and plastic; and <2% metal
 - Beneath the capping layer to a proven depth of 3.8 metres bgl was well decomposed general waste with slow biodegradables (timber, glass, plastic, fabric and metal) and aggregates. The approximate composition of the landfill area is: 45-55% fines; 15-20% aggregates; 25-30% textiles, wood and plastic; and <5% metal

Hydrology and hydrogeology

- 10.21 The Environment Agency (EA) divides the underlying strata in England and Wales into principal (formerly 'major' aquifers), secondary A and B (formerly 'minor' aquifers) and unproductive strata (formerly non-aquifers). These designations reflect the importance of aquifers in terms of groundwater as a resource (drinking water supply) but also their role in supporting surface water flows and wetland ecosystems. The underlying Upper Chalk across the whole of the site and the surrounding area is classified as a principal aquifer. The Clay-with-Flints is a low permeability drift deposit that is classified as an unproductive strata.
- 10.22 Previous site investigations have encountered groundwater at depths ranging from 30 – 60 metres bgl across the site within the Upper Chalk. It is reported that perched water may be present within the made ground. There are three groundwater abstractions within 500 metres of the Airport boundary, and whilst the majority of the Airport site is outside the total catchments of any groundwater source protection zones (SPZs), the northern half of the Airport including the West Apron, Taxiway Echo, North Apron and Cargo Centre are within the total catchment of an SPZ.
- 10.23 The closest surface water feature is the River Lea / Lee, which is approximately 250 metres to the south west of the Airport. There are no known surface water abstractions within 1 kilometre. The Airport is not located within an Environment Agency indicative flood plain. Further information on the water environment is provided in chapter 14 of this ES.

Current potential polluting land uses

- 10.24 There are a number of bulk storage facilities across the Airport, including Jet A1 aviation fuel stored at the fuel depot, and de-icing compounds, gas oil and diesel for airside vehicles, fire fighting foam and diesel oil for the engine house, stored at the fire station and at four switch houses based on the airfield. These substances have the potential to give rise to contamination.

Historical land use

- 10.25 Historical maps and anecdotal information indicate the site has been occupied by an airfield since pre-1940, prior to which the site appeared as open land, with the only former land uses being a brick and tile works, Spittlesea Hospital and Falconer's Hall. Review of historical development on the site suggests limited potential for significant historic contamination. Further information on the historical development of the site is provided within chapter 7 of this ES (Cultural Heritage) and technical appendix C.

Regulatory information

- 10.26 Regulatory enquiries have identified, within 250 metres of the Airport boundary, the summary information listed in table 10.5.

A registered landfill adjacent to the western boundary of the site, associated with Vauxhall Motors Ltd

There are four registered transfer stations / treatment facilities located within 250 metres of the site; three transfer stations associated with the former landfill, and a treatment / disposal site associated with Vauxhall Motors Ltd

There are three fuel stations within 250 metres of the site

There are six discharge consents within 250 metres of the site; three of which are on site and attributable to the Airport

There are six pollution incidents recorded; two Category 2 – Significant Incidents and four Category 3 – Minor Incidents.

Table 10.5: Results of regulatory enquiries

Third party information

- 10.27 WSP Environmental reviewed a number of reports from previous contamination studies at the Airport, and a summary of the main findings is presented in table 10.6.

There has been elevated concentrations of lead, copper, zinc and total petroleum hydrocarbons (TPH) observed within the made ground present in the former landfill area, however one report indicated that the concentrations of determinands sampled within the clay material forming the landfill cap were all below their respective guidelines.

Toluene extractable material (TEM) is elevated across the Airport, indicative of grease, oil and diesel fuel.

Soil vapour results across the Airport indicated minor exceedances of volatile hydrocarbons and chlorinated solvents.

Sporadic localised hydrocarbon concentrations were observed in the borehole near the central soakaway.

With the exception of elevated metals, glycol and fluorinated surfactants from fire fighting foam, persistent unacceptable levels of contaminants monitored were not present within surface or groundwater.

Landfill leachate has been found to contain elevated diesel range organics and hydrocarbons within the range C₃₁-C₄₀. Where present, the Clay-with-Flints is considered to act as a barrier, protecting the underlying aquifer.

A phased groundworks remediation programme has reduced the risk of sub-surface contamination caused by the fire training ground.

It is recommended that buried concrete be designed in accordance with Design Sulphate class DS-1, and Aggressive Chemical Environment for Concrete class ACEC-AC-1s. Due to the age of some of the reports, a number recommend alternative classes; however, these classifications relate to superseded digests.

Filling operations (details unknown) have occurred to accommodate construction of the eastern end of the runway.

Japanese knotweed in the south west corner of the Airport to the north of the runway, which has subsequently been treated / remediated.

Within the landfill area it is considered that in some parts the waste rests directly onto the chalk, creating a preferential pathway from source to receptor.

Landfill gas concentrations encountered require protection measures to be included in development over the landfill.

There have been no breaches of consent limits and no Red List Substances (compounds particularly toxic to the aquatic environment) used on the Airport.

There are fourteen known Underground Storage Tanks present across the Airport.

Electrical transformers and switchgear at the Airport may have resulted in the release of oils containing Poly-chlorinated Biphenyls (PCBs).

Table 10.6: Summary of previous contamination studies

Recent intrusive investigation of the landfill

- 10.28 Desk study information identified prior to the 2012 intrusive investigation indicated that the landfill was operated by Luton County Borough Council between 1937 and 1978. The records show a broad range of wastes were accepted including: industrial; inert; household; and liquids/sludge.
- 10.29 During the 2012 Delta-Simons survey, visual/olfactory evidence of hydrocarbon contamination was identified at a number of locations within the landfill area, however, following chemical analysis, concentrations of hydrocarbons were recorded below the relevant commercial screening values for soils.
- 10.30 The only potential contaminants recorded above relevant screening values were for lead in nine out of 24 soil samples analysed, at a maximum concentration of 2,400 milligrams per kilogram (mg/kg), and for nickel in two out of 24 soil samples, at a maximum concentration of 2,500 mg/kg.

- 10.31 Suspected asbestos containing materials were identified in the waste within the landfill. Following laboratory analysis, this confirmed that the material was not asbestos, however, it should be noted that this cannot completely rule out the presence of asbestos.
- 10.32 Groundwater and / or leachate was not encountered, however, the waste material was recorded as being 'damp / moist' in some locations.
- 10.33 From an initial waste classification assessment, five samples of the capping material have been recorded as Non-Hazardous, and some of this material (possibly 50%) may be further classified as being Inert. The majority of the landfill waste material (15 out of 18 samples testing) was recorded as being Hazardous, with the three remaining samples being classified as Non-Hazardous.

Sensitive receptors

- 10.34 Surrounding land uses of a sensitive nature include residential properties to the north and north west. Other less sensitive land uses in the vicinity include industrial units to the north and west, and agricultural land to the south.
- 10.35 Based on the findings of the WSP assessment, the Airport as a whole is considered to be of medium environmental sensitivity due to the underlying principal aquifer, the presence of several groundwater SPZs within 500 metres of the site and the surrounding residential and agricultural land uses. However, the Clay-with-Flints drift deposits are expected to provide some protection to the principal aquifer across the majority of the site, depending on the thickness of the deposits.
- 10.36 Specific receptors within the Airport's boundary have been identified and their sensitivity to contamination effects has been categorised with reference to figure 10.2, see table 10.7.

Receptor	Sensitivity categorisation
Human health	High
Soil and groundwater (Clay-with-flints)	Low
Soil and groundwater (Chalk aquifer)	High
Surface water	High
Agricultural land	Medium

Table 10.7: Sensitivity of receptors

Effects during construction

- 10.37 The nature of the proposed development indicates potential for a range of interactions with ground conditions:
- Construction of the new dual carriageway section for Airport Way will require stripping of topsoil and excavation to allow construction of highways infrastructure and highways drainage. This has potential to create a pathway between construction personnel and any contaminants present in soil. It is

considered unlikely that the depth of excavation will have potential to create any pathway to the underlying aquifer

- Construction of new sections of taxiway and Airport apron (excluding Taxiway Foxtrot) will similarly require stripping of existing surfaces (topsoil and hard surfacing) and excavation of other in situ material to a depth of up to one metre to facilitate construction of new surfaces and their foundations. As is the case for the construction of the road, this has potential to create a pathway between construction personnel and any contaminants present in soil but is also unlikely to create any pathway to the underlying aquifer
- Construction of Taxiway Foxtrot will require the excavation of the capping layer and the landfill waste material below in some areas, to a maximum depth of approximately 2.4 metres bgl. This creates a potential risk to construction personnel during the works and will also create excess materials
- Construction of foundations for the extension of the terminal, new pier structure and the multi-storey car park will have the potential to penetrate the Clay-with-Flints strata and have the potential to create a pathway for contaminants to the underlying chalk. As with other areas of construction, excavations have potential to bring construction personnel into contact with contaminants present in soils.

10.38 All construction works have the potential to generate the following potential effects relevant to this assessment:

1. Dust generation
2. Effects to construction personnel
3. Excavated materials
4. Creation of areas of contamination e.g. through spillage
5. Creation of pathway for contamination into the underlying principal aquifer.

Dust generation

10.39 Whilst likely not to be contaminated, dust and silt can result from ground disturbance during construction, which can lead to accidental ingestion, dermal contact or inhalation of particles by site workers and possibly the general public. In some cases, generation of dust and silt may also lead to deposition on nearby surface waters. These risks would be most severe in the event that construction works were to take place where contaminants are present, where recent and historic contaminative uses on site pose a potential risk to sensitive receptors. In the absence of mitigation, this potential impact is assessed to be moderate significance.

Effects to construction personnel

10.40 Potential sources of contamination have been recognised within the made ground and construction personnel may be exposed to potentially contaminated material during the construction phase of the development. Construction personnel are considered to be a receptor of high sensitivity. The nature of potential contamination on areas of the site is considered to be of small to medium magnitude and therefore the significance of the potential effects to construction personnel is of moderate to substantial adverse significance, in advance of mitigation.

Plant, operations and materials

- 10.41 During the construction phase there is a potential for contaminants associated with construction plant, operations and materials to impact on the soils and groundwater at the Airport. The primary mechanism for this is through local spillages and leaks from construction plant and operations. The Clay-with-Flints strata will provide some protection to the chalk aquifer against this potential contamination. In the absence of mitigation, the significance of the potential adverse effect to Clay-with-Flints strata is slight to moderate and for the Chalk aquifer is moderate to substantial, by virtue of its higher sensitivity.

Excavated materials

- 10.42 It is anticipated that in general spoil generated is likely to be suitable for use (subject to pre-agreed protocols) on site for landscaping or other engineering purposes, therefore limiting the volumes of material that will require disposal off-site e.g. if contaminated or structurally unsuitable as fill material. The impact is assessed as negligible / slight significance where soils can be re-used on site and moderate / substantial significance for soils requiring off-site disposal to landfill (without mitigation).

Pathway creation

- 10.43 Any piled foundations for the new buildings / structures have the potential to create a preferential pathway between any contamination within the ground and the underlying chalk aquifer, given that the piles are likely to require drilling through the lower permeability deposits (Clay-with-Flints). It is noted that contamination may not be present within the area of the proposed buildings. However, on a precautionary basis, this is considered to be a potential impact of moderate to substantial significance in the absence of further specific investigation and / or mitigation.

Summary of construction effects

- 10.44 Table 10.8 provides a summary of the construction effects of the proposed development prior to mitigation.

Effect	Sensitivity of receptor	Magnitude of impact	Significance of effect
Dust generation and wind-blown contaminants	High	Small	Moderate
Site personnel exposed to contaminated soils during construction	High	Small to medium	Moderate to substantial
Construction plant, operations and materials to impact soils and groundwater (Clay-with-Flint)	Low	Small to medium	Slight to moderate
Construction plant, operations and materials to impact soils and groundwater (Chalk aquifer)	High	Small to medium	Moderate to substantial
Excavated materials (Non-contaminated)	Medium	Small to negligible	Negligible / slight
Excavated materials (Contaminated)	Medium	Medium to large	Moderate to substantial
Creation of a pathway for contamination into the Chalk aquifer	High	Small to medium	Moderate to substantial
Table 10.8: Summary of effects during construction			

Effects during operation

Risk of contamination to future users of the site

- 10.45 Upon completion of respective areas of construction, a number of activities could potentially lead to adverse effects on site end users. Substances that may impact upon end users include fuel and oils, metals, herbicides and other substances from the previous and current use of the site. It is considered that there is limited potential for end users e.g. passengers and Airport staff, to come into contact with potentially contaminated soils because of the predominant presence of hard surfacing in areas of human activity. The impact assessed is considered to be of slight to negligible significance depending on the nature, frequency and volume of contamination encountered.
- 10.46 During operation, there may be limited potential for accidental spillage of potentially contaminating materials from delivery locations, plant operational locations and storage of fuel/oils for refuelling vehicles and the disturbance of previously unidentified contaminated land. Where this occurs, this is considered to be of moderate to substantial significance.

Controlled waters – groundwater and surface water

- 10.47 In operational use, areas of the Airport have the potential for adverse effects on water quality. Substances that may result in reduced water quality and therefore adverse effects on controlled waters include fuels and oils, de-icing compounds, chemicals and other substances and herbicides or pesticides resulting from field and landscaped area maintenance. During operation, there may be limited potential for accidental spillage of potentially contaminating materials from delivery locations, plant operational locations and storage of fuel/oils for refuelling vehicles. Because

of the presence of hard surfacing and the Clay-with-Flints strata, the potential impact of such spillages is assessed as moderate to substantial significance depending on the nature, frequency and volume of the spillage.

- 10.48 The piled foundations for the new pier structure and multi-storey car park have the potential to create a preferential pathway between the surface and the underlying chalk aquifer. Although it is unlikely to facilitate a full pollutant linkage, it may be possible for surface spillages in the vicinity of the piled foundations to result in contamination of the underlying aquifer. On a precautionary basis, this is therefore considered to be a potential impact of moderate to substantial significance in the absence of mitigation.

Summary of operational effects

- 10.49 Table 10.9 provides a summary of the operational effects of the proposed development prior to mitigation.

Effect	Sensitivity of receptor	Magnitude of impact	Significance of effect
Risk to human health from in situ on site contamination	High	Small	Slight to negligible
Risk to human health from new on site contamination	High	Small to medium	Moderate to substantial
Risk to controlled water from on site contamination (Chalk aquifer)	High	Small to medium	Moderate to substantial
Risk to controlled water from preferential pathways via foundations (Chalk aquifer)	High	Small to medium	Moderate to substantial

Table 10.9: Summary of effects during operation

Mitigation

Prior to construction

Further investigation / assessment

- 10.50 In order to complete the detailed construction methodology and design it may be necessary to undertake further targeted intrusive investigations to further clarify the extent of any contamination present at the various construction locations.
- 10.51 In the area of the landfill, whilst elevated concentrations of lead and nickel were recorded in soils, significant contamination was not recorded. However, a Quantitative Risk Assessment (QRA) may still be required for the purposes of assessing the risk to groundwater/controlled waters. A QRA may also be required if significant contamination is identified elsewhere. Should a QRA and/or remediation be required, liaison will be carried out with the regulatory authorities throughout the procedures.
- 10.52 A Piling Risk Assessment will also be completed prior to construction to highlight the preferred and safest method for piling in order to protect the underlying chalk aquifer.

- 10.53 A Materials Management Plan (MMP) shall be produced detailing specific soils management plans, including those for imported primary materials and proposals for the reuse of site-won materials. The MMP shall provide a structured plan for the earthworks to be completed, to avoid double handling of materials and the excessive use of energy to complete the scheme.

Construction phase

Excavated materials

- 10.54 The handling, storage and removal of any potentially contaminated material on site will be subject to prevailing waste management legislation and guidance, and the appropriate disposal or reuse of materials will be considered as part of the detailed construction design and integrated with the Site Waste Management Plan that seeks to maximise beneficial pre-planned re-use of suitable site materials.
- 10.55 More specifically, given the requirement for excavated materials from the landfill, the design team, engineers and geotechnical / contamination consultants will work together in order to reduce the amount of excavated material requiring off-site disposal to landfill. The opportunities that are considered to be currently available are:
- Re-using of materials, where they are considered to be suitable for use (e.g. the capping material absent of landfill waste)
 - Screening out of recoverable materials (e.g. metals) and reusable materials (e.g. aggregates, plastics for recycling, wood)
 - Stabilising and/or treating finer materials so that they are suitable for re-use (e.g. combining with other organics, clay capping and wood for composting and topsoil generation)
- 10.56 It is considered that the implementation of the above mitigation measures will reduce the magnitude of change for excavated materials to small, which would result in a slight effect that will not be significant.

Construction workers

- 10.57 Health and safety risks to construction workers will be mitigated by the implementation of appropriate health and safety measures. The appointed contractors will be responsible for ensuring that members of the public and site workers are protected from the potential effects of any contamination encountered during the entire construction process. Measures utilised will be incorporated within the general construction site safety standards.
- 10.58 The contractors will carry out a health and safety risk assessment with appropriate precautionary measures planned and recorded in advance by adequately trained and qualified persons. During all works, the principles outlined in the Protection of Workers and the General Public during Development of Contaminated Land (HSE, 1991), or prevailing best practice guidelines, should be adhered to.
- 10.59 Points that will be considered include:

- i. Advice should be provided to all site personnel concerning the significance of land affected by contamination and the associated risks to human health on site prior to commencing work.
- ii. Suitable personal protective equipment (PPE), including clothing, footwear, gloves and respiratory equipment (if necessary) should be provided for all site personnel, who should be advised on the use of PPE items on the site with the items remaining on site at all times.
- iii. No workers should eat, drink or smoke in the vicinity of the works. Comprehensive welfare facilities should be provided for all site staff to enable workers to wash prior to leaving the site.
- iv. Health and safety risks to adjacent site users relating to dust, noise, odour and vibration should be appropriately addressed prior to commencement of site works.

10.60 It is considered that the implementation of the above mitigation measures will reduce the magnitude of change for construction personnel to small to negligible, which would result in a slight to negligible effect that will not be significant.

Construction related activities

10.61 Protection of the underlying groundwater and nearby surface water from construction activities will be achieved using the following mitigation methods:

- i. Damping down of surfaces and sheeting of stockpiled material where necessary.
- ii. Prevention of water entering excavations, where possible.
- iii. Use of measures such as cut off ditches, silt fences or impermeable membranes to prevent uncontrolled release of runoff from excavations or exposed ground.
- iv. Appropriate storage of potentially polluting materials and chemicals in accordance with the Control of Pollution (Oil Storage) Regulations (England) 2001.
- v. Adequate supervision of all deliveries and refuelling involving potentially polluting substances.
- vi. Delivery and refuelling areas to be located away from surface water bodies with adequate measures in place to contain spillages at these locations.
- vii. Leaks or spillages of potentially polluting substances to be contained, collected then removed from site in an appropriate manner e.g. use of absorbent material, bunding or booms. An emergency action plan will be formulated which all site personnel will have read and understood.
- viii. Storage of machinery and equipment to be located away from surface water bodies. Drip trays to be placed underneath any parts where oil/fuel parts where oil/fuel may be found.
- ix. Use of adequate wheel wash facilities to contain and dispose of potentially polluted runoff.
- x. Regular washing of machinery and access roads and dampening to reduce dust emissions with appropriate collection and disposal runoff.
- xi. Secure access to the site for construction personnel only.

General

10.62 A CEMP will be prepared and implemented by the contractors of each zone prior to the commencement of the respective construction phases. Mitigation measure will

be implemented during the construction phase to minimise potential effects associated with airborne dust.

- 10.63 Dust mitigation measures such as damping down, covering of stockpiles, use of wheel washes and covering of lorries during transportation should be implemented as part of a general good site management plan to ensure that the potential effects associated with airborne dust are minimised. Further information on these measures is provided within chapter 6 of this ES.
- 10.64 Spillage mitigation measures will include the storage of chemicals and contaminative material in accordance with the EA guidance; regular servicing and inspection of vehicles used on-site; restriction of refuelling vehicles to bunded areas underlain by hard standing, or other impermeable materials and the restriction of vehicle movements within close proximity of the surface watercourses.
- 10.65 As part of the CEMP, there will also be a 'hotspot' protocol to be followed by workers should visual and / or olfactory evidence of contamination be identified during construction that has not previously been recorded. This protocol ensures that if any previously unidentified contamination is encountered, appropriate measures are taken to assess and potentially remediate the contamination.
- 10.66 The aforementioned mitigation measures are considered to reduce the potential for adverse effects associated with contaminants in wind blown dust and construction plant and machinery to small. Associated effects would be considered to be slight and not significant.

Operational phase

- 10.67 The SI results considered during the WSP and Delta-Simons assessments do not indicate site wide contamination, and it is envisaged that if remediation is required, it will only be for localised areas of contamination.
- 10.68 It is considered that, following the implementation of the mitigation measures prior to construction (further investigation and assessment) and those during construction outlined above, there will be no significant residual effects associated with the post-construction phase of the development. The site investigation works prior to the construction phase will either confirm the lack of, or define the extent of, a contaminant source, which if deemed necessary following appropriate assessment, remediation can be undertaken.
- 10.69 The most likely source of any potential operation-phase surface and groundwater contamination is from fuel oils, de-icing compounds and fire fighting foam entering the groundwater via the drainage system, particularly the soakaways, and surface water via the drainage system and discharge points. There are existing control mechanisms within the Airport drainage infrastructure such as interceptors and all new areas of surfacing will be directed via these features. Further details of the drainage system are provided in chapter 14 of this ES. No significant effects are predicted.
- 10.70 The impact of accidental spillages will be minimised through appropriate storage of potentially polluting materials and chemicals in accordance with the Control of Pollution (Oil Storage) Regulations (England) 2001 (Ref 10.10); the provision of hard

standing in such areas with appropriate drainage infrastructure and the adoption of standard material handling and storage procedures. The residual effect of the completed development to controlled waters is assessed as negligible significance.

Cumulative effects

- 10.71 The contained nature of predicted ground conditions impacts within the Airport site and the limited potential for the proposed development to interact with groundwater indicates that there is no significant potential for cumulative impacts off-site with the three identified cumulative developments at Century Park, Junction 10a and the Sundon Rail Freight Depot.

Residual effects

- 10.72 Following the implementation of the mitigation measures described above, it is considered that none of the residual effects are considered to be significant, as all the potential impacts have been reduced to either slight or negligible. It is also noted that should significant localised contamination be encountered requiring remediation, and following the excavation, screening and re-using of materials within the landfill area, it could be considered that following the development there will be a slight beneficial change in the ground conditions.

Ch 11

Environmental Statement
Chapter 11 Landscape and visual impact



Chapter 11: Landscape and visual impact

Introduction

- 11.1 This chapter of the ES sets out the assessment of the landscape and visual effects associated with the development proposals. The purpose of the assessment is to understand the character of the existing landscape and how the area is perceived visually. The assessment provides a baseline against which potential effects likely to arise from the construction and operation of the proposed development can be predicted and their significance assessed.
- 11.2 This chapter has been based on a specialist assessment prepared by Arup, which is provided in full within technical appendix F to this ES and should be read in conjunction with chapter 3 of the ES.

Legislation and policy

- 11.3 The documents from which the relevant statutory planning policies relating to the landscape and visual impact assessment have been taken are:
- The National Planning Policy Framework (NPPF) – states that the planning system should contribute to and enhance the natural and local environment by protecting and enhancing valued landscapes. The policy guidance emphasises that great weight should be given to conserving landscape and scenic beauty in areas that have the highest status of protection in relation to landscape and scenic beauty such as Areas of Outstanding Natural Beauty.
 - Saved policies from Luton Borough Council's Local Plan 2001 – 2011 – under policy ENV1, the Council states that planning permission will not be granted for development that has a detrimental effect on the special character, natural beauty, landscape and setting of the Chilterns Area of Outstanding Natural Beauty. Policy ENV2 states that planning permission will not be granted for development in any locally designated landscape areas unless the development would preserve or enhance these designations. Policies ENV9 and ENV10 set objectives for design principles including landscape design
 - North Hertfordshire District Council Local Plan 1996 Saved policies under Planning and Compulsory Purchase Act 2004, Written Statement September 2007 – Policy 11 confirms that the Council will conserve and enhance the natural beauty of the Chilterns Area of Outstanding Natural Beauty by ensuring that development is carefully sited and is of high quality design
 - South Bedfordshire District Landscape Character Assessment April 2009.

Methodology

- 11.4 The methodology for the landscape and visual assessment generally follows the guidance set out in the following documents:
- Guidelines For Landscape and Visual Impact Assessment (GLVIA) Landscape Institute and the Institute for Environment Management and Assessment (2nd Edition, 2002) (a revised edition of the guidelines is currently out to consultation but is not yet published)

- Design Manual for Roads and Bridges (DMRB), Volume 11 Section 3 Part 5 'Landscape Effects' (1993).

11.5 These documents are currently under review and the methodology that has been developed for this assessment seeks to accommodate recent developments as far as possible in the assessment of landscape and visual effects, for example through avoiding judgments on landscape quality. This incorporates, as far as possible, updates in the consultation draft 3rd edition GLVIA.

Consultation

11.6 Consultation has been completed with the landscape officer in LBC and with an additional viewpoint from Cutenhoe Road all proposed viewpoints are now agreed.

11.7 A pre-application consultation exercise was undertaken by Arup in February and March 2012. Feedback received from this process has informed the EIA process. Feedback included concern about the impact on Areas of Outstanding Natural Beauty (AONBs). The Chilterns AONB is split into two areas that lie north and west of the site. The AONB north of the site is approximately 3 kilometres away and separated from it by residential and intermittent commercial premises. The AONB west of the site is approximately 4 kilometres away and is separated from the site by the M1 motorway, Midland Mainline railway line and urban areas of Luton that have a mix of residential, large industrial and commercial premises. Given the distance and intervening land use, there are no likely impacts on the Chilterns AONB, and this has therefore not been assessed further.

Assessment scenarios

11.8 The assessment of landscape and visual effects has been undertaken for the construction phase and post-construction (operational) phase of the development. Assessment of potential construction impact has assumed the largest amount of construction plant on-site, including cranes, and regular road traffic movements. Effects arising from construction of the proposed development have been assessed against the identified baseline.

11.9 The assessment of operational effects has considered the proposed development in its entirety and operating at a throughput of 18 million passengers per annum (mppa). This development case is considered to arise by 2028. The corresponding base case for the assessment is the Airport in 2028 operating at a throughput of 12.4 mppa and having the same physical characteristics as the Airport today (as described in chapter 2 of the ES).

Study area

11.10 The study area has been defined as the area over which the physical components or changes caused by the introduction of the proposed development could affect peoples' views of the landscape within the wider area. The Zone of Theoretical Visibility (ZTV) has been used as a tool to establish the extent of the landscape and visual study areas, alongside professional judgement, which has been used to interpret the model, in line with GVLIA guidance.

Methodology for establishing baseline conditions

- 11.11 Relevant planning designations that are used to assess the local landscape are listed below and illustrated on figure 11.1. The existence of designations is an indicator of the relative 'value' of the landscape.
- Designated open space
 - Metropolitan Greenbelt
 - Designated Conservation Areas
 - Chilterns Area of Outstanding Natural Beauty (AONB)
 - Historic parks and gardens
 - Scheduled monuments
 - Area of Special Landscape Character/ Area of Local Character
 - Designated Public Rights of Way
 - County Wildlife Site
 - Ancient Woodland.
- 11.12 The landscape and visual baseline has been established through desk-based research and a field survey to establish the character of the site, surrounding areas and the nature of existing views.
- 11.13 The study area has been defined as the area over which the physical components or changes caused by the introduction of the proposed development could affect peoples' views of the landscape within the wider area. A Zone of Theoretical Visibility (ZTV) has been used as a tool to establish the extent of the landscape and visual study areas, alongside professional judgement, which has been used to interpret the model in line with GLVIA guidance.
- 11.14 The ZTV, which is shown as figure 11.2, has been created by digitally modelling the landform within the study area using a digital terrain model (ground profile) combined with building height information from a digital surface model. Woodland information was interpreted as a solid barrier, where trees blocks obstruct visibility. Professional judgement was used to interpret this on-site.
- 11.15 The ZTV for the proposed development has been generated by modelling the heights and extents of the proposed development, as set out in chapter 3 of this ES. An offset of 1.6 metres above ground level has been used to represent the eye level view of an average height person. The model highlights areas from which the construction phase and the completed proposed development would theoretically be visible. The validity of the ZTV has been checked on-site, using professional judgement to ensure the output is a fair representation of the theoretical visibility of the proposed development.
- 11.16 The policy and guidance documents used in the desk-based research are listed in paragraph 11.3. Whilst the proposed development would take place wholly within Luton Borough, due to the proximity of the site to North Hertfordshire planning policies from those districts have also been taken into consideration.
- 11.17 In addition, topographic information sourced from the Ordnance Survey (OS) has been used to identify the ZTV. Multi Agency Geographic Information for the Countryside (MAGIC) was used to obtain baseline designations listed in paragraph 11.12.

- 11.18 Field survey data used in the establishment of the landscape and visual baseline has been gathered through a field photography survey undertaken in the spring and summer 2012, recording existing site conditions.

Landscape baseline

- 11.19 In accordance with the methodology set out in the GLVIA, the landscape baseline includes an overview within the assessment area, in the form of text and plans of the following elements:
- Topography
 - Land use
 - Development patterns and scale, including reference to building heights;
 - Vegetation patterns and extents, including known Tree Preservation Orders (TPOs)
 - Open space distribution and type, including statutory, non-statutory and local plan open space designations
 - Transport routes.
- 11.20 The landscape baseline elements have been used to prepare a landscape character assessment covering the study area for the assessment, classifying the landscape into distinct character areas, which display common features and characteristics. These character areas are influenced by statutory, non-statutory and local plan designations, particularly Conservation Areas. For the purposes of the assessment, the site itself has been classified as a discrete area within the landscape.
- 11.21 The character of the site and surrounding landscape character areas has been described, influenced by existing documentation where available, including Conservation Area character appraisals. Any designated areas falling within the site or character areas have been noted. Any particular components that make a significant contribution to the character of the site, or surrounding landscape character areas, have been noted and described, including listed buildings and structures, and planting areas.
- 11.22 The sensitivity of the site and surrounding landscape character areas to change has been assessed. The assessment of sensitivity requires the application of professional judgement, in line with the guidance in GLVIA. The presence of any combination of attributes may be considered when assessing the sensitivity of the site or character area. This allows professional judgement to be used when determining the relative importance of different attributes, which varies on a site-specific basis. Attributes that contribute to the sensitivity of the site may include those stated in table 11.1 (the occurrence of any one attribute may be sufficient to allocate the sensitivity rating).
- 11.23 The list of attributes set out in table 11.1 reflects best practice guidance from the GLVIA.

Sensitivity	Definition The site or landscape character area:
High	<ul style="list-style-type: none"> • Is valued at the international, national, regional or Borough scale • Is predominantly characterised by landscape components that are rare and distinctive and/or listed • Is designated as a conservation area, registered park and garden or public open space • Has a character that is rare within the assessment area • Has an elevated tranquillity • Has limited tolerance to change • Has components that are not easily replaced or substituted (e.g. mature trees) • Has limited scope for effective mitigation in character with the existing landscape.
Medium	<ul style="list-style-type: none"> • Is locally valued • Has some components that are rare and/or distinctive • Has a character which is common within the assessment area • Has moderate levels of tranquillity • Is fairly tolerant of change • Has components that are easily replaced or substituted • Has scope for effective mitigation in character with the existing townscape.
Low	<ul style="list-style-type: none"> • Has limited landscape value • Has few or no distinctive components, or components that detract from the overall character of the site • Has a character that is common within the assessment area • Has limited tranquillity • Is tolerant of change • Has components that are easily replaced or substituted • Has scope for effective mitigation in character with the existing townscape, and opportunities for an improvement in character.
Negligible	<ul style="list-style-type: none"> • A landscape valued by few people with few features of value or interest • Featureless, spoiled or mundane landscape with few features of value or interest

Table 11.1: Landscape sensitivity criteria

Visual baseline

11.24 Within the study area defined above, visual receptor types have been mapped by category in the following hierarchy:

- High sensitivity – residential, recreational
- Medium sensitivity – transport
- Low sensitivity – active sports, employment and other institutions.

11.25 These categories are based on best practice guidance contained within the GLVIA.

11.26 The visual baseline has been described for each specific viewpoint selected through a detailed analysis of the visual resource of the assessment area. These viewpoints have formed the basis for the visual assessment.

11.27 Viewpoints have been selected to represent groups of receptors within the ZTV. Where a viewpoint is located in an area that may represent multiple receptor

types, the most sensitive receptor has been selected. Attributes which affect the selection of viewpoints may include:

- Theoretical visibility of the project
- Consultation and feedback from local authorities
- The receptor type
- The accessibility of the viewpoint
- The extent of screening or filtering of the view (e.g. by buildings or vegetation).

11.28 For each viewpoint, text and photos have been used to describe the baseline characteristics. In each case, the following has been described:

- The composition of the view, including foreground and background characteristics
- The nature of the view of the site, including what, if anything, filters (or screens) the view and whether a view is a wide panorama, framed, glimpsed or sequential view.

Determining the magnitude and significance of landscape effects

11.29 Physical changes to landscape may give rise to effects on landscape character. Effects within the site boundary are typically direct, whereby landscape components are lost, damaged or altered by the construction or operation of the proposed development. Effects within the wider landscape are indirect, whereby the proposed development alters the setting of surrounding landscape character areas and components.

11.30 Factors that have been considered in assessing the magnitude of change to the landscape character areas surrounding the site (either beneficial or adverse) are set out in table 11.2, based on guidance from the GLVIA.

Impact magnitude	Definition
Large	Total loss of or major alteration to key characteristics of the setting of the landscape character area. Addition of new features or landscape components that substantially alter the setting of the landscape character area. Introduction of elements that markedly alter the tranquillity of the landscape character area.
Medium	Partial loss or alteration to one or more key characteristics of the setting of the landscape character area. Addition of new features or landscape components that form prominent elements of the setting of the landscape character area, but are largely characteristic of the existing setting. Introduction of elements that noticeably alter the tranquillity of the landscape character area.
Small	Minor loss or alteration to one or more characteristics of the setting of the landscape character area. Addition of new features or landscape components that form largely inconspicuous elements of the existing setting of the landscape and are characteristics of the existing setting. Introduction of elements that discernibly alter the tranquillity of the landscape character area.
Negligible	No change to, or very minor loss or alteration of inconspicuous characteristics of the setting of the landscape character area. Addition of new features or landscape components that do not influence the overall setting of the landscape character area, or are entirely characteristic of the existing setting. Introduction of elements that make no perceptible change to the tranquillity of the landscape character area.

Table 11.2: Landscape character area magnitude criteria

- 11.31 Determination of the significance of an effect requires the application of professional judgement to weigh the findings of the sensitivity of the receptor and the magnitude of an effect. This approach is recommended by GLVIA. The presence of any combination of factors may be considered when assessing the significance of effect. This allows professional judgement to be used when determining the relative importance of different factors, which varies on a site-specific basis. Effects may be adverse or beneficial. The broad criteria that influence the level of significance of landscape effects are noted in table 11.3. In accordance with the GLVIA, both the substantial and moderate categories are considered to comprise a significant effect. Any one aspect described may result in a categorisation within that significance level.

Significance of effect	Description The proposed development would result in effects that:
Substantial adverse	<ul style="list-style-type: none"> • Would be at considerable variance with the existing landscape character, degrading its integrity • Would permanently degrade, diminish or destroy the integrity of valued characteristic features, elements and/or their setting • Would be judged adverse at a national or regional level • Would comprehensively conflict with regional or local environmental policies for the protection and enhancement of the landscape.
Moderate adverse	<ul style="list-style-type: none"> • Would be at variance with the existing landscape character • Would be judged adverse at a local level • Would not be wholly compatible with local environmental policies for the protection and enhancement of the landscape.
Slight adverse	• Would be slightly at variance with the existing landscape character
Negligible	• Would be compatible with the existing landscape character.
Slight beneficial	<ul style="list-style-type: none"> • Would improve and enhance the existing landscape character • Would restore valued characteristic features partially lost through other land uses.
Moderate beneficial	<ul style="list-style-type: none"> • Would markedly improve and enhance the existing landscape character • Would restore valued characteristic features substantially lost through other land uses.
Substantial beneficial	• Generally, development projects would be unlikely to merit this score.
Table 11.3: Landscape effects significance criteria	

- 11.32 The significance for landscape effects generally follows the criteria set out in GLVIA and DMRB, acknowledging that these documents are currently under review.

Determining the magnitude and significance of visual effects

- 11.33 Visual effects relate to the changes that arise in the composition of available views as a result of changes arising from the proposed development and people's responses to changes.
- 11.34 The factors that have been considered in assessing the magnitude of change on views and on visual amenity of the identified receptors (either beneficial or adverse) are summarised in table 11.4 below.

Impact magnitude	Definition
Large	<p>Total loss of or major alteration to key characteristics of the view from a receptor.</p> <p>Addition of new features or components that are continuously highly visible and incongruous with the existing view from a receptor.</p> <p>Substantial changes in close proximity to the visual receptor, within the direct frame of view.</p>
Medium	<p>Partial loss of or alteration to one or more key characteristics of the view from a receptor.</p> <p>Addition of new features or components that may be continuously highly visible, but are largely characteristic of the existing view from a receptor.</p> <p>Changes a relatively short distance from the receptor, but viewed as one of a series of components in the middle ground of the view.</p> <p>Substantial change partially filtered by intervening vegetation and/or built form, or viewed obliquely from the visual receptor.</p>
Small	<p>Minor loss of or alteration to one or more characteristics of the view from a receptor.</p> <p>Addition of new features or landscape components that may be continuously or intermittently visible, but are largely characteristic of the existing view from a receptor.</p> <p>Changes within the background of the view, viewed as one of a series of components in the wider panoramic view from a receptor.</p> <p>Change largely filtered by intervening vegetation and/or built form, or viewed obliquely from the visual receptor.</p>
Negligible	<p>Very minor loss or alteration of inconspicuous characteristics of the view from a receptor.</p> <p>Addition of new features or landscape components that are largely inconspicuous and characteristic of the existing site when viewed from a receptor.</p> <p>Changes within the background of the view, viewed as an inconspicuous element within the wider panoramic view from a receptor.</p> <p>Change from a visual receptor almost entirely obscured by intervening vegetation and/or built form.</p>

Table 11.4: Visual impact magnitude criteria

- 11.35 Determination of the significance of an effect requires the application of professional judgement to weigh the sensitivity of the receptor with the magnitude of an impact. This approach is recommended by GLVIA. Effects may be adverse or beneficial. The broad criteria that influence the level of significance of visual effects are set out in table 11.5. In accordance with the GLVIA, both the major and moderate categories are considered to comprise a significant effect.
- 11.36 The significance for visual effects follows the criteria set out in GLVIA and DMRB, acknowledging that these documents are currently under review.

Significance of effect	Description The proposed development would result in:
Substantial adverse	A marked deterioration in the existing view
Moderate adverse	A noticeable deterioration in the existing view
Slight adverse	A discernible deterioration in the existing view
Negligible	No perceptible deterioration or improvement in the existing view
Slight beneficial	A discernible improvement in the existing view
Moderate beneficial	A noticeable improvement in the existing view
Substantial beneficial	A marked improvement in the existing view
Table 11.5: Visual effects significance criteria	

- 11.37 The significance criteria for visual effects generally follow the criteria set out in GLVIA.

Photomontages

- 11.38 Two block photomontages have been prepared for high sensitivity receptors; viewpoints 12 and 14, which have uninterrupted views of the proposed development. These photomontages, which are based on the parameters of built development described within chapter 3 of this ES, have been prepared in order to assist in the assessment of the changes from existing conditions to the proposed and are also utilised within the cultural heritage assessment (chapter 10 of this ES).
- 11.39 The photomontages have been generated following the guidelines set out in the GLVIA. This guidance is currently under review and the methodology that has been evolved for this project seeks to accommodate recent developments in the assessment of landscape and visual effects.

Baseline conditions

- 11.40 The proposed development is located entirely within the existing site of the Airport, characterised by large areas of hard standing (including car parking, aircraft parking stands, taxiways and the runway), buildings (including the terminal building, hangars and other storage and industrial buildings), and extensive areas of short, mown grass.
- 11.41 Central to the study area is the Airport, north of which is the Luton urban area that is included to the extent of Stopsley residential area. Rural settlements as far as Breachwood Green to the east, East Hyde to the south mark the limit of settlements and rural landscape are included. Industrial and commercial areas are included bounded by the M1.

Physical elements

- 11.42 The physical elements of the landscape in the study area are described below.

Topography

- 11.43 The proposed development sits on a plateau, which falls steeply away to the east and west of the Airport leading to the narrow valleys of Whiteway Bottom and the Upper Lee Valley, where there is a relative level change of 35 metres.

Land use

- 11.44 To the north of the site, the area is predominantly residential, with some industrial and commercial warehouses located immediately adjacent to the north west boundary. Further to the west, beyond the Midland Mainline railway line, the landscape is predominantly low-rise residential properties in a southern suburb of Luton. The landscape to the east and south of the site is dominated by agricultural fields, intermittent woodland copses and the River Lee valley located between the Airport, the A1081 road, the Midland Mainline railway line and Luton Airport Parkway railway station.

Development patterns and scale

- 11.45 Residences are generally two to three-storey, semi-detached and detached properties and set amongst private gardens and public open spaces lining residential streets, which are prevalent with cul-de-sacs. The buildings to the north west of the Airport and those adjacent are large scale and industrial in character.

Vegetation patterns and extent

- 11.46 Figure 11.1, illustrates the pattern and extent of vegetation, including tree cover within the study area. Semi-mature evergreen and broadleaf street trees are a common feature surrounding the site particularly along Eaton Green Road. A variety of formal broadleaf and evergreen vegetation can be found in the residential gardens and open spaces north of the site.
- 11.47 Vegetation is an important element within the residential areas and provides a green appearance to the streetscape, particularly during summer. Mature, species-rich hedgerows border agriculture fields and join areas of ancient woodland that extends across the rural landscape to the east and south of the site. There are no known Tree Preservation Orders within the site boundary.

Open space distribution and type

- 11.48 Figure 11.1 also illustrates the distribution of different open space types within the study area, indicating all relevant statutory, non-statutory and local plan designations. These include metropolitan greenbelt, Chilterns AONB, ancient woodland, historic parks and gardens, Conservation Areas and areas of great landscape value.

Open space	Distance and direction from the site	Character summary
Wigmore Valley Park – County Wildlife Site	Adjacent	Medium size open space open amenity grassland areas with numerous mature trees.
Green Belt	Adjacent	Large areas of agriculture land and woodland
Ancient Natural Woodland	<ul style="list-style-type: none"> Winch Hill Wood –adjacent to eastern boundary Withstocks wood – 600 metres to the south George Wood – 900 metres to the south Sewett's and Hurst wood – 1.4 kilometres south east 	All sites are small dense enclosed woodlands.
Historic Park and Gardens	Luton Hoo – 600 metres to the south west	Large size open and closed spaces characterised by ancient woodland, scattered mature trees, lakes, walled garden and an 18-hole golf course, all of which sit within metropolitan green belt.

Table 11.6: Landscape – open space type and distribution

Transport routes

- 11.49 Figure 11.1 illustrates the transport network within the study area, including cycleways, footpaths and Public Rights of Way.
- 11.50 The road network within the assessment area consists of, from the west: the M1 that joins the A1081 East Luton Corridor / Airport Way at junction 10a and is the main access into the Airport. The A505 Vauxhall way follows on from the A1081 bypassing the Airport heading into Luton. Off Vauxhall Way running east to west, north of the site is Eaton Green Road giving access to the Wigmore residential area. To the east and south is a 'B' road network that provides access to rural settlements of Tea Green, Breachwood Green and Peters Green.
- 11.51 The study area is well connected by public transport; with Luton Airport Parkway National Rail station located 1.5 kilometres from the Airport, and a shuttle bus running between. The Airport is also served by local bus services connecting the Airport and the surrounding areas.
- 11.52 There are public footpaths; bridleways and a national trail present in the rural areas to the east and south of the site. The national trail, Chiltern Way, runs north to south to the east of the site, approximately 1 kilometre away. None of the transport routes named above is within the site.

Landscape character assessment of the Airport site

- 11.53 There are no statutory, non-statutory or local plan landscape designations within the site boundary. For the purposes of this assessment, the Airport has been considered in terms of four character plots. Within these plots, the Airport is currently includes the following land uses as indicated on figure 11.3.

- Plot A – Runway and taxiways
- Plot B – Terminal buildings and aprons
- Plot C – Car parks
- Plot D – Industrial / commercial buildings.

- 11.54 The presence of industrial and commercial activities, airside and landside airport traffic and the associated noise levels of the Airport, means that across all plots there is a low level of tranquillity.
- 11.55 Plot A consists of the single runway and the three main taxiways, with large associated grass areas that give a visual openness across the southern part of the site. Due to its elevated position on a plateau, the runway is noticeable on the horizon of the surrounding landscape but lacks any features of landscape value. The runway, taxiways and surrounding grass areas are in good condition and well maintained, as is consistent with the operational requirements of the Airport. Although the condition is good, the low levels of tranquillity, plain nature and the lack of characteristic features mean that this character area has a low sensitivity to change.
- 11.56 Plot B, the Central Terminal Area, comprises the terminal building, control tower building, pier A, aprons, offices, car park and transportation facilities which form a cluster of buildings that are accessible for airside and landside requirements. Most buildings within this part of the Airport are of a functional design with little specific landscaping. The physical appearance of different structures is variable, reflecting the different ages of these buildings. By virtue of the nature and function of this area of the Airport site, levels of tranquillity are low and this character area has a negligible sensitivity to change.
- 11.57 Plot C, comprises a rental vehicle car park, LTCP, fire training area and a construction aggregate storage area to the east and the MTCP to the west. All of these areas are open with hard surfacing and security fencing. The industrial area of the open aggregate works and fire training area offer no landscape merit, while the car parks lack any features of landscape value or visual interest. The car park surfaces, grass verge and security fencing are generally well maintained but of a low landscape quality. Because the landscape value is low, the levels of tranquillity are low and characteristic features are lacking, this character area has a negligible sensitivity to change.
- 11.58 Plot D comprises office, commercial and industrial buildings that create a visual barrier to the northern and western boundaries of the site. The area is also functional in layout and does not possess any scenic qualities or have a cohesive landscaped approach to external spaces. The physical condition of the area is variable, again reflective of buildings of different ages. Because the landscape value is low and there is a low level of tranquillity, this character area has a low sensitivity to change.

Landscape character assessment beyond the Airport site

- 11.59 The landscape character areas surrounding the site are identified in figure 11.4. Landscape character areas are based on the South Bedfordshire District Landscape Character Assessment (April 2009) and are ordered beginning with

the north of the site and continuing around the site in a clockwise direction. Each area is described below.

Wigmore residential area

- 11.60 This character area is defined by two-storey, detached, semi-detached and terraced houses with private gardens. Shrubs, hedges and semi-mature trees are intermittent throughout the residential area. The residential area is in an informal grid intersected by cul-de-sacs which combine small open spaces and parks, to give an open and leafy extensive character that is not substantially influenced by the character of surrounding areas. The exception to this is towards the periphery of the residential area where properties are orientated towards and influenced by the surrounding industrial and commercial land uses.
- 11.61 The residential character has an enclosure provided by an absence of through roads, creating minimal vehicular movement. The tranquillity within this residential area is moderate, and is currently influenced by road traffic and airport activities.
- 11.62 The buildings, roads, open spaces and vegetation within the area are well maintained. The overall landscape condition is good. Because of the moderate levels of tranquillity, widespread nature of this character type and the strong characteristic features, this character area has a medium sensitivity to change.

Wigmore Park

- 11.63 Wigmore Valley Park lies directly east of the Airport. It is a designated County Wildlife Site with amenity space characterised by a play area, sports pitches and open grass areas that are broken up by narrow bands of scattered shrub and mature trees in the north. The southern end of the park consists of open undulating grassland, informal paths and scattered mature and semi-mature trees and shrubs. It is enclosed by a tree belt along the boundary with the Airport.
- 11.64 Despite the openness of the grassland areas with clumps of mature and semi-mature tree coverage, the visual backdrop of the Airport glimpsed through the vegetation and the associated airport noise and operational movement means the tranquillity within the park area is medium. The area is generally well maintained. The overall landscape condition is medium to high.
- 11.65 Due to the moderate levels of tranquillity, limited nature of this character type and importance as a County Wildlife Site and a recreational resource, this character area has a high sensitivity to change.

Rural settlements

- 11.66 This character area falls within Metropolitan Green Belt where there are a number of small villages and hamlets characterised by detached and semi-detached houses generally with large gardens that contrast to the densely populated urban feel of Luton. The settlements have a good connectivity through a network of country lanes and public footpaths. The settlements are inevitably influenced by the presence of aircraft approaching and departing from the Airport.
- 11.67 The settlements have a reasonably high scenic value and are set within rolling arable farmland with occasional blocks of woodland giving a high level of tranquillity. The general condition of buildings and open spaces within these settlements is good.

- 11.68 Because of the high levels of tranquillity and generally good condition, this character area has a high sensitivity to change.

Rural area

- 11.69 This character area falls within Landscape Conservation Area, Metropolitan Green Belt, Countryside Stewardship Agreements, with areas designated as County Wildlife Sites, ancient woodland and Wigmore Employment Area. Approach and departure flight paths for the Airport pass above parts of this area. The countryside comprises a gently rolling plateau ridge landscape with large arable fields and occasional blocks of woodland. The field pattern is degraded with remnant individual hedgerow trees.

- 11.70 The area is well served with footpaths and bridleways including the national trail, Chiltern Way and has a medium to high level of tranquillity. The physical condition of the landscape is reasonably good but would benefit from the improvement of features such as hedgerows. Because of the high levels of tranquillity, this character area has a medium sensitivity to change.

Historic parks and gardens

- 11.71 This character area falls within an Area of Great Landscape Value, Metropolitan Green Belt, Countryside Stewardship Agreements and is a Grade II* Historic Park and Garden, within which are areas designated as County Wildlife Sites and ancient woodland. The area comprises extensive landscapes including formal and walled gardens, picturesque landscapes, woodlands and a golf course. Buildings within the area consist of Grade I listed Luton Hoo Hotel and outbuildings. The landscape character is high value.
- 11.72 This area has a high level of tranquillity due to relatively limited use, open spaces and the abundance of dense mature trees providing enclosure. The buildings and landscape within the area are very well maintained. The overall condition is good. Because of the good condition and high levels of tranquillity, this character area has a high sensitivity to change.

Visual baseline

- 11.73 Figure 11.5 indicates the location of viewpoints referenced below. All residential and recreational receptors have a high sensitivity to change. Figure 11.2 identifies areas where views and glimpses of the site are available, taking into account topography and landscape features. Viewpoints were chosen during a walkover on 5 February 2012, the aim being to select the most visible locations.

Residential receptors

- 11.74 Residential receptors have been assessed as having a high sensitivity to change, because attention is often focused on the landscape surrounding the property rather than on another focused activity (as would be the case in predominantly employment or industrial areas).
- 11.75 Viewpoint 1 (illustrated in figure 11.6a) is from within Wigmore residential area looking south from the highest point on Hollybush Road. The linear view is dominated by the road, pavements, gardens and houses which frames the view to the commercial hangars of the airport that form the horizon, below which are

houses and mature evergreen vegetation. Views of the site are limited to horizontal sections.

- 11.76 Viewpoint 2 (illustrated in figure 11.6b) is from within Wigmore residential area looking south from the end of Lalleford Road. The foreground is taken up by the road and pavements, beyond which is boundary shrub planting to several commercial buildings. Views of the site are obstructed.
- 11.77 Viewpoint 3 (illustrated in figure 11.6c) is from within Wigmore residential area looking south along a public footpath off Lindsey Road. From the highest point on the road, the view is dominated by houses and the associated hard standing of road, parking and pavements. In the background semi-mature trees line Eaton Green Road and bound a car park that lies on an incline slope, on top of which are commercial buildings that create horizon. The site is glimpsed through residential buildings and trees.
- 11.78 Viewpoint 4 (illustrated in figure 11.6d) is from within Wigmore residential area looking south west from Crawley Green Road residences approximately 500 metres away from the site boundary. The viewpoint is slightly elevated above the site with views across Wigmore Primary School playing fields to airport buildings that include the control tower. An intermittent hedgerow follows along Crawley Green Road, which partially screens southern views. Horizontal sections of the site are visible through foreground vegetation.

Recreational receptors

- 11.79 Recreational receptors (apart from those engaged in active sports) generally have a high sensitivity to change, as attention is focused on enjoyment of the landscape.
- 11.80 Viewpoint 5 (illustrated in figure 11.7a) is taken within the north of Wigmore Valley Park looking south west from the leisure centre car park. The view is an open panorama across sports fields where a strip of vegetation partially screens views beyond. In the background Airport commercial buildings break the horizon beyond the park's boundary vegetation and the site is clearly visible. This viewpoint represents an area of high/active sports recreational use, therefore the receptor is considered to be of medium sensitivity.
- 11.81 Viewpoint 6 (illustrated in figure 11.7b) is from within the County Wildlife Site south of Wigmore Valley Park looking west from an informal path. The view is dominated by open grassland and semi-mature trees along the Airport boundary. Glimpses of commercial buildings beyond the vegetation and car park lighting are visible. Views are partially screened towards the site.
- 11.82 Viewpoint 7 (illustrated in figure 11.7c) is from Darley Road adjacent to Wandon End Farm along Chiltern Way national trail. The view is characterised by rolling arable fields with linear woodland features. In the background the Airport control tower breaks the horizon in the far distance behind the vegetation. Glimpses of commercial buildings to the right of the photo beyond the vegetation are barely visible. The runway lies on the plate centre left of the picture. The bund can be seen as a light brown strip on the horizon. Views are largely screened of the proposed development buildings, but are clear towards the runway.

- 11.83 Viewpoint 8 (illustrated in figure 11.7d) is taken from the Green of Tea Green hamlet. The view is closed by a mature hedgerow and trees that line the country lane. Beyond the hedgerow in the far distance along the horizon are distant glimpses of the Airport control tower and commercial buildings. Views are distant and partially screened.
- 11.84 Viewpoint 9 (illustrated in figure 11.8a) is from a public footpath adjacent to Meadow House, off Colemans Road. The view is an open panorama dominated by an arable field that descends into the valley. In the middle distance below the horizon, mature trees are scattered on the field's boundaries. Beyond the crest of the arable field in the far distance to the left of the picture lies the start of the Airport's landing lights. The runway continues along a plateau of which the bund can be seen as an intermittent light brown strip below the horizon heading towards the control tower. There are distant glimpses of the control tower and commercial buildings. Views are distant and partially screened.
- 11.85 Viewpoint 10 (illustrated in figure 11.8b) is taken from a public footpath behind West Winds hamlet. The view is an open panorama dominated by arable fields and a mature hedgerow lined with trees. In the distance, central left of the picture below the horizon lays the Airport runway and landing lights framed by mature woodland blocks. Woodland blocks cover the horizon meaning views to the proposed development are obstructed with distant views of the runway only.
- 11.86 This view (illustrated in figure 11.8c) is from Dean Street just up from Dean Street cottage. The focus is a linear view looking north up an elevated country lane, framed both sides by mature hedgerows. On the horizon mature trees are distributed along the hedgerow that follows the road. Views to the proposed development are obstructed by elevated levels and vegetation.
- 11.87 Viewpoint 12 (illustrated in figure 11.9a) is adjacent to Someries Farm and Someries Castle. The view is an open panorama across arable fields that adjoin the same plateaus as the runway. Airport buildings including the control tower break the horizon. To the left of the picture a public footpath follows Copt Hall Road. Views of the proposed development are distant but clear.
- 11.88 Viewpoint 13 (illustrated in figure 11.9b) is from behind Luton Hoo Hotel adjacent to Stocking Wood, looking across open fields down to Lee Lake. Across the lake is a band of mature vegetation that partially screens views towards the B653 road and railway. In the background beyond the railway the ground level rises 50 metres to George Wood on the horizon. Views to the proposed development are distant and very limited.
- 11.89 Viewpoint 14 (illustrated in figure 11.9c) is from the junction of Seymour Road and Cutenhoe Road. The view looks north east down tree lined Cutenhoe Road and across Vauxhall Motor Vehicle Works towards the Airport in the background. Residential properties and garden vegetation obscure open views. Views of the proposed development are distant and intermittent.

Assessment of effects from construction

Construction phase site assessment

- 11.90 With reference to the construction methodology described in chapter 3 of this ES, the effects on the landscape of the proposed development would arise from; ground works including the creation of taxiways, aprons and road widening. Activity associated with the construction of structures includes; the terminal building infill, Pier B, pedestrian link and a multi-storey car park (MSCP). The impacts from specific elements of the proposed development are described below in table 11.7.

ID	Element	Impacts
01	Taxiway extensions and new taxiway	Airside site access and haul route. Cut and fill construction works requires limited removal of mature vegetation, excavation of grassed areas and stockpiling of materials. Lighting of works.
02	Terminal infill	Temporary hoarding, scaffolding and netting. Diverted and new access routes.
03	MSCP	Changes to the layout of the existing surface car park. Demolition of existing structures on the western side of the car park. Temporary fencing. Diverted and new access routes. Temporary stockpiling of materials. External scaffolds and cranes.
04	Extended aircraft parking area	Demolition of existing surfacing. Stockpiling of materials. Temporary fencing.
05	New Pier 'B'	Demolition of existing surfacing. Temporary hoarding. Diverted and new access routes.
06	Dualling of Airport Way	Cut and fill, excavation of grassed areas, slope retention and removal of five large mature trees.
07	Welfare and accommodation	Temporary welfare and storage buildings and plant storage areas and associated fencing. Diverted and new access routes.

Table 11.7: Landscape – construction impacts within the site

- 11.91 The magnitude of change to the site during the construction period is considered to be small because additions of new features or groundwork components that form largely unobtrusive elements in the existing setting are characteristic of the existing setting.
- 11.92 The site has a low level of tranquillity at present because of existing high levels of activity for operations, maintenance and training. Therefore the magnitude of change to tranquillity is considered to be small.
- 11.93 The small magnitude of impact, assessed alongside the low sensitivity of all four on-site character plots, would result in slight adverse effects (not significant).

Construction phase landscape character areas assessment

Wigmore Residential Area

- 11.94 The site is immediately south of this character area but only adjoins along a 200-metre section of Eaton Green Road. The remainder of the character area is

separated from the site by offices and light industrial and commercial buildings. Construction activity would take place at a number of locations on the site but would be largely screened by the presence of existing hangars within the site and numerous commercial buildings adjacent to the site.

- 11.95 The setting of this character area would only be affected to a limited extent and would be set against an existing industrial/commercial context, including commercial airport operations. A limited number of residences would be affected within the character area setting, therefore the magnitude of change is considered to be small. The small magnitude of impact, assessed alongside the medium sensitivity of this character area, would result in a slight adverse effect.

Wigmore Park, County Wildlife Site

- 11.96 The site is located immediately west of this character area. Construction activities take place at a number of locations across the site but structures would be focused around the Central Terminal Area, away from the eastern Airport boundary, which has screen planting along its length, apart from two small sections that allow direct views towards the Airport. These openings would look onto an existing industrial/commercial context, including commercial airport operations and for that reason the setting of this character area would only be affected to a limited extent. Therefore due to the high levels of construction against a commercial airport context, the magnitude of change is considered to be small. The small magnitude of impact, assessed alongside the high sensitivity of this character area, would result in a moderate adverse effect (not significant).

Rural settlements

- 11.97 The site boundary is approximately 2 kilometres south west, west and north west of rural settlements, which include Perry Green, Tea Green, The Heath and Breachwood Green. Although construction activity would take place at a number of locations within the site, settlements are at a distance where glimpses are against an industrial / commercial context, as well as commercial airport operations. This means that the majority of the setting to the character area would remain unaffected, therefore the magnitude of change is considered to be negligible. The negligible magnitude of impact, assessed alongside the high sensitivity of this character area, would result in a negligible effect (not significant).

Rural

- 11.98 The site forms the edge of Luton urban area that joins directly to this character area to its north and west extremity. Construction activity would take place at a number of locations within the site and would generally be glimpsed within the wider setting of this character area against an existing industrial/commercial context, including commercial airport operations. Therefore the setting of this character area would only be affected to a limited extent. The majority of the setting to the character area would remain unaffected, therefore the magnitude of change is considered to be negligible. The negligible magnitude of impact, assessed alongside the medium sensitivity of this character area, would result in a negligible effect (not significant).

Historic parks and gardens

- 11.99 The site forms the edge of Luton urban area is approximately 600 metres to the north east of this character area, separated by the River Lee and associated mature vegetation, woodland blocks and farmland. Construction activity would

take place at a number of locations within the site but would be screened by dense vegetation within and along the character area boundary, creating a thick enclosure, along with elevated ground levels that would substantially reduce the effects on the setting. Therefore the magnitude of change is considered to be negligible. The negligible magnitude to change assessed alongside the high sensitivity of this character area, would result in a negligible effect (not significant).

Construction phase visual assessment

11.100 The assessment of visual impact resulting from the construction phase is presented in table 11.8 below for each of the 14 viewpoints.

Viewpoint	Description of change	Sensitivity of receptor	Magnitude of change	Significance of impact
1	Views from this location would not be affected during construction, as existing airport commercial hangars obstruct views beyond the north west boundary.	High	Negligible.	Negligible (not significant)
2	Views from this location would not be affected during construction, because of the screening by existing commercial buildings.	High	Negligible.	Negligible (not significant)
3	Views from this location would not be affected during construction, as existing Airport commercial hangars obstruct views beyond the north west boundary and construction traffic is not using Eaton Green Road.	High	Negligible.	Negligible (not significant)
4	Views from this location would not be affected during construction as intervening structure such as commercial hangars would obstruct views beyond the north-west boundary	High	Negligible.	Negligible (not significant)
5	Views from this location would be affected during construction. Although existing aircraft hangars and mature and semi-mature vegetation would in the most part screen views of the construction activity, cranes may be visible above the vegetation at a distance of approximately 500 metres when in use, and be set against commercial buildings and airport operations.	Medium	Negligible	Negligible (not significant)
6	Views from this location would be affected during construction. Although mature and semi-mature vegetation would partially screen views of the construction activity, when in use, cranes would be visible above the vegetation and through small openings in the screen vegetation. There would be limited clear views of construction activity which would be visible set at a distance of approximately 400 metres against commercial buildings and airport operations	High	Small	Moderate (significant)
7	Views from this location would be affected during construction. The fore and mid-ground view would remain unaltered, but because of the elevated position of the viewpoint, the runway is noticeable in the background above and through mature vegetation. Bulk excavation activities would take place along this area adjacent to the runway. Although the construction activity would be visible, it would be set against commercial airport operations	Medium	Small	Slight (not significant)
8	Views from this location would be slightly affected during construction. The fore and mid-ground would remain unaltered, but visibility of construction activity would be seen at a distance intermittently upon the horizon, which would mainly consist of the tops of cranes when these are in use.	High	Negligible	Negligible (not significant)

Viewpoint	Description of change	Sensitivity of receptor	Magnitude of change	Significance of impact
9	Views from this location would be slightly affected during construction. The fore and mid-ground would remain unaltered, but visibility of construction activity would be seen intermittently upon the horizon, which would consist of cranes when these are in use.	High	Negligible	Negligible (not significant)
10	Views from this location would not be affected during construction.	High	Negligible.	Negligible (not significant)
11	Views from this location would not be affected during construction.	High	Negligible.	Negligible (not significant)
12	Views from this location would be affected during construction. The foreground and middle ground would remain unaltered, but distant visibility of construction activities would be seen when construction activities are taking place, consisting of cranes, pile rigs, plant machinery, scaffolding and hording that would all be seen at a distance of approximately 500 metres and set against commercial buildings and airport operations.	High	Negligible	Negligible (not significant)
13	Views from this location would not be affected during construction. The view would remain unaltered.	High	Negligible	Negligible (not significant)
14	Views from this location would be affected during construction. The foreground and middle ground would remain unaltered, but visibility on the horizon of construction activities would, consisting of cranes, pile rigs, that would be seen at a distance of approximately 2000m and set amongst commercial and operational buildings and activities of the Airport.	High	Negligible	Negligible (not significant)

Table 11.8: Predicted visual impacts to viewpoints during the construction phase

Assessment of effects from operation

Operational phase site assessment

- 11.101 Since the operation of the proposed development would gradually increase airport activity, it would have a small effect on the tranquillity of the landscape character areas. This is not stated again for each of the character areas.
- 11.102 The proposed development would have a permanent effect on the landscape resource of the site and would result in a larger building cluster area. The impacts on the landscape from operation are summarised in table 11.9 below.

ID	Element	Impacts
01	Taxiway extensions and new taxiway	Grass area lost to creation of hard surfacing.
02	Extended Terminal entrance foyer and Terminal infill	Reformed, clad and infill to existing terminal building foyer and pier, increasing its volume and providing new access.
03	MSCP and pedestrian link	Open hard surfacing replaced with four storey car park and pedestrian link extending the CTA massing envelope
04	Extended aircraft parking	Section of open hard surface car park and grassed areas replaced with apron hard surfacing.
05	New Pier 'B'	Area of existing car park lost to linear structures set out in 'L' configuration.
06	Dualling of entrance road	Slopes regraded, loss of mature vegetation to along Airport Way due to additional road lane.

Table 11.9: Landscape impacts on the site during operation

- 11.103 The magnitude of change to the site is considered to be small because additional new features or landscape components are in keeping with the size and scale of elements that are characteristic of the existing setting. The small magnitude of impact, assessed alongside the low sensitivity of all four character plots on the site, would result in a slight effect (not significant).

Operational landscape character areas assessment

Wigmore Residential Area

- 11.104 The site is immediately south of this character area but the proposed development is set back within the site. Existing buildings and boundary vegetation provide screening to the majority of the character area, whilst being set against the existing industrial/commercial context of the Airport. Therefore the magnitude of change is considered to be negligible. The negligible magnitude of impact, assessed alongside the high sensitivity of this character area, would result in a negligible effect (not significant).

Wigmore Park

- 11.105 The proposed development would not result in changes to the open setting of this character area. The form and scale of the proposed development is to a similar extent of the existing and would be set against the backdrop of the commercial airport context; including commercial airport operations and for that reason the

setting of this character area would only be affected to a limited extent. Therefore the magnitude of change is considered to be small. The small magnitude of impact, assessed alongside the high sensitivity of this character area, would result in a moderate effect (significant).

Rural settlements

- 11.106 The proposed development would result in a largely unaltered change to the setting of this character area. The distant views from Tea Green and Breachwood Green would have limited glimpses of the tops of proposed structures, which would be set against the existing industrial/commercial context of the Airport, as well as intermittent woodland blocks and boundary vegetation giving irregular views to the character area. Therefore the magnitude of change is considered to be negligible. The negligible magnitude of impact, assessed alongside the high sensitivity of this character area, would result in a negligible effect (not significant).

Rural

- 11.107 The proposed development would result in a largely unaltered change to the setting of this character area. Distant and limited views of parts of the proposed structures would be set against an existing industrial/commercial context within the wider setting of this character area. Therefore the magnitude of change is considered to be negligible. The negligible magnitude of impact, assessed alongside the medium sensitivity of this character area, would result in a negligible effect (not significant).

Historic parks and gardens

- 11.108 The proposed development would result in an unaltered change to the setting of this character area. The site is approximately 600 metres north east of this character area, and intervening screening provided by dense vegetation along with elevated ground levels would substantially reduce the impact on the setting. Therefore the magnitude of change is considered to be negligible. The negligible magnitude of impact, assessed alongside the high sensitivity of this character area, would result in a negligible effect (not significant).

Operational visual assessment

- 11.109 In line with the ZTV and site walkover, no specific assessment of visual effects has been made for the 11 viewpoints listed below, as the ZTV has shown that components of the proposed development would either not be visible, or would be barely perceptible in the background of the view:

- Viewpoint 1: View south from residence on Hollybush Road
- Viewpoint 2: View south from residence on Lalleford Road
- Viewpoint 3: View south from residence on Lindsey Road
- Viewpoint 4: View south-west along Crawley Green Road
- Viewpoint 5: View west from Wigmore Park, North
- Viewpoint 7: View south from Darley Road
- Viewpoint 8: View west from Tea Green
- Viewpoint 9: View west from footpath on Colemans Road
- Viewpoint 10: View west from footpath on Lye Hill
- Viewpoint 11: View west from Dane Street
- Viewpoint 13: View north-east from Luton Hoo Hotel on The Luton Drive.

- 11.110 Views from Viewpoint 6 (west from Wigmore Park, County Wildlife Site) would in part be affected by the structures of the Pier and MSCP as they would partially be seen

through an opening in the boundary vegetation that gives clear views into the site. The magnitude of change is considered to be small, because of:

- The placement of the structures within the Central Terminal Area, away from the boundary
- The form and scale of the structures would fit with the existing geometry
- Materials are likely to be large and bulky with simple finishes in line with the existing building character.

11.111 The small magnitude of impact, assessed alongside the medium sensitivity of the receptor, would result in a slight adverse effect (not significant).

11.112 From Viewpoint 12 (north from Someries Castle on Copt Hall Road), the photomontage (figure 11.10) demonstrates that distant views across open ground would be affected by the proposed MSCP and pier structures that would just break the horizon continuing a similar configuration to the existing context. This magnitude of change is considered to be negligible, due to:

- The placement of the structures within the CTA, away from the boundary
- The form and scale of the structures fit with the existing geometry structures
- The proposed development is compatible with the character of the surrounding buildings.

11.113 The negligible magnitude of impact, assessed alongside the high sensitivity of the receptor, would result in a negligible effect (not significant).

11.114 From Viewpoint 14 (north east from Cutenhoe Road), the photomontage (figure 11.12) shows the distant views across Upper Lea Valley would be affected by the proposed MSCP, which would just break the horizon to the right of the existing control tower, continuing a similar configuration to the existing context. The predicted magnitude of change is however considered to be negligible, due to:

- The form and scale of the structures fit with the existing geometry of structures on the Airport site
- The proposed development is compatible with the scale and character of the surrounding buildings.

11.115 The negligible magnitude of impact, assessed alongside the high sensitivity of the receptor, would result in a negligible effect (not significant).

Mitigation measures

Mitigation of effects from construction

11.116 Because of the visible nature of some of the construction activities, not all views can be fully mitigated, however the changes in views during the construction phase would be temporary. In the case of cranes a light neutral colour choice would avoid attention on the skyline. The use of hoarding (enhanced with image, pattern, and text) along with bunds from surplus excavation material to Wigmore Valley Park would assist in minimising open and direct views. Industry best practice construction standards regarding noise and working hours will be employed to reduce the potential impact of construction activities on local receptors.

Cumulative LVIA effects

- 11.117 Chapter 3 of this ES lists the cumulative developments considered in this assessment. Of those developments listed, it is considered that the FBO hangar next to the Cargo Centre within the Airport boundary and Century Park, located to the east of the Airport within Wigmore Employment Area, would have the potential for cumulative effects with the proposed development. Developments at Junction 10a and the Sundon Rail Freight Depot are considered to be sufficiently distant and with intervening features that these would not be considered in the same landscape or views as the Airport.
- 11.118 The FBO hangar next to Cargo Centre has a footprint of approximately 4,800m² with an overall height of 23 metres. It is however of consistent scale and character to other hangar structures on the northern side of the Airport.
- 11.119 The approved Century Park development comprises commercial units, offices and warehouses and their associated road network, which the ES prepared for the development (January 2009) acknowledges will result in inevitable changes to the landscape character as a consequence of new urban influences. The Century Park ES notes that the landscape effects of the development were generally assessed to be neutral to minor adverse.
- 11.120 Century Park and the LLAOL development proposals would be constructed over an extended period of time, with the potential for simultaneous construction works. If these processes overlap, this would present potential for considerable change to surrounding residential and recreational receptors from the existing situation, with increased construction traffic, construction activities, including cut and fill earthworks, piling, utility installations, construction of roads and construction of buildings.
- 11.121 Cumulative effects would not occur at any locations other than Wigmore residential and Wigmore Valley Park, County Wildlife Site. With both developments completed, there would be considerable change from the existing situation of building density and open fields and scattered hedgerows. At these receptor locations, the cumulative post-construction effects would be moderate adverse.

Residual effects

Residual effects from construction

- 11.122 Assuming the successful implementation of the mitigation measures stated in paragraph 11.116, the effects from construction of the proposed development on the character areas Wigmore Valley Park, Wigmore Residential Area and Viewpoint 6 would be reduced from moderate adverse to slight. By virtue of the open environment of Viewpoint 7 the predicted slight adverse effect would remain. In summary, no significant landscape or visual effects would arise as a result of the construction of the proposed development.

Residual effects from operation

- 11.123 No significant landscape or visual effects would arise as a result of the operation of the proposed development.

Chapter 12: Noise and vibration

Introduction

- 12.1 The noise assessment has been undertaken by Bickerdike Allen Partners (BAP) and this chapter of the ES considers the noise impact of the proposed development based on the development proposals described in chapter 3 of this ES.
- 12.2 The proposed development is predicted to lead to annual aircraft movements of up to 156,840 by 2028 compared to the baseline (2011) annual movements of 99,299. This chapter addresses the following noise emissions from the Airport:
- Airborne aircraft noise – the noise as aircraft depart from and arrive on to the runway at Luton. Because of the local wind conditions, aircraft land from the east over Stevenage and depart to the west over the southern edge of Luton for approximately 70% of the year. Consideration has also been given to noise-induced vibration from aircraft activities
 - Ground noise – the noise as the aircraft taxi and manoeuvre after landing or prior to departure on the Airport's aprons and taxiways
 - Road traffic noise – the noise generated by cars, vans and lorries moving to and from the Airport
 - Construction noise – the noise occurring during the construction of the proposed development works.
- 12.3 This chapter outlines the methodology used to assess the impact of airborne aircraft noise, before the methodology used to assess ground noise, road access noise, and construction noise is briefly described. Where appropriate, detailed matters are contained within technical appendix H, which includes a glossary of acoustic terms in its appendix N(1). The recent practice for UK aircraft noise assessment is discussed in technical appendix H (appendix N(2)), taking the National Planning Policy Framework (NPPF) into account, which replaced Planning and Noise Guidance Note 24 (PPG24) in March 2012.
- 12.4 Having described the methodology, baseline conditions (2011) are described prior to reporting the forecast future conditions with the development completed for 2028. Noise management and proposed mitigation is then described. Cumulative impact and significant residual effects remaining following mitigation are summarised at the end of the chapter.

Legislation and policy

Airborne aircraft noise assessment methodology

- 12.5 The government published the White Paper, *A New Deal for transport: Better for Everyone* in 1998, which announced the preparation of a UK Aerodromes policy looking 30 years ahead. The government then carried out a very thorough study of the future of air transport in the period 1998-2003, which included delineation of national policy with regard to airborne aircraft noise. The study led to the publication in December 2003 of the White paper entitled *The Future of Air Transport*, Department of Transport, the 'ATWP', which advised on the need to

make best use of existing runways in the South East. This policy was reaffirmed in the *Future of Transport* White paper in July 2004, *The Future of Air Transport 2006* progress report, and in the government's response (24th February 2010) to the House of Commons Transport Committee's First Report Session 2009-2010.

12.6 Chapter 3 of the ATWP advises on environmental impacts including a section on noise in paragraphs 3.10-3.27. Paragraph 3.14 confirms the use of the equivalent continuous sound level (dB $L_{Aeq,T}$) and 57 dB L_{Aeq} as the level of daytime noise marking the approximate onset of significant community annoyance.

12.7 The ATWP describes the DfT's policies for the appraisal and management of environmental impacts from aerodromes, including noise. The basic aim stated is to limit and, where possible, reduce the number of people in the UK significantly affected by aircraft noise. With respect to aircraft noise measurement and mapping, the ATWP advised that, based on research, the government has used 57 dB(A) L_{eq} as the level of daytime noise marking the approximate onset of significant community annoyance (box on page 34 of the ATWP).

12.8 The ATWP also explains the government approach to noise mitigation and compensation. Paragraph 3.15 of the ATWP states:

"Our approach to noise impacts is first, to seek to control the scale of impacts; second, to mitigate remaining impacts; and third, to compensate for those impacts which cannot be mitigated ..."

12.9 The ATWP also contains advice on the actions the government expects aerodrome operators (aerodromes with more than 50,000 movements per year) to take, as stated in paragraph 3.2.1 of the ATWP:

"Accordingly, with immediate effect, we expect the relevant Aerodrome operators to:

- Offer householders subject to high levels of noise (69 dBA L_{eq} or more) assistance with the cost of relocating; and*
- Offer acoustic insulation (applied to residential properties) to other noise-sensitive buildings, such as schools and hospitals, exposed to medium to high levels of noise (63 dBA L_{eq} or more)."*

12.10 Paragraph 3.2.4 states:

"To address the impacts of future Aerodrome growth we expect the relevant Aerodrome operators to:

- Offer to purchase those properties suffering from both a high level of noise (69 dBA L_{eq} or more) and a large increase in noise (3 dBA L_{eq} or more); and*
- Offer acoustic insulation to any residential property which suffers from both a medium to high level of noise (63 dBA L_{eq} or more) and a large increase in noise (3 dBA L_{eq} or more)."*

12.11 This national planning policy approach indicates that to assess an airport application it is necessary to determine the amenity effects when the aircraft noise exceeds 57 dB $L_{Aeq,16h}$, 63 dB $L_{Aeq,16h}$ and 69 dB $L_{Aeq,16h}$. The Environmental Research and Consultancy Department of the Civil Aviation Authority (ERCD),

provided evidence in November 2007 in support of a third runway at Heathrow Airport in its report 0705, in which aircraft noise exposure was discussed in paragraph 2.1.1.

"Since 1990, the established index for relating the amount of aircraft noise exposure to community annoyance has been the Equivalent Continuous Sound Level index, or L_{eq} . In the UK this index is applied to an average summer day (taking into account traffic between mid-June and mid-September) over 16 hours, between 0700 and 2300 local time. The background to the use of this index is explained in DORA Report 9023 (Ref 4). The magnitude and extent of the aircraft noise around an Aerodrome is depicted on maps by plotting contours of constant aircraft noise exposure (L_{eq}) values. It is conventional practice to plot contours between 57 and 72 dBA L_{eq} in 3 dB steps. It has become general usage to describe 57, 63 and 69 dB L_{eq} as denoting low, medium and high community annoyance respectively, whilst noting that 57 dBA L_{eq} is also taken to describe the onset of significant community annoyance. More recently 54 dBA L_{eq} contours have also been plotted as a sensitivity test of underlying forecasts and noise performance assumptions. Populations and numbers of households within the noise contours are then estimated using 2001 Census data as updated by CACI Ltd in 2006".

- 12.12 This national policy approach has been applied generally in the UK, however the coalition government produced a draft sustainable framework for UK aviation (dAPF), in July 2012 and consultation on this document continued until 31 October 2012. When adopted, this Aviation Policy Framework, in conjunction with other relevant policies will replace parts of the ATWP. It does not indicate any intention on the part of government to alter the advice on noise matters given in the ATWP, and described above.
- 12.13 The ATWP remains, except with regard to additional runways at Heathrow, Gatwick and Stansted, the current national policy until replaced. In March/April 2014, a new regime for night flights at Heathrow, Gatwick and Stansted will be announced, after public consultation in the period autumn 2012 to summer 2013.

Night noise assessment methodology

- 12.14 Unlike day-time assessment, which is based entirely on $L_{Aeq,T}$ dB contours, night-time aircraft noise is evaluated in different ways, using different units, such as single event level (SEL) as well as the $L_{Aeq,8h}$ index (for the period 23.00 to 07.00 hours) (see appendix N(2) of technical appendix H).
- 12.15 The SEL unit has been used in the UK in relation to assessing the potential for sleep disturbance. For locations shown to be within the 90 dB(A) SEL footprint, it has been assessed that there will be a very slight risk of sleep disturbance.

National Planning Policy Framework (NPPF)

- 12.16 In March 2012, the coalition government published the NPPF, which set out the government's planning policies for England and how these are expected to be applied. This replaced the heavily used PPG 24.

12.17 Noise policy is delineated in paragraph 109 of the NPPF, which confirms that the planning system should contribute to and enhance the natural and local environment by:

“preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability”

12.18 The aim of planning policies and decisions with respect to noise is also addressed in paragraph 123 of the NPPF as follows:

- *“avoid noise from giving rise to significant adverse impacts¹ on health and quality of life as a result of new development;*
- *mitigate and reduce to a minimum other adverse impacts¹ 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 businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established²; and*
- *identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this season.”*

Noise Policy Statement for England (NPSE)

12.19 In March 2010 Defra published its *Noise Policy Statement for England* (NPSE). This sought to make explicit the underlying principles and aims regarding noise management and control that are to be found in existing policy documents, legislation and guidance. In particular, it stresses the need to integrate noise management policy with the government's sustainable development strategy. It introduces a new concept of Significant Observed Adverse Effect Level (SOAEL), but clarifies that no numerical values have yet been determined by Defra, and advises that the lack of values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available. Defra has commissioned a research contract to investigate and advise on numerical values for SOAEL.

12.20 The NPSE delineates the Noise Policy Aims as, through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development to:

- Avoid significant adverse impacts on health and quality of life
- Mitigate and minimise adverse impacts on health and quality of life
- Where possible, contribute to the improvement of health and quality of life.

12.21 In light of the non-numerical advice from DCLG and Defra, this development has been assessed using the current numerical policies given in the ATWP, and the principles delineated in the NPPF and NPSE.

¹ See Explanatory Note to Noise Policy Statement for England (Defra)

² Subject to the provisions of the Environmental Protection Act 1990 and other relevant law.

Local plans

- 12.22 The Luton Local Plan 2011-2031 is scheduled for examination by an independent Inspector in early 2014, with adoption of the plan in July 2014. The previous Luton Local Plan 2001-2011 has now expired, except for certain saved policies. One of those saved policies is policy LLA1, which with respect to noise confirms that the borough council will grant planning permission providing that development results in an aircraft noise impact that is below the 1999 level.
- 12.23 Policy LLA1, as drafted, does not clearly delineate the 1999 descriptor. This was referred to in the previous Luton Local Plan 2001-2011, specifically in paragraph 9.73. This advised that at the Local Plan Inquiry in 2004 the Inspector recommended a policy was adopted that would enable expansion, subject to noise impact that is below 1999 levels. In this context, the Inspector made reference to noise controls within the 1998 planning consent for the terminal building extension that related to predicted contours produced in the associated (1997) Environmental Statement. The regime under which the Airport currently operates refers to noise contours for 1999 from this 1997 Environmental Statement, aircraft noise had previously been monitored annually against 1984 levels. The 2001-2011 local plan stated that applications for further development will be assessed against this 1999 benchmark.
- 12.24 The most recent Luton Airport Development Brief was adopted by the council as supplementary planning guidance in September 2001. It considers air and ground noise in chapter 9.

Vibration

- 12.25 High levels of aircraft noise can produce vibrations within buildings that can cause windows and objects on shelves to rattle. This arises because of the low frequency components of aircraft noise, particularly in the case of helicopters. Government guidance is that vibration from aircraft is unlikely to be a consideration except in the immediate vicinity of an aerodrome. At Luton, dwellings are generally located well away from aircraft activities and the potential for noise-induced vibration is slight. For fixed-wing aircraft, noise induced vibration effects normally arise only when an aircraft produces a noise level, outside a dwelling, of more than 90 dB L_{Amax} typically. No current or proposed operations give rise to noise levels of this magnitude outside a dwelling.
- 12.26 While the complaints received by the Airport have not identified vibration as a major source of disturbance, some complaints have been received. No more than three complainants have reported vibration events in recent years.

Methodology

Airborne aircraft noise prediction

- 12.27 For this assessment, BAP has used the latest version of the Federal Aviation Administrations Integrated Noise Model (INM) to produce both baseline (2011) and forecast (2028) contours. This model allows the input data given in detail in technical appendix H (appendix N(3)) to be incorporated into a noise model of

operations at Luton for the baseline and with development scenarios. INM is the most widely used worldwide prediction model, and is in line with the latest European Civil Aviation Conference (ECAC) prediction standard.

- 12.28 The outputs are noise contours that take into account the arrivals and departures. The calculations are made for the various time periods, in line with normal practice and with the requirements from the Luton Airport Development Brief.
- 12.29 The INM model used at Luton has taken into account local terrain details. Previous published contours have not taken terrain into account. It also takes into account validation of the general INM methodology to Luton operations, see technical appendix H (appendix N(3)). It should be noted that the contours presented within this ES are produced using the most up to date methodology, which differs from that used in the production of the noise contours for the 2010 Airport Annual Monitoring report (AMR). Comparisons are provided within this chapter of the respective areas covered by noise contours under these different modelling approaches.

Airborne aircraft noise contours

- 12.30 The following noise contours have been produced and are reproduced in technical appendix H (appendix N(3)).

As used by central government and in Luton Airport AMRs

Daytime average mode summer period contours, dB $L_{Aeq,16h}$ [07:00-23:00] and night-time average mode summer period contours, dB $L_{Aeq,16h}$ [23:00-07:00] for:

- 1999 Luton noise budget
- 2011 baseline: 9.5 mppa⁽¹⁾
- 2028 future baseline: 12.4 mppa
- 2028 with development: 18 mppa without fleet modernisation
- 2028 with development: 18 mppa with fleet modernisation

⁽¹⁾Million passengers per annum.

As used for Noise Action Plans in the U.K

London Luton Airport strategic noise maps for both 2011 baseline and 2028 with development (18 mppa) with and without fleet modernisation:

- 24 hour day average mode annual period contours dB L_{den}
- Night average mode annual period contours dB L_{night} [23:00-07:00]

Airborne aircraft noise footprints

- 12.31 For night-time noise evaluation, 80 and 90dB(A) SEL footprints have been produced, as recommended in the CAP 725 guidance, which are shown on the following figures in technical appendix H (appendix N(4)):
- Figure N(4) 1: SEL footprints for Airbus A300, A319 and A320, Boeing 737-800 for arrival from east
 - Figure N(4) 2: SEL footprints for Airbus A300, A319 and A320, Boeing 737-800 for departure to west on Runway 26 CLN/DVR/DET route
 - Figure N(4) 3: SEL footprints for Airbus A320 for arrival from west and departure on Runway 08 Compton Route

- Figure N(4) 4: SEL footprints for Airbus A320 for arrival from west and departure on Runway 08 CLN/DVR/DET route
- Figure N(4) 5: SEL footprints for Airbus A320 for arrival from east and departure on Runway 26 Olney route
- Figure N(4) 6: SEL footprints for Airbus A320 and Airbus A320 NEO for arrival from east and departure to west on Runway 26 CLN/DVR/DET
- Figure N(4)7: SEL footprints for Airbus A300-B4 and Airbus A300-600 aircraft for arrival from east, departure to west on Runway 26 CLN/DVR/DET route.

Ground noise assessment

Ground noise

12.32 Noise generated other than by aircraft in flight or taking off or landing is termed ground noise. The main sources of Airport ground noise are:

- Taxiing and manoeuvring aircraft
- Operation of aircraft auxiliary power units (APUs)
- Mobile ground equipment such as ground power units (GPUs)
- Testing (ground running) of aircraft engines.

12.33 Noise from ground operations has the potential to have an impact on residential areas close to the aerodrome boundary. At Luton residential properties to the north of the Airport are generally distant from the aprons and taxiways, with considerable local screening due to industrial buildings and the large hangars. There are isolated properties to the south and east.

12.34 Aerodrome ground noise is heard in the context of other local ambient noise sources. The most common contributors to the noise climate in the residential areas closest to the Airport are road traffic and airborne aircraft noise. It was reported in the Development Brief that ground noise from the Airport at Eaton Green Road was dominated by road traffic noise, not solely related to the Airport, and the effect of the ground operations at the Airport themselves was not significant. LBC has more recently raised concern over ground noise in the Wigmore area of Luton.

Ground noise assessment criteria

12.35 Unlike the assessment of airborne noise, there is no definitive agreement on the method of assessment of ground noise. Various methods have been adopted in the past, and these have led to the assessment of ground noise in terms of the equivalent continuous sound level, dB $L_{Aeq,T}$

12.36 In this study a basic assessment has been made, as the populated areas are generally distant from sources of ground noise. The nearest residential area is located to the north of the Airport, north of Eaton Green Road. Taxiway Alpha, which passes through the West Apron area is 350 metres from the nearest residential areas, and in between the housing and this busy ground noise source area are large hangars and other industrial buildings that form a noise barrier. The closest apron is the Cargo Apron, which is closer to the housing and currently has less screening by existing buildings.

12.37 The assessment has used the dB $L_{Aeq,16h}$ metric for the daytime period 07:00- 23:00 hours and dB $L_{Aeq,8h}$ for the night-time period 23:00-07:00. This allows the level of such ground noise assessed at various nearby locations to be compared to the

existing ambient environmental noise (see technical appendix H (appendix N(5)) and the World Health Organisation (WHO) general environmental criteria given in table 12.1.

Source	Sound level, dB $L_{Aeq,T}$	Form of criterion
WHO	55	Daytime (prevents any significant/serious community annoyance)
WHO	45	Night-time noise (adopting '10 dB lower' rule)

Table 12.1: Ground noise impact criteria used within this assessment

12.38 In the absence of agreed national criteria for ground noise, and based on UK best practice and professional experience, the significance criteria below have been used in this assessment:

Magnitude of ground noise

Daytime:

- ≥ 55 dB $L_{Aeq,16h}$ – onset of significant effect
- < 55 dB $L_{Aeq,16h}$ – no significant effect

Night-time:

- ≥ 45 dB $L_{Aeq,8h}$ – onset of significant effect
- < 45 dB $L_{Aeq,16h}$ – no significant effect

Changes in ground noise:

- 0 to 2 dB – no effect
- 3 to 5 dB – marginal effect
- 6 to 9 dB – significant effect

Ground noise prediction method

12.39 The prediction of ground noise has been undertaken using a spreadsheet model in conjunction with reference noise level data and event duration information determined from BAP's field noise measurements taken at various aerodromes (see technical appendix H (appendix N(6))). Predictions have been based on the forecast movements in the assessment years. Some prediction has been made of current conditions. Study of the aerodrome complaint statistics for the last six years indicates low (and generally decreasing) community reactions over ground noise, as shown in table 12.2. This would be expected, as the aircraft are distant from local amenities (see table 12.3).

12.40 The recent short-term baseline noise measurements (technical appendix H (appendix N(5))) included identification of the contribution of ground noise to overall ambient levels.

Year	Numbers of complaints (annual)	
	Ground noise	Engine ground runs
1994	11	-
1995	64	-
1996	20	-
1997	22	-
1998	3	-
1999	3	-
2000	23	-
2001	22	-
2002	22	15
2003	18	6
2004	14	12
2005	27	18
2006	69	44
2007	44	3
2008	35	14
2009	14	5
2010	11	8
2011	5	3

Table 12.2: Complaints analysis/ground noise

Assessment locations		Separation (m) of receptor from		
		New taxiway	New apron	Pier B
1	Somerles Farm	650-750	750-850	>1000
2	Dane Street Farm	400-550	>1000	>1000
3	Eaton Green Road/Barnston Close	>1000	300	700
4	Eaton Green Road/Chertsey Close	>1000	300	800
5	Eaton Green Road/ Wigmore Valley Park Centre	>1000	700	900

Table 12.3: Ground noise elementary assessments: separation from ground noise sources

Road access noise assessment

- 12.41 The proposed development will result in increased traffic flows on the local road network and an assessment of future road traffic noise has been made in conjunction with the TA.

Road traffic noise assessment criteria

- 12.42 Unlike for the airborne noise assessment, the criteria used in the analysis here take into account the approach adopted in the UK using information in the recently withdrawn PPG 24, as well as the UK Department of Transport document Design Manual for Roads and Bridges, Volume 11 (DMRB).
- 12.43 The prediction of road traffic noise has been undertaken utilising the calculation method given in the UK Department of Transport Calculation of Road Traffic Noise

publication (CRTN). Short term noise measurements have been made of the current road traffic noise on Eaton Green Road (see technical appendix H (appendix N(5))).

12.44 This study uses noise measured in terms of dB $L_{Aeq,16h}$ to assess road traffic noise. The Noise Insulation Regulations 1975 (as amended in 1988) identify the threshold for eligibility for soundproofing. That is expressed as a façade level of 68 dB $L_{A10,18hr}$. A correction of -3 dB(A) is applied to convert the façade level to a free-field level, and a further correction of -2 dB(A) approximately converts from the $L_{A10,18h}$ to the $L_{Aeq,16h}$ metric. The resulting criterion for sound proofing is 63 dB $L_{Aeq,16h}$, which is the same level as used by the ATWP for sound insulation from airport noise.

12.45 Based on the above, the absolute criteria given in table 12.4 have been adopted for use in this assessment.

Absolute noise level at façade, dB $L_{Aeq,16h}$	Significance criteria
> 66 dB $L_{Aeq,16h}$	Substantial
59 - 66 dB $L_{Aeq,16h}$	Moderate
< 59 dB $L_{Aeq,16h}$	Minor

Table 12.4: Absolute road traffic noise criteria

12.46 The significance of changes in road traffic noise level on people relates to the magnitude of the change and, to some extent, when it occurs. As with the other types of noise, the amount of annoyance and perception of change depends on the individual. A scale of significance is given below for road traffic noise, derived from an interpretation of change criteria from DMRB. Significance depends on whether the change occurs all of a sudden or gradually. Table 12.5 is based on the former, representing a 'worst case', although, in practice any change will be gradual, as no new roads are proposed near noise sensitive receptors.

Increase in noise level	Change in % of people bothered very much or quite a lot by noise	Interpreted significance
<1 dB	< 20%	Negligible
1 - 3 dB	20% - 30%	Minor
3 - 5 dB	30% - 35%	Moderate

Table 12.5: Subjective importance in changes in noise level

12.47 In summary, the significance criteria used in this assessment of road traffic noise are based on those described in tables 12.4 and 12.5, namely:

Magnitude of road traffic noise

- > 66 dB $L_{Aeq,16h}$ – onset of substantial effect
- 59 - 66 dB $L_{Aeq,16h}$ – moderate effect
- < 59 dB $L_{Aeq,16h}$ – minor effect

Changes in road traffic noise*

- < 1 dB – no effect
- 1 - 3 dB – marginal effect
- 3 - 5 dB – significant effect

*Where the change is sudden. If the change is slow then the significance criteria are as used for changes in airborne aircraft and ground noise.

Construction noise assessment

- 12.48 Predictions have been undertaken based on procedures set out in BS5228 to give an indication of the likely levels of construction noise that might affect nearby properties. The impact has been assessed using standard methods. Technical appendix H (appendix N(5)) contains the results of recent short term measurements of background noise.
- 12.49 Comparison has been made with the existing ambient environmental noise, and with the significant criteria for daytime construction noise given in BS5228:
- 65 dB $L_{Aeq,16h}$ - threshold of significance when ambient levels are less than 65dB L_{Aeq}
 - 70dB – not to be exceeded for rural, suburban and urban areas away from main traffic and industrial noise
 - 75 dB $L_{Aeq,16h}$ - not to be exceeded in noisy urban areas
 - 75dB – noise insulation trigger level.

Combined noise impacts

- 12.50 Some locations will be affected by a combination of noise from various sources. Using the separate impact assessments, the combined impact at locations where several sources are significant has been considered.

Baseline conditions

Airborne aircraft activity

- 12.51 Technical appendix H (appendix N(3)) records the details of both current and projected future flying operations at the aerodrome, based on information provided by LLAOL and these details have been used in the noise modelling. Figure 12.2 illustrates the current arrival and departure routes at the Airport. Figure 12.3 presents the daytime noise contours for summer 2011 and figure 12.4 presents the night-time noise contours. Technical appendix H(7) gives current complaint statistics.
- 12.52 Figure 11.5 compares the 2011 baseline daytime contours at 57 dB $L_{Aeq,16h}$ with those at the two planning limit years; 1984, 'the old budget', and 1999, 'the new budget'. The contours for actual activity in 1999 are also shown. This demonstrates that the 2011 baseline daytime contour is predominantly within the two noise budget contours and is less than the actual 1999 levels. Figure 12.6 presents similar comparison for night-time noise using the 48 dB $L_{Aeq,8h}$ parameter, which demonstrates that with the exception of an area to the south west of the Airport, the 2011 baseline contour is within the two noise budget contours.
- 12.53 Table 12.6 summarises the past and current areas of the daytime and night-time contours respectively.

	Daytime	Night time
Scenario	Area exposed to 57 dB $L_{Aeq,16h}$ and above (km ²)	Area exposed to 48 dB $L_{Aeq,8h}$ and above (km ²)
Actual 1984 (CAA, 1.8 mppa)	31.1 (old noise budget)	85.0 (old noise budget)
Actual 1998 (ANCON 2, 4.1 mppa)	15.8	58.6
Forecast 1999 (ANCON 2, 5 mppa)	19.6 (new noise budget)	60.6 (new noise budget)
Actual 1999 (INM, 5.3 mppa)	19.4	37.2
Actual 2005 (INM, 7 mppa)	13.5	26.6
Actual 2008 (INM, 10.2 mppa)	16.6	38.5
Actual 2011 (INM, 9.5 mppa)	14.4	35.8
Forecast 2028 future baseline (INM, 12.4 mppa) without fleet modernisation	18.2	38.9
Forecast 2028 future baseline (INM, 12.4 mppa) with partial fleet modernisation	15.2	32.3

Table 12.6: London Luton Airport daytime and night time noise contour areas

⁽¹⁾ () indicates noise contour prediction method, and annual passengers.

- 12.54 The daytime noise impacted areas delineated by the 2011 contour range from the rural area near St Paul's Walden to the east to areas near the M1 in Slip End. The contours include most of Breachwood Green and parts of South Luton. There are approximately 6,726 people resident in the areas covered by the 57 dB $L_{Aeq,16h}$ contour for 2011. The area of these daytime contours is well within the area set by the original Luton Budget (1984) contours and the current Budget (1999) relevant to LBC planning policy LLA1.
- 12.55 The area of the night-time noise impacted areas is greater than those used for daytime (see figures 12.3 and 12.4) and stretches from Stevenage to south of Markyate. The area of the night-time contours are well within the area set by the original Luton Budget (1984) contours and the current Budget (1999) relevant to LBC planning policy LLA1. There are approximately 16,347 people within the contour area for 2011.
- 12.56 Tables 12.7 illustrates the baseline and future baseline airborne aircraft noise levels during daytime and night-time for local areas respectively.

Location	1984 actual		1999 actual		1999 predicted		2011 actual		2028 future baseline ⁽¹⁾		2028 future baseline ⁽²⁾	
	D	N	D	N	D	N	D	N	D	N	D	N
Old Knebworth Lodge Farm	<54	<48	<54	<48	<54	<48	<54	<48	<54	<48	<54	<48
Grove Farm Noise Terminal	60	54	56	50	56	51	55	50	56	51	55	50
Caddington	55	51	54	50	56	52	<54	50	54	49	<54	48
Park Town, Luton	60	56	60	52	59	55	59	54	60	55	59	54
Whitwell	<54	48	<54	<48	<54	49	<54	<48	<54	<48	<54	<48
Frogmore Noise Terminal	60	58	60	55	60	59	58	55	59	55	58	54
Breachwood Green	63	62	62	60	64	64	<54	49	54	49	<54	48
St Pauls Walden	57	53	55	49	56	53	<54	48	<54	48	<54	<48
Peter's Green	<54	<48	<54	<48	<54	<48	<54	<48	<54	<48	<54	<48
Kinsbourne Green	<54	<48	<54	<48	<54	<48	<54	<48	<54	<48	<54	<48
Farley Hill School, Luton	<54	48	<54	<48	<54	48	<54	<48	<54	<48	<54	<48
Slip End	62	57	58	53	57	54	58	53	59	54	58	53
Winch Hill Farm	62	58	63	57	63	60	59	54	60	55	59	54
Harpenden Children's Home	<54	<48	<54	<48	<54	<48	<54	<48	<54	<48	<54	<48
Walkern	<54	<48	<54	<48	<54	<48	<54	<48	<54	<48	<54	<48
Stevenage (Eastern Perimeter)	<54	<48	<54	<48	<54	<48	<54	<48	<54	<48	<54	<48
Stevenage Station	55	51	<54	<48	<54	50	<54	48	<54	48	<54	<48
Rush Green	57	57	54	54	54	54	<54	50	55	50	54	49
Luton (Wondon End)	<54	50	55	48	<54	51	<54	<48	<54	48	<54	<48
Luton (South East)	69	65	67	61	68	65	65	60	66	61	65	60
Kensworth	<54	<48	<54	<48	<54	48	<54	<48	<54	<48	<54	<48
Hudnall Corner	<54	49	<54	<48	<54	<48	<54	<48	<54	<48	<54	<48
Flamstead	57	50	<54	<48	<54	<48	<54	<48	<54	<48	<54	<48
Markyate	56	50	<54	<48	<54	<48	<54	<48	<54	<48	<54	<48

Table 12.7: London Luton Airport baseline and future baseline daytime (D) and night time (N) airport noise at local areas

(1) Assumes no fleet modernisation

(2) Assumes partial fleet modernisation

12.57 Table 12.7 generally shows slight reductions in 2011 during the daytime when compared to 1999 conditions and there are no increases. Considering the night-time situation, the data shows significant reductions in some areas, particularly Breachwood Green. For other areas, the night noise levels in 2011 generally show

slight reductions when compared to the forecast 1999 conditions and are similar to actual 1999 conditions. One exception is at Luton Park Town where there was a 2dB increase between the 1999 actual level and 2011.

Population exposed

- 12.58 Table 12.8 indicates the populated dwellings within the 2011 contours. These estimates utilise current information from the CACI database, which uses the results of the 2001 census updated to 2011. This method differs from that used by the Airport for the Annual Monitoring Report, as dwelling and population methodology has changed.

Noise parameter	Number of dwellings		Population	
	2011	2028	2011	2028
Daytime				
57-60 dB $L_{Aeq,16h}$	1,800	2,072	4,226	4,406
60-63 dB $L_{Aeq,16h}$	594	966	1,677	2,668
63-66 dB $L_{Aeq,16h}$	289	522	813	1,458
66-69 dB $L_{Aeq,16h}$	5	10	10	27
69-72 dB $L_{Aeq,16h}$	0	1	0	2
Night-time				
48-51 dB $L_{Aeq,8h}$	3,232	3,084	7,678	7,449
51-54 dB $L_{Aeq,8h}$	2,048	2,443	4,357	5,399
54-57 dB $L_{Aeq,8h}$	994	1,478	2,757	3,636
57-60 dB $L_{Aeq,8h}$	547	592	1,526	1,605
60-63 dB $L_{Aeq,8h}$	10	187	27	573
63-66 dB $L_{Aeq,8h}$	1	1	2	2
66-69 dB $L_{Aeq,8h}$	0	0		0

Table 12.8: Dwellings and population exposed based on 2011 baseline and 2028 future baseline (no fleet modernisation) airborne aircraft noise

- 12.59 The daytime aircraft noise above 57 dB $L_{Aeq,16hr}$, predominantly affects residents located in parts of Breachwood Green and Slip End, with the greatest number in south Luton. The residents in the area of south Luton adjoining the busy aircraft west-bound departure route are exposed to the highest levels. That includes the school at Capability Green. There are no hospitals within the daytime contour. For the 57 dB $L_{Aeq,16hr}$ contour the increase from 2011 to the 2028 future baseline is approximately 32% for dwellings and 27% for population. For the 63 dB $L_{Aeq,16hr}$ contour the predicted increase from 2011 to 2028 future baseline is 81% for dwellings and population.
- 12.60 The night-time contours also stretch from Stevenage to areas south of Markyate, with the largest residential area impacted in south Luton. For 2011, there are approximately 2,800 people exposed to the night-time interim target value of 55 dB $L_{Aeq,8h}$, and about 16,350 above the night level of 48 dB $L_{Aeq,8h}$. In 2028, without the proposed development, there would be about 4,300 people exposed to the night-time interim target value of 55 dB $L_{Aeq,8h}$, and about 18,660 above the night level of 48 dB $L_{Aeq,8h}$. The SEL analysis given in technical appendix H (appendix N(4)) indicates a population of approximately 1,100 people exposed to a slight risk of sleep disturbance from operations of the Airbus A320 at night, specifically westerly departures.

Complaints

- 12.61 As reported in technical appendix H (appendix N(7)), 733 complaints were received by the Airport over 2011 operations from 305 complainants. That number excludes complaints from Redbourn and Flamstead over the Clacton/ Dover/Detling runway 26 departure route trial activity, which has now ceased.
- 12.62 Concentrating on the complaints not related to the trial, the main areas from which complainants raised concerns were:
- Caddington
 - Flamstead
 - Harpenden
 - Luton.
- 12.63 In 2011, the majority (71%) of complaints related to westerly departures. This represents an increase from the level of 65% in 1999. Approximately 31% of complaints related to night time disturbance.

Ground noise activity

- 12.64 The Airport layout is such that there are no domestic residential buildings overlooking the aprons and taxiways. The Main Apron, which serves the busy contact stands (those that abut the terminal buildings), is shielded from local residential development by the large and near continuous hangars that stretch from the Signature Hangar 125 to the west to Hangars 7 and 9 to the east near Airport Approach Road. This explains why only a relatively small number of complaints have been received, e.g. in 2011 only five complaints were received in relation to ground noise. Of these, three were related to engine ground runs, one to APU noise and one to taxiing to the Cargo Apron at night.
- 12.65 In light of this, only basic predictions of the current and future ground noise have been made. These have concentrated on the North Apron Area, where new stands closer to the local housing are to be provided. For the contact stands by the Main Apron no change in layout is planned, such that any effect would relate to the intensification of use.
- 12.66 In the ES prepared for the terminal expansion (1997) the ground noise impact assessment considered both APU noise and taxiing noise for two locations on Eaton Green Road. This approach has been adopted within this assessment using similar methodology as these properties represent the closest potentially affected. Technical appendix H (appendix N(6)) gives details of the assessments made, table 12.9 summarises the results and figure 12.7 shows the North Apron area.

Receptor locations		Ground noise estimates db $L_{Aeq,T}$			
		Daytime		Night-time	
		APU	Taxiing	APU	Taxiing
3	Eaton Green Road/Barnston Close	44-50	47	44-50	41
4	Eaton Green Road/Chertsey Close	43-46	45	43-47	39

Table 12.9: Estimates* of baseline ground noise (North Apron Area)

*These estimates are based on initial stand/taxiway assumptions.

- 12.67 The only non-domestic residential building potentially affected by ground noise is the Holiday Inn hotel on Percival Way, which abuts the general aviation parking area that will become the West Apron. The hotel was designed for the location, which is about 150 metres from Taxiway A serving the Main Apron.
- 12.68 The short-term baseline measurements undertaken as part of this assessment indicate that the closest houses on Eaton Green Road experience a much greater ambient noise level from road traffic than from airport ground noise. Therefore, as found in the last analysis reported in the Development Brief, current ground noise is not considered to be significant.

Road traffic noise

- 12.69 The 1997 ES identified road links with significant numbers of noise sensitive receptors as Eaton Green Road and the A505 Vauxhall Way. These are still considered to be the road links where access traffic is closest to local receptors. The Transport Assessment and chapter 13 of this ES confirm that both roads currently have high traffic flows.
- 12.70 Information on current and projected future traffic flows have been provided by URS, as part of the transport assessment work for the proposed development. Using this information, the typical noise levels resulting from road traffic at a nominal distance of 10 metres from the carriageway have been calculated.
- 12.71 Table 12.10 sets out the results of predictions of existing typical road traffic noise levels along feeder roads around the Airport and nearby main roads that pass through residential areas.

Road segment	Daytime road traffic noise (2011) dB $L_{Aeq,16h}$
<i>Vauxhall Way / Kimpton Road / Airport Way</i>	
A1081 Airport Way	64
Airport Way ELC spur (new)	68
Kimpton Road	67
<i>Vauxhall Way / Eaton Green Road / Harrowden Road</i>	
A505 Vauxhall Way (N)	69
A505 Vauxhall Way (S)	69
Eaton Green Road	67
<i>Eaton Green Road / Airport Approach</i>	
Eaton Green Road (W)	67
Eaton Green Road (E)	68
Airport Approach (Frank Lester Way)	66
<i>Eaton Green Road / Wigmore Lane</i>	
Wigmore Lane	66
Wigmore Place	55
Eaton Green Road (east of Wigmore Lane)	64
<i>A505 Vauxhall Road / Crawley Green Road</i>	
Crawley Green Road (W)	67
Crawley Green Road (E)	67
Table 12.10: Baseline road traffic noise levels	

- 12.72 Short term noise measurements were made at locations in the area to the north of the Airport (see technical appendix H (appendix N(5)) and provide a basis for comparison with the modelled road traffic noise levels set out in table 12.10. These indicated daytime road traffic noise levels of 65-68 dB $L_{Aeq,T}$ for Eaton Green Road and Crawley Green Road, which is consistent with the modelled predictions.
- 12.73 Table 12.10 indicates that for Eaton Green Road and Crawley Green Road, where dwellings are located close to the roadside, noise levels are of a magnitude likely to give rise to the onset of significant disturbance. For most of the other major roads, such as Vauxhall Way (S), the airport approach roads and Kimpton Road, there are few noise-sensitive buildings flanking the roads or, as is the case for Vauxhall Way (N), dwellings are located further back from the roadside (typically around 30 metres), where noise levels are lower, giving rise to a moderate impact currently.

Effects during construction

- 12.74 The proposed development involves several areas of the Airport site in which major construction activities will be necessary. These areas are generally located away from noise sensitive receptors. Table 12.11 sets out the approximate distances between the main construction areas and the closest noise sensitive receptors. The noise receptors considered are the isolated properties to the south of the runway, e.g. Someries Farm, the residential area north of Eaton Green Road and the Holiday Inn hotel.

Assessment location		Separation (m) of receptor from			
		New taxiway	New apron	Pier B	New carriageway works
1	Someries Farm	650-700	>1,000	>1,000	900
2	Dane Street Farm	350-500	>1,000	>1,000	>1,000
3	Eaton Green Road/Barnston Close	>1,000	250-300	750-800	900
4	Eaton Green Road/Chertsey Close	>1,000	250-350	800	>1,000
5	Eaton Green Road/Wigmore Valley Park Centre	>1,000	650-800	850-950	>1,000
6	Holiday Inn hotel	220-250	550-700	450-550	25-150

Table 12.11: Separation of residential buildings from construction sources

- 12.75 As shown in table 12.11, most receptors are over 250 metres distant from construction works, and frequently substantially more. The Transport and Road Research Laboratory Supplementary Report SR 502 advises that 'less than 20% of the people who live beyond 100m of the construction are seriously bothered by construction'.
- 12.76 To assess the potential noise impact of the construction works, predictions have been made (see technical appendix H (appendix N(8))). Standard noise levels associated with construction techniques and plant have been obtained from data in BS 5228 Part 1 2009 and the Defra update. These can be used for predicting noise

levels at sensitive receptors during the various stages of construction. Typical plant and assumptions for stationary and mobile plant are set out in table 15 of technical appendix H. For this assessment the appropriate reference source noise level for construction activities is 80 dB.

- 12.77 Based on the noisiest construction activities, table 12.12 gives the calculated daily noise levels at the selected receptor locations.

Assessment location		Approximate Sound Level dB $L_{Aeq,12h}$ predicted* from construction activities			
		Airside works/apron taxiway		Landside works/new access	
		Typical	Worst	Typical	Worst
1	Somerles Farm	36	37	23	23
2	Dane Street Farm	40	43	17	18
3	Eaton Green Road/Barnston Close	40	42	23	23
4	Eaton Green Road/Chertsey Close	38	42	21	22
5	Eaton Green Road/Wigmore Valley Park Centre	33	34	19	19
6	Holiday Inn hotel	47	48	53	72

Table 12.12: Construction noise assessment

* Assuming for either works, a typical emission level of 80 dB $L_{Aeq,12h}$ at 10m, and for the worst case the nearest part of the works, and for the typical case the noise from the more distant centre of the works.

- 12.78 This assessment indicates that the construction works related to the proposed development can be carried out without exceeding the threshold levels from BS 5228. The results indicate that most of the receptors will experience a noise level less than 55 dB $L_{Aeq,12h}$. The exception is for the Holiday Inn hotel, which for some of the new access works will be very close to the works. A construction environmental management plan will be implemented to ensure works are carried out as quietly as possible, in accordance with BS 5228.
- 12.79 There will also be some demolition activity as part of the development proposals and for this work, a typical emission level of 90 dB $L_{Aeq,12h}$ at 10 metres is considered to be representative. During such activities, the noise levels at receptors would be 10 dB higher than the levels set out in table 12.12.
- 12.80 All residential receptors would remain below 55 dB $L_{Aeq,12h}$ and no significant construction noise effects are predicted for residential receptors. Predicted worst-case demolition and construction noise levels at the Holiday Inn hotel may exceed the threshold for 'noisy urban areas' set out in BS 5228.

Effects during operation

Airborne aircraft activity

- 12.81 Technical appendix H (appendix N(3)) records the details of both current and future air traffic movements and these details have been used in the noise modelling. The impact assessment has used the arrival and departure routes shown on figure 12.2, assuming no change is made to airspace or standard instrument departure routes.

- 12.82 The impact assessment for the future baseline is based on 12.4 mppa (127,000 annual aircraft movements) and the 'with development' scenario is based on 18 mppa (157,000 annual aircraft movements). Comparison has also been provided for the envisaged effects of modernisation of the aircraft fleet. To reflect the effect of fleet replacement, contours have been produced on the basis of replacement of narrow body single aisle aircraft, Airbus A320, by the Airbus A320 NEO and Boeing 737-800 by Boeing 737 MAX. These re-engined aircraft are designed to be quieter than current types and, using the same assumptions as adopted by the government's scientists at CAA-ERCD, future contours for 2028 have been produced.
- 12.83 Figure 12.8 presents the future daytime noise contours for summer 2028 and figure 12.9 presents the future night-time noise contours. Figure 12.10 illustrates the potential effect of fleet modernisation on the size of the future daytime contours. Figure 12.11 compares the future daytime contours without fleet modernisation at 57 dB $L_{Aeq,16h}$ with those experienced in 2011, and figure 12.12 produces a similar comparison for night-time noise using the 48 dB $L_{Aeq,8h}$ parameter.
- 12.84 Table 12.13 summarises the predicted change in areas exposed to daytime noise levels of 57 dB $L_{Aeq,16h}$ and above and night time levels of 48 dB $L_{Aeq,8h}$ and above. These predictions demonstrate that during daytime, there is an increase in the area exposed as a result of the proposed development compared to the future baseline scenario and that without fleet modernisation, this is predicted to be 21% larger than the 1999 daytime budget area. With fleet modernisation, the predicted area affected is slightly less than the 1999 budget. For night time, the area exposed to noise levels above 48 $L_{Aeq,8h}$ is also larger than the future baseline but is substantially smaller than the area for the 1999 noise budget.

Scenario	Area exposed to 57 dB $L_{Aeq,16h}$ and above (km ²)	Area exposed to 48 dB $L_{Aeq,8h}$ and above (km ²)
Forecast 1999 (ANCON 2, 5 mppa)	19.6 (noise budget)	60.6 (noise budget)
Forecast 2028 future baseline (INM) without fleet modernisation (12.4 mppa)	18.2	38.9
Forecast 2028 future baseline (INM) with fleet modernisation (12.4 mppa)	15.2	32.3
Forecast 2028 with development (INM) without fleet modernisation (18 mppa)	23.7	48.0
Forecast 2028 with development (INM) with fleet modernisation (18 mppa)	19.5	40.4

Table 12.13: London Luton Airport predicted daytime noise contour areas

⁽¹⁾ () indicates noise contour prediction method, and annual passengers.

- 12.85 Table 12.14 illustrates the predicted change in noise levels during daytime and night-time for local areas respectively. These generally show that noise levels in the forecast future are similar to 1999 levels in the daytime, although there are differences in some areas due to the contours being different shapes. Considering the night-time situation, significant reductions are observed in Breachwood Green. For other areas, the night noise levels in the forecast future generally show slight reductions when compared to forecast 1999 conditions and slight increases when compared to the actual 1999 conditions set out in table 12.7.

12.86 For receptor locations where the daytime noise level with the development in place is predicted to be in excess of 54 dB $L_{Aeq,16h}$, the range of increase in noise level between 1999 and 2028 without fleet modernisation is 0 dB to 2 dB (average 1.2 dB). The range of increase between the 2011 baseline and 2028 without fleet modernisation is 2 dB to 3 dB (average 2.9 dB).

12.87 For night time, for receptor locations exceeding 48 $L_{Aeq,8h}$, the range of increase between 1999 and 2028 without fleet modernisation is predicted to be 0 dB to 2 dB (average 1.3 dB). The range of increase between the 2011 baseline and 2028 without fleet modernisation is 1 dB to 3 dB (average 1.6 dB).

Location	1999 predicted		2028 future baseline		2028 future baseline with fleet modernisation		2028 with development		2028 with development and fleet modernisation	
	D	N	D	N	D	N	D	N	D	N
Old Knebworth Lodge Farm	<54	<48	<54	<48	<54	<48	<54	<48	<54	<48
Grove Farm Noise Terminal	56	51	56	51	55	50	58	52	57	51
Caddington	56	52	54	49	<54	48	55	50	54	49
Park Town, Luton	59	55	60	55	59	54	62	57	61	56
Whitwell	<54	49	<54	<48	<54	<48	<54	<48	<54	<48
Frogmore Noise Terminal	60	59	59	55	58	54	61	56	60	55
Breachwood Green	64	64	54	49	<54	48	55	50	54	49
St Pauls Walden	56	53	<54	48	<54	<48	55	50	<54	49
Peter's Green	<54	<48	<54	<48	<54	<48	<54	<48	<54	<48
Kinsbourne Green	<54	<48	<54	<48	<54	<48	<54	<48	<54	<48
Farley Hill School, Luton	<54	48	<54	<48	<54	<48	<54	<48	<54	<48
Slip End	57	54	59	54	58	53	61	56	60	55
Winch Hill Farm	63	60	60	55	59	54	61	55	59	54
Harpenden Children's Home	<54	<48	<54	<48	<54	<48	<54	<48	<54	<48
Walkern	<54	<48	<54	<48	<54	<48	<54	<48	<54	<48
Stevenage (Eastern Perimeter)	<54	<48	<54	<48	<54	<48	<54	<48	<54	<48
Stevenage Station	<54	50	<54	48	<54	<48	54	49	<54	48
Rush Green	54	54	55	50	54	49	56	51	55	50
Luton (Wondon End)	<54	51	<54	48	<54	<48	54	49	<54	48
Luton (South East)	68	65	66	61	65	60	68	63	67	62
Kensworth	<54	48	<54	<48	<54	<48	<54	<48	<54	<48
Hudnall Corner	<54	<48	<54	<48	<54	<48	<54	<48	<54	<48
Flamstead	<54	<48	<54	<48	<54	<48	<54	48	<54	<48
Markyate	<54	<48	<54	<48	<54	<48	<54	48	<54	<48

Table 12.14: Predicted daytime (D) and night time (N) noise levels

12.88 Table 12.15 indicates the populated dwellings within the 2028 with-development contours. During daytime, the population impacted is predicted to include 2,498

people exposed to the 'moderate annoyance level' (63 dB $L_{Aeq,16h}$) and 11,784 above the 'low annoyance level' (57 dB $L_{Aeq,16h}$). These changes relate to increases of 68% and 38% respectively from the predicted exposure in 2028 without the development due to an increase in noise of around 1 dB(A).

- 12.89 For the night period, the population impacted will include about 6,300 people exposed to the night-time interim target value of 55 dB $L_{Aeq,8h}$, which represents an increase of approximately 58% compared to 2011 and 38% compared to the 2028 future baseline. There is predicted to be a increase of approximately 25,800 people above the night level of 48 dB $L_{Aeq,8h}$. This level is compared to approximately 33,600 people estimated to be within the 48 dB $L_{Aeq,8h}$ LLA1 1999 predicted noise contour. and 16,347 people within this contour in 2011.

Noise parameter	Number of dwellings	Population
<i>Daytime</i>		
57-60 $L_{Aeq,16h}$	2,392 (2,546)	5,505 (5,473)
60-63 $L_{Aeq,16h}$	1,613 (1,079)	3,781 (2,898)
63-66 $L_{Aeq,16h}$	593 (661)	1,675 (1,868)
66-69 $L_{Aeq,16h}$	287 (10)	802 (27)
69-72 $L_{Aeq,16h}$	7 (1)	21 (2)
<i>Night-time</i>		
48-51 $L_{Aeq,8h}$	4,911 (3,062)	11,738 (7,208)
51-54 $L_{Aeq,8h}$	2,562 (2,376)	5,964 (5,448)
54-57 $L_{Aeq,8h}$	2,082 (1,661)	4,496 (3,899)
57-60 $L_{Aeq,8h}$	841 (542)	2,379 (1,547)
60-63 $L_{Aeq,8h}$	436 (291)	1,205 (817)
63-66 $L_{Aeq,8h}$	7 (3)	21 (6)
66-69 $L_{Aeq,8h}$	0 (0)	0 (0)

Table 12.15: 2028 airborne aircraft noise (with fleet modernisation)

Summary of airborne aircraft noise impact

- 12.90 The airborne aircraft noise produces significant impact, with an increase in the area affected both during daytime and night-time (see figures 12.11 and 12.12) based on the assumption of no improvement in aircraft noise performance. The daytime impact, as now, will be significant; however the predicted increases in noise level are generally small.
- 12.91 The night-time impact, as now, will be significant; and as with the predicted daytime impact the change from current conditions as a result of the proposed development is generally around 1 dB.
- 12.92 Although the airborne aircraft noise due to the proposed development on the worst case assumption of no fleet modernisation over the next 17 years will result in growth of the noise impacted areas from current (2011) circumstances, the actual increase in noise experienced by the population within the contours will be small.
- 12.93 The current planning policy (LLA1) relates noise impact to that predicted for 1999 and LBC has requested that the proposed development is considered in the context of this policy. The proposed development will produce an increase (21%) in the noise impacted area during the daytime and a reduced noise impacted area during the night-time. If fleet modernisation occurs as envisaged, the future impact

would be approximately the same as predicted for the 1999 development during the daytime and a third less during the night-time.

Ground aircraft activity

- 12.94 The future 2028 ground noise with the proposed development will be influenced by the overall increase in activity and the alteration to aircraft stand provision and usage. The overall increase in activity relates to the 58% increase in overall aircraft movements (99,299-156,840). On the assumption of similar aircraft types in 2011 to 2028, this suggests an overall increase in general ground noise level of less than 2 dB $L_{Aeq,T}$. Such an increase is not considered significant and would not cause a change in reaction to ground noise from that currently assessed, i.e. no significant disturbance.
- 12.95 As well as this overall increase, the development includes modifications to the area near the North Apron. That is the area of ground noise activity closest to local noise receptors, in the housing abutting Eaton Green Road. The modifications in this area include the provision of a new hangar to the north of the Cargo Apron, which is the subject of a separate planning application.
- 12.96 Under this application, areas to the north of Taxiway Echo will be brought into mixed use for general aviation, cargo and commercial aviation. These remote parking stands may be brought into use to facilitate overnight parking of commercial aircraft. The stands would require passengers to be bussed to the three stands shown in figure 12.7. Aircraft leaving these stands would use the same area of Taxiway Echo for push-back and start-up and so would impede aircraft leaving and arriving at the more important existing contact stands. Their use would be limited and could consist of one arrival per day, with one departure on the following day per stand.
- 12.97 To assess the possible noise impact of these extra parking stands, which locate aircraft closer to the nearest residential locations than aircraft on Pier A North Stand or on Taxiway Echo, ground noise has been assessed and is given in table 12.16.

Receptor locations		Ground noise estimates db $L_{Aeq,T}$			
		Daytime		Night-time	
		APU	Taxiing	APU	Taxiing
3	Eaton Green Road/Barnston Close	47-53	49	47-53	43
4	Eaton Green Road/Chertsey Close	48-51	47	48-51	41

Table 12.16: Estimates of current future ground noise (North Apron Area)

*These estimates are based on initial stand/taxiway assumptions.

- 12.98 The future prediction is strongly affected by the screening arising from the industrial units and other buildings that are located between the North Apron and the housing in Eaton Green Road. These other buildings will be affected by other developments relating to RSS Enterprises and Signature that do not form part of this application.
- 12.99 The future ground noise will be similar to that experienced today; slight increases of approximately 1 dB are forecast. No significant daytime or night time noise impact from ground noise is predicted.

Road access activity

12.100 URS has provided the future traffic flows on the road network around the Airport. Except for the dualling of the access road from the Holiday Inn hotel to the CTA, the noise changes relate to changes in the volume of traffic. Table 12.17 sets out the results of predictions of typical road traffic noise levels near local roads, which also take account of additional road traffic likely to arise from completion of the committed development in the area. Figures have been rounded.

Road segment	2028 future baseline dB $L_{Aeq,16h}$	2028 with development dB $L_{Aeq,16h}$
<i>Vauxhall Way / Kimpton Road / Airport Way</i>		
A1081 Airport Way	65	67 (+1.3)
Airport Way ELC Spur (new)	70	70 (+0)
Kimpton Road	69	69 (+0.5)
<i>Vauxhall Way / Eaton Green Road / Harrowden Road</i>		
A505 Vauxhall Way (N)	70	70 (+0.3)
A505 Vauxhall Way (S)	71	71 (+0.1)
Eaton Green Road	68	68 (+0.4)
<i>Eaton Green Road / Airport Approach</i>		
Eaton Green Road (W)	68	68 (+0.4)
Eaton Green Road (E)	69	69 (+0.5)
Airport Approach (Frank Lester Way)	67	68 (+1.1)
<i>Eaton Green Road / Wigmore Lane</i>		
Wigmore Lane	67	68 (+0.4)
Wigmore Place	56	56 (-0.3)
Eaton Green Road (east of Wigmore Lane)	65	66 (+0.3)
<i>A505 Vauxhall Road / Crawley Green Road</i>		
Crawley Green Road (W)	68	68 (+0)
Crawley Green Road (E)	68	68 (+0)
Table 12.17: Predicted daytime road traffic noise levels near local roads in 2028		

12.101 Table 12.17 shows that there will be no more than a 1.3 dB increase in all locations, which will be a negligible change. When compared to 2011 baseline traffic flows the most significant increase in noise level would be associated with the Holiday Inn / Percival Way junction where the increases expected in road traffic will give rise to no more than a 2 dB change over current levels, with or without the proposed development. There are no residential buildings in close proximity to this section of the road. Overall, there will be a negligible noise effect from road traffic on the local community as a result of the proposed development, which will not be significant.

Mitigation

Construction noise

- 12.102 The assessment of predicted demolition and construction noise concluded that there would be no significant impact to residential receptors and that all would remain below 55 dB $L_{Aeq,12h}$. Predicted worst-case demolition and construction noise levels at the Holiday Inn hotel may exceed the threshold for 'noisy urban areas' set out in BS 5228.
- 12.103 Construction methods will be reviewed and consideration given to mitigation measures such as quiet methods of construction, the introduction of temporary screening and the creation of respite periods.

Current operational noise control and mitigation

Planning conditions

- 12.104 The Airport has for many years taken measures to monitor noise produced by aircraft flying into and out of the Airport and to manage noise by, in particular, controls on the types of aircraft that may operate in the night period. The operational controls are given in the UK AIP (see technical appendix H (appendix N(9))).
- 12.105 Conditions imposed on a previous planning permission resulted in an annual noise control scheme and day to day noise control schemes, which have been operated since. The annual noise control scheme is reported upon in the Annual Monitoring Reports (AMR), which are available on the Airport's website for recent years.
- 12.106 The day to day noise control scheme is reported upon four times per year to the London Luton Airport Consultative Committee LLACC and its Noise and Track Sub-committee. The LLACC deliberations on these matters are reported on the LLACC website. It is envisaged that the annual and day-to-day noise control schemes will continue.

Night flying policy

- 12.107 A voluntary night jet policy was operated in the period 1994-2002. This included restrictions on the number of jet aircraft, those designed as NN/B, which did not meet the ICAO Chapter III noise standard. From 2002 onwards a new Night Noise Policy was put in place, and several reviews have been undertaken. The current Issue 8 is in place to 31 March 2015 (see technical appendix H (appendix N(10))).
- 12.108 The policy is based around monitoring and managing and includes:

Monitoring:

- By specialised noise and track keeping system
- By determining noise of individual departing aircraft at three fixed locations, Frogmore, Pepsal End and Grove Farm off Markyate Road (South of Slip End)
- By reporting quarterly on the number of night movements
- By complaint analysis, response, and reporting
- By Continuous Descent Approach (CDA) reporting
- By Track Keeping reporting
- By production of quarterly night contours

- By production of annual night contours

Managing:

- By differential landing charges
- By surcharges if maximum noise levels recorded at the fixed monitoring location exceed 82 dB (A) L_{max}
- By extending the ban on non Chapter III aircraft to aircraft with maximum take off weight more than 11,600 kg
- By prohibiting flying training between 20:00-08:00 hours
- By operating a scheduling ban on aircraft rated as QC4/QC8/QC16 between 23:00-05:59, Monday to Saturday, and 23:00-06:59 on Sundays
- By not permitting engine ground runs in period 23:00-05:59 on week days, and 23:00-06:59 on Saturdays, Sundays and local public holidays

Noise Action Plan

12.109 The Airport prepared a Noise Action Plan (NAP) in accordance with the Environmental Noise (England) Regulations 2006. After extensive stakeholder and public consultation, it was submitted to Defra and DoT for approval. Recently, the NAP has been approved and published on the Airport's website.

12.110 The NAP originally quantified the noise arising from airborne aircraft using the Airport in 2006 through noise contours and tables delineating the population and dwellings within the specific annual contours specified by Defra. This has been subsequently updated using air traffic movements for 2011.

12.111 The NAP includes 55 measures that have been approved by Defra and which are designed to manage noise issues and effects arising from aircraft departing from and arriving at the Airport. They support the government's aim (set out in the ATWP) to limit, and where possible reduce, the number of people in the UK significantly affected by aircraft noise. Details of these measures are provided in technical appendix H (appendix N(11)).

12.112 The measures set out in the NAP will continue to be implemented at the Airport.

Future operational noise control and mitigation

12.113 Before considering future controls it is useful to summarise the predicted impacts for daytime and night-time (table 12.18).

Year	Estimated dwellings exposed	
	Daytime >57 dB $L_{Aeq,16h}$	Night-time >48 dB $L_{Aeq,8h}$
1999 predicted	4,017	14,006
2011 actual	2,688	6,832
2028 no development	3,720	7,880
2028 with development (without fleet modernisation)	4,892	10,839
2028 with development (with fleet modernisation)	4,297	7,935

Table 12.18: Airborne aircraft noise: dwelling exposures (now and future)

- 12.114 The future noise control measures to be deployed at the Airport will be based on the existing measures set out in the NAP. These measures include communication with a variety of stakeholders on a regular basis to discuss and progress a large range of noise related matters.
- 12.115 The 55 measures in the NAP will be supplemented by seven new noise control measures that have developed in response to consultation. These measures are intended to address the amount of activity at night, the noisiness of individual aircraft, the routes flown by individual movements, and mitigation for residential properties.
- 12.116 To control the amount of activity at night there will firstly be a restriction on the number of aircraft movements. Specifically the annual number in the period 23.30 – 06.00 will be limited to 10,200.
- 12.117 Furthermore the Airport will introduce the government's Quota Count (QC) system, and so will have a similar system to ten other UK airports and that of Luton's neighbouring airport London Stansted. Within the QC system, aircraft are certified by the International Civil Aviation Organisation (ICAO) according to the noise they produce. They are classified separately for both take off and landing. Points are allocated to different aircraft types according to how noisy they are. The noisier the aircraft type, the higher the points allocated. This provides an incentive for airlines to use quieter aircraft types. The Airport will have an annual quota count budget of 5,000 for the period 23.30 – 06.00. As part of this quota count system there will be a ban on operations by aircraft that have a quota count of more than 2 at night (23.30 – 06.00).
- 12.118 For the daytime period airlines will continue to be incentivised to operate aircraft quietly by fines for those that cause departure noise levels at the Airport's monitors above set limits. These daytime limits will be progressively reduced, from the current value of 94 dB(A) to 85 dB(A) from 1 January 2013, 82 dB(A) from 1 January 2015 and 80 dB(A) from 1 January 2020. The night-time limit has already been recently reduced to 82 dB(A) and a further reduction to 80 dB(A) is proposed. The fine for infringement will be in line with the published levels in the Annual Monitoring Report, which is up to 400% of the landing fee during the day and up to 600% at night. This will be paid into the Community Fund.
- 12.119 To optimise the benefit of Noise Preferential Routes, the initiatives will reduce the incidence of aircraft diverging from the NPRs by increasing the minimum height they must attain on it, and fining aircraft that fly outside the NPRs from next year. Infringements will incur a penalty of £750 during the day or £1000 at night. The fines will be paid into the Community Fund.
- 12.120 The mitigation of the residual noise is to be achieved as in the recent past at Luton by operation of a noise insulation grants scheme. The new scheme, towards which the Airport will contribute up to £100,000 per annum, is to be managed by LLACC. The regular information already provided by the Airport will be utilised in determining where the mitigation should be directed. The mitigation measures normally comprise the installation of acoustically-enhanced glazing and attenuated ventilators.

		Number of properties affected				
	Noise bands (dB LAeq)	Baseline 2011	Future Baseline 2028	With Development 2028	Increase 2011 to 2028 WD	Increase 2028 baseline to 2028 WD
Day	63-66	289	522	593	+304	+71
	66-69	5	10	287	+282	+277
	69-72	0	1	7	+7	+6
Table 12.19: Properties qualifying for noise insulation assuming no change in fleet mix						

12.121 In addition the Airport will continue to pay £50,000 per annum to its Community Fund, which will be independently managed in accordance with existing arrangements.

12.122 With these additional measures the Airport's programme includes an appropriate range of controls, incentives, and mitigation measures. These are in line with the governments latest thinking in its Draft Aviation Policy Framework July 2012.

Cumulative effects

12.123 On the basis that the cumulative assessment developments of Century Park, Sundon Rail Freight Depot and Junction 10a of the M1 do not involve any sources of aviation noise, the assessment of cumulative impact has been restricted to construction noise and road traffic noise.

12.124 With respect to construction noise, of Junction 10a is approximately 3.5 kilometres to the south west of the Airport and the Sundon Rail Freight depot is approximately 9.5 kilometres to the north west. These distances are such that no potential receptors would be affected by construction noise from the Airport with either of these two developments.

12.125 The proposed development at Century Park, to the east of the Airport is much closer to the potential receptors identified in table 12.12, potentially affected receptors for site construction noise from the Century Park development are likely to be further to the east along Eaton Green Road than those considered within this assessment. Thus no significant cumulative impact is envisaged with respect to construction noise.

12.126 The assessment of road traffic impacts used within this assessment has inherently taken committed development into account, including changes in traffic flow associated with the Century Park development and Junction 10a. The impact assessment demonstrated that whilst there are elevated levels of road traffic noise along roads in the vicinity of the Airport, the additional effect of traffic associated with the Airport development would not be significant. On this basis there would also not be any significant cumulative impacts associated with road traffic.

12.127 The proposed development of the Sundon Rail Freight Depot is seeking direct access to Junction 11a of the M1 and the nature of this proposed use is such that the majority of its operational traffic will either be by rail or via the M1. By virtue of

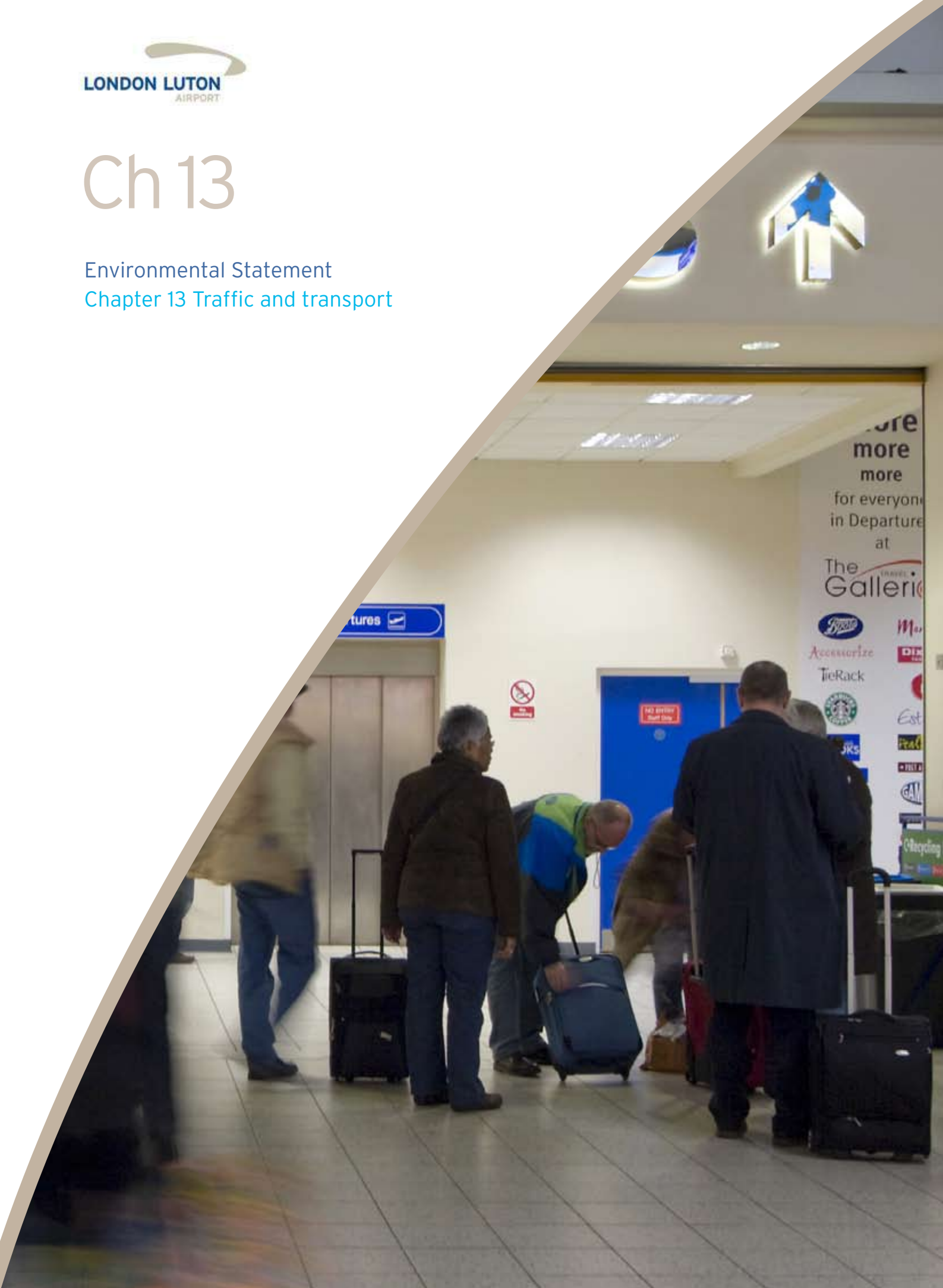
this envisaged pattern of use, no significant cumulative effects are therefore predicted associated with road traffic from the Rail Freight Depot and the Airport development.

Residual effects

- 12.128 The current level of airborne aircraft noise presents a significant adverse impact during the day and night. The level of airborne aircraft noise will remain significant with the proposed development. There are already substantial mitigation measures in place within the NAP to control airborne noise reducing the residual noise impact. These measures will be supplemented by the new package of additional measures, which will assist the Airport in minimising noise emissions, particularly from the noisiest aircraft. The noise insulation scheme will provide effective mitigation for the most affected properties so that the intrusion associated with aircraft noise is reduced in real terms.
- 12.129 The current level of aircraft ground noise does not result in a significant adverse impact during the day and night. Some limited adverse community reaction has been recorded related to engine ground runs, which are already subject to noise mitigation measures described above. The proposed development is unlikely to result in a significant change in ground noise level and therefore no significant residual noise impact is anticipated.
- 12.130 The current level of road traffic noise results in a significant adverse impact. The level of road traffic noise is not predicted to increase significantly with the proposed development and as a result there will be only a negligible noise impact, which will not be significant.
- 12.131 No significant adverse noise impact is predicted for the temporary construction works for most receptors. A short-term significant adverse impact at the Holiday Inn hotel may arise from demolition and construction activities close to the hotel. Further to this a construction environmental management plan will be implemented to mitigate construction noise levels. There remains the possibility of a residual temporary significant noise impact at the hotel.

Ch 13

Environmental Statement
Chapter 13 Traffic and transport



Chapter 13: Traffic and transport

Introduction

- 13.1 This chapter of the ES assesses the potential impact of the proposed development on the surrounding highway network, based on an assessment of the interaction between future development-related movements and existing patterns of vehicular movement. The impact upon the public transport, cycle and pedestrian networks has also been considered, with mitigation measures proposed to minimise or remove adverse impacts, where applicable.
- 13.2 This chapter sets out the relevant government policy, at national, regional and local level that has been considered in respect of the proposed development. The assessment methodology and significance criteria used are outlined, prior to a description of the baseline conditions. Impact assessment and mitigation have been considered for both the construction stages and the completed development.
- 13.3 This chapter presents a summary of the Transport Assessment (TA) that has been produced to support the outline planning application, which will be submitted as a stand-alone document in support of the application. This chapter and the TA have been written by URS Infrastructure & Environment UK Limited (URS).

Legislative and policy context

- 13.4 This section summarises the key planning policies relevant to this ES with expanded detail provided in chapter 3 of the TA.

National policy

- 13.5 The coalition government is currently consulting on a new, sustainable framework for aviation in the UK. The consultation document, Developing a Sustainable Framework for UK Aviation: Scoping Document (March 2011), sees an urgent need for such a framework to guide the aviation industry in planning its investment and technological development in the short, medium and long-term. The government accepts the need for aviation to grow sustainably in support of the economy over the longer term, and aims to adopt a new framework for aviation by 2013. The consultation document acknowledges that aviation is an important element in the UK's transport system, and should be seen in the context of the government's vision for a greener transport system that acts as an engine for future growth. The government's overall goal for UK aviation also includes improving the passenger experience at airports.
- 13.6 On 27 March 2012 the Coalition Government published its new National Planning Policy Framework¹, which will now guide the planning process for the years to come. The framework recognises that:
- The transport system needs to be balanced in favour of sustainable transport modes to give people a real choice about how they travel, while ensuring that safe and suitable access to the site can be achieved for all people

¹ National Planning Policy Framework. March 2012 Department for Communities and Local Government.

- Solutions supporting reductions in greenhouse gas emissions and reduced congestion should be encouraged
- Improvements can cost-effectively limit the significant impacts of the development
- Development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe.

13.7 With specific reference to planning for airports and airfields, plans should take account of the new framework as well as the principles set out in the relevant national policy statements and the Framework for UK Aviation.

Regional policy

13.8 Regional Spatial Strategies (RSS) provided regional level planning frameworks for the regions of England outside London. On 6 July 2010 the coalition government announced that these were to be revoked. Both plans covered Luton and a part of Central Bedfordshire unitary authorities. In its place the coalition government is introducing legislation to establish a new planning system (see above).

Local policy

13.9 Until legislation establishes the new system, LBC has indicated that the Joint Committee (for the former Growth Area of Luton/ Dunstable/ Houghton Regis and Leighton Linlade) may wish to progress work started on a Core Strategy, to provide an overall strategic vision for the future of Luton and the southern part of Central Bedfordshire until 2026 but without the sub regional growth agenda. Policy for Luton relies on policies saved under the Local Plan 2006 and Structure Plan. This position will remain until either the new planning system is introduced, or interim progress is made on a Core Strategy as part of the LDF (which may also be abolished) by the Joint Committee. Following a Core Strategy Examination the Luton and South Bedfordshire Joint Committee resolved on the 29th July 2011 to seek to withdraw the Luton and southern Central Bedfordshire Joint Core Strategy. The Secretary of State subsequently agreed and directed that the Joint Core Strategy must be withdrawn.

13.10 With the passing of the Localism Act on 15th November 2011 new local plan regulations now introduce the 'local plan' as the collective of separate development plan documents (DPDs) where appropriate.

13.11 The previous Local Plan 2001-2011 has now expired except for saved policies:

- Expired Local Plan Policies - ENV3, ENV11, ENV13, ENV15, ENV16, H8, LC8, T1, T4, T6, T7, T10, T11, U1, LLA3, IMP3
- All other local plan policies have been saved and still apply.

13.12 LBC is in the process of preparing a new local plan to cover the period 2011 to 2031. A six-week consultation took place between 25 June and 3 August 2012. LBC requested feedback and it is currently reviewing the responses received. In July, LLAOL submitted a representation setting out the strategic significance of the Airport to the borough, and encouraged LBC to take account of this in the local plan.

13.13 LLAOL considers that the local plan should include a policy that establishes the principle for further development at the Airport in a similar manner to that in the current adopted local plan (policy LLA1). The evidence supporting this planning

application could be used to inform such a policy. This policy could then provide the basis for the preparation of a new supplementary planning document (such as a new development brief), to provide an up to date local planning policy framework for the Airport.

- 13.14 LBC intends to publish a pre-deposit consultation in March 2013. The Airport will make further representations on LBC's new local plan at this time.

Local Transport Plan 3

- 13.15 The Luton Local Transport Plan 3 (LTP3) was published in March 2011. It includes a long-term strategy for the period up to 2026 and an Implementation Plan covering the period to 2015.

- 13.16 The LTP's vision for the long-term strategy involves providing an integrated, safe, accessible and more sustainable transport system that supports economic regeneration, prosperity and planned growth in the Luton conurbation. The vision also involves reducing unnecessary car use and carbon emissions, while enhancing the environment and improving the community's health and quality of life.

- 13.17 To achieve that vision, the LTP has a number of aims, including:

"Supporting Luton's growth as an international gateway in the context of both the growth of London Luton Airport and ease of access to the new Channel Tunnel Rail Link terminus at St Pancras".

- 13.18 The main LTP priority at the strategic level is to improve east-west connectivity, particularly between Luton and Dunstable / Houghton Regis but also on other strategic corridors depending on the timing of major developments. The main focus for managing congestion and reducing emissions will be through the intensive application of smarter choices measures to encourage modal shift from single-occupancy cars to more sustainable modes.

Other local policies

- 13.19 Although the Airport is situated within the Borough of Luton, it adjoins Hertfordshire and geographically also has close ties with Central Bedfordshire.

- 13.20 The Hertfordshire LTP² places a high priority on making better use of the existing road network rather than building new roads. Among the key challenges it sees are supporting economic development and housing growth, improving transport opportunities for all, achieving modal shift, enhancing the quality of life and environmental quality, and safety and security. The county council will promote and where possible facilitate a modal shift of both Airport passengers and employees towards sustainable modes.

- 13.21 The Central Bedfordshire LTP³ refers to the council's growth agenda to help the economy of Central Bedfordshire to develop. The LTP seeks to create an integrated transport system that is safe, sustainable and accessible for all. It will manage the anticipated increase in travel demand in Central Bedfordshire by providing new capacity, making better use of existing provision, and reducing the need to travel.

² Local Transport Plan (LTP3) 2011-2031. Hertfordshire County Council.

³ Local Transport Plan 3: The Central Bedfordshire Council Transport Strategy - April 2011 to March 2026. Central Bedfordshire Council

The LTP's objectives include increasing the ease of access to employment by sustainable modes.

London-Luton Airport Surface Access Strategy

- 13.22 The Airport published its Airport Surface Access Strategy (ASAS) 2012-2017 in January 2012, which sets out challenging new targets that reflect the Department for Transport's (DfT) Guidance on Air Transport Forums and Airport Surface Access Strategies (1999). The strategy has been subject to both stakeholder and wider public consultation and is an important consideration to guide future development. The strategy accords with guidance by setting out the Airport's targets and action plans for 2012-2017 to provide the foundation for travel behaviour and initiatives beyond that horizon when considering sustainable transportation planning to accommodate further passenger growth as part of this assessment.

Methodology

Assessment methodology

- 13.23 This section presents an assessment of the main effects in terms of transportation and access associated with the proposed development. The scale and extent of the assessment have been defined in accordance with Guidelines for the Environmental Assessment of Road Traffic, Institute of Environmental Assessment, (IEA 1993). The IEA is now recognised as the Institute of Environmental Management and Assessment (IEMA). This has involved first identifying the affected parties or locations that may be sensitive to changes in traffic conditions.
- 13.24 Based on the land uses around the site, those potentially affected parties considered are:
- Pedestrians on the footways adjacent to the site
 - Motorised users on the local highway network
 - Public transport facilities around the site.
- 13.25 The IEMA guidance recommends a detailed environmental assessment for highway links where:
- Traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%); or
 - Specific environmental problems may occur (sensitive areas affected by traffic increases of at least 10% unless there are significant changes in the composition of traffic).
- 13.26 In cases where the thresholds are exceeded the IEMA guidelines set out a list of environmental effects that should be assessed for significance to include: noise and vibration, visual effects, severance, driver delay, pedestrian delay, pedestrian amenity, accidents and safety, hazardous loads and dust and dirt. It is acknowledged by the guidelines that not all the effects would be applicable to every development.

Significance criteria

- 13.27 Guidance provided by the IEMA and Manual of Environment Appraisal (MEA) has been consulted to identify significance criteria applicable to the current assessment.

Different significance criteria have been used for different impacts. For a number of effects there are no ready thresholds of significance, in which case there has been a need for interpretation and judgement, based on knowledge of the site and/ or quantitative data where available. The assessment of significance used within this chapter of the ES therefore differs slightly to that described within chapter 5 of this ES.

13.28 After taking into consideration mitigation, residual impacts have been identified as either beneficial or adverse impacts are further defined as:

- Minor: slight, very short or highly localised impact of no significant consequence;
- Moderate: limited impact (by extent, duration or magnitude) which may be considered significant; or
- Major: considerable impact (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability, legislation, policy or standards.

13.29 Table 13.1 shows the thresholds of significance used to determine the level of significance for various impacts.

Impact	Level of Significance			
	Negligible	Minor	Moderate	Major
Change in driver journey time	Increase or decrease of less than 2 minutes	Increase or decrease of more than 2 minutes and less than 5 minutes	Increase or decrease of more than 5 minutes and less than 20 minutes	Increase or decrease of more than 20 minutes
Change in driver delay	Increase or decrease of less than 30 seconds	Increase or decrease of more than 30 seconds and less than 60 seconds in journey time	Increase or decrease of more than 60 seconds and less than 3 minutes seconds in journey time	Increase or decrease of more than 3 minutes in journey time
Change in pedestrian and cyclist journey time	Increase or decrease of less than 2 minutes	Increase or decrease of more than 2 minutes and less than 5 minutes	Increase or decrease of more than 5 minutes and less than 10 minutes	Increase or decrease of more than 10 minutes
Change in pedestrian and cyclist delay	Increase or decrease of less than 30 seconds	Increase or decrease of more than 30 seconds and less than 60 seconds in journey time	Increase or decrease of more than 60 seconds and less than 3 minutes seconds in journey time	Increase or decrease of more than 3 minutes in journey time
Change in level of accessibility for pedestrians and cyclists	Increase or decrease of less than 2 minutes in journey time	Increase or decrease of more than 2 minutes and less than 5 minutes in journey time; Need to cross quiet road	Increase or decrease of more than 5 minutes and less than 10 minutes in journey time; Need to cross busy road; Closure of one or more points of access to a location	Increase or decrease of more than 10 minutes in journey time; Need to cross busy major road; Closure of all points of access to a location
Change in pedestrian and cyclist amenity	Increase or decrease in road traffic of less than 30%, or less than 10% if location considered sensitive	Increase or decrease in road traffic or HGV's of between 30% and 49%; Slight increase or decrease in width of footway/cycleway	Increase or decrease in road traffic or HGV's of between 50% and 99%; Large increase or decrease in width of footway/cycleway; Closure or opening up of short stretch (<100m long) of footway/cycleway	Increase or decrease in road traffic or HGV's of 100% or more; Closure or opening of long stretch (>100m long) of footway/cycleway

Table 13.1: Significance criteria

Operational assessment

13.30 The transport movements generated by the proposed growth in passenger numbers at the Airport have been derived from forecasts determined by LLAOL. These were based upon flight profiles, road capacity and public transport availability. The LLAOL

forecasting model was originally developed in 2010, validated using 2009 base data for both flight profile and traffic survey data collected in that year. It has been further developed to include staff numbers in 2012 and revalidated using new 2012 traffic survey data. The assumptions underpinning the landside traffic forecasts have been based on:

- Air service development up to 18mppa in 2028. This is from a total LLA demand of 18mppa and a total London short-haul demand of 140mppa
- Natural peak spreading occurs with growth, where as flight activity reaches runway capacity during peak demand times, airlines move their departure time to a non-peak hour, and this is reflected within the benchmark
- A degree of seasonal peak spreading through increased aircraft utilisation in the summer shoulder season and in the winter
- Mode share assumptions (e.g. car, bus, rail etc) consistent with the Airport Surface Access Strategy (ASAS) 2012-2017
- The forecast future airline schedule is intended to represent the typical busy day namely the peak day of an average week in the peak month. For Luton this historically constitutes a typical Friday in August. For Luton the difference between a busy day and a peak day tends to be in load factor rather than the number of flights in the schedule. The output from this stage is a likely profile of arriving and departing passenger movements across each hour of the busy day.
- Converting movements per hour to a viable flight schedule (for passengers, cargo, maintenance and executive aviation) by:
 - Projecting passenger demand by route
 - Making assumptions for the number of aircraft based at LLA
 - Producing a feasible flight schedule

13.31 The basis for the projection is historic Airport data (currently 2001-2010) for aircraft movements by hour on a typical busy day plotted against annual passenger throughputs with arrivals and departures being plotted separately. This is then projected against the future annual passenger forecast. Mode split of trip generation has been directly informed by the ASAS, with targets to:

- Increase the proportion of air passengers travelling to and from the Airport by public transport to more than 40% by 2017
- Reduce the proportion of staff travelling alone by car to and from the Airport.

13.32 The forecast model accommodates the mode-shift from car to other modes and ensures that where additional capacity is required it is incorporated into the forecast traffic (for example more frequent long distance coach/ increased rail-air shuttle service to Luton Parkway Station).

Assessment of cumulative effects

13.33 A review of proposed or possible future third party projects that may have a cumulative effect with the proposals has been carried out to inform the TA and this ES. The schedule of future committed development has been agreed with LBC to

match assumptions made with its own work surrounding the future assessment of M1 J10a. This would represent a worst-case assessment as not all of these developments are currently consented.

- 13.34 Details are provided in Section 10 of the TA, which also includes the particulars of forecast traffic flows and assumptions related to distribution for all committed development.

Baseline conditions

Existing site

- 13.35 The Airport is located on the eastern side of Luton some 4.0 kilometres (2.5 miles) from the town centre. The Airport lies predominantly within the unitary authority of LBC, with small areas lying within Central Bedfordshire Council (CBC) and North Hertfordshire District Council (NHDC). The planning application boundary lies predominantly within LBC. The Airport possesses a single runway, running roughly east to west, with all the Airport facilities found to the north of the runway. Landside access to the terminal is along Airport Way, which passes the Airport's Mid-Term Car Park (MTCP) and beneath a taxiway to feed a Public Transport Hub (PTH), Drop Off Zone (DOZ), taxi rank, Short Term Car Park (STCP) and some staff car parking in the vicinity of the Airport Terminal Building (ATB). These features are shown on figure 3.2 of this ES.
- 13.36 The single carriageway Airport Way link connects with A1081 East Luton Corridor (ELC) and also through to the A505 Vauxhall Way. These connections are managed by a roundabout junction adjacent to the Holiday Inn hotel that also serves access to Percival Way and its adjoining business estate, while offering a route to the Airport's Long-Term Car Parking (LTCP) and Car Hire facilities. The ELC subsequently offers a connection through to the M1 motorway at junction 10 via J10a, while the A505 and subsequent connections link the Airport with other neighbouring areas and beyond to include Luton town centre. These links are shown on figure 2.4 of this ES.
- 13.37 The proposed development would primarily be accessed by way of the A1081 East Luton Corridor (ELC) and the A505 Vauxhall Way route, supplemented by local road connections that link them with the Airport site.

Local road network

- 13.38 The Airport is well connected to the strategic highway network. M1 Junction 10 is only some 4.6 kilometres (2.9 miles) south west from the terminal building, connected via the A1081 ELC, which was completed in 2009 to facilitate growth in this corridor. To the east, the A505 provides connections to the A1 (M), M11 and East Anglia. Local access to the Airport is provided by the A6 to Bedford, A505 to Leighton Buzzard, Hitchin and Letchworth, the A1081 to Harpenden and St Albans and the B653 to Harpenden.
- 13.39 The Central Terminal Area (CTA) of the Airport is effectively a cul-de-sac, with Airport Way entering as a single carriageway road that is currently subject to a 30mph speed limit. The road climbs steadily from its junction with A1081 ELC / Percival Way roundabout, passing through cutting before eventually levelling out at a substantial teardrop feature that was formerly a roundabout. This serves access to a

number of Airport facilitates to include the PTH, public car parking for short term collect and drop off plus areas for staff car parking.

- 13.40 From the terminal the road travels west, passing a simple T-junction serving the MTCP to then connect with the A1081 at the ELC/ Airport Way/ Percival Way roundabout at the Holiday Inn. Percival Way offers access around the west of the airside facilities where it joins to form a roundabout junction with Frank Lester Way and President Way further north. President Way continues eastwards offering a route to the Airport's long term, staff and car hire parking facilities. Frank Lester Way connects to the public highway at a three-arm roundabout with Eaton Green Road. Eaton Green Road then links with the A505 to the south west at Vauxhall Way and more local roads at Wigmore Lane, Tea Green and beyond to the north east.
- 13.41 The connection with Eaton Green Road also provides two potential local routes for connection with the A505 at Stopsley Green Roundabout further north. The first follows Lalleford Road, Crawley Green Road and then Ashcroft Road, while the second follows Wigmore Lane passing the ASDA superstore before crossing Crawley Green Road to then join with Ashcroft Road some 300 metres south east of Stopsley Green. The former is shorter and potentially quicker, although Wigmore Lane is the more direct in terms of its characteristics.

Public transport

Rail services

- 13.42 Access to the national rail network is available at Luton Airport Parkway station. Situated on the Midland Mainline it links St Pancras International with the Midlands with a service schedule that is suited to travel by both air travellers and staff. East Midland Trains (EMT) and First Capital Connect (FCC) both serve the station, with connections to London, the South Coast, the Midlands and the North of England.
- 13.43 FCC operates the station with a rail-air shuttle bus provided to carry passengers between the station and the Airport terminal, with through ticketing available. This is in the form of a bendy-bus service provided by First Group on behalf of FCC. Convenient pick-up and drop-off is available directly outside the station, with a request stop along the route to the north of the Holiday Inn roundabout that allows access to local hotels and other facilities in the vicinity. A 10-minute shuttle service operates between 05:00hrs and midnight, with the schedule extending to connect with all trains calling at Luton Airport Parkway overnight. The journey time to the Airport is approximately 5 minutes each-way with buses benefiting from a dedicated bus lane facility along a substantial part of the eastbound carriageway of the A1081 ELC.
- 13.44 FCC operates the Thameslink franchise and provides direct trains to destinations including: Bedford, St Albans, London St Pancras and Brighton. A summary of these services from Luton Airport Parkway Station is given in table 13.2.

Station	Typical Weekday Frequency	Typical Journey Time
Bedford	4 trains per hour	28 mins
St Albans	6 trains per hour	12 mins
London St Pancras	6 trains per hour	32 mins
Brighton	4 trains per hour	108 mins
Sutton	2 trains per hour	109 mins

Table 13.2: First Capital Connect Service – Key Destinations

Source: Table 4.3 London-Luton Airport Surface Access Strategy 2012-2017

- 13.45 East Midlands Trains provide services between London St Pancras and stations in Yorkshire; some call at Luton Airport Parkway. Key destinations are summarised below, with typical journey times detailed in table 13.3.

Station	Typical Weekday Frequency	Typical Journey Time
Nottingham	1 train per hour	90 mins
Leicester	1 train per hour	60 mins
London St Pancras	1 train per hour	24 mins

Table 13.3: East Midlands Train Services - Key Destinations

Source: Table 4.4 London-Luton Airport Surface Access Strategy 2012-2017

- 13.46 The service to Leicester and Nottingham also allows links with Derby and other stations along the line to include Bedford, Wellingborough, Kettering and Market Harborough. Some passengers can also use the stopping opportunities offered by East Midland Trains at Luton Station, with onward travel to and from the Airport using local buses or taxi.
- 13.47 Chapter 9 of the TA provides details of assumed Airport rail demand by hour for a busy Friday in August 2011. The peak hourly rail demand period has been identified as 08:00-09:00hrs with a total of 678 passengers; 224 inbound to the Airport and 454 outbound. Accepting the time lag to travel between the Airport and the rail station, many of the outbound travellers around this time would share their train journey with other travellers using the line towards London.
- 13.48 One key indicator in terms of the operation of the rail network serving the Airport relates to the capacity of the railway line to London St Pancras. The baseline position at St Pancras is presented in table 4.2 of the London and South East Rail Utilisation Strategy (subsequently referred to here as the RUS) and an extract is reproduced in relation to London St Pancras as table 13.4.
- 13.49 The data presents the capacity and demand baseline for this key route corridor, together with indicators of current overcrowding for each in the morning peak period. The information is based upon on-train loadings measured in autumn 2010 and the anticipation that capacity improvements for peak inbound morning movements to London will satisfy the busiest demand at other times.

		Thameslink MML	MML Long Distance	TOTAL
3 Hour Weekday Morning Peak	Total Capacity	27,900	5,500	33,400
	Total Demand	19,600	4,400	24,000
	Total Demand/ Total Capacity	70%	80%	-
	Overcrowding Indicator	0%	0%	-
Busiest 1 Hour in Morning Peak	Total Capacity	11,700	2,900	14,600
	Total Demand	9,900	2,300	12,200
	Total Demand/ Total Capacity	85%	79%	-
	Overcrowding Indicator	0%	2%	-

Table 13.4: Morning Peak Demand and Capacity (2010) for London St Pancras

Source: Table 4.2 London and South East RUS. Network Rail (July 2011)

- 13.50 The highest base case of outbound Airport passengers travelling during the morning peak demand period in August has been assessed as 454 people. While accepting the differing years, the Airport passenger element would represent only some 4.6% of the total Thameslink demand travelling into St Pancras and therefore a relatively small proportion of the total rail patronage during this busy time. In reality these Airport passengers would divide their journey between travel north and south along the line, with some further sub-division as some passengers could also use the East Midlands Train service for some journeys. An assessment of passenger demographic information by LLAOL has indicated that around 87% would travel south from Luton on the line towards London with the remainder travelling north.
- 13.51 The 2010 RUS figures confirm there is capacity on the line in terms of the 3-hour weekday morning peak, although issues are highlighted in relation to the Midland Mainline for the busiest hour into London. Network Rail is confident that recent and continuing introduction of longer trains on the Thameslink line, with more planned from 2015, will relieve issues of overcrowding.

Bus and coach services

- 13.52 The Airport PTH located adjacent to the terminal is arranged to cater for the wide variety of services that the Airport operations demand with 13 bus stands allocated to specific services and a coach lay-over area. Bus and coach operations are a prominent feature of the hub to serve the need for interchange with this important mode. Alongside coach and bus services, the dedicated CTA PTH accommodates the regular rail-air shuttle and shuttle buses linking with the Airport's long, medium and peripheral staff car parks plus those seeking the car hire facility. Airport employees are encouraged to travel around the Airport site on car park buses and the rail-air shuttle, helping to reduce the need for the private car. The current configuration includes central islands as bus stands, which requires some passengers to cross the path of inbound and outbound buses using marked, at-grade pedestrian crossing to link with the terminal building.
- 13.53 Green Line 757 provides an express coach link between the Airport and Central London, while easyBus offers a high frequency, low cost express bus service between Central London and the Airport. easyBus coaches run 24-hours a day between the Airport and Central London, with stops at Brent Cross, Finchley Road, Baker Street, Oxford Street/ Marble Arch and London Victoria. The easyBus airport

coaches and bus service are run as a commercial partnership with Greenline coaches so buses are both easyBus/ Greenline branded.

- 13.54 National Express services serve destinations across the UK to include major cities and airports. Direct services from LLA include Service 707 to Northampton, Service 737 to High Wycombe and Oxford, Service 767 to Leicester and Nottingham, Service 777 to Coventry, Birmingham and Wolverhampton and Service 787 to Cambridge. Many of these call at the recently opened Milton Keynes Coachway. Regular direct services are also provided to Stansted, Heathrow and Gatwick Airports, while Stagecoach Route 99 operates an hourly express service seven days per week between the Airport and Milton Keynes. The range and frequency of these coach services is shown in table 13.5.

Operator	Destination	Typical Weekday Frequency	Typical Journey Time (Minutes)
Green Line/ easyBus	Central London	59 Services	80
Stagecoach	Milton Keynes	16 Services	45
National Express	Northampton	9 Services	75
National Express	Cambridge	9 Services	95
National Express	Oxford	8 Services	120
National Express	High Wycombe	8 Services	75
National Express	Leicester	9 Services	110
National Express	Nottingham	9 Services	145
National Express	Birmingham	11 Services	150
National Express	Coventry	11 Services	100
National Express	Stansted Airport	26 Services	90
National Express	Heathrow Airport	19 Services	65
National Express	Gatwick Airport	11 Services	145

Table 13.5: Typical Approximate Journey Times to Major Destinations

Source: Table 4.1 London-Luton Airport Surface Access Strategy 2012-2017

- 13.55 Frequent local bus services are operated by Arriva (see table 13.6) offering direct access to Luton town centre, Aylesbury, Dunstable, Hitchin, Stevenage, Watford, St Albans and Harpenden.

Route	Key Towns Served	Operating Days	Peak Weekday Route Frequency
61	Aylesbury, Dunstable, Luton	Mon-Sat	60 mins
100	Hitchin, Stevenage, Luton	Mon-Sat	60 mins
321, 521	Watford, St Albans, Harpenden, Luton	Mon-Sun	30 mins

Table 13.6: Local Bus Services

Source: Table 4.2 London-Luton Airport Surface Access Strategy 2012-2017

- 13.56 Centrebus provides other local bus services to Colwell Rise, Stopsley, Stevenage and Luton via Eaton Green Road, near the Airport⁴. These are mainly used by staff as an alternative to the more strategic routes that focus on the terminal building. Centrebus also provides services from Luton town centre offering access to

⁴ Source: <http://lutonbus.com/bustimes.aspx> taken from LLA Surface Access Strategy 2012-2017

Wigmore, Slip End, Markyate and Hemel Hempstead by interchanging with a route that travels between the Airport and the town centre⁵. Additional local connections are available from Luton Airport Parkway to Hatfield, Stevenage and Capability Green.

- 13.57 Most bus and coach routes operate on a daily basis, although local bus routes 61 and 100 do not run on Sundays⁶. Service frequencies tend to be similar on all days, although route 321 to Watford has a reduced frequency on a Sunday⁷. Service spans are also broadly similar each day, although some routes offer additional services around midnight on Sunday night/ Monday morning.
- 13.58 A survey of bus and coach passengers taken on Friday 24 August 2012 has confirmed the number of passengers boarding and alighting from each service and any that remained on the vehicles as through passengers. Details by hour are reported in chapter 9 of the TA. This confirms that between 04:00-09:00hrs 567 passengers per hour arrived at the Airport terminal by bus and coach with 272 departing. The highest time period for arrivals at the Airport was recorded between 05:00-06:00hrs with most boarding to leave in the hour that followed. The highest number of arrivals occurred at a time when bus and coach services were less plentiful than later in the survey period, which is also true of the 04:00-05:00hrs period.
- 13.59 The survey also recorded occupancy information for Airport car park and Luton Airport Parkway Station shuttle services. On average the Luton Airport Parkway Shuttle service delivered around 129 people per hour to the Airport balanced by 69 people leaving; an average occupancy of 24 and 15 passengers per vehicle, respectively. The Airport's own shuttle services returned similar values with the LTCP shuttle delivering about 25 passengers per bus to the terminal, although returning with only about two at this time of day. Inbound patronage on the Car Hire shuttle was less with an average occupancy of 14 although returning is slightly higher with an average per vehicle of six. An average of 16 passengers per vehicle alighted from the mid term shuttle bus with an average of three travelling back to the car park.

Pedestrian and cycle

- 13.60 Walking is an option for some passengers, especially those lodging in the nearby Ibis Hotel or Holiday Inn, and a footway enclosed by pedestrian guard railing is offered on the north side of Airport Way leading up to the CTA to facilitate this and other journeys on foot. A section of footway is also available to link the Holiday Inn roundabout with a bus stop on the southern side of the road to the north, but otherwise there is no footway provision along this section.
- 13.61 The opportunity is also available to walk for some staff living locally or those moving between the CTA and airport related facilities on the nearby Percival Way employment area, although Airport buses can be used for part of the journey. Footways are provided along each side of the carriageway through the employment area. Airport Way between the Holiday Inn roundabout and A505 Vauxhall Way features a continuous footway along its northern flank. The same is true for A1081 ELC on the immediate approach to the Holiday Inn roundabout, where the facility is

⁵ Source: <http://lutonbus.com/bustimes.aspx> taken from LLA Surface Access Strategy 2012-2017

⁶ Source: [http://www.arrivabus.co.uk/ServiceSearchResults.aspx?regid=1737&txt=Luton Airport](http://www.arrivabus.co.uk/ServiceSearchResults.aspx?regid=1737&txt=Luton+Airport) taken from LLA Surface Access Strategy 2012-2017

⁷ Source: <http://www.arrivabus.co.uk/serviceinformation.aspx?id=12755> taken from LLA Surface Access Strategy 2012-2017

shared with cyclists. Footways and zebra crossing facilities, supplemented by pedestrian guard railing where appropriate, channel pedestrian movements along suitable routes to the various facilities required at the CTA.

- 13.62 The A505 Vauxhall Way has been designed to function as a traffic corridor, with no direct frontage development. A footway along its western flank is provided for movement between Kimpton Road and Harrowden Road although for the remainder, a feature of the design is that footways are largely absent along its length, except in the vicinity of highway junctions where provision is made to link with the adjoining side-road footway network. A footbridge is provided to cross the A505 connecting Turners Road north with south, with another provided immediately north of Eaton Green Road/ Harrowden Road to aid crossing movements. Two other footbridges are found in association with the former Vauxhall Motors' car park to link directly across to the works site.
- 13.63 While unlikely to be an option for most passengers, cycling is a mode available for employees and a network of on-and off-road cycle routes and facilities that connect the Airport with the surrounding town and beyond. The routes currently available are published by LBC in its Luton Area Cycle Network Map (figure 13.1).
- 13.64 At the Holiday Inn roundabout cycle signs and markings identify the off-road facilities available with proposals identified by LBC to include a traffic free route alongside Airport Way between the Holiday Inn and A505 Vauxhall Road. A similar route is shown to travel from Gipsy Lane Traffic Signals alongside the northern carriageway of A1081 ELC to then drop down to the A505 Vauxhall Way/ Kimpton Road roundabout beneath. This facility also enables connection with NCR6.

Road safety

- 13.65 Personal injury data has been obtained from LBC for the main corridor routes serving the Airport for the most recent 3-year period 1 January 2009 to 31 December 2011. The records show an overall total of 84 collisions over the 3-year study period, with numbers falling since 2009. Nearly 90% were recorded as slight injury collisions, with less than 10% as serious and one recorded fatality. From these collisions 105 personal injuries were confirmed, with the proportions in terms of severity almost matching those for the collision record. These data verify an average of 28 collisions per year for the 3-year study period, with an average casualty rate of 1.25 casualties per collision.
- 13.66 The records show that the number of reported collisions within the study area has been gradually falling over the years. In terms of personal injury most resulted in slight casualties, with vehicle drivers at most risk followed by their passengers. Very few collisions involved pedestrians although this was not the case for the one recorded fatality. June and September were the most eventful in terms of the potential for collisions, with most occurring on a weekday, around the morning peak and during late afternoon and early evening. Most occur at junctions during daylight hours and in dry road conditions, fine weather and without evidence of strong winds. Collisions at junctions are most common and in particular at roundabouts. In this respect the M1 J10A attracted particular attention, while the section of the A505 route passing through the study area headed the list in terms of the overall number of collisions. Driver error was reported as the main causal factor, especially at roundabouts, followed by careless driving and then by a variety of reasons involving anti-social driver actions or driver inexperience.
- 13.67 While chapter 6 of the TA confirms June and September among the busier months at the Airport it is worth noting that the AM Airport peak for traffic occurs much

earlier than the usual morning highway peak when the network is less congested. There is however, less variation in terms of Airport traffic during the periods either side of the highway PM peak and early evening peak.

Traffic flows

- 13.68 To determine the traffic flows on the highway network on the main approach routes to the Airport, a series of traffic counts were undertaken at key junctions within the study area where the potential for material impact as a result of passenger throughput at 18mppa has been identified. The assessment focuses on the A1081 ELC approach from and including M1 Junction 10a and the A505 approach entering Luton from the A1(M), to include its connection with the A1081. The survey regime included the local network serving the employment area surrounding Percival Way and the adjoining Eaton Green Road. The junction counts recorded full classified turning movements between the hours of 04:00 until 19:00hrs on Friday 9 March 2012.
- 13.69 Traffic counts information surrounding M1J10a and the A1081 ELC link to Gipsy Lane traffic signals was collated from independent work in support of Luton Borough Council's assessment of J10a improvement works discussed later in this chapter.
- 13.70 The classified junction counts were supplemented by Automatic Traffic Counts (ATC) to monitor link flows. With one exception these data were continuously recorded between Sunday 4 and Saturday 10 March 2012 to coincide with the manual classified count (MCC) survey data and broaden the detail in terms of daily and weekly traffic patterns. The exception was at ATC Site 8 A505 Beech Hill, which was in place 9 - 15 March 2012.
- 13.71 In addition ATC data from a permanent count located between the Holiday Inn roundabout and the MTCP along Airport Way was interrogated to provide data across the whole of 2011 and to supplement the March 2012 surveys. Finally Automatic Number Plate Recognition cameras (ANPR) were installed to record and match traffic movements at selected locations to identify traffic distribution surrounding the Airport, while also providing information on existing journey times. The locations of the various traffic count locations are included as figure 13.2 with the full survey results set out in detail within the TA. The modelled study area is shown in figure 13.3.
- 13.72 The traffic flows presented in table 13.7 show Annual Average Daily Traffic (AADT) base year, committed development and future year 2028. The table also includes forecast 2028 future base year traffic both with and without committed development traffic; these future base year flows exclude anticipated Airport growth. Committed development traffic is also identified separately for each link. The 2028 baseline with committed development scenario is referenced in the TA as Scenario B and reflects the future year position without Airport development. The traffic flows are 24hr Average Daily Totals (7-Days) with Scenario B providing a 'Comparator' or 'Reference Case' set of future traffic flows against which to compare the current or base flows. The reference in the first column refers to the junction number and approach link convention used for identification in the TA.

Ref		Approach Link	2012 Base	2028 Future Base	Committed Development	Ref Case (Scenario B)
3	A	Airport Way (W)	17,929	21,627	0	21,627
	B	Airport Way (E)	17,263	20,825	0	20,825
	C	Mid Term CP	2,033	2,450	0	2,450
4	A	Percival Way	10,059	12,126	0	12,126
	B	Terminal Approach Road	18,023	21,741	0	21,741
	C	A1081 Airport Way - ELC	17,591	21,216	0	21,216
	D	Old Airport Way	7,504	9,050	0	9,050
5	A	A505 Vauxhall Way	25,267	30,457	3,012	33,469
	C	Airport Way ELC Spur	17,741	21,386	5,637	27,023
	D	A505 Kimpton Rd	12,196	14,704	5,498	20,202
6	A	A505 Vauxhall Way (N)	19,953	24,055	2,733	26,788
	B	Eaton Green Rd	14,217	17,139	1,894	19,033
	C	CP Entry/Exit	814	982	0	982
	E	Harrowden Rd	816	984	0	984
7	B	Eaton Green Rd (E)	17,351	20,914	1,506	22,420
	C	Airport Approach Rd	12,986	15,657	0	15,657
8	B	President Way	4,631	5,584	0	5,584
	C	Airport Approach (E)	606	730	0	730
	D	Percival Way	10,088	12,163	0	12,163
9	A	A505 Vauxhall Way (N)	21,630	26,074	2,438	28,512
	B	Crawley Green Rd (W)	16,168	19,483	0	19,483
	D	Crawley Green Rd (E)	15,954	19,228	690	19,918
10	A	A505 Stopsley Way	41,425	49,937	3,246	53,183
	C	A5228 Hitchin Rd	33,273	40,108	808	40,916
11	A	A505 Hitchin Rd	25,165	30,339	3,467	33,806
	B	Ashcroft Rd	16,095	19,397	147	19,544
	D	Hitchin Rd	5,595	6,742	0	6,742
	E	Petrol Station Exit	1,109	1,338	0	1,338
12	A	Wigmore Lane	12,696	15,300	849	16,149
	B	Wigmore Place	1,335	1,608	0	1,608
	C	Eaton Green Rd (E)	8,038	9,686	473	10,159

Table 13.7: Base, Committed Development and Reference Case Flows (24hr AADT)

13.73 The baseline survey data for 2012 highlights the attractiveness of the A1081 ELC and A505 corridors for journeys involving this sector of Luton. Highest flows are reported for the A505 Stopsley Way, while the A5228 Hitchin Road into Luton was also highlighted as a popular route that caters for traffic volumes broadly equivalent to the remainder of the A505. Outside these main corridors Eaton Green Road, Crawley Green Road, Ashcroft Road and Wigmore Lane also make a significant contribution to carry local traffic in the area.

13.74 Site 4 provides details of flows for the Holiday Inn roundabout that serves the more immediate Airport access roads and highlights the relative appeal of both the Terminal Approach road and the A1081 ELC for traffic in this area. While the volumes for Percival Way leading through to the adjacent employment area and

Airport Way linking with the A505 are lower, they contribute to the demand to the Holiday Inn roundabout, which is an important junction in the Airport context.

- 13.75 When the forecast 2028 future year base figures are examined they reveal the influence of background traffic growth over the intervening years, which is predicted to add 20 to 21% to existing flows through natural growth. The cumulative impact is forecast to have most impact along this A505 corridor including the A505 Kimpton Road. The influence is far less on other areas of the local network. The main impact from committed development would be encountered during the AM and PM peak highway hours.

Assessment of potential impacts

Rail network

- 13.76 The LLAOL forecasting model has been used to predict future additional rail patronage for a 'busy' August peak period in 2028, assuming the ASAS mode split assumptions (see figure 13.4).
- 13.77 The forecasts indicate the potential for an overall increase of 7,020 two-way rail trips by Airport passengers during the course of a busy day in 2028, with the period 08:00-09:00hrs representing the highest period of additional demand in the morning and 17:00-18:00hrs in the evening. The additional contribution would lead to more passengers passing through the station and waiting on platforms plus the extra demand for space on the train itself.
- 13.78 During the period 08:00-09:00hrs, which represents the highest hour for Airport related travellers, at a value of 454 outbound passengers and assuming that they all travelled towards London they would represent only 4.6% of the total Thameslink demand and would form only a minor proportion of the total rail patronage during this busy time. In reality these Airport passengers would sub-divide their journey between travel north and south along the line, with some further sub-division as some passengers could also use the East Midlands Train service for some journeys. The baseline 2010 figures confirm capacity on the line in terms of the 3-hour weekday morning peak, although issues are evident in relation to Midland Mainline trains for the busiest hour into London. The impact in this case has been assessed as minor adverse.

Bus and coach network

- 13.79 The results of adding forecast additional patronage to the baseline bus and coach services assuming the present mode share at 32.5% and the ASAS assumptions of 40% are provided as tables 56 and 57 within chapter 11 the TA. The results indicate that despite the assumed increase in passenger numbers under both scenarios the majority of the services would still maintain the ability to cater for predicted demand based on existing frequencies and service levels. The exceptions involve two National Express Services 422 and 737 where the calculated maximum loading is over 100%. The impact in these cases has been categorised as minor (+10-20%) and moderate (+20-30%) respectively assuming current mode share at 18mppa moving to major (+30%) in both cases when the ASAS 40% mode share figure is applied.

Road network

- 13.80 In terms of AADT the forecast of a 20-21% increase in background traffic flows between the base and future base case 2028 fall below the IEMA guidance of 30% for assessment. The same is true when committed development traffic is added to form the 2028 Reference case. More specific environmental impacts do emerge when the highway peak hours are examined. These are highlighted in chapter 6 of the TA, which examines existing peak hour issues and chapter 7 of the TA, which examines the 2028 Scenario B Reference Case plus the 2028 case with Airport Growth (Scenario D) in terms of link capacities and junction performance in detail.
- 13.81 The detailed network assessment has been drawn primarily from outputs derived from two VISSIM micro-simulation models. The VISSIM micro-simulation model is a visual tool that is able to simulate the behaviour of individual vehicles within a predefined road network and predict the likely impact of changes in traffic patterns in response to variations in traffic flow or from alterations to the road environment. It is particularly useful when modelling congested road networks as it is able to simulate queuing conditions and is therefore very useful to inform analysis of traffic operations in urban areas where junctions are very likely to interact with each other.
- 13.82 It was agreed with LBC that impacts should be informed by the council's own model that has been used to justify improvements surrounding M1 J10a and that covers the A1081 ELC to include Gipsy Lane traffic signals. This is referenced in the TA as the LBC model. The LLAOL VISSIM model supplements this with focus on the network serving more immediate access to the Airport. The study area also extends to include analysis of other junctions outside the VISSIM model boundaries confirmed by figure 13.3. Details of the various models and junction testing are detailed in the TA.
- 13.83 Chapter 6 of the TA confirms that the M1 J10a is already known as a junction under severe stress in both the AM and PM network peak hours. A baseline assessment of the junction undertaken by LBC and based on surveys carried out in 2008/ 09 has confirmed that the junction is already over its capacity of 5,000 vehicles, with a pattern of queuing on all approach arms that confirm the need to satisfy additional demand. In response LBC is promoting a major junction solution to address future growth, which includes the schedule of committed development in the area and the expansion of the Airport. There is a high level of confidence that the improvements will be delivered and the proposed improvement has therefore been included as a committed scheme in the 2028 Reference Case and when assessing the Airport impacts.
- 13.84 The TA also reports traffic queues tailing back on the southern approach to the A505 Vauxhall Way / Kimpton Road roundabout junction towards the Airport Way flyover between 16:00 and 18:00hrs. These are generally 130 metres in length but on occasions up to 300 metres, although queues on the other approaches were much less at between 0 and 45 metres. Further assessment has shown that the A505 Vauxhall Way link between the roundabout and Eaton Green Road to the north is also a link that is over capacity during the AM (southbound) and PM (northbound) highway peak hours and as a consequence could experience flow breakdown on occasions with increased journey times relative to free flow conditions. The current operation of the junction indicates the potential need for future improvement.
- 13.85 A comparison between the 2028 Scenario B Reference Case link flows and future conditions with assumed new Airport traffic is presented in figure 13.5. The

percentage change has been used to inform an assessment of the impact of change at each location using the following scale that reflect the overall assessment of transport impacts for this ES:

- 0% No Change
- 1%+ Negligible
- 10%+ Minor
- 20%+ Moderate
- 30%+ Major.

- 13.86 The major impact identified with proposed development at the Airport would be evident on links approaching the MTCP access junction (Junction 3) plus those serving the adjoining Holiday Inn roundabout (Junction 4). Major impact would also be expected for the main route travelling through the Percival Way employment area between the Holiday Inn roundabout and Eaton Green Road that incorporates the Percival Way, Presidents Way and Frank Lester Way corridor. At all other junctions the impact is considered to be; minor, negligible or no change.
- 13.87 Minor impacts relative to the Reference Case are predicted for the links serving the A505 Vauxhall Way north of Eaton Green Road and Crawley Green Road plus the A505 Kimpton Road. Eaton Green Road is also predicted to attract a minor impact, both on the approach to the A505 and approaching Frank Lester Way roundabout. Eaton Green Road east of its junction with Wigmore Lane falls into the same category, as does Wigmore Lane itself approaching the same junction.
- 13.88 In terms of daily traffic, the impact is significantly higher during the earlier morning peak hours of 04:00hrs to 06:00hrs when compared with the Reference Case. Two peak AM hours are therefore provided in figure 13.6: 05:00 to 06:00hrs, and the busiest hour in terms of non-airport traffic, i.e. 08:00 to 09:00hrs. The busiest PM peak hour for both airport and non-airport traffic is between 17:00 and 18:00hrs to allow comparison between the Reference Case (B) and Development Scenario (D).
- 13.89 The most significant impact on the network occurs during the early morning period 05:00 to 06:00hrs where the flow increases have been assessed as major across all junctions within the LLAOL VISSIM study area. Queues dissipate at most junctions during the hour/s that follow before the main highway peak from 08:00 to 09:00hrs, although the additional traffic at the junction of Percival Way/ Frank Lester Way is still categorised as still assessed as a major impact. With the Holiday Inn is noted as moderate while all others fall into one moderate but mainly negligible or no change categories. In the PM peak the junctions at the MTCP access, Holiday Inn and Percival Way / Frank Lester Way junctions are forecast as major impact, with the remainder assessed as either a minor or negligible impact.
- 13.90 A comparison of peak hour flows for the A1081 ELC to the west of Gipsy Lane taken from the LBC model for the AM and PM peak hours i.e. 08:00 to 09:00hrs and 17:00 to 18:00hrs respectively, show a significant increase along the key sections of the route in both directions based on the LBC inputs to its VISSIM model (figure 13.7). In both the AM and PM peaks the main impact was assessed as major for some sections of the A1081 Airport Way and moderate for others, with the exception of a minor impact at M1 J10a during the PM peak. The assessment reflects the tidal nature of traffic flows along this corridor. The impact at M1 J10 has been assessed as moderate during both peak hours.
- 13.91 The Airport modelled flows in the LBC model are higher than the flows incorporated into the LLAOL model as the LBC model assumed Airport growth at 21mppa (see

table 13.8 below) for robustness. As has been concluded in the TA, the scheme at J10A is therefore deemed sufficiently robust to mitigate the impact of traffic generated by the Airport.

Operator	Hourly Period	LBC Flows (vehs)	LLAOL Flow (vehs)
To Airport (eastbound)	AM 08:00 – 09:00	525	243
	PM 17:00 – 18:00	716	387
From Airport (westbound)	AM 08:00 – 09:00	553	170
	PM 17:00 – 18:00	617	545

Table 13.8: Comparison of modelled traffic flows

Network congestion

13.92 Chapter 13 of the TA outlines the results of the 2028 Reference Case network assessment to confirm that the emerging capacity issues identified for the baseline position at the A505 Vauxhall Way / Kimpton Road junction would become a key network constraint by 2028 due to the impact of background traffic growth and committed development. Left unresolved the impact has been assessed as **major**. The 2028 Reference Case was therefore tested to include a revised junction arrangement controlled by traffic signals in conjunction with additional lane capacity on the A505 to satisfy forecast traffic demand. The mitigation addressed the junction capacity issues and was assumed to be linked with delivery of the committed development prior to testing the network impact with assumed additional Airport traffic.

13.93 As a further measure of impact, junction capacity measured in terms of the demand (traffic) placed on the network against the capacity of the entry link of the junction, was used to review those parts of the network that fell outside the limits of the VISSIM modelled network. These individual tests were carried out at junctions along the A505 (Vauxhall Way and Stopsley Way) and the A5228 (Hitchin Road) beyond the A505/ Eaton Green Road junction. These are all roundabout junctions and were modelled using ARCADY software. A RFC (ratio of flow to capacity) of 0.85 is accepted as a junction functioning within its operational capacity, while a value in excess of 1.0 means that the capacity of the junction has been exceeded and long queues are likely to form at the junction. The outcome is shown in table 13.9.

SCENARIO B - 2028 Future Year Background Traffic + Committed Development					
Site	JUNCTION LOCATION	AM			PM
		06:00-07:00	07:00-08:00	08:00-09:00	17:00-18:00
9	A505 Vauxhall Way/ Crawley Green Rd/ Harrowden Rd	<1.0	1.46	1.57	1.23
10	A505 Vauxhall Way/ A5228 Hitchin Rd/ A505 Stopsley Way	<1.0	1.08	1.17	1.28
11	A505 Stopsley Way/ A505 Hitchin Rd/ Ashcroft Road	<1.0	1.38	1.62	1.21
12	Eaton Green Road/ Wigmore Lane/ Wigmore Place	<1.0	<1.0	1.07	1.19
SCENARIO D – Background + Airport Growth + Committed Development (2028)					
Site	JUNCTION LOCATION	AM			PM
		06:00-07:00	07:00-08:00	08:00-09:00	17:00-18:00
9	A505 Vauxhall Way/ Crawley Green Rd/ Harrowden Rd	<1.0	1.49	1.63	1.35
10	A505 Vauxhall Way/ A5228 Hitchin Rd/ A505 Stopsley Way	<1.0	1.15	1.29	1.32
11	A505 Stopsley Way/ A505 Hitchin Rd/ Ashcroft Road	<1.0	1.59	1.67	1.27
12	Eaton Green Road/ Wigmore Lane/ Wigmore Place	<1.0	<1.0	1.28	1.51
Relative Change in RFC Values					
Site	JUNCTION LOCATION	AM			PM
		06:00-07:00	07:00-08:00	08:00-09:00	17:00-18:00
9	A505 Vauxhall Way/ Crawley Green Rd/ Harrowden Rd	-	0.03	0.06	0.12
10	A505 Vauxhall Way/ A5228 Hitchin Rd/ A505 Stopsley Way	-	0.07	0.12	0.04
11	A505 Stopsley Way/ A505 Hitchin Rd/ Ashcroft Road	-	0.21	0.05	0.06
12	Eaton Green Road/ Wigmore Lane/ Wigmore Place	-	-	0.21	0.32

Table 13.9: Network Capacity at Non-VISSIM network roundabout junctions

KEY	% Change	Scale of Impact
	0%	No change
	1%+	Negligible
	10%+	Minor
	20%+	Moderate
	30%+	Major

13.94 The results forecast over capacity issues at all four of the junctions tested, both in the Scenario B Reference Case and Scenario D with forecast Airport generated traffic. The critical links involved at each were:

- Vauxhall Way/ Crawley Green Road – Vauxhall Way North and Crawley Green Road Eastern approach (AM). A505 Vauxhall Way South and both Eastern and Western approaches Crawley Green Road (PM).
- Vauxhall Way/ Stopsley Way – A505 Stopsley Way and A5228 Hitchin Road approach (AM). A505 Vauxhall Way and A5228 Hitchin Road (PM).
- Stopsley Way/ Hitchin Road/ Ashcroft Road - Ashcroft Road and A505 Hitchin Road North approach (AM). A505 Stopsley Way and Ashcroft Road approach (PM).

- Eaton Green Road/ Wigmore Road - Eaton Green Road Eastern Approach (AM).
Eaton Green Road Western Approach (PM).

- 13.95 Overall the assessment of the Reference Case indicates that the impact would be **major** at all the junctions tested in this case, with RFC values above 1.0. The situation does not change when additional Airport traffic is added.
- 13.96 The largest incremental impact through additional Airport traffic is at the Eaton Green Road / Wigmore Road Roundabout where the RFC rises from 1.19 to 1.51 in the PM peak to indicate a relative increase of 0.32. This would result in the potential for traffic to be added to Reference Case queues with additional delay at the junction when the two scenarios are compared. The impact in this case is therefore considered to be **major**. A relative rise by 0.21 is also recorded at the A505 Stopsley Way/ Hitchin Road roundabout in the AM peak, which would again lead to additional traffic joining the Reference Case queues. In this situation the impact assessed as moderate.
- 13.97 Data from the LBC VISSIM model provides the basis for potential impact on M1 J10a. A summary to follow the same format is provided in table 13.10 as a guide to the predicted Airport traffic impact. The table also identifies the forecast additional Airport traffic associated with 18 mppa in a separate column for comparison.

Junction	Time Period		All Traffic	Airport Growth (Vehs)	Airport %
	From	To			
M1 Junction 10A	05:00	06:00	3,451	+1,683	49%
	08:00	09:00	8,983	+367	4%
	17:00	18:00	10,712	+894	8%

Table 13.10: Scenario D - M1 J10A Throughput and Airport Contribution 18mppa 2028

- 13.98 While the very early morning additional Airport demand accounts for 49% of the total junction throughput the impact is much less when the highway peak hours of 08:00-09:00hrs and 17:00-18:00hrs are compared, during which time the Airport accounts for only 4% and 8% respectively. Importantly the total vehicle throughput predicted at the junction in each of these peak highway hours is at least 260% greater than during the 05:00-06:00hrs period to provide confidence that the revised J10a design should be more than capable of accommodating future Airport traffic in an 18mppa scenario. The impact of Airport traffic is therefore considered to be **minor** during the period when the junction is likely to be under most pressure.
- 13.99 A summary of local junction throughput that includes background and committed development except Century Park and forecast Airport traffic by 2028 is provided in table 13.11. This provides a guide to the predicted Airport traffic impact. The table also identifies the forecast additional Airport traffic associated with 18mppa in a separate column for comparison.

JUNCTION		Time Period		All Traffic	Airport Growth (Vehs)	Airport %
		From	To			
3	Mid Term Car Park Access	05:00	06:00	4,222	+2,433	58%
		08:00	09:00	1,284	-39	-3%
		17:00	18:00	2,177	+1,174	54%
4	A1081 ELC/ Airport Way/ Percival Way – (Holiday Inn Junction)	05:00	06:00	4,587	+2,627	57%
		08:00	09:00	2,953	+593	20%
		17:00	18:00	3,692	+1,609	44%
5	A505 / Vauxhall Way/ Kimpton Rd/ Airport Way Roundabout	05:00	06:00	1,867	+653	35%
		08:00	09:00	3,937	+129	3%
		17:00	18:00	4,688	+428	9%
6	Percival Way/ Frank Lester Way Roundabout	05:00	06:00	1,839	+582	32%
		08:00	09:00	3,500	+140	4%
		17:00	18:00	3,961	+265	7%
7	Eaton Green Road/ Frank Lester Way Roundabout	05:00	06:00	1,111	+507	46%
		08:00	09:00	2,804	+445	16%
		17:00	18:00	3,066	+606	20%
8	A505 Vauxhall Way/ Eaton Green Road/ Harrowden Road Roundabout	05:00	06:00	1,118	+614	55%
		08:00	09:00	2,422	+762	31%
		17:00	18:00	2,288	+797	35%
9	A505 Vauxhall Way/ Crawley Green Road Roundabout	05:00	06:00	1,647	+582	35%
		08:00	09:00	4,085	+140	3%
		17:00	18:00	4,486	+265	6%
10	A505 Vauxhall Way/ Stopsley Way/ A5228 Hitchin Road Roundabout	05:00	06:00	1,624	+582	36%
		08:00	09:00	4,797	+140	3%
		17:00	18:00	4,857	+265	5%
11	A505 Stopsley Way/ A505 Hitchin Rd/ Ashcroft Way – Stopsley Green Roundabout	05:00	06:00	1,043	+295	28%
		08:00	09:00	4,823	+98	2%
		17:00	18:00	4,812	+177	4%
12	Eaton Green Rd/ Wigmore Lane/ Wigmore Place Roundabout	05:00	06:00	578	+173	30%
		08:00	09:00	2,348	+300	13%
		17:00	18:00	2,883	+442	15%

Table 13.11: Future Local Junction Throughput and Airport Contribution 18mppa 2028

13.100 In term of the highway peak hours and influence on highway junctions the relative contribution to junction throughput made by the forecast additional Airport traffic is below 10%. There are a number of exceptions, which include the junctions at the Holiday Inn (4), Eaton Green Road/ Frank Lester Way (7), A505 Vauxhall Way/ Eaton Green Road/ Harrowden Road (8) and to a lesser degree A505 Stopsley Way/ Hitchin Road/ Ashcroft Way (12).

13.101 At the time of busiest forecast Airport demand (05:00-06:00 hrs) the Airport contribution across all junctions is relatively higher, although with the notable exception of the Holiday Inn junction and at the MTCP junction close to the Airport, the total junction throughput is significantly lower than highway peak hours. As a consequence the Airport contribution during this very early morning period is relatively much higher.

Accidents

13.102 An accident analysis of the 3-year accident records for 2009-2011 undertaken as part of the TA revealed an overall total of 84 collisions, with numbers falling since 2009. Nearly 90% were recorded as Slight injury collisions, with less than 10% as Serious and one recorded fatality. From these collisions 105 personal injuries were confirmed, with the proportions in terms of severity almost matching those for the collision record. These data verify an average of 28 collisions per year for the 3-year study period, with an average casualty rate of 1.25 casualties per collision.

13.103 There is potential for an increase of an additional 8 collisions per year assuming the Reference Case growth in traffic on the network with a further 7 collisions with the additional Airport traffic added. Across the network as a whole and given other factors involved such as weather conditions and improvements to vehicle safety this would be a negligible increase that cannot be mitigated for. The impact is therefore considered to be negligible adverse.

Receptors

13.104 The following are identified as potential areas of impact and considered to be part of the EIA process.

- Severance
- Driver delay
- Pedestrian delay
- Pedestrian amenity
- Collisions & safety
- Hazardous loads
- Dust & dirt.

13.105 These are considered for construction (combined) and operation.

Construction

13.106 The construction of the proposed development will generate increases in vehicle movements on the highway in the vicinity of the site, particularly heavy goods vehicles. Potential impacts that may arise include:

- Temporary disruption to road users from vehicles travelling to/ from the site
- Temporary disruption to pedestrians and cyclists from vehicles going to/ from the site
- Temporary reduction in amenity for pedestrians and cyclists.

13.107 Chapter 3 of the ES summarises the construction programme. This is forecast to be implemented over a period until the end of 2026. As the site can be accessed from the A505 and A1081 roads, it is anticipated that it would be inappropriate for HGV movements to route through adjoining residential areas of Luton, or use local routes for any significant length, and if this were to occur, a minor impact may be experienced.

13.108 To minimise the impact of construction vehicles accessing the site:

- All construction traffic entering and leaving the site will be closely controlled. Vehicles making deliveries to the site or removing spoil will travel via designated routes, which will be agreed with relevant bodies including LBC, CBC, HCC and

the HA. These routes will be selected to avoid residential and other sensitive area wherever practicable

- Deliveries will be phased and controlled on a just-in-time basis, all being clearly marked to show their destination. This will minimise travel time around the site and any associated noise. All vehicles will use rubber tyres wherever practicable
- Wheel/ body washing facilities will be provided on site, and used as necessary
- Road sweeping facilities will be provided on site and readily available as necessary
- Vehicles carrying waste material off-site will be sheeted, as necessary.

Severance

13.109 The Manual of Environment Appraisal (MEA) sets out a range of indicators for determining the significance of the relief from severance. Changes in traffic of 30%, 60% and 90% are regarded as producing 'slight', 'moderate' and 'substantial' changes respectively. Changes of this magnitude that could be experienced are highlighted in table 13.12.

Ref		Junction and Link	2028 Ref Case (Scenario B)*	2028 With New Airport Traffic (Scenario D)*	Diff	% Change	Impact
3	A	Airport Way (W)	21,627	33,472	11,845	54.77%	Slight
	B	Airport Way (E)	20,825	30,735	9,910	47.59%	Slight
	C	Mid Term CP	2,450	3,420	970	39.59%	Slight
4	A	Percival Way	12,126	18,124	5,998	49.46%	Slight
	B	Terminal Approach Road	21,741	34,033	12,292	56.54%	Slight
	C	A1081 Airport Way - ELC	21,216	31,693	10,477	49.38%	Slight
	D	Old Airport Way	9,050	13,304	4,254	47.01%	Slight
7	C	Airport Approach Rd	15,657	22,254	6,597	42.13%	Slight
8	B	President Way	5,584	8,251	2,667	47.76%	Slight
	C	Airport Approach (E)	730	1,496	766	104.93%	Major
	D	Percival Way	12,163	18,401	6,238	51.29%	Slight
* Excludes Century Park committed development							
Table 13.12: Magnitude of Severance							

13.110 The Frank Lester Way link - Airport Approach (E) indicates that the impact could be substantial when related to the Reference Case. The other links shown fall within the 30-60% category and as a consequence the impact in terms of severance in these instances is forecast to be slight. In all other cases the impact would be considered relatively minor.

Driver delay

13.111 At Junction 10A, the scheduled improvements to provide grade-separation means that A1081 Airport Way runs unimpeded through the junction, unless tailbacks down the two off-slips reach the main line. At the northern roundabout, modelled average queues are predicted to be very slight in the AM peak period 08:00-09:00hrs, with the highest being 13 vehicles on the Airport Way westbound off-slip approaching the northern roundabout. Modelled maximum queues on each of the three approaches to the northern roundabout peaked at 120 vehicles, which in the case of the eastbound off-slip could temporarily impede the main eastbound carriageway, but

the low average queues indicate that these are transient effects and do not cause unrecoverable congestion. The impact is considered to be moderate adverse.

- 13.112 At the southern roundabout, the average queues are negligible on all three approaches. Maximum modelled queues are also low, except for the London Road northbound arm, where the maximum value was 160 vehicles. The maximum queue modelled on the westbound off-slip was 80 vehicles, which is unlikely to adversely affect the westbound main line.
- 13.113 At Gipsy Lane however, the improved Junction 10A delivers more traffic to the junction as the metering effect of the unimproved Junction 10A ceases. Queues that previously formed on the M1 spur eastbound are allowed through to alter the pattern of arrivals at Gipsy Lane. While driver delay at M1 J10a would improve with the revised junction there is significant impact on Gipsy Lane traffic signals. The impact through excessive queues on Gipsy Lane itself have been assessed as major, while queues on the A1018 Airport Way approaches are predicted to be much less, although the inbound average queue would still be significant.
- 13.114 While it may be that there are further optimisation adjustments that could be made to the traffic signals, it is unlikely that they would make a large difference and these results indicate that the junction is under considerable stress by 2028. Corresponding PM peak results were not available at this time; however given the predicted higher overall forecast flows into the Gipsy Lane junction it is likely that the conclusions will be similar. The relative impact of the proposed Airport traffic in the modelled AM peak hour is considered to be moderate.
- 13.115 Changes in journey times resulting from additional traffic generated by the Airport were provided from the validated LLAOL VISSIM micro-simulation model for the base and forecast years, both with and without forecast Airport development traffic. These provided an indication on the scale of impact resulting from the Airport on the more immediate local network involving existing users and new passengers seeking access to the facility. The model output was used to assess the level of significance of driver journey times by identifying corridors of movement and summing journey times, and also through individual junction delays by assessing individual link delays (figure 13.8).
- 13.116 Again, the two AM peak hours were used for this assessment as the earlier peak hour (05:00 to 06:00hrs) represents the busiest demand period for traffic generated by the Airport, while the traditional peak hour (08:00 to 09:00hrs) represents the busiest peak hour on the highway network. In addition, the analysis was undertaken for the busiest peak hour for both Airport and the rest of the highway traffic in the afternoon peak (16:00 to 18:00hrs).
- 13.117 The assessment of inbound journeys towards the Airport has indicated a major impact (journey time difference greater than 3 minutes) for traffic travelling through the Holiday Inn junction
- 13.118 Figure 13.8 presents a summary of journey times on key network links for inbound and outbound flows for the Reference Case (Scenario B - general traffic growth to 2028, plus committed developments, with no airport growth) measured against traffic forecast to be generated by the Airport (included in Scenario D). Differences in journey times and delays are attributable to additional junction delay caused by extra traffic on the network.

- 13.119 Changes in driver journey time are identified in the shaded boxes for complete routes, for example ELC to the Airport, and for a summation of all these routes. Individual junction delays are shown in the non-shaded boxes on the right hand side of the table for each individual link and junction.
- 13.120 On the remaining parts of the study area network driver delay will increase at those junctions that are already at or approaching capacity both with and without committed development. The relative impact compared to the 2028 Reference Case has been assessed as minor adverse. The most significant impacts associated with the proposed Airport development would be experienced on junctions in the immediate vicinity of the Airport with the main attention focussed on the Holiday Inn roundabout.
- 13.121 The commercial flight pattern predicted by 2028 for a busy day prompts significant early Airport traffic demand (05:00 - 06:00hrs) attracted by the first flights of the day. Faced with this demand the operation of the Holiday Inn roundabout proves to be unacceptable, with queues tailing back almost to J10a that do not clear for well over 1.5 hours. Volumes however are relatively much lower across the rest of day and while the early morning rush causes congestion with extensive queues the situation would clear before 07:00hrs. The situation arises again during the PM peak highway hour. No other issues have been identified for other modelled periods of the day suggesting extreme capacity issues at the roundabout would only occur during this very focussed early morning period. The impacts during these busy periods have been assessed as major adverse.
- 13.122 Eaton Green Road/ Wigmore Road roundabout is expected to experience congestion and delay in the Reference Case and would face additional stress when proposed Airport development traffic is added. The relative impact with forecast Airport traffic is considered to be moderate adverse.

Pedestrian delay

- 13.123 Within the Airport pedestrian facilities will be enhanced and there will be improved way finding and revisions at the CTA to improve the pedestrian environment. The high degree of segregation proposed and direct linkages will remove the need for most passengers to face the prospect of conflict with road vehicles. Enhanced segregation and more logical routing arrangements will reduce the journey time for most passengers moving around the CTA. The enlarged area given over to short term car parking will result in some passengers walking further than was previously possible, but this is offset by the ability to provide for additional parking opportunities in relatively close proximity to the terminal. Improvements to the local walk network and pedestrian environment surrounding the Airport terminal and MTCP will be provided, ensuring that pedestrian amenity is improved. This receptor is therefore assessed to be moderate beneficial.

Pedestrian amenity

- 13.124 The altered PTH will deliver passengers using public bus and coach services directly to the terminal frontage. The fan shaped layout and drive in and reverse out layout will significantly improve pedestrian amenity and safety at the terminal by removing the need for passengers to come into contact with vehicular traffic. This high degree of segregation extends to cover the authorised taxi rank, with further enhancements provided in the form of clearly defined walking routes to the DOZ and elevated covered walkways accessed by lifts and stairs to link with the STCP. These walkways avoid the need for pedestrians to cross busy traffic routes.

- 13.125 The DOZ has been arranged to include elongated parking bays with protective markings that allow passengers to open doors and move around a vehicle with enhanced comfort. The layout allows passengers to alight directly onto a footway and subsequently follow a route to the terminal that for many will avoid moving vehicles. Where there is a need to cross the internal roadway, formal pedestrian crossings are provided.
- 13.126 The routing arrangements for the entry and exit to the STCP and payment barriers for the DOZ have also been designed to minimise the likelihood of heavy vehicular activity in areas where pedestrians are likely to congregate. Barriers have been positioned away from areas where pedestrians are likely to congregate and the internal STCP layout has been design to encourage vehicles to disperse relatively evenly around the area. The longer-term proposal for a multi-storey car park will provide further segregation and the opportunity for passengers to park under cover. The impact surrounding the immediate Airport environs is considered to be moderate beneficial.
- 13.127 Further afield a controlled crossing is proposed at the MTCP entrance to allow passengers to cross the proposed dual carriageway. This is supplemented by another at the proposed traffic signals at the Holiday Inn junction, which will help those wishing to cross Percival Way from the corner nearest to the Ibis Hotel to the benefit of those people who choose to walk between here and the Airport Terminal or need access to nearby bus stops.
- 13.128 It is acknowledged that no allowance has been made at this time to isolate and identify specific pedestrian improvements outside those identified at the Holiday Inn junction and for the immediate Airport Way approach road. LLAOL accepts that Airport growth will have some local impacts on the network that may be considered adverse; however this will be the subject of further dialogue and negotiation with the authorities at a suitable time in the planning process. The impact on the surrounding road through increased traffic when most pedestrians are active is however considered to be moderate adverse.
- 13.129 Improvements to the local walk network and environment surrounding the Airport Terminal and MTCP will be provided, ensuring that pedestrian amenity for passengers at the Airport is significantly improved. This receptor is therefore assessed to be moderate beneficial.

Collisions & safety

- 13.130 There is potential for an increase of an additional eight collisions per year assuming the Reference Case growth in traffic on the network with a further seven collisions with the additional Airport traffic added. It is predicted that most of these accidents will fall into the 'slight' category. Across the network as a whole and given other factors involved such as weather conditions and improvements to vehicle safety this would be a negligible increase that cannot be mitigated. This receptor is therefore assessed to be negligible adverse.

Hazardous loads

- 13.131 The Airport is anticipated to generate an additional requirement for fuel and chemicals (e.g. for de-icing) once operational. There is likely to be a proportional increase in vehicles required to cater for transporting these commodities and the Airport will continue to manage them as they do now. The development is therefore judged to a negligible adverse impact in this respect. .

Dust & dirt

- 13.132 The Airport uses are not anticipated to generate traffic that will carry dirty loads once operational. The development is therefore judged to have no change in this respect.

Mitigation

Access road network

Junction 10a

- 13.133 It is assumed that the M1 J10a improvements are in place as this is necessary to mitigate the general impact of future growth related to the rise in background traffic and committed development. The TA confirms that the proposed improvements already include an allowance for Airport growth above the scale proposed for 18 mppa.

The Holiday Inn roundabout junction

- 13.134 The addition of proposed Airport growth requires mitigation measures to deliver improvement at the Holiday Inn junction and the proposed new traffic signal arrangement shown on figure 3.2 of this ES will address this need through an appropriate design. Forecast future Airport traffic released on the A505 will add additional stress to what is predicted to be an already congested network by 2028. Therefore the requirement for mitigation is not wholly linked with Airport growth and is yet to be determined in detail.
- 13.135 The proposed improvement to the Holiday Inn roundabout will also offer appropriate mitigation against the impacts of the predicted additional traffic seeking the Airport. The impacts in this case are assessed as moderate beneficial.
- 13.136 There remains some uncertainty over the final access arrangements to serve proposed committed development at Century Park, which adds a level of complexity that may require the final details of the Holiday Inn junction to be revisited at a later time depending on resolution of this matter. Although Century Park benefits from outline consent, access is yet to be formally approved. The most direct route would be between the Holiday Inn roundabout passing through the CTA and beyond, as shown on figure 1.1 of this ES.
- 13.137 This planning application contains an appendix to the planning supporting statement that details how this route can be delivered, how it would work in traffic terms and how it could be constructed without significant adverse impact on the Airport operations. As the final arrangements for Century Park are yet to be confirmed, the specific impact and form of eventual improvement required demands further assessment and negotiation with the various parties involved to agree a viable strategy and to confirm the scale and timing of any future improvements.

Wider network improvements

- 13.138 The M1 J10a is already well known as a junction under stress and LBC has prepared and is promoting a scheme for improvement that should address the current capacity failings plus assist with delivery of future development in the corridor. The Highways Agency Active Traffic Management system, once fully operational, will also release link capacity for the M1 motorway, which will be aided by future proposals for the M1 – A5 link road. The proposed improvement scheme at J10a has been submitted as a National Infrastructure Project and the Examination in Public into the proposals has commenced. A finish date is in May 2013 followed by a decision in November 2013. Funding is in place for the scheme and it is

supported by the Highways Agency. There is therefore a high level of confidence that this improvement will be delivered with a design that will accommodate the forecast future Airport growth.

13.139 Setting aside M1 J10a, the wider network testing has identified a number of significant issues associated with the future performance of the surrounding highway network (A1081 and A505 Corridors), irrespective of Airport growth. These are predicted to require fairly extensive infrastructure improvements over the coming years to keep pace with both potential background traffic growth and to enable the schedule of committed development proposed for this area of Luton. The situation becomes even more acute when the influence of Century Park traffic is added.

13.140 Faced with the potential scale of network issues that are envisaged to require enhancement by 2028, even without proposed Airport expansion, it seems unreasonable at this time to try and isolate and identify specific improvements on the wider network proportionate to Airport impacts alone. The potential scale of change necessary for both the A1081 and the A505 is considered well in excess of what the applicant could reasonably be expected to address or fund on an exclusive basis as they are also dependent on other factors outside the applicant's control.

13.141 No allowance has therefore been made to isolate and identify specific highway improvements outside those identified in mitigation for the immediate Airport Way approach roads and improvements to change the method of junction control at the Holiday Inn roundabout. The applicant accepts that this is a matter that will be the subject of further dialogue and negotiation with the authorities at a suitable time in the planning process.

13.142 It is also recognised that there are a number of local routes available to residents, employees and others that could be used for Airport related travel from the surrounding area and the Airport encourages people to use main routes. It is not practicable for the TA to make an assessment of every route available and it would be the responsibility of the Highway Authority to identify and promote controls if particular issues arise.

Car parking

13.143 Taking account of the ASAS objective for more than 40% of passengers travelling by public transport by 2017 and beyond, the parking space available at the Airport and a number of off-airport parking facilities, there is no need at this time to provide additional parking capacity on site above that already planned. As the Airport grows, it is highly important that the correct range of parking options (short, medium and long-stay spaces) are provided for customers and also for staff. On-going monitoring of use will inform this decision. The Airport actively manages all its car parking and achieves occupancy of over 99% by using pre-booking and other strategies that make effective use of space. It will continue to do this and if further parking capacity is eventually needed on site in the future this will be provided in a timely manner and a further planning application(s) will be made at the appropriate time.

Employee travel plan

13.144 To limit congestion on the nearby road network and to reduce the environmental impact of travel both to and from the Airport, LLAOL will continue to actively encourage crew, employees and passengers to use public transport and where practicable other sustainable modes to access the Airport. Where this is not practicable car sharing with colleagues is promoted. An employee travel plan is

included for this purpose with the planning application. In future local employees and some passengers will also be able to ride the Luton-Dunstable busway thereby adding further choice and convenience to their travel arrangements.

Residual impacts

Rail

13.145 Demand forecasting by National Rail to 2031 shown in table 13.13 confirms that additional interventions are not required for the Thameslink Services to accommodate predicted growth by 2031; the required capacity is delivered by completion of the Thameslink Programme in 2018 to follow the recent addition of longer trains, with more planned from 2015 and the potential for 24 trains per hour.

13.146 Network Rail acknowledges a peak capacity gap for the Midland Main Line (MML) by 2031 based on currently committed schemes only. The London and South East RUS anticipates that the shortfall in commuter capacity on the MML would be resolved by replacing the existing high speed train fleet with higher capacity IEP trains or similar, following on from high speed train replacement on the Great Western Main Line (GWML) and East Coast Main Line (ECML), and in the longer term by demand between the East Midlands and London shifting to HS2.

LONDON ST PANCRA SERVICE GROUP	2031 Capacity and Demand in High Peak Hour			
	Anticipated Capacity	Demand Forecast	Demand/ Capacity Utilisation Ratio	Forecast gap (Based on 85% Utilisation)
Thameslink MML	24,500	14,700	60%	0
MML Long Distance	2,900	3,800	133%	1,400
High Speed 1 (domestic)	5,700	5,300	93%	500
TOTAL	33,100	23,800	-	1,900

Table 13.13: 2031 Morning Peak Busiest Hour Demand, Capacity, Route Utilisation And Gap Forecasts (Do-Minimum)

Source: Table 7.1 London and South East RUS. Network Rail (July 2011)

13.147 There is anticipated to be spare capacity on the Thameslink line with many Airport passengers likely to use this service as it is estimated that some 87% of them will use the southern section of the line from Luton Parkway Station towards London. Growth at the Airport will add impact in terms of additional passengers to the demand however, in terms of the Thameslink Service there is forecast to be predicted adequate capacity to cater for this increase and as a consequence the residual impact is considered to be neutral adverse.

Bus and coach

13.148 In terms of bus demand it is acknowledged there could be capacity issues on National Express Services to cater for future demand with a mode share at 40%. It is considered reasonable to expect that National Express or another future operator would provide additional vehicles to take advantage of the commercial benefits to be gained by serving this extra demand. The proposed new layout of the PTH has been designed to cater for this forecast rise in services, with an arrangement that will enhance the passenger experience to promote travel by this mode. While all services will experience additional demand, and therefore more people on each vehicle, there is generally adequate capacity to deal with the extra passengers.

Where this is the case the impact has been assessed as minor adverse. Some National Express Services will face excessive demand and passengers will rely on the supply of additional vehicles to address the shortfall and as a consequence the residual impacts are considered to be moderate to major adverse.

Airport access roads

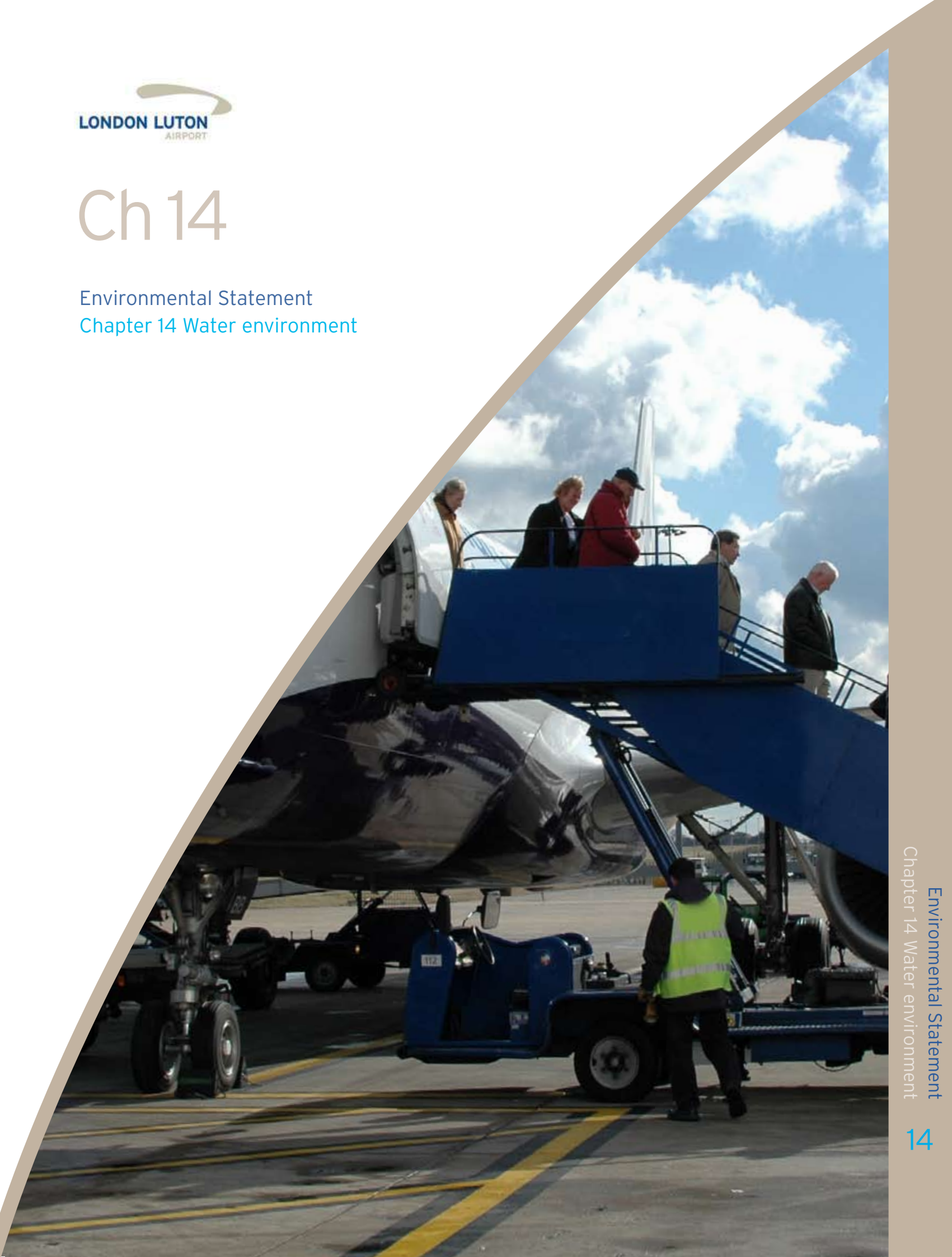
- 13.149 In traffic and transportation terms, the proposed new built development is not envisaged to directly result in significant changes to the general pattern of travel to and from the Airport, although the number of travelling passengers will inevitably increase. The development proposals will serve to increase the passenger throughput of the Airport from a level of 9.5 mppa during 2011 to a projected throughput of up to 18 mppa.
- 13.150 The proposed upgrade of Airport Approach Road to dual carriageway and provision of traffic signals at the MTCP entrance, in association with improvements to ease traffic flow around the CTA, will provide adequate capacity to deal with forecast future traffic demand without issue.
- 13.151 The revised PTH provides adequate capacity for forecast service delivery and segregated routes for access to drop off facilities and additional STCP capacity is integral to the plans. More direct and mostly fully segregated routes for pedestrians that avoid traffic will cater for anticipated passenger footfall enabling that with footbridges. Where a need remains for pedestrians to cross traffic at road level then formal crossing facilities are included to establish priorities and for safety reasons.
- 13.152 It is acknowledged that if retained in its present form the early morning Airport demand would cause the Holiday Inn roundabout at the junction of the A1081/ Airport Way/ Percival Way to exceed its operational capacity. Replacement of the roundabout with a revised junction layout controlled by traffic signals will provide a suitable remedy, although it is acknowledged that there could be a relatively short period in the very early morning during peak August Airport demand where unreasonable queues are predicted to develop on the ELC. The situation is likely to last well under an hour and the junction should recover quickly once the early morning wave of Airport traffic subsides to then operate with adequate capacity at all other times.
- 13.153 The TA has demonstrated the need for improvements to Gipsy Lane traffic signals and the A505 Vauxhall Way / Kimpton Road junction by 2028 to accommodate future traffic and committed development traffic. The influence of committed development alone would lead to significant over capacity issues at all junctions tested along the A505. Mitigation of impacts to these junctions is beyond the control of LLAOL and therefore the predicted additional effects of the proposed development at these junctions are residual impacts, as set out in table 13.14.

Nature of residual impact		Scale
Bus services	Increased demand for National Express bus services 422 and 737	Moderate to major adverse
Road links	Peak hour capacity at the MTCP junction, Percival Way/Presidents Way/Frank Lester Way junction and sections of the A1081 west of Gipsy Lane	Major adverse
	Peak hour capacity at the A505 north of Eaton Green Road, A505 Kimpton Road, Crawley Green Road, Eaton Green Road and Wigmore Lane	Minor adverse
Network congestion	Change at Eaton Green Road / Wigmore Road roundabout	Major adverse
	Change at A505 Stopsley Way / Hitchin Road in the AM peak	Moderate adverse
	Change at junction 10a in the Airport peak (05:00 to 06:00)	Major adverse
	Change at junction 10a in the network peak	Minor adverse
Severance	Change at Frank Lester Way-Airport Approach	Major adverse
	Change at all other locations	Minor adverse
Driver delay	Change at J10a, Gipsy Lane junction,	Moderate adverse
	Change at the Holiday Inn junction	Moderate beneficial
	Change at Eaton Green Road / Wigmore Road	Moderate
	Changes at other network junctions	Minor adverse
Pedestrian delay and amenity	Improvements to the layout of the CTA, PTH and STCP	Moderate beneficial
	Effect of changes in traffic flow on the wider network	Moderate adverse

Table 13.14: Predicted residual traffic and transport impacts

Ch 14

Environmental Statement
Chapter 14 Water environment



Chapter 14: Water environment

Introduction

- 14.1 This chapter of the ES describes the local water environment, the impact that the proposed development might have on it and the mitigation measures that are proposed. It considers the potential impacts on groundwater (hydrogeology) and surface water (hydrology) receptors on the site and the surrounding area, and flood risk.
- 14.2 This chapter draws upon three supporting technical reports:
- Flood Risk Assessment, Jacobs, November 2012 (technical appendix J)
 - London Luton Airport Surface Water Management Plan - December 2011 to December 2012 (November 2011)
 - Phase 1 Environmental Assessment, WSP Environment, April 2006 (technical appendix E).
- 14.3 A summary of these technical reports is presented in this chapter in sufficient detail to allow a qualitative assessment of the likely impacts on the water environment. In the first instance, impacts are assessed assuming that no mitigation is provided, before appropriate mitigation measures are highlighted and potential impacts are reassessed.

Legislation and policy context

- 14.4 The design of the proposed development and this assessment of the likely effects have taken account of current legislation, technical guidance and other codes of best practice in order to minimise the effects of the development. The key legislation and policy considered includes the following:
- **Environment Act 1995** - established the Environment Agency (EA) in England and Wales and transferred responsibilities to this agency from a number of bodies. These functions were originally conferred by previous legislation. The EA assumed various responsibilities of the National Rivers Authority (NRA), the waste regulation and disposal authorities and Her Majesty's Inspectorate of Pollution (HMIP)
 - **Water Resources Act 1991 / Water Act 2004** - is the key piece of legislation governing discharges to surface waters and replaced the corresponding sections of the Water Act 1989. The WRA sets out the responsibilities of the Environment Agency in relation to water pollution, resource management, flood defence, fisheries, and in some areas, navigation. The WRA regulates discharges to controlled waters, namely rivers, estuaries, coastal waters, lakes and groundwaters
 - **EC Water Framework Directive (2000/60/EC)** – was transposed into UK law in 2003 and establishes a strategic framework for managing the water environment. It requires a management plan for each river basin to be developed every 6 years. The plans are based on a detailed analysis of the impacts of human activity on the water environment and incorporate a programme of measures to improve water bodies where required.

- ***Groundwater Regulations 2009*** - are an environmental protection measure that complete transposition of the Groundwater Directive (80/68/EEC) and provide enhanced protection for groundwater. Under the Regulations, the Environment Agency has responsibility for the enforcement of the Regulations and decisions of their scope and effect.
- ***Technical Guidance to the National Planning Policy Framework, DCLG, March 2012*** – replaces the former Planning Policy Guidance Note 25: Development and flood risk, providing new guidance on the assessment of flood risk in relation to built development
- ***Luton and Southern Central Bedfordshire Water Cycle Strategy*** – this study has been undertaken in two phases. The Phase 1 work, which was completed in 2008, looked at the environmental and infrastructure constraints of the existing area and helped inform the preferred location for new strategic developments. The Phase 2 (2010) report considered in more detail the implications identified in the Phase 1 report and established minimum design standards to be applied to new developments to ensure a sustainable and integrated water cycle. It also provides further advice to guide future developments.

14.5 Relevant guidance documents are set out below:

- Control of Water Pollution from Construction Sites SP156 – Guide to Good Practice (CIRIA 2002)
- Control of Pollution from Construction Sites C532 – Guidance for Consultants and Contractors (CIRIA 2001)
- Code of Practice for Site Investigations, BS5930
- Environmental Good Practice on Site C650 (CIRIA 2005)
- Institute of Hydrology Flood Estimation Handbook CD ROM, Version 3, 2009.

14.6 The Environment Agency Pollution Prevention Guidelines (PPGs) identified below are the principal documents used for guidance on preventing water pollution from construction activities. These are available via the Environment Agency website (www.environment-agency.gov.uk):

- PPG1: General Guide to the Prevention of Pollution
- PPG3: Use and Design of Oil Separators in Surface Water Drainage Systems
- PPG5: Works and maintenance in or near water
- PPG6: Working at Construction and Demolition Sites
- PPG8: Storage and Disposal of Used Oils
- PPG18: Managing Firewater and Major Spillages
- PPG21: Pollution Incident Response Planning.

Methodology

14.7 This assessment has been predominantly desk-based, although it has been supplemented by a site visit undertaken by Jacobs in March 2012. Additional sources used as part of this assessment are listed in table 14.1.

British Geological Survey (BGS) Sheet 221, 1:50,000 series
British Geological Survey (BGS) Borehole Record Viewer, www.bgs.ac.uk/data/boreholescans/home.html (accessed 1 May 2012)
Capita Symonds, 2011, Preliminary Flood Risk Assessment, Luton Borough Council, June 2011
DCLG, 2012, National Planning Policy Framework
DoE, 1981, The Wallingford Procedure, Design and Analysis of Urban Storm Drainage, Volume 1
Jacobs, 2004, Strategy for Flood and Coastal Erosion Risk Management: Groundwater Flooding Scoping Study (Defra, LDS 23)
Mott MacDonald, 2007, London Luton Airport – Airport Way Surface Water Catchment – Outline Options Report
Mott MacDonald, 2008, London Luton Airport – Surface Water Drainage Asset Management Plan
Scott Wilson, 2008, Level 1 Strategic Flood Risk Assessment, Luton Borough Council and South Bedfordshire District Council

Table 14.1: Reference and data sources

Assessment criteria

- 14.8 The significance of an effect on the water environment has been determined from criteria developed from best practice techniques and specialist experience. The significance of an effect is derived from measures of the magnitude or scale of effect, and the importance or sensitivity of the resource affected. The categories for receptor sensitivity and magnitude of effect for the water environment are shown in figures 14.1 and 14.2 respectively.
- 14.9 There are no known published 'standard' significance criteria for assessing the effects on the water environment. Reference has therefore been made to a wide range of criteria relating to the nature of the receptors, expected duration of impact and the predicted change in relation to the baseline situation. The magnitude and sensitivity measures have thus been considered along with the determination of significance matrix (figure 14.3) to determine the significance of any effect.
- 14.10 The assessment methodology is qualitative, in which the probability that an impact will occur and the magnitude of the impact are considered. This approach provides a mechanism for identifying where mitigation measures are required and identifies mitigation measures that are appropriate to the risk posed by the development. This approach allows effort to be focused on reducing risk where the greatest benefit may result.

Baseline conditions

Watercourses

- 14.11 The closest surface watercourse to the Airport is the River Lea (or Lee), which is located approximately 250 metres to the south west of the Airport boundary. The river runs from Leagrave, at the edge of Luton, into Hertfordshire and the south to enter Greater London near Waltham Cross, ultimately meeting the River Thames at Bow in East London. The River Lea is classified as a main river and, in the vicinity of the Airport, flows approximately north west to south east.

- 14.12 The nearest water quality monitoring station to the Airport is on the River Lea at the Luton Sewage Treatment Works in East Hyde Bridge. This is approximately 4 kilometres to the south of the Airport. The most recent water quality monitoring results for this location are not based on the current Water Framework Directive classification system but on the former Environment Agency General Quality Assessment (GQA). These confirmed that in 2009, the biological water quality was grade A and the chemical water quality was grade B. Levels of nitrates and phosphates were both high (6 and 5 respectively).

Hydrogeology

- 14.13 Reference to British Geological Survey (BGS) solid and drift edition mapping (Sheet 221, Hitchin), and to records of previous intrusive site investigations on the Airport site (see technical appendix E) has confirmed that the hydrogeology of the Airport is characterised by Clay-with-Flints over Upper Chalk.
- 14.14 Under the Environment Agency's current aquifer designations, the Upper Chalk geology below the site is classified as a principal aquifer. Principal aquifers usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. The Environment Agency has reported that the predominant direction of groundwater flow in the Luton area is towards the south and south east¹.
- 14.15 The drift geology of Clay-with-Flints is classified as an unproductive strata. This is defined as rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow and is the same as the previous non-aquifer classification.
- 14.16 As noted in chapter 10 of this ES, previous site investigations have encountered groundwater at depths ranging from 30 – 60 metres below ground level (bgl) across the site within the Upper Chalk. It is reported that perched water may be present within the made ground. There are three groundwater abstractions within 500 metres of the Airport boundary, and whilst the majority of the Airport site is outside the Total Catchments of any Groundwater Source Protection Zones (SPZs), the northern half of the Airport including the West Apron, Taxiway Echo, North Apron and Cargo Centre are within the Total Catchment of an SPZ.

Existing drainage infrastructure

- 14.17 There are several independent surface water networks serving the Airport, as summarised in table 14.2, which drain either to the foul sewer network, soakaways or Thames Water Utilities Limited (TWUL) surface water sewers.

¹ Groundwater Quality Review: The Chalk of the Upper River Lee, Thames Region, Environment Agency, February 2005

Catchment name	Catchment Area (hectares)	Comments
Central soakaway	48.3	Partially served by the first flush system
Airport Way	40	Partially served by the first flush system. Shared with Esso and Shell
Northern soakaway	15.2	Partially served by the first flush system
Runway West	5.3	Bifurcation to Airport Way catchment
Eaton Green Road (GKN)	5.2	Shared with GKN
Eaton Green Road (Kerry Ingredients)	4.1	Shared with Kerry Ingredients
North East Balancing Pond	3.2	N/A
Frank Lester Way	1.8	N/A
President Way	0.4	N/A
Direct to soakaway	104.93	N/A

Table 13.2: Summary of Airport drainage catchments

- 14.18 The catchments are shown on figure 14.4. Some parts of the surface systems drain to a 'first flush' system which operates during periods of increased flow to take the most polluted surface water (such as de-icing chemicals used during the winter) to the public foul sewer network to minimise pollution to surface waters. The areas served by the first flush system are shown on figure 14.5. All the surface water catchments draining to TWUL sewers are connected to a common TWUL surface water network, which drains via a 1,500 mm diameter sewer to the River Lea at Luton Hoo Park to the south west of the Airport.
- 14.19 Surface water discharges to the River Lea are currently only via TWUL surface water sewers, and therefore are controlled by a discharge consent issued by the Environment Agency to TWUL. It is understood that there is currently no explicit reference to the Airport or LLAOL in this consent.
- 14.20 Surface water discharges to soakaways are consented by the Environment Agency. There is only one active discharge consent, which is for the Central Soakaway and it is understood that this is currently under review by the Environment Agency as part of a wider review process under the Environmental Permitting Regulations (2011). The Airport has an environmental permit for the Northern Soakaway, issued by the Environment Agency in 2012.

Overland flows

- 14.21 The Airport is on high ground to the east of Luton, which is at a lower elevation in the valley of the River Lea. The Luton and South Bedfordshire Strategic Flood Risk Assessment (SFRA) states that "*areas of steep ground have the potential to generate runoff which can present a flood source. The steep topography in parts of the study area...may present a flood source to areas downslope of them*". The Airport is situated near the hill crest, so the risk of flooding to the Airport from upslope sources is considered low.

- 14.22 The Central Soakaway is considered to be functioning above its intended capacity and is known to spill over to an embankment on the downslope side, which acts to create an informal flood storage area. Runoff that spills over from the soakaway will therefore not leave the Airport site as overland flow. However, the embankment is not thought to have been designed to hold water. The water levels behind the embankment are normally below its base, but could rise in extreme flood conditions. If this embankment was to fail with the soakaway basin full of water, the risk to life or critical infrastructure is considered to be minimal, with possibly only the fire training area located in the flow path.

Flood risk

- 14.23 The relevant potential flooding mechanisms for the Airport are identified as:

- Fluvial flooding
- Surface flooding, including that from the site surface water drainage system
- Flooding from services
- Groundwater flooding
- Flooding from reservoirs.

- 14.24 The Airport lies within flood zone 1 and is therefore at low risk of fluvial flooding. The site is sufficiently far from the River Lea's floodplain for it to be assumed that climate change should not alter this situation during the lifetime of the proposed development. LBC has commissioned a Surface Water Management Plan for the borough, which is currently under review, and has provided a critical drainage area plan for the Vauxhall Road area, which includes the eastern side of the Airport. This shows a number of ponding areas at and around the Airport. Flooding is shown as occurring at the East Apron, within the Central Soakaway Catchment. Runoff from this area is contained on the Airport site and should not therefore affect runoff rates and volumes leaving the site. The plan also shows that the Airport Way underpass is at risk of flooding, with flood depths in excess of 1.5 metres in the 75-year return period storm. Luton Borough Council's Preliminary Flood Risk Assessment (PFRA; 2011) states that *"30 mm rain over 45 minutes was recorded. Several roads flooded (including Airport Way); people trapped in cars"*.

- 14.25 The council's SFRA reports that there have been historical instances of flooding due to sewer surcharge within Luton town, although all of these were at least 2 kilometres north west of the Airport. This area is generally more low-lying than the Airport site and the areas of more frequent sewer flooding are all on the opposite bank of the River Lea and so would not affect the Airport. TWUL has confirmed that it has no records of foul sewer flooding in the area.

- 14.26 There are no reported instances of groundwater flooding within 1 kilometres of the Airport boundary and the council's PFRA reports that the entire Airport site falls within an area classed as having 'very low' susceptibility to groundwater flooding. The Environment Agency's online mapping shows that the town is upstream from the nearest reservoirs at Luton Hoo Lakes, so any flooding from these reservoirs would not be expected to affect the River Lea at Luton. As the Airport is uphill from the town, the risk of flooding from this source at the Airport is considered to be negligible.

Assessment of sensitivity

- 14.27 Following the baseline analysis, a number of sensitive water environment receptors have been identified, in accordance with the criteria set out in figure 14.1. Table 14.3 summarises the sensitive receptors that form part of this assessment.

Receptor	Sensitivity of receptor
River Lea (Lee)	Medium
Groundwater (Principal aquifer)	High
Existing drainage infrastructure	Medium
End users and off site receptors (flood risk)	High

Table 14.3: Sensitivity of receptors

Potential effects

- 14.28 Potential environmental effects that are likely during the construction and operational phases are described below.

Effects during construction

- 14.29 The primary activities carried out during the construction period have the potential to affect the water environment in the following ways:

- Increase in surface water (storm water) runoff as a result of new areas of impermeable surfaces
- Changing groundwater levels through reducing the level of infiltration from precipitation
- Altering the hydrology through major groundwork (cut and fill)
- Deterioration in water quality due to spillage/leakage of fuels and lubricants during storage, or from construction vehicles in operation or refuelling
- Deterioration in water quality due to deposits from general site works, such as concrete mixing facilities, dust and particulate/silt mobilisation in runoff, etc.

Changes in surface water runoff

- 14.30 The proposed development will introduce new areas of impermeable surfaces within existing surface water drainage catchments in the Airport boundary, as shown in table 14.4.

Location	Existing paved area (ha)	Proposed paved area (ha)	Additional paved area (ha)
Landside development (Dual carriageway, CTA, PTH, STCP, MTCP and LTCP)			
Draining to Airport Way catchment	4.95	5.45	0.5
Draining to the Central Soakaway catchment	5.01	4.63	-0.38
Mid Term Car Park extension	6.88	6.92	0.04
Long Term Car Park extension	0	2.14	2.14
Taxiways and stands			
North Apron (draining to Central Soakaway)	0.62	1.67	1.05
East Apron (draining to Central Soakaway)	3.70	3.83	0.13
Main Apron (Stands 10 and 11) (draining to Central Soakaway)	0.57	0.57	0.00
Main Apron (SMR Tower) (draining to Central Soakaway)	0.37	0.48	0.11
West Apron (draining to Airport Way)	1.18	1.47	0.29
South Apron (northern part of the extension, draining to Airport Way)	1.44	1.89	0.45
South Apron (southern part of the extension, draining to Central Soakaway)	1.74	2.08	0.34
Taxiway Foxtrot (draining to Central Soakaway)	0	2.14	2.14
Taxiway Golf (draining to Central Soakaway)	0	0.94	0.94
Taxiway Hotel – North East Outfall (draining to Airport Way)	0.31	0.62	0.31
Taxiway Hotel – South Outfall (draining to the Runway West)	0.40	1.43	1.03
Terminal building			
Terminal building – old terminal + link building A + walkway A (draining to Airport Way)	2.38	2.38	0.00
Terminal building – immigration building and link + pier A + pier B (draining to Central Soakaway)	1.8	1.8	0.00
Total	31.35	40.44	9.09
Table 14.4: Existing and proposed hard standing			

14.31 The drainage strategy described within technical appendix J and summarised in chapter 3 of this ES proposes to maintain the existing means of surface water management for the Central Soakaway, Runway West, Mid Term Car Park and North East Balancing Pond catchments. All new areas of taxiway and apron within these catchments will be included in the first-flush drainage system where this is present to ensure that the most polluted surface water is drained to the foul sewer rather than to soakaways. Where there is not coverage of the first-flush system, interception will be incorporated into the drainage design.

14.32 With the exception of the terminal building extensions, all other elements of the development proposal will result in additional paved / impermeable surfaces within

their respective catchments. This will result in corresponding increases in surface water runoff. Previous network assessment by Veolia in 2007 has confirmed that the existing drainage network at the Airport is known to function at full capacity. Utilising the criteria set out in figure 14.3, the additional surface water runoff associated with the proposed development is considered to represent a change of large magnitude in the absence of mitigation because this would be in excess of the capacity of the drainage system. When considered in conjunction with the medium sensitivity of the site drainage network the predicted impact is of substantial significance.

Groundwater recharge

- 14.33 The potential for the proposed development to affect groundwater recharge is directly linked to the changes in surface water runoff, as an increase in impermeable surfaces can also reduce the amount, rate and location of groundwater recharge. Table 14.4 sets out the change in impermeable surface area.
- 14.34 The predominance of the underlying Clay-with-Flints drift geology currently affords low levels of infiltration from the surface to groundwater. The relatively low proportional increases in impermeable surfaces, and the intention to continue to use of soakaways for the majority of surface water drainage within the Airport, will maintain the current pattern of groundwater recharge. No significant effects are therefore predicted.

Alterations to hydrology

- 14.35 No surface watercourses will be affected by the proposed development and hence there are no predicted direct impacts to these features.

Alterations to hydrogeology

- 14.36 As described in chapter 3 of this ES, there will be a requirement for excavation of up to 900 mm depth for construction of the new taxiways and roads and up to 620 mm depth for the apron areas. Excavations have the potential to interrupt groundwater; however, the recorded depths of groundwater across the site from previous site investigations (see technical appendix E) suggest that it is at a substantially greater depth (approximately 30 to 60 metres bgl) than excavations that will be required for the construction works. No significant impacts on the underlying hydrogeology are predicted.

Deterioration in water quality from general construction activities

- 14.37 There is potential for contamination of surface water and groundwater due to the spillage / leakage of stored fuels and lubricants on the site, and from the movement of construction vehicles. Although likely to be in relatively small quantities, if such materials reached surface watercourses or groundwater, this is considered to be a potential impact of medium magnitude resulting in an impact of moderate significance in the absence of mitigation measures.

Post-construction effects

Flood risk

- 14.38 The assessment of potential additional storm water flows associated with changes in permeable and impermeable surfaces is assessed within the construction impact above. The proposed development is in flood zone 1 and is not at risk from fluvial,

groundwater or reservoir flooding. The risk of flooding on site from existing services is not expected to change as a result of the proposed development.

Pollution from operational activities

- 14.39 The operational use of the site will remain as existing. There is currently no evidence of significant contamination on the site and the operational activities at the Airport will not change with the provision of the new areas of impermeable surfaces. The existing Airport drainage systems incorporate first-flush and interceptors to separate hydrocarbons and other contaminants before surface water is discharged into soakaways, and these systems will be used for the additional drainage associated with the proposed development. On this basis, no significant effects are predicted.

Mitigation measures

Construction

Control of surface water runoff

- 14.40 The change in impermeable surfaces on the site set out in table 14.4 plus the appropriate allowance for climate change will result in additional storm water flows entering the existing surface water drainage network. These increases would be in excess of the capacity of the existing drainage system and this has been assessed as an impact of substantial significance in the absence of mitigation.
- 14.41 In order to prevent increased discharge to the TWUL network and / or on site flooding, attenuation storage will be employed to reduce runoff rates from the proposed taxiway extensions, new taxiway and areas of new apron. It is proposed that the design runoff rates from both these features will be limited to realistic (low) Greenfield runoff rates (approximately 1 to 3 l/s/ha, for events up to the 1-in-100 year storm event including a 20% allowance for climate change). Underground storage tanks and / or oversized pipes will be provided offline and inline as appropriate adjacent to the areas of new pavement and will allow temporary storage of storm water flows prior to discharge to the existing site soakaways.
- 14.42 It is also proposed that the capacity of the existing Central Soakaway is increased to ensure that this is of an appropriate scale to be able to effectively manage the predicted increase in surface water flows resulting from the complete development within its catchment, and taking account of climate change. This will mitigate both the existing capacity issues and the future impacts of additional surface water flows within this catchment.
- 14.43 The dualling of Airport Way and proposed changes to the CTA, PTH and western side of the STCP will result in an increase in the total amount of hard standing in the catchment draining westwards to the TWUL public surface water sewer. Within the Airport Way catchment it is proposed that attenuation storage in the form of oversized pipes and / or tanked storage will be employed to limit the runoff from the development and ensure that runoff rates will not significantly increase for up to a 1-in-100 year storm. The proposed development will also represent some betterment to the flood risk to the Airport Way underpass for up to a 1-in-100 year storm.

- 14.44 Following implementation of the attenuation proposed for these aspects of the development, the predicted magnitude of change would be reduced to negligible and no significant effects are predicted.

Control of water quality

- 14.45 The potential for construction works to adversely affect the quality of surface water and groundwater will be controlled through a Construction Environmental Management Plan (CEMP). This will be prepared in conjunction with the appointed main contractor and agreed with LBC and the Environment Agency.
- 14.46 With respect to protection of the water environment, the CEMP will adopt good management practices and relevant measures described in the Environment Agency's Pollution Prevention Guidelines (see paragraph 14.5 of this chapter). Of particular relevance are PPG5 and PPG6. A pollution control procedure will also be included in the CEMP.
- 14.47 A bunded storage area, with at least 110% of the capacity of the stored materials, will be provided for the duration of the construction period for the storage of oils, fuels, chemicals and other hazardous construction materials. The compound will be located away from sensitive surface water features and will be provided with an impervious hard standing base and bund.
- 14.48 With the implementation of the proposed mitigation during the construction phase, the predicted magnitude of change associated with pollution of watercourses from construction plant and activities is considered to reduce from medium to negligible and hence this would no longer be considered to be a significant effect.

Mitigation measures during operation

- 14.49 No mitigation measures are required over and above those proposed for the construction phase. The surface water attenuation introduced during the construction phase will be designed to manage potential changes in storm water flows over the lifespan of the proposed development, including the additional effects predicted for climate change. Control of pollution during the operation of the Airport will continue as it is at present, ensuring that there is compliance with legislation and prevailing best practice.

Cumulative effects

- 14.50 The specific proposed means of discharge for surface water drainage from the potential cumulative developments at Century Park, Junction 10a and Sundon Rail Freight Depot is not known. Drainage from the Airport site is either managed via the on-site soakaways or via a Thames Water Utilities surface water sewer.
- 14.51 The location of the three potential cumulative developments is such that these are unlikely to be discharging into the same surface water sewer network as the Airport. The development proposals will ensure that attenuation is provided to ensure that discharge to the sewer system is at no greater than the current rate and therefore there is no potential for significant cumulative effects on surface water sewers.
- 14.52 On the basis that new soakaways are likely to require an environmental permit from the Environment Agency, it is envisaged that permits would not be granted for

discharge to new soakaways if these were shown to have a significant adverse impact on groundwater. No significant cumulative impact is therefore predicted in this respect.

- 14.53 All of the developments will have potential for localised impacts to water quality associated with their respective construction and post-construction phases. The relative separation of the four sites is however such that the potential for significant cumulative effect from spills and leaks of chemicals and fuels to the water environment is very low.

Residual effects

- 14.54 Following the implementation of the proposed surface water attenuation no significant residual effects are predicted to the water environment.

Ch 15

Environmental Statement
Chapter 15 Summary tables



Chapter 15: Summary tables

Introduction

- 15.1 This chapter summarises the findings of the EIA. Table 15.1 summarises the mitigation measures proposed and table 15.2 summarises the significant residual effects envisaged to remain following mitigation.

Potential effect	Proposed mitigation
	Air quality
Dust generation during construction	<p>The following good practice constructions measures will be put in place:</p> <ul style="list-style-type: none"> • Water suppression to minimise dust during demolition activity • Use of water sprays to ensure that any unpaved routes across the site are maintained in a damp condition when in use • Use of consolidated surfaces close to residential areas • Imposition and enforcement of a 5 mph speed limit on unpaved ground • Minimising any dust generating activities on very dry or windy days • Sheeting of all lorries carrying materials on and off site • Locating and / or covering of stockpiles as far from sensitive locations as possible, and provision of appropriate hoardings • Wherever practicable, off-road plant to use Ultra-Low Sulphur Diesel and be equipped with exhaust after-treatment • Regular cleaning of all paved areas on site • Use of a jet-spray vehicle and wheel wash for all vehicles leaving the site • Regular use of a water-assisted dust sweeper on the access and local roads, as necessary, to remove any material tracked out of the site • Use of water suppression during any cutting of stone or concrete <p>Where mitigation measures rely on water, it is expected that only sufficient water will be applied to damp down the material. There should not be any excess to potentially contaminate local watercourses.</p>
Impacts on local air quality from road traffic	<p>Mitigation measures to further minimise local air quality impacts will be addressed via the Airport Surface Access Strategy. This commits the Airport to:</p> <ul style="list-style-type: none"> • Work with partners to deliver sustainable transport solutions • Work with stakeholders, including public transport operators and transport authorities, to ensure a coordinated approach • Build on the Airport's function as a regional interchange centre to further improve public transport services • Set challenging targets for reducing dependence on the private car • Identify specific actions to encourage greater use of public transport and more sustainable travel behaviour
Odour impacts	<p>The Airport has committed to eliminating the use of APUs on stand, which will reduce hydrocarbon emissions from the apron area. This will further minimise any odour impacts.</p>
Increased carbon dioxide emissions	<p>The Airport will continue to implement measures to reduce carbon dioxide emissions.</p> <p>The Airport is further committed to reducing carbon dioxide emissions from these sources and has appointed British Gas for Business to conduct a three year Carbon Management Plan to reduce emissions associated with energy consumption.</p> <p>The proposed development works will be designed to current building</p>

Potential effect	Proposed mitigation
	regulations and the design will use a holistic approach to energy efficiency. This will include cladding and curtain walling systems with low U-values, the refurbishment and renewal of sections of existing plant equipment, especially in the Old Terminal Building, and the use of high efficiency lighting.
Cultural heritage	
Potential for destruction of below ground archaeological remains during construction in previously undisturbed areas	A written scheme of investigation detailing an archaeological watching brief across any areas of the site that have not been previously affected by development at the airport could be applied to ensure appropriate levels of recording and mitigation. In the unlikely event that features of archaeological interest are uncovered, further appropriate surveys and investigations will be undertaken. In the first instance, Central Bedfordshire's archaeology officer will be informed and the methodology for appropriate archaeological investigations will be discussed and agreed.
Natural heritage	
Loss of secondary woodland	Compensation for this loss should include new tree planting with a ratio of two trees planted for every one tree lost.
Loss of four trees with low potential for roosting bats	A watching brief will be carried out during felling works of these trees by a licensed bat workers.
Potential adverse effects on badger during construction works	The grassland and scrub within the Airport boundary is used by foraging badgers. There is a risk that badgers may become trapped in any exposed excavations. It is recommended that all excavations over 0.5 metres deep have an egress point to allow badgers to exit, and those over 2 metres deep should be covered, or fenced, at night to prevent badgers from falling in.
Potential effects on amphibians during construction	It is recommended that during the soil strip associated with the development of Taxiway Golf an ecologist is present to translocate any amphibians present. The works are close to breeding ponds and animals could be present in the rough grassland.
Loss of invertebrate habitat	<p>LLAOL controls sufficient suitable land to provide appropriate invertebrate mitigation up to twice the area of habitat lost in Area 7 as a result of the construction of Taxiway Foxtrot. Based on the current survey appropriate mitigation would be the recreation of lost habitats (a mix of scrub, ruderal vegetation and mesotrophic grassland) with the creation of small mounds to provide south facing slopes, alongside areas of bare ground and spoil.</p> <p>If the material is suitable the topsoil from Area 7 will be used to cover these mounds. If not, the mounds will either be left to colonise naturally or seeded. If seeded, certain key species such as oxeye daisy and wild carrot will be included in the specified seed mix.</p> <p>If the remaining area between Taxiway Foxtrot and the Long-Term Car Park still supports important invertebrates at the time of the taxiway construction LLAOL will continue to survey the area to ensure appropriate conditions for invertebrates are maintained. The extant scrub in this area may need to be removed for operational reasons. However given the proximity of extensive areas of scrub in close proximity to this area this is not considered to be a significant impact requiring mitigation.</p>
Disturbance of nesting birds during clearance of vegetation	Any habitats that could be used by breeding birds, such as scrub and trees, that require removal will be removed outside the bird nesting season (March to July inclusive). Any scrub not removed in this window would be checked by an ecologist prior to removal to ensure nesting birds are not present.
Disturbance of nesting skylark and meadow pipit during construction of the parallel taxiways	<ul style="list-style-type: none"> The grassland areas in question should be made unsuitable for nesting skylarks during the winter months through mowing. The sward should be kept short from February onwards, with the average height not exceeding 1cm during the period March to August

Potential effect	Proposed mitigation
	<ul style="list-style-type: none"> Any areas of grassland being used temporarily during construction i.e. storage areas or access tracks, should be managed as above. If this is not possible these areas will be checked prior to their use during construction by a suitably experienced ecologist to ensure there are no nests present on the ground If works on the taxiways commence within the bird breeding season (this is currently only scheduled for Taxiway Foxtrot) searches for nests of breeding birds will be made within a 25-metre buffer around construction works. If active nests are found in this buffer zone appropriate no-work buffers will be implemented by the appointed ecologist and enforced while the nest is active by the works manager If nests are found in any affected areas a suitable buffer area should be placed around the nest to minimise disturbance, no works can continue within this buffer until the chicks have fledged and the nest is unoccupied.
Community and economic	
Affect on local amenity from increased aircraft noise	The mitigation measures discussed in the noise section below will help to reduce the potential for adverse effects on local amenity as a result of increased aircraft noise.
Ground conditions	
General	<p>In order to complete the detailed construction methodology and design, it may be necessary to undertake further targeted intrusive investigations to further clarify the extent of any contamination present at the site, particularly in the vicinity of the former landfill site. Mitigation measures and foundation designs may have to be altered to reflect the findings.</p> <p>A Materials Management Plan (MMP) shall be produced detailing specific soils management plans, including those for imported primary materials and proposals for the reuse of site-won materials. The MMP shall provide a structured plan for the earthworks to be completed, to avoid double handling of materials and the excessive use of energy to complete the scheme.</p>
CEMP	A construction environmental management plan will be prepared and implemented by the contractors of each zone prior to the commencement of the respective construction phases.
Excavated materials	<p>The handling, storage and removal of any potentially contaminated material on site will be subject to prevailing waste management legislation and guidance, and the appropriate disposal or reuse of materials will be considered as part of the detailed construction design and integrated with the Site Waste Management Plan that seeks to maximise beneficial pre-planned re-use of suitable site materials.</p> <p>More specifically, given the requirement for excavated materials from the landfill, the design team, engineers and geotechnical / contamination consultants will work together in order to reduce the amount of excavated material requiring off-site disposal to landfill. The opportunities that are considered to be currently available are:</p> <ul style="list-style-type: none"> Re-using of materials, where they are considered to be suitable for use (e.g. the capping material absent of landfill waste) Screening out of recoverable materials (e.g. metals) and reusable materials (e.g. aggregates, plastics for recycling, wood) Stabilising and/or treating finer materials so that they are suitable for re-use (e.g. combining with other organics, clay capping and wood for

Potential effect	Proposed mitigation
	composting and topsoil generation)
Health and safety risks to construction workers and adjacent site users during construction	<p>Appropriate health and safety measures will be implemented. The appointed contractors will be responsible for ensuring that members of the public and site workers are protected from the potential effects of any contamination encountered during the construction process. Measures utilised will be incorporated within the general construction site safety standards.</p> <p>The contractors will carry out a health and safety risk assessment, with appropriate precautionary measures planned and recorded in advance by adequately trained and qualified persons. During all works, the principles outlined in the Protection of Workers and the General Public during Development of Contaminated Land (HSE, 1991), or prevailing best practice guidelines, should be adhered to. Points that will be considered include:</p> <ul style="list-style-type: none"> • Advice should be provided to all site personnel concerning the significance of land affected by contamination and the associated risks to human health on site prior to commencing work • Suitable personal protective equipment (PPE), including clothing, footwear, gloves and respiratory equipment (if necessary) should be provided for all site personnel, who should be advised on the use of PPE items on the site, with the items remaining on site at all times • No workers should eat, drink or smoke in the vicinity of the works. Comprehensive welfare facilities should be provided for all site staff to enable workers to wash prior to leaving the site • Health and safety risks to adjacent site users relating to dust, noise, odour and vibration should be appropriately addressed prior to commencement of site works
Contamination of groundwater and nearby surface water during construction	<p>The following measures will be used to protect underlying groundwater and nearby surface water during construction:</p> <ul style="list-style-type: none"> • Damping down of surfaces and sheeting of stockpiled material where necessary • Prevention of water entering excavations, where possible • Use of measures such as cut off ditches, silt fences or impermeable membranes to prevent uncontrolled release of runoff from excavations or exposed ground • Appropriate storage of potentially polluting materials and chemicals in accordance with the Control of Pollution (Oil Storage) Regulations (England) 2001 • Adequate supervision of all deliveries and refuelling involving potentially polluting substances • Delivery and refuelling areas to be located away from surface water bodies, with adequate measures in place to contain spillages at these locations • Leaks or spillages of potentially polluting substances to be contained, collected then removed from site in an appropriate manner, e.g. use of absorbent material, bunding or booms. An emergency action plan will be formulated that all site personnel will have read and understood • Storage of machinery and equipment to be located away from surface water bodies. Drip trays to be placed underneath any parts where oil / fuel may be found • Use of adequate wheel wash facilities to contain and dispose of potentially polluted runoff • Regular washing of machinery and access roads and dampening to reduce dust emissions, with appropriate collection and disposal of runoff • Secure access to the site for construction personnel only
Generation of dust during construction	Dust mitigation measures such as damping down, covering of stockpiles, use of wheel washes and covering of lorries during transportation should be implemented as part of a general good site management plan. Further details

Potential effect	Proposed mitigation
	on dust mitigation are set out in the air quality section above.
Spillage of chemicals and contaminative material	Chemicals and contaminative material will be stored in accordance with Environment Agency guidance. Vehicles used on site will be regularly serviced and inspected. Refuelling of vehicles will be restricted to bunded areas underlain by hard standing, or other impermeable materials. Vehicle movements will be restricted in close proximity of surface watercourses.
Pollution of surface water and groundwater during operation	<p>There are existing pollution control mechanisms within the airport drainage infrastructure, such as interceptors, and all new areas of surfacing will be directed via these features.</p> <p>The impact of accidental spillages from office, light industrial, educational and temporary accommodation will be minimised by appropriate storage of potentially polluting materials and chemicals in accordance with the Control of Pollution (Oil Storage) Regulations (England) 2001, the use of appropriate drainage infrastructure in hard standing in these areas, and the adoption of standard material handling and storage procedures.</p>
Landscape and visual impact	
Construction impact on Wigmore Park County Wildlife Site	Because of the visible nature of some of the construction activities, not all views can be fully mitigated, however the changes in views during the construction phase would be temporary. In the case of cranes a light neutral colour choose would avoid attention on the skyline. The use of hoarding (enhanced with image, pattern, and text) along with bunds from surplus excavation material to Wigmore Valley Park would assist in minimising open and direct views. Industry best practice construction standards regarding noise and working hours will be employed to reduce the potential impact of construction activities on local receptors.
Noise and vibration	
Increase in the areas within noise contours for aircraft noise and the number of people predicted to be affected	<p>Continued implementation of the 55 measures set out in the Airport Noise Action Plan</p> <p>Implementation of a new package of noise control measures including:</p> <ul style="list-style-type: none"> To control the amount of activity at night there will firstly be a restriction on the number of aircraft movements. Specifically the annual number in the period 23.30 – 06.00 will be limited to 10,200. Furthermore the Airport will introduce the Government's Quota Count (QC) system, and so have a similar system to ten other UK airports and one similar to that of Luton's neighbouring airport London Stansted. Within the QC system, aircraft are certified by the International Civil Aviation Organisation (ICAO) according to the noise they produce. They are classified separately for both take off and landing. Points are allocated to different aircraft types according to how noisy they are. The noisier the aircraft type, the higher the points allocated. This provides an incentive for airlines to use quieter aircraft types. The Airport will have an annual quota count budget of 5,000 for the period 23.30 – 06.00. As part of this quota count system there will be a ban on operations by aircraft that have a quota count of more than 2 at night (23.30 – 06.00). For the daytime period airlines will continue to be incentivised to operate aircraft quietly by fining those that cause departure noise levels at the Airport's monitors above set limits. These daytime limits will be progressively reduced, from the current value of 94 dB(A) to 85 dB(A) from 1 January 2013, 82 dB(A) from 1 January 2015 and 80 dB(A) from 1 January 2020. The night-time limit has already been recently reduced to 82 dB(A) and a further reduction to 80 dB(A) is proposed. The fine for infringement will be in line with the published levels in the Annual Monitoring Report, which is up to 400% of the landing fee during the day and up to 600% at night. This will be paid into the Community Fund.

Potential effect	Proposed mitigation
	<ul style="list-style-type: none"> To optimise the benefit of Noise Preferential Routes, the initiatives will reduce the incidence of aircraft diverging from the NPR's by increasing the minimum height they must attain on it, and fining aircraft that fly outside the NPR's from next year. Infringements will incur a penalty of £750 during the day or £1000 at night. The fines will be paid into the Community Fund. The mitigation of the residual noise is to be achieved as in the recent past at Luton by operation of a noise insulation grants scheme. The new scheme, towards which the Airport will contribute up to £100,000 per annum, is to be managed by LLACC. The regular information already provided by the Airport will be utilised in determining where the mitigation should be directed. The mitigation measures normally comprise the installation of acoustically-enhanced glazing and attenuated ventilators. In addition the Airport will continue to pay £50,000 per annum to its Community Fund, which will be independently managed in accordance with existing arrangements.
Traffic and transport	
Increased HGV traffic during construction	<p>The following measures will be implemented during construction:</p> <ul style="list-style-type: none"> All construction traffic entering and leaving the site will be closely controlled. Vehicles making deliveries to the site or removing spoil will travel via designated routes, which will be agreed with relevant bodies, including LBC, Central Bedfordshire Council, Hertfordshire County Council and the Highways Agency. These routes will be selected to avoid residential and other sensitive areas wherever practicable Deliveries will be phased and controlled on a just-in-time basis and will be clearly marked to show their destination. This will minimise travel time around the site and any associated noise. All vehicles will use rubber tyres wherever practicable Wheel / body washing facilities will be provided on site and used as necessary Road sweeping facilities will be provided on site and will be readily available as necessary Vehicles carrying waste material off site will be sheeted, as necessary
Increased delays on the Holiday Inn roundabout	Provision of a revised junction layout at the location of the current Holiday Inn roundabout. This will take the form of a signalised junction
Staff modal split and travel demand	Introduction of an employee travel plan to complement the measures within the Airport Surface Access Strategy
Water environment	
Increase in surface water runoff from new areas of impermeable surfaces	Provision of attenuation storage in the form of oversized pipes and tanked storage (storm cells) to be agreed with the Environment Agency. The capacity and function of the existing Central Soakaway will also be increased.
Pollution of surface water or groundwater during construction	<p>A construction environmental management plan will be prepared in conjunction with the appointed main contractor and agreed with LBC and the Environment Agency. It will adopt good management practices and relevant measures described in the Environment Agency's Pollution Prevention Guidelines. A pollution control procedure will also be included.</p> <p>A bunded storage area, with at least 110% of the capacity of the stored materials, will be provided for the duration of the construction period for the storage of oils, fuels, chemicals and other hazardous construction materials. The compound will be located away from sensitive surface water features and will be provided with an impervious hard standing base and bund.</p>

Table 15.1: Mitigation measures

Significant residual effect	Sensitivity of receptor	Magnitude of change	Nature	Duration	Degree of effect	Level of certainty
Air quality						
None	--	--	--	--	--	--
Cultural heritage						
Somerles Castle SM	High	Small	Permanent	Adverse	Slight / moderate	Reasonable
Natural heritage						
None	--	--	--	--	--	--
Community and economic						
Generation of employment during construction	High	Small	Beneficial	Short term	Moderate	Reasonable
Generation of employment post-construction	High	Medium	Beneficial	Long term	Substantial	Reasonable
Increased value of the Airport to the local economy and local and central government	High	Large	Beneficial	Long term	Very substantial	Reasonable
Wider economic benefits associated with the proposed development	High	Small	Beneficial	Long term	Moderate	Reasonable
Increased contributions to local community projects and services	High	Small	Beneficial	Long term	Moderate	Reasonable
Ground conditions						
None						
Landscape and visual						
None						
Noise						
Effect of airborne aircraft noise during daytime and night time	N/A	N/A	Adverse	Long term	Significant	Reasonable
Traffic and transport						
Increased demand for National Express bus services 422 and 737	N/A	N/A	Adverse	Long term	Moderate to Major	Reasonable
Peak hour capacity at the MTCP junction, Percival Way/Presidents Way/Frank Lester Way junction and sections of the A1081 west of Gipsy Lane	N/A	N/A	Adverse	Long term	Major	Reasonable
Peak hour capacity at the A505 north of Eaton Green Road, A505 Kimpton Road, Crawley Green Road,	N/A	N/A	Adverse	Long term	Minor	Reasonable

Significant residual effect	Sensitivity of receptor	Magnitude of change	Nature	Duration	Degree of effect	Level of certainty
Eaton Green Road and Wigmore Lane						
Change at Eaton Green Road / Wigmore Road roundabout	N/A	N/A	Adverse	Long term	Major	Reasonable
Change at A505 Stopsley Way / Hitchin Road in the AM peak	N/A	N/A	Adverse	Long term	Moderate	Reasonable
Change at junction 10a in the Airport peak (05:00 to 06:00)	N/A	N/A	Adverse	Long term	Major	Reasonable
Change at junction 10a in the network peak	N/A	N/A	Adverse	Long term	Minor	Reasonable
Change at Frank Lester Way-Airport Approach	N/A	N/A	Adverse	Long term	Major	Reasonable
Change at all other locations	N/A	N/A	Adverse	Long term	Minor	Reasonable
Change at J10a, Gipsy Lane junction,	N/A	N/A	Adverse	Long term	Moderate	Reasonable
Change at the Holiday Inn junction	N/A	N/A	Beneficial	Long term	Moderate	Reasonable
Change at Eaton Green Road / Wigmore Road	N/A	N/A	Adverse	Long term	Moderate	Reasonable
Changes at other network junctions	N/A	N/A	Adverse	Long term	Minor	Reasonable
Improvements to the layout of the CTA, PTH and STCP	N/A	N/A	Beneficial	Long term	Moderate	Reasonable
Effect of changes in traffic flow on the wider network	N/A	N/A	Adverse	Long term	Moderate	Reasonable

Water environment

None	--	--	--	--	--	--
------	----	----	----	----	----	----

Table 15.2: Significant residual effects