RSP

RiverOak Strategic Partners

Manston Airport Development Consent Order

Preliminary Environmental Information Report
Volume 1: Chapters 1 to 6
Introduction and Air Quality
June 2017

For consultation

Scheme Name	Manston Airport DCO
Promoter's Name	RiverOak Strategic Partners
Author	Amec Foster Wheeler
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2017 Consultation

Suite of Consultation Documents

1.1 As part of the statutory consultation under section 47 of the Planning Act 2008 a suite of consultation documents relating to the proposal to reopen Manston Airport is available to the public. Together these documents give an overview of the development proposals including information on the potential benefits and impacts of the Project, environmental considerations and the business case. The documents also provide further information on the consultation process and enable the public to submit their feedback.

1.2 This consultation also forms part of RiverOak's initial engagement on the design of airspace and procedures associated with the airport. As such it is an opportunity for members of the community to highlight any factors which they believe RiverOak should take into account during that design phase. Having taken all such factors into account, the subsequent proposals for flightpaths and airspace will be subject to a separate round of consultation once the DCO application has been made.

1.3 The suite of consultation documents includes:

1. a Consultation Leaflet giving an overview of the proposals and details of where more information about the Project can be found;
2. a Feedback Form in order to collect responses to the consultation;
3. an Overview Report giving a summary of the proposals including the potential benefits and impacts of the Project, how we propose to mitigate against potential impacts, and a non-technical summary of the Preliminary Environmental Information Report (PEIR);
4. **a Preliminary Environmental Information Report (PEIR); containing preliminary information on the likely environmental effects of our proposals as we have ascertained them so far, including noise, transport and air quality, and how we propose to minimise these effects, as well as how we propose to maximise the benefits of the Project;**
5. a draft Masterplan for Manston Airport;
6. Manston Airport - a Regional and National Asset, Volumes I-IV; an analysis of air freight capacity limitations and constraints in the South East and Manston's ability to address these and provide for future growth;
7. an Outline Business Case;
8. a Statement of Community Consultation;
9. a Location Plan; and
10. an Interim Consultation Report, setting out the details of the first stage of consultation and how feedback received has been used to help develop the proposals.

1.4 This Preliminary Environmental Information Report has been prepared pursuant to the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009, as amended.

RiverOak Strategic Partners

Manston Airport DCO EIA

Preliminary Environmental Information Report

May 2017

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1	Draft for review	10/04/2017
2	Revised for review	20/04/2017
3	Final for issue	23/05/2017

Executive summary

Purpose of this report

This report has been produced for the purpose of providing Preliminary Environmental Information fulfilling requirements of the consultation process under Sections 42 and 47 of the Planning Act 2008 (“the 2008 Act”), as part of the application for Development Consent under the 2008 Act to authorise the redevelopment of Manston Airport principally as a freight airport.

This project will be a Nationally Significant Infrastructure Project under the terms of the 2008 Act and will provide much needed additional air freight capacity to the UK and also serve to relieve pressure from the other, already heavily congested, London and South East airports.

In producing this report consideration has been given to the requirements of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009, and relevant Planning Inspectorate Advice Notes.

Structure of the scoping report

The report is structured as follows:

- **Chapter 1** provides an introduction to the Proposed Development including an outline of the need for an Environmental Impact Assessment, and of the purpose and structure of this report.
- **Chapter 2** outlines the need for the Proposed Development and the strategic and scheme specific alternatives that have been considered.
- **Chapter 3** describes the Proposed Development, including information on how it would be constructed and operated.
- **Chapter 4** sets out planning policies that have informed the preliminary assessment.
- **Chapter 5** summarises the assessment approach that has been used to produce this PEIR.
- **Chapters 6 to 14** outline the preliminary environmental information for each of the topics considered in the assessment.

Chapters 1 to 6 are provided in **Volume 1**.

Chapters 7 to 11 are provided in **Volume 2**.

Chapters 12 to 14 are provided in **Volume 3**.

All Figures referred to in this report, which are not embedded as part of the relevant chapter, are provided in **Volume 4**.

All Appendices referred to in this report are provided in **Volumes 5** to **9**.

A non-technical summary which provides an overview in non-technical language of the main findings of the PEIR is included as part of the Overview Report.

Contents

1. Introduction

1.1 Overview of the Proposals

1.1.1 RiverOak Strategic Partners (hereafter referred to as 'RiverOak') intends to submit an application for development consent to reopen Manston Airport as a new air freight and cargo hub in the South East. The site is located within the district of Thanet in the county of Kent; the site location is shown in **Figure 1.1**[1].

1.1.2 There has been an operational airport at the site since 1916. Until 1998 it was operated by the Royal Air Force as RAF Manston, and for a period in the 1950s was also a base for the United States Air Force (USAF). From 1998 it was operated as a private commercial airport (known as Kent International Airport) with a range of services including scheduled passenger flights, charter flights, air freight and cargo, a flight training school, flight crew training and aircraft testing; in the most recent years it was operating as a specialist air freight and cargo hub servicing a range of operators. Although the airport was closed in May 2014 much of the airport infrastructure, including the runway, taxiways, aprons, cargo facilities and passenger terminal remain (**Figure 1.2**).

1.1.3 The Proposed Development shall consist of the following principal components:

- an area for cargo freight operations able to handle at least 10,000 movements per year;
- Facilities for other aviation-related development, including:
  - a passenger terminal and associated facilities;
  - an aircraft teardown and recycling facility;
  - a flight training school;
  - a base for at least one passenger carrier;
  - a fixed base operation for executive travel; and
  - business facilities for aviation related organisations.

1.1.4 A detailed description of the Proposed Development is provided in **Chapter 3: Description of the Proposed Development**.

1.1.5 The Proposed Development is considered to be a Nationally Significant Infrastructure Project (NSIP) in accordance with *The Planning Act 2008*[2].

1.1.6 The Planning Act 2008 ('the Act') defines what type of projects constitute NSIPs. Under Part 3, Section 14(1)(i) of the Act, an NSIP includes 'airport-related development'. Paragraph 23(3)(b) of the Act states that the 'airport-related development' mentioned within Section 14(1)(i) includes 'the alteration of an airport in a case within subsection (4)'. The case within subsection 23(4) states

[1] This Preliminary Environmental Information Report (PEIR) is supported by a number of Figures (drawings) provided in **Volume 4**. The Reader is directed to these Figures as they assist the understanding of the descriptions and assessments presented in the PEIR.
[2] Planning Act 2008, Chapter 29.

that an airport is within this subsection only if '(a) the airport is in England, or in English waters' and '(b) the alteration is expected to have the effect specified in subsection (5)'. One of the effects specified in subsection 23(5) is 'to increase by at least 10,000 per year the number of air traffic movements (ATM) of cargo aircraft for which the airport is capable of providing air cargo transport services'.

1.1.7 Accordingly, the Proposed Development is considered to be a NSIP as it involves an alteration of an airport that is located within England, which is expected to lead to an increase in airport capacity of at least 10,000 ATMs of cargo aircraft than currently provided by the airport.

1.1.8 This NSIP will help to provide much needed additional air freight and cargo handling facilities in the south-east of England in accordance with the Government's stated aim to maintain the UK's status as a global hub for aviation by allowing for increased aviation capacity in the South East[3].

1.1.9 As the Proposed Development is an NSIP, it therefore requires the grant of development consent by the making of a Development Consent Order (DCO). An application for development consent – referred to in this document as a DCO application – must be submitted to the Planning Inspectorate[4] (PINS) and, where that development is 'Environmental Impact Assessment (EIA) Development' (discussed further in section 1.2 of this report), that application must be supported by an Environmental Statement (ES) reporting on the findings of the EIA process; as required by the Act, *The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009*[5] (referred to in this report as the EIA Regulations) and *The Infrastructure Planning (Applications: Prescribed Forms and Procedures) Regulations 2009*.

1.2 The need for an Environmental Impact Assessment

1.2.1 Environmental Impact Assessment (EIA) is a process which brings together information about any likely significant environmental effects of a Proposed Development. It provides decision-makers and the public with the environmental information needed to make sustainable decisions when determining applications for certain developments. The legal basis for EIA was originally through European Community Directive 85/337/EEC[6] (then further amended by Directives 97/11/EC[7] and 2003/35/EC[8]), the amended directive being consolidated as Directive

[3] Airports Commission Final Report, July 2015
[4] The Planning Inspectorate (PINS) is responsible for examining the application and then making a recommendation to the Secretary of State for Transport about whether or not development consent should be granted and a Development Consent Order made
[5] SI 2009 No. 2263 as amended by SI 2011 No. 2741 and SI 2012 No. 787
[6] Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment
[7] Council Directive 97/11/EC of 3 March 1997 amending Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment
[8] Directive 2003/35/EC of the European Parliament and of the Council of 26 May 2003 providing for public participation in respect of the drawing up of certain plans and programmes relating to the environment and amending with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/EC

2011/92/EU[9]. Subsequent to this, Directive 2011/92/EU has been substantially amended by Directive 2014/52/EU[10]. This 2014 Directive applies in the UK as of 16 May 2017. However, it will not apply to this project as it only applies to those projects for which a Scoping Opinion has not been requested from the Secretary of State before 16 May 2017. A Scoping Opinion for this project was requested in June 2016, and received in August 2016, and so the previous Directive will continue to apply.

1.2.2 On 23 June 2016, the UK held a referendum and voted to leave the European Union. There is no immediate change to infrastructure legislation or policy currently foreseen. Relevant EU Directives have been transposed into UK law and those are to remain unchanged unless they are amended by Parliament and so will continue to apply.

1.2.3 EIA is required for certain developments under the EIA Regulations. Some NSIPs always require EIA (the EIA Regulations define these under Schedule 1), others only require EIA if they are likely to have significant effects on the environment by virtue of their nature, size or location (the EIA Regulations define these in Schedule 2).

1.2.4 In this instance, RiverOak is undertaking an EIA (in accordance with the EIA Regulations) under paragraph 10(e) of Schedule 2 because of the characteristics, location and potential impact of reopening Manston Airport, to ensure that any potentially significant effects of the Proposed Development on the environment are considered and, where appropriate, mitigated. Therefore, in accordance with Regulation 6(1b) of the EIA Regulations, RiverOak has written to the Secretary of State, via PINS, to provide notification that it intends to undertake an EIA in relation to the proposed development for which the DCO application for Manston Airport will be made.

1.2.5 As indicated in paragraph 1.2.1, a Scoping Report for the Proposed Development was submitted to PINS in June 2016 (**Appendix 1.1**[11]). This set out the likely potentially significant environmental effects (as identified at that time) that would be assessed in more detail (i.e. scoped-in) as well as those that were unlikely to be significant and could therefore be scoped-out of the assessment.

1.2.6 The Scoping Opinion was issued by PINS in August 2016 and has been reviewed during the preparation of this report (**Appendix 1.2**). A summary of the Scoping Opinion comments and where they are addressed in this report, or confirmation that they will be addressed in the ES, are documented in each of the topic chapters.

1.3 Purpose of this Report

1.3.1 This Preliminary Environmental Information Report (PEIR) has been prepared on behalf of RiverOak as part of the requirements of the consultation process under

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[9] Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (codification)
[10] Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment
[11] This Preliminary Environmental Information Report (PEIR) is supported by a number of Appendices provided in **Volumes 5** to **9**.

Sections 42 and 47 of the Act, and will enable consultees and other interested parties to develop their understanding of the likely environmental effects of the Proposed Development prior to completion of the ES.

1.3.2 Under the EIA Regulations, 'Preliminary environmental information' denotes information referred to in Schedule 4, Part 1 of the EIA Regulations which has been compiled by the applicant and is reasonably required to assess the environmental effects of the development and any associated development. **Table 1.1** summarises where, within this PEIR, the information required by Schedule 4 can be found.

1.3.3 This report provides preliminary information based on the development of the project to date and data gathered up to this point, which will subsequently be provided in full and final form within the ES. As this information has been compiled at this stage in the pre-application process, the information may be necessarily incomplete and subject to further update and revision whilst the ES is being finalised. The limitations of the information presented in this PEIR are explained in the technical topic chapters (6-14).

Table 1.1 Location of the information for inclusion in ESs (Schedule 4 of the EIA Regulations) presented in this PEIR

Schedule 4, Part 1	Topic Chapters and Document References
Description of the development	Chapter 3
Outline of the main alternatives	Chapter 2
Description of the aspects of the environment likely to be significantly affected and the likely significant effects	
Population	Landscape and visual [Chapter 10]; Traffic and Transport [Chapter 13]; Noise [Chapter 11]; Air Quality [Chapter 5]; and Socio-economics [Chapter 12].
Fauna	Biodiversity [Chapter 6].
Flora	Biodiversity [Chapter 6].
Soil	Land Quality [Chapter 9]
Water	Freshwater Environment [Chapter 7]
Air	Traffic and Transport [Chapter 13]; Air Quality [Chapter 5]
Climatic Factors	Freshwater Environment [Chapter 7]
Material assets, including the architectural and archaeological heritage	Historic Environment [Chapter 8]
Landscape	Landscape and Visual [Chapter 10]
The inter-relationship between the above factors	These are discussed within each chapter as appropriate.
Cumulative Effects	Cumulative Effects Assessment [Chapter 5]
Description of the measures to prevent, reduce and where possible offset any significant adverse effects on the environment	These are discussed within each chapter as appropriate.
A non-technical summary	Non-Technical Summary included as part of the Overview Report

Schedule 4, Part 1	Topic Chapters and Document References
An indication of the difficulties encountered in compiling the required information	These are discussed within each section as relevant including the limitations of the PEIR.

1.4 Consultation

1.4.1 Following the submission of the request for a Scoping Opinion and of the EIA Scoping Report (**Appendix 1.1**) in June 2016, as part of a non-statutory consultation held between July and September 2016, RiverOak held a series of six informal non-statutory pre-application consultation events in Thanet and other parts of East Kent. These events attracted over 1000 visitors and 822 written responses were received. The Interim Consultation Report available as part of the consultation materials sets out who was consulted in 2016 and how their responses were taken into account. The feedback and responses from these events, combined with the PINS Scoping Opinion (**Appendix 1.2**) have been analysed and used to inform the ongoing project design.

1.4.2 The statutory consultation, as required under Section 42 and 47 of the Act, is being held from 12 June to 23 July 2017. A series of public exhibitions are being held in June 2017 at a range of venues in Thanet and the surrounding area. A Statement of Community Consultation (included as part of the consultation materials) has been prepared and consulted upon with Thanet District Council and other local authorities. This sets out how RiverOak proposes to consult people living in the vicinity of the Proposed Development and those who may be affected by it.

1.4.3 RiverOak is consulting on the Proposed Development and is inviting responses in relation to all elements of it, some of which have featured in the earlier non-statutory pre-application period of consultation and engagement on the project. It should be noted, however, that there are a number of matters that have not been presented before. In particular:

- changes that have been made to the design of the Proposed Development following publication of the EIA Scoping Report;
- detailed elements of the proposals, including the air traffic forecast, the jobs forecast to be generated, the project construction programme, construction information, and the outline drainage strategy;
- the preliminary environmental information which has been compiled to date on the environmental effects of the Proposed Development (this document); and
- other elements of the proposals, such as mitigation measures (referred to in this report as environmental measures), which relate to specific geographical areas where the works are proposed.

1.4.4 Following this statutory consultation stage, and having regard to consultation feedback, the Proposed Development will be further refined and the ES will be completed. A DCO application, including the ES, is currently programmed to be submitted to PINS later in 2017.

1.5 Structure of the PEIR

1.5.1 This report is structured as follows:

- **Chapter 2** outlines the need for the Proposed Development and the strategic and scheme specific alternatives that have been considered.
- **Chapter 3** describes the Proposed Development, including information on how it would be constructed and operated.
- **Chapter 4** sets out planning policies that have informed the preliminary assessment.
- **Chapter 5** summarises the assessment approach that has been used to produce this PEIR.
- **Chapters 6 to 14** outline the preliminary environmental information for each of the topics considered in the assessment.

1.5.2 Chapters 1 to 6 are provided in **Volume 1**.

1.5.3 Chapters 7 to 11 are provided in **Volume 2**.

1.5.4 Chapters 12 to 14 are provided in **Volume 3**.

1.5.5 All Figures referred to in this report, which are not embedded as part of the relevant chapter, are provided in **Volume 4**.

1.5.6 All Appendices referred to in this report are provided in **Volumes 5** to **9**.

1.5.7 A non-technical summary which provides an overview in non-technical language of the main findings of the PEIR is included as part of the Overview Report.

2. The Need for the Proposed Development and the Alternatives Considered to Date

2.1 The need for the Proposed Development

2.1.1 The aviation sector is of vital importance to the UK economy, and has been estimated to contribute an annual £52 billion or 3.4% to UK GDP[12]. In addition the UK aviation services sector supports the wider UK economy, including British manufacturing, by carrying high value exports around the world, including to emerging markets. The total value of tradeable goods carried through UK airports in 2014 exceeded £140 billion, and an estimated 40%, by value, of the UK's trade with economies outside of the EU is carried by air[13].

2.1.2 The increase in demand for air transport seen over the preceding years is also forecast to continue in the period up to 2035. There are forecast to be 50% more flights in Europe in 2035 compared with 2012[14]. The demand for air freight is also set to increase by more than 50% across the period 2015 to 2035, with particularly strong growth forecast for the longer distance routes such as Europe-Asia (4.6% annually) and Europe-Africa (3.8% annually)[15].

2.1.3 A large proportion of air freight is currently carried as 'belly hold' freight, i.e. in the hold of passenger aircraft, particularly in the UK. But the advantages of transporting air freight by dedicated air freighters, particularly for high-value goods, has led to a forecast increase in the number of airplanes in the worldwide freighter fleet of 70% from 2015 to 2035 (Boeing 2016 p4).

2.1.4 Should the UK be unable to meet the increased demand for air freight and air freighters, some 2.1 million tonnes of freight would be diverted elsewhere by 2050, mainly to Northern European airports (York Aviation, 2015, p. 19).

2.1.5 London's six airports: Heathrow, Gatwick, Stansted, Luton, London City and Southend, facilitate around 76% of the UK's air freight. However, the Airports Commission report shows that all London airports will be at capacity by 2030. The South East is particularly hard hit by the lack of airport capacity with sustained losses in potential trade running at £2bn/year without additional runway capacity (Centre for Business Research, 2016[16]).

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[12] Oxford Economics (2015), Economic Benefits from Air Transport in the UK. Available from http://www.oxfordeconomics.com/my-oxford/projects/281929 (accessed 16 August 2016).
[13] Airports Commission (2015), Airports Commission: Final report.
[14] Eurocontrol (2013), Challenges of Growth 2013: Summary Report. European Commission: Brussels. Available from http://www.eurocontrol.int/sites/default/files/content/documents/official-documents/reports/201307-challenges-of-growthsummary-report.pdf (accessed 16 August 2016).
[15] Boeing (2016) World Air Cargo Forecast 2016-2017. Available from http://www.boeing.com/resources/boeingdotcom/commercial/about-ourmarket/cargo-market-detail-wacf/download-report/assets/pdfs/wacf.pdf (accessed 30 January 2017).
[16] Centre for Business Research (2016), The Importance of Air Freight to UK Exports: The impact of delaying the runway capacity decision on UK international trade growth. Report for Let Britain Fly Campaign. Available from http://londonfirst.co.uk/wp- content/uploads/2016/09/Importance-of-air-freight-to-UK-exports-PDF-FINAL.pdf (accessed 7 September 2016)

2.1.6 Further information on the UK aviation sectors, including a qualitative study of potential demand, has been undertaken by Azimuth Associates[17], and is included as part of the consultations materials. This identifies a number of issues, which could be addressed by the Proposed Development and the reopening of Manston Airport, including:

- the lack of available slots at existing South East airports;
- 'bumping' of freight from passenger aircraft;
- security issues particularly with outsized cargo; and
- speed of turnaround and bottlenecks for air freight.

2.1.7 In promoting this Proposed Development, RiverOak have identified that a dedicated freight airport, that is an airport at which the needs of airfreight carriers and operators are given priority over passenger flights, could provide a significant contribution to meeting the wider need for increased airport capacity in the UK.

2.2 Characteristics of an air freight airport

2.2.1 As has been outlined above, and discussed in further detail in Manston Airport: A National and Regional Aviation Asset (Azimuth Associates 2017), there is an identified need for increased capacity for airfreight and for dedicated air freighters in the UK aviation sector. Whilst some additional capacity can be provided at existing passenger focused airports, including the six main London airports, there is insufficient capacity to meet both the existing forecast demand, or to allow the UK aviation sector, and wider UK economy, to grow and to capture new market share.

2.2.2 Aviation infrastructure is critical to the air freight industry. A survey of global competitiveness produced by the World Economic Forum[18], showed that capacity constraints within the UK's air transport infrastructure are reducing competition and the desire to strive to provide the highest quality service. Providing sufficient aviation capacity to meet future airfreight demand is, say Oxford Economics[19] (2013, p. 8), the first step to encouraging future trade growth. This will become ever more critical as the UK prepares to exit the EU.

2.2.3 In the consideration of the needs case for the Proposed Development, and through the project evolution and design, a set of characteristics for a dedicated air freight airport have been established. These have formed the basis for both the consideration of alternatives, but also for the design of the Proposed Development.

2.2.4 The characteristics of an idealised air freight airport, based on the developing or enhancing of an existing airport site, would include:

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[17] Azimuth Associates (2017) Manston Airport: A National and Regional Aviation Asset – Volumes I to IV
[18] https://www.weforum.org/reports/the-global-competitiveness-report-2016-2017-1/ (accessed 10 May 2017) p354
[19] Oxford Economics (2013), Impacts on the Air Freight Industry, Customers and Associated Business Sectors. Available from http://content.tfl.gov.uk/impacts-of-a-new-hubairport-on-air-freight-industry.pdf (accessed 11 March 2016)

- a 2500m+ (non-grass) runway capable of supporting CAT II/III runway operations (for more information see **Appendix 3.1**);
- airport infrastructure with the capacity to expand and provide facilities for new airfreight operators according to demand;
- licensed, or the ability to obtain a licence, from the European Aviation Safety Agency (EASA), or other relevant licensing organisation, for the operation of the types of aircraft currently used, and likely to be used in the future, by airfreight operators;
- capacity to accommodate dedicated air freighters and hold freight, including capability to handle outsized and live animal cargo;
- availability of new slots for airfreight operators, and a flexibility of existing slots;
- air freight operations not constrained by passenger and other operations;
- airspace that is outside of the London Control Zone (CTR) to provide maximum flexibility and capacity for airport operations;
- good surface access to the strategic highways network, with no bottlenecks to access in or around the airport, with as an additional advantage a good connection to high quality public transport infrastructure; and
- located in the South East of England close to the main significant population and commercial centres, with as an additional advantage a good connection with continental Europe.

2.3 Main alternatives for an air freight airport

2.3.1 The EIA Regulations set out within Schedule 4, Part 1 the need to outline the main alternatives considered as part of the EIA process.

2.3.2 In considering the main alternatives consideration has been given to the characteristics of an air freight airport as outlined in **Section 2.2**, and on the information on the current airport capacity and constraints within the UK aviation sector provided within Manston Airport: A National and Regional Aviation Asset Volume I (Azimuth Associates 2017)

Strategic Alternatives to Manston Airport

2.3.3 As outlined in at paragraph 2.1.5, and in Manston Airport: A National and Regional Aviation Asset Volume I (Azimuth Associates 2017), at present 76% of the UK's air freight is currently carried through London's six main airports: Stansted, Heathrow, Gatwick, Luton, London City and Southend. However, all of these existing and mature airports are focused primarily on the passenger market with most of the freight carried as belly hold. A summary of the current air freight operations, and of the constraints to the increase in air freight, at these airports is provided below.

Stansted Airport

2.3.4 Cargo-only flights account for only around 8% of ATMs at Stansted, and the airport is currently prevented from operating to its maximum capacity due to the conditions of its consent. It seems likely that the airport's owners, Manchester Airport Group (MAG), will want to maximise the use of their infrastructure, in line with the DfT's desire to make full use of existing capacity (DfT, 2012) but this is highly likely to focus heavily on the passenger market.

Heathrow Airport

2.3.5 Heathrow is the UK's only hub airport. Whilst it handles 63% of the UK's air freight, very few dedicated cargo aircraft use the airport (CAA, 2016). More than 99% of air freight at Heathrow is carried in the belly hold of passenger aircraft (CAA, 2013, p. 35).

2.3.6 The addition of a third runway at Heathrow is unlikely to resolve the capacity issues for dedicated freighters. Since Heathrow's passenger market has been constrained for some years, it is likely that the new runway will be used to meet this existing demand. Heathrow's focus on passenger and belly hold markets is likely to continue to keep dedicated freighters out of the airport. This means that markets not served by passenger aircraft will remain unreachable for UK importers and exporters without a dedicated freighter operation.

2.3.7 In 2015, Heathrow Airport Limited announced their intention to overhaul their cargo facilities, with the key aim of reducing the current processing time to around 4 hours. However, this is still considerably longer than Manston's previous and proposed processing times for freight (Manston Airport: A National and Regional Aviation Asset Volume II p58 (Azimuth Associates 2017)). Also, as the York Aviation figures show, there will be a shortfall of slots for dedicated freighters in the South East, likely to be in the region of 45,000 by 2050, even with the addition of a third runway at Heathrow (York Aviation, 2015, p. 19[20]).

2.3.8 As such, even with an operational third runway at Heathrow, Manston will still be vital to ensure the UK meets the needs, wherever possible, of the demand for air freight.

Gatwick

2.3.9 Gatwick handles very few dedicated freighters, although it has increased its annual tonnage from only 3,000 in 2014 to 73,000 tonnes in 2015. This lack of experience, which is a key element in the choice of a freight airport for operators (Kupfer et al, 2016[21]), prevents Gatwick from being a serious competitor in the freight market. It has been forecast that with a second runway at Gatwick there would be a need for around 65,000 additional freighter movements per year from 2050 (York Aviation, 2015, p. 19); it can therefore be concluded that even with additional runways at both Heathrow and Gatwick the shortfall in capacity will equate to approximately 20,000 freighter movements.

[20] York Aviation (2015), Implications for the Air Freight Sector of Different Airport Capacity Options. Available from http://content.tfl.gov.uk/air-freight-implications-from-newcapacity.pdf (accessed 2 April 2016).
[21] Kupfer, F., Kessels, R., Goos, P., Van de Voorde, E. and Verhetsel, A. (2016), The Origin Destination Airport Choice for All-Cargo Aircraft Operations in Europe. Transportation Research Part E, vol. 87, pp. 53-74.

Luton

2.3.10 Luton Airport is located close to the M1 and therefore well situated to access the UK's road network. The airport handles around 28,000 tonnes of cargo each year with DHL, MNG Airlines and British Airways operating dedicated freighters from the airport.

2.3.11 The current number of stands at Luton is unable to support significant growth[22]. Luton's business profile is similar to Stansted's in terms of the dominance of Low Cost Carriers, therefore the airport is focused on passenger traffic. It would therefore be improbable for the airport to provide a hub for dedicated freighters.

London City

2.3.12 London City has recently benefited from permission to build seven new aircraft stands, a parallel taxiway and extend the passenger terminal. However, the airport is focused on the passenger market and handled only 24 tonnes of freight in 2015. London City has a short and constrained runway, at 1,900 metres, and is therefore unable to support a large freighter operation.

Southend

2.3.13 Southend Airport is focused on the Low Cost Carrier passenger market, handling only five tonnes of freight in 2015. Although extended in 2012, Southend's runway is unlikely to be suitable for long or mid-range freighter aircraft.

Other South East UK Airfields

2.3.14 Alternative options for increasing air freight capacity in the South East have been identified. However, as shown in the table below each are subject to fundamental constraints on their development and or their ability to meet the requirements outlined in **Section 2.2**.

Table 2.1 Other airfields in the South East.

Airfield	Constraint
Biggin Hill	Difficult road access to main M25 artery, restricted opening hours, short runway, runway direction and proximity to Gatwick Airport creates numerous airspace issues, residential location, experiences poor weather conditions due to elevated location.
Farnborough	Restricted number of movement particularly at weekends, only certain aircraft categories permitted.
Lydd	Short runway with considerable approach issues (including MOD Hythe firing range and proximity of Dungeness Power Station), rural location with relatively poor surface transport connectivity.
Northolt	RAF station, safety issues raised due to proximity to Heathrow, difficulties integrating with London airspace, short runway.
Rochester	Grass runway.
Shoreham	Short runway, light aircraft use only.

[22] https://www.caa.co.uk/WorkArea/DownloadAsset.aspx?id=4294972551

Airports outside of the South East

2.3.15 As outlined in **Section 2.2** one of the key requirements for a dedicated air freight airport would be close proximity to the main UK commercial and population centres in the South East, with an additional advantage of easy access to continental Europe. None of the existing main London airports have the capability or willingness to focus primarily on air freight and air freighters, and, with the exception of the Proposed Development, none of the other airports in the South East has either the existing airport infrastructure or the ability for the new infrastructure to support air freight to be created.

2.3.16 Outside of the South East the only airport that handles a significant volume of air freight is East Midlands Airport; this is a major integrator hub, focused on handling packages and parcels. This has led to a number of integrator carriers, such as DHL, TNT and UPS, setting up bases at East Midlands Airport for the handling of packages and parcels.

2.3.17 However, East Midlands serves a wide catchment area, with many of the business served by the airport located in the South East at some distance from the airport, with access hampered by congestion on the UK's road network in and around the Midlands. Therefore, total time taken to deliver from origin to final destination increases, particularly around the bottlenecks on some of the major motorways.

Manston Airport the Preferred Option

2.3.18 The requirements for an idealised air freight airport, as set out in **Section 2.2** above, have been considered in relation to the Proposed Development.

2.3.19 Manston Airport is located outside of the London Air Traffic Control Zone, and flights approaching from the south and east, i.e. from Africa, or Europe, the Middle East and Asia, can save up to 45 minutes in flying time compared with other airports.

2.3.20 Manston Airport also has an existing 2748m long paved runway, which, with only minor alterations and new navigational aids and equipment (see **Section 3.2** below), would be able to obtain a license from the EASA to allow it to handle the larger classes of aircraft, that are used and operated by air freight carriers.

2.3.21 In addition, as is shown in **Section 3.2**, Manston Airport has sufficient space for the construction of new air freight handling, storage and processing facilities, alongside the new aircraft stands and aprons. This would provide a significant advantage as it allows the freight handling, forwarding and integrating to be undertaken airside on the airport site, and minimises the need for the transfer of freight off the airport site for processing.

2.3.22 Whilst there are some disadvantages to the Proposed Development at Manston Airport, for example being located to the south east of London with increased road journey times to the north and west of London and the centres along the M4 corridor, these can minimised and offset by the proposals which include an existing 2748m paved runway; dedicated air freight stands, aprons, handling, storage and processing facilities; prioritisation of freight with quick turnaround and unloading time of aircraft; and availability and flexibility of slots.

2.3.23 Taking the above into consideration, Manston Airport is considered to be the most suitable, viable choice for the location of a freight-focused airport in the South East of England due to its size, location and lack of airspace constraints. Indeed, the 2003 White Paper, The Future of Air Transport, acknowledged that Manston '*could play a valuable role in meeting local demand and could contribute to regional economic development*' (Department for Transport, 2003, p.132[23]).

2.4 Consideration of on-site alternatives

2.4.1 In addition to the assessment of alternative sites for a dedicated air freight airport in the South East, the EIA has also given consideration to on-site alternatives for individual elements and components of the Proposed Development. This has been undertake as part of the on-going project evolution (see **Section 5.3**) as part of the project design process.

2.4.2 A number of alternative layouts, designs and configurations were considered for the air freight and cargo facilities. This included looking at the number of aircraft stands, apron design, taxiway layout and configuration, and size, location and layout of the associated freight handling and parking facilities. Whilst these were constrained by the need to provide sufficient capacity to meet the demands of the airfreight forecast, and to allow for the safe and efficient operation of the airport; opportunities to incorporate environmental measures into the design of the scheme have been considered. Further information on these alternatives is provided throughout this PEIR.

Site Access

2.4.3 Site access, including the access for HGVs, passengers, staff, and fuel deliveries, was considered as part of this process. When Manston Airport was previously operating the airfreight facilities used an access from the Spitfire Way (B2190), with all other parts of the airport accessed from Manston Road (B2050). Neither of these were designed to accommodate the volumes of traffic experienced when the airport was previously operational, and are considered insufficient for the traffic forecast for the Proposed Development.

2.4.4 Alternative access for the vehicles associated with the airfreight operations considered using the existing airfreight access, a new single airport access, located somewhere on Manston Road (B2050), or a new dedicated airfreight access. It was this option, to be located on the Spitfire Way (B2190), away from the existing residential receptors, that was considered to provide the most advantages, both operationally and in mitigation of any potentially significant environment effects.

2.4.5 Further detail and design of the new accesses, including of the access for passengers and airport staff is discussed in **Chapter 3: Description of the Proposed Development**, and **Chapter 14: Traffic and Transportation**.

[23] Department for Transport (2003), The Future of Transport, Cm 6046. London: The Stationery Office.

Surface Water Infrastructure

2.4.6 The design of the surface water capture, treatment and drainage system has also been subject to the consideration of on-site alternatives and options. The size, location and layout of the attenuation ponds, the surface water collection and drainage network, the water treatment facilities, and the options for the discharge of surface water from the site have also been considered.

2.4.7 Work is currently ongoing through the design process, capacity and condition surveys are being conducted on the existing discharge outfall and discussion on the capacity of the existing foul water network are being undertaken. More detail on these elements will be presented within the Drainage Strategy which will be included as part of the ES to be submitted in support of the DCO application.

Fuel Farm

2.4.8 The location and design of the new airport fuel farm is also the subject of consideration of alternatives within the airport master planning and design process. In selecting the location for the fuel farm consideration was given to the following:

- preference for location airside, with minimal disruption to other airport operational activities from the fuel farm;
- the operation of the fuel farm, including the method for delivery and transport of fuel around the airport, should be acceptable to the Civil Aviation Authority;
- good access for fuel tankers and other deliveries, preferably separate from the main airport access;
- ability to accommodate the new infrastructure and facilities required to meet the airport fuel storage requirements;
- a location outside of Groundwater Source Protection Zone 1 (SPZ1); and
- a location that meets any requirements of the Health & Safety Executive.

2.4.9 The currently preferred location for the new fuel farm, is the existing Jentex fuel facility in the southeast of the Proposed Development and there are ongoing discussions on the use of this site taking place with the Environment Agency.

3. Description of the Proposed Development

3.1 Description of the Site and the Surrounding Area

The Application Site

3.1.1 The application site is on the existing site of Manston Airport, west of the village of Manston and north east of the village of Minster, in Kent. The town of Margate lies approximately 5km to the north of the site and Ramsgate approximately 4km to the east. Sandwich Bay is located approximately 4-5km to the south east. The northern part of the site is bisected by the B2050 (Manston Road), and the site is bounded by the A299 dual carriageway to the south and the B2190 (Spitfire Way) to the west. The existing site access is from the junction of the B2050 with the B2190. The location of the site is shown on **Figure 3.1**.

3.1.2 The site covers an area of approximately 296 hectares (732 acres) and comprises a combination of existing buildings and hardstanding, large expanses of grassland, and some limited areas of scrub and/or landscaping. This includes the 2748m long, 60m wide runway, which is orientated in an east-west direction across the southern part of the site. The existing buildings are clustered along the east and northwest boundaries of the site, as shown on **Figure 3.2**, and include:

- a cargo handling facility comprising two storage warehouses 6 - 8m high, and one hangar 12m high, all finished with metal cladding, on an area of 5,200m^2, with gated entrances and a security box;
- a 12m high fire station building, constructed of brick and with a corrugated metal roof, on an area of 2,200m^2;
- a helicopter pilot training facility comprising two 10m high hangars with metal cladding, on an area of 950m^2;
- two 5m high museum buildings of brick construction, on an area of 2,000m^2;
- a 4m high terminal building, on an area of 2,400m^2;
- a 6m high air traffic control building, including a 9m high viewing tower, on an area of 700m^2;
- a 12m high airplane maintenance hangar, with a taller 16m high movable section to enclose an airplane tail fin, on an area of 4,700m^2; and
- a fuel farm.

3.1.3 A network of hard surfacing, used for taxiways, aprons, passenger car parking, and roads connects the buildings to the runway and to the two main airport entrance points that are located in the east and west of the site. The buildings and facilities are generally surrounded by grassland; during previous operation this was kept closely mown. Landscape planting is limited to lines of ornamental trees and shrubs along some sections of the boundary such as the B2190, around some buildings and in car parking areas on the eastern edge. Post and wire security fencing of varying height runs alongside most of the airport perimeter.

3.1.4 The part of the site to the north of Manston Road (B2050), which bisects the centre of the site in a roughly east to west direction, is referred to as the 'Northern Grass'. This part of the site is predominantly grassland, with some areas of hard standing, including a stretch of taxiway that formerly linked across to the main taxiway network. The two museums, the Spitfire and Hurricane Memorial Museum, and the RAF Manston Museum, are located in the southwestern corner of the 'Northern Grass'. A small number of other redundant buildings, such as the former RAF air traffic control tower, are also located on the 'Northern Grass'.

Site History

3.1.5 The airport provided a variety of airport-related services from 1916 until it ceased operation in May 2014. It operated as RAF Manston until 1998, and was also a base for the United States Air Force for a period in the 1950s. From 1998 it operated as a private commercial airport with a range of services including scheduled passenger flights, charter flights, air freight and cargo, a flight training school, flight crew training and aircraft testing. More recently it operated as a specialist air freight and cargo hub. Much of the airport infrastructure, including the runway, taxiways, aprons, cargo facilities, and a passenger terminal still remains, with a number of the buildings still in use, including a helicopter pilot training centre, and the Spitfire and Hurricane and RAF Manston museums.

The Surrounding Area

3.1.6 The site is located within National Landscape Character Area 113: North Kent Plain. This encompasses an approximately (~) 90km long strip of land bordering the Thames Estuary to the north and the chalk of the Kent Downs to the south. The site is also within the Thanet Landscape Character Area. This features a centrally domed ridge on the crest of which the airport is dominant. The area is generally characterised by open, large scale arable fields with long views.

3.1.7 The surrounding area is generally characterised by a moderate density of villages, small groups of residential properties and individual properties. These include:

- properties at Bell Davies Drive and Esmonde Drive to the north;
- properties at the southern end of Manston Court Road to the east of the airport;
- properties on the north side of the B2190 Spitfire Way;
- properties on the northwest side of Manston Road;
- properties along either side of Manston Court Road;
- properties at the southern end of Manston High Street; and
- those parts of Cliffsend adjacent to Canterbury Road West.

3.1.8 Not immediately adjacent but within 0.5km to 1km are several smaller settlements including Manston, Minister, Cliffsend, Acol, Alland Grange Lane and Woodchurch.

3.2 Description of the Proposed Development

Summary Description

3.2.1 The aims and purpose of the Proposed Development are to reopen and develop Manston Airport into a dedicated air freight facility, which also offers passenger, executive travel, and aircraft engineering services. The facilities for air freight and cargo operations would be able to handle a minimum of 10,000 air freight air traffic movements per year, and the airport and facilities at the airport would be compliant with European Aviation Safety Agency (EASA), or other relevant licensing organisation standards. The existing site layout in the context of EASA requirements, and technical safeguarding in relation to the proposed layout, are shown on **Figures 3.3 and 3.26**, respectively.

3.2.2 A glossary of airport and aviation related terminology is included as **Appendix 3.1**.

3.2.3 A summary of the works to be undertaken as part of the proposed development are presented below:

- upgrade of Runway 28 to allow CAT II/III operations;
- realignment of the parallel taxiway (Alpha) to provide EASA compliant clearances to runway operations;
- construction of 19 EASA compliant Code E stands for air freight aircraft;
- installation of new high mast lighting for aprons and stands;
- construction of 65,500m² of cargo facilities;
- construction of a new air traffic control tower;
- construction of a new airport fuel farm;
- existing fire station refurbishment/replacement;
- construction of new fire training area;
- complete fit-out of airfield navigational aids (nav-aids);
- construction of new aircraft maintenance hangars;
- development of the 'Northern Grass Area' for airport related businesses;
- demolition of the redundant 'old' Air Traffic Control Tower;
- relocation of the RAF Manston museum and enhancement of existing facilities for museums on the site;
- highway improvement works, both on and off site; and
- extension of passenger service facilities including an apron extension to accommodate an additional aircraft stand and doubling of the current terminal size.

3.2.4 The proposed zoning of different areas within the airport, and the proposed site layout are shown on **Figure 3.4** and **Figure 3.5**, respectively. Indicative visuals of the proposed development have been prepared and are shown on **Figures 3.6-3.9**.

Manston Airport DCO Programme and Project Delivery

3.2.5 The submission of the DCO application is planned for Autumn 2017 following the completion of the statutory consultation, under section 42 of the Planning Act, between June and July 2017. Based on this programme and the anticipated determination period, the DCO may be granted in Spring 2019 and this timescale has been assumed when developing the construction/operational programme for this assessment.

3.2.6 The forecasting of the air freight and passenger movements for the airport, as discussed further below, has been conducted across a 20 year period from the granting of the DCO. This section outlines the programme for construction and then operation of Manston Airport from over this 20-year period.

3.2.7 The main activities to be undertaken during year 1 would be the construction activities required to return the airport to full operational use. There may be some limited airport services, for example helicopter and heli-charter services, flight school and training services, and fixed base of operation services; however these will be dependent on the level of work required to rehabilitate the runway and to construct other essential services and utilities.

3.2.8 The full reopening of the airport would therefore take place in year 2, currently expected to be 2020, which would also see the start of the air freight services. Passenger services are anticipated to start in year 3, currently 2021.

3.2.9 Three further phases of construction, as described in more detail below, would follow in years 2-4, 4-10 and 10-15. During these three phases of construction the airport would remain operational.

3.2.10 Construction phasing is depicted on **Figures 3.27-3.30**.

Table 3.1 Outline Project Programme

Component	Start Date	End Date	Airport Year of Operation
Granting of DCO	2019	N/A	Year 1
Construction Phase 1	2019	2020	Year 1
Start of limited airport services	2019	2020	Year 1
Opening of 1st Phase of airport	2020	N/A	Year 2
Start of air freight services	2020	N/A	Year 2
Construction Phase 2	2020	2023	Years 2-4
Start of passenger services	2021	N/A	Year 3
Construction Phase 3	2023	2030	Years 4-10

Component	Start Date	End Date	Airport Year of Operation
Construction Phase 4	2030	2036	Years 11-17

Airport Masterplan Components

Runway, Taxiway, Apron and Stands

3.2.11 It is proposed that the existing 2748m east-west aligned runway is retained for the reopened airport. Following the granting of the DCO, and prior to commencements of any construction activities a full assessment of the runway condition would be undertaken; it is likely that rehabilitation to improve the load bearing capacity for future aircraft operations and in order to be compliant to allow CAT II/III operations[24], would be required (for more information see **Appendix 3.1**). This is likely to require a 150mm overlay of bituminous materials across the runway; further details of the construction methodology for the runway rehabilitation works are presented below (see the Asphalt Pavement section of this chapter).

3.2.12 The operational part of the runway paved area is currently 60m wide. The original concrete paving for the Second World War runway, which was built very wide to accommodate simultaneous take-offs and safe landing for damaged aircraft, is up to 230m wide in places. The area of the runway to be refurbished covers a standard operational width of 45m with 7.5m shoulders (60m paved total).

3.2.13 The runway pavement improvement proposals are shown on **Figure 3.10**.

3.2.14 The existing parallel taxiway (Taxiway Alpha) is not compliant with European Aviation Safety Agency (EASA) guidelines with regard to the separation distance from the runway to allow for the taxiing of larger classes of aircraft. Therefore, a new taxiway Alpha, plus associated taxiways to serve the new cargo stands, would be required. It is proposed that the new taxiways would be constructed in concrete. The Runway-Taxiway Alpha Interference is shown on **Figure 3.11**.

3.2.15 A total of 19 Code E[25] stands would be created to service the air freight operations, with new taxiways to service the stands and connect them to the runway. The total area for the new taxiway and airfreight stands would be approximately 255,000m^2.

3.2.16 The existing passenger apron, which can accommodate 3 passenger aircraft stands, would be retained. Some rehabilitation or refurbishment may be required in order that it is also made compliant with EASA guidelines. If required, this apron would be extended during construction phase 4 to provide an additional passenger aircraft stand.

3.2.17 The aircraft stands would be constructed using Pavement Quality Concrete (PQC). This is an industry standard form of construction due to its ability to withstand aircraft static loads in order to provide the required durability. Positive drainage,

[24] Category II and III runway operations refer to category of instrument landing systems (ILS) equipment which support the different categories of approach/landing operations. Category II is the minimum requirement to allow an airport to obtain EASA certification (see Box 3.1 below).
[25] Alphabetic code for defining aircraft size based on wingspan from A (smallest) to F (largest).

where the drainage has been designed so that all surface water run off flows into the airport drainage network, would be provided on all stand areas. High mast lights would provide the required lighting for operational aircraft stands. It is expected these would vary in height from 15m to 25m depending on Obstacle Limitation Surface (OLS)[26] requirements. OLS requirements in relation to the cargo area are shown on **Figure 3.12**.

3.2.18 It is assumed that all airport stands would incorporate fixed electrical ground power (FEGP) units, and therefore that the requirements for auxiliary power units (APU) would be minimal.

3.2.19 The area where the new stands and taxiways would be constructed, located to the north of the existing runway, currently has a gradient of more than 1.5%. In order to comply with the EASA guidance on airport design (document CS-ADR-DSN) the gradient for longitudinal slopes on taxiways should not exceed 1.5% and on an aircraft stand the maximum slope should not exceed 1% in any direction.

3.2.20 Therefore earthwork operations would be required in order to provide a suitable and compliant building platform for the taxiway, aprons and stands. This work would be completed during construction phase 1. It is estimated that approximately 300,000m^3 of material would be needed. At this stage, a cut-dispose-import solution is assumed by importing the required engineering fill material. Excavated material from the site would need to be disposed of, most likely off-site, and new engineering fill material imported for the construction. As an alternative the re-use of site won material, for example from the removal of existing taxiways and areas of hardstanding, would be considered where viable. However until an assessment of the suitability of this material is undertaken, it has been assumed that all engineering fill material will be imported.

3.2.21 Existing site contours and proposed contours are shown on **Figure 3.22a** and **Figure 3.22b**, respectively. Cross-sections of the proposed development are shown on **Figure 3.23**.

Air Traffic Control, Navigations Aids, Radar and Lighting

3.2.22 Much of the equipment formerly required to operate the airport has been removed, and many of the existing facilities and buildings would require refurbishment or replacing. Therefore, in order to allow the airport to obtain a CAA aerodrome licence, and to comply with relevant EASA guidance new equipment and facilities are required.

3.2.23 The existing air traffic control (ATC) building, located immediately to the north of the runway, is not in a location that would allow the controllers to safely and easily operate the new configuration of the re-opened airport, and therefore a new ATC facility would be required. A study is currently being completed regarding the provision of an offsite ATC facility. This could result in the removal of the ATC building and its replacement with a series of CCTV cameras which are linked to a remote ATC service. Until this study has been completed and discussions held with the CAA the assumption is that a new ATC building would be required and new equipment installed.

[26] The purpose of the OLS is to define the airspace around aerodromes to be maintained free from obstacles. This is comprised of numerous invisible slopes relating to the runway position and elevation.

3.2.24 The current proposal is for a new ATC facility to be located in the northwest of the main airport site adjacent to the airfreight cargo stands, from where the controllers will have uninterrupted views of the runway, taxiways, both thresholds, and cargo stands.

3.2.25 The new ATC would have a maximum height of no more than 29m, including aerials, masts and other equipment to be located on the top. The design concept of the ATC will be completed for the DCO application, but currently two alternative options are being considered:

- a building design with a footprint of approximately 15m by 15m, this design incorporates offices and other facilities in the base and lower floors, with the control room located at the top, this would reduce the need for other offices elsewhere on the airport site; and
- a more traditional tower type structure, with the control room located at the top of a tower. This design can incorporate innovative design features that make the control towers itself a landmark.

3.2.26 Indicative visuals of the ATC Tower are shown on **Figure 3.16c**. These visuals correspond to the second design concept outlined above.

3.2.27 A new radar would be required to replace the previous radar which was sold when the airport closed. The new radar would be installed using the existing radar tower located in the 'Northern Grass' area.

3.2.28 The former approach lights within the airport have been removed so would need replacing. Outside of the airport the approach remain and at this stage it is anticipated that these would not require replacing. For the Runway 28 end, additional approach lights would be required to meet the requirements for CAT II/III operations, but existing lights will be reused where possible.

3.2.29 The existing airfield ground lighting (AGL), located within the runway and taxiway surface would be replaced and additional lights installed on the new taxiways to comply with appropriate requirements.

3.2.30 The proposed lighting scheme is shown on **Figure 3.13**.

Air Freight and Cargo Facilities

3.2.31 The primary focus of the reopened airport will be airfreight, and in order to meet the anticipated demand from the airfreight forecast, new cargo facilities would be required. The layout of the cargo area is shown on **Figure 3.14**.

3.2.32 The cargo facilities, which would be constructed on the new building platform to be created for the taxiways and stands, would be built in phases as detailed in **Table 3.2** below to meet the demand and requirements of the airfreight forecast. The proposed contours for the cargo area are shown on **Figure 3.22c**.

3.2.33 Each cargo facility would have associated HGV parking, storage and car parking. The new cargo facilities would cover approximately 65,500m^2 in total, with maximum building heights of 15m with a total storage and parking area of approximately 120,000m^2.

3.2.34 External wall finishes can be tailored to suit the end user requirements but a typical construction methodology would be for a steel portal framed building with CFA (Continuous Flight Auger) piled foundations. Wall cladding could be vertically and/or horizontally laid with feature panels to break up the exterior view. Coloured cladding could be used to signify key areas i.e: office units or the division between facilities. Early concept stage visualisations of the cargo facility show an aerofoil shaped building representing a plane's wing. The final facility may follow this or another architectural scheme.

3.2.35 Materials such as Kalzip, a standing seem aluminium roof and wall cladding system, could be used to create the required architectural building envelopes with polycarbonate sheets providing internal natural lighting. External lighting would be through tower lights and wall mounted units typical of cargo and distribution facilities. Strategic tree planting would provide visual shielding to neighbouring areas.

3.2.36 The existing cargo facilities located in the north east of the site would be retained during Construction Phase 1 and used for airport operational buildings i.e. vehicle storage, as well as equipment, storage, laydown and working areas during Construction Phase 1. These buildings would be demolished during Construction Phase 3 in order to accommodate the new cargo facilities that would be built during this phase.

Passenger Terminal and Parking Facilities

3.2.37 The primary focus of the airport would be on air freight and cargo operations, but as detailed below it is anticipated that there would be passenger services from Year 3 of the airport's operation.

3.2.38 The existing terminal building is in a poor state of repair, and it is therefore considered that a new passenger terminal and other facilities would be required and that the old building would be demolished during Construction Phase 1. The new terminal would be located on the site of the existing terminal, and would be designed with sufficient capacity to meet the demands of the passenger forecast. The indicative design of the new terminal building is shown in **Figure 3.16a**, the design concept and layout of the new facilities will be confirmed for the DCO application and assessed in the ES.

3.2.39 The passenger facilities would use the existing passenger apron, with sufficient space for up to four additional aircraft stands if required. The layout of the passenger area is shown on **Figure 3.15**, and passenger facilities are shown on **Figure 3.18**.

3.2.40 The existing terminal car park, which provides approximately 860 spaces, would be extended to provide parking for another 826 cars. A long stay car park will also be provided with a further 760 parking spaces. Land is already available adjacent to the existing car park having been set aside for a previous airport masterplan proposal. Some general maintenance and new access/exit barriers would be needed to the existing car park. Parking facilities to the west of the site entrance from Manston Road (B2050) would provide staff parking.

3.2.41 The car park would also include new areas for taxi ranks, drop off/pick up, buses and coaches; the number of spaces for these modes of transport will be determined following the completion of the Transport Assessment (see **Chapter 14: Traffic and Transportation**). Car parking, public transport infrastructure and cycling facilities are shown on **Figure 3.17**.

Fuel Farm

3.2.42 The airport would require a new fuel farm facility to replace the existing facility, which is located on the Northern Grass area and does not include sufficient storage or other facilities to meet the Proposed Development's needs. The new fuel farm would need to be located airside, i.e. not on the Northern Grass area, for operational reasons in order to allow for the safe and efficient transport and delivery of fuel around the airport site. At present, it is assumed that fuel would be delivered to the airport via road tanker, however alternatives, such as delivery via rail will be investigated as potential longer-term options.

3.2.43 The currently preferred site for the new fuel farm is in the southeast of the airport, on the site of the existing Jentex fuel facility. This is currently a separately operated fuel facility, but until the 1960s it was part of the airport site, and was the main fuel farm for the RAF airbase. Whilst the fuel farm would use the existing site, new tanks and other infrastructure would be required to meet the needs of the airport, and to ensure that the facility is adequately designed and fit for purpose. Discussions are taking place with the Environment Agency on the suitability and design of this site for use as a fuel farm for the airport.

3.2.44 Before the construction of the new facility the existing tanks and infrastructure would be decommissioned, and if required remediation of any contamination undertaken. A number of site investigations have been undertaken at the Jentex site, for more information see **Chapter 10: Land Quality**, and a number of old tanks have already been decommissioned. These site investigations have not identified any significant contamination at the locations of the former tanks, but further site investigations would be undertaken to inform the detailed design of the fuel farm facility.

3.2.45 The new fuel farm facility will be designed and constructed using best available techniques (BAT), and will incorporate features such as above ground double skinned and bunded fuel tanks. The Environment Agency and Southern Water will continue to be consulted on the design of the fuel farm facility, and on the scope of any site investigations and remediation that may be required.

3.2.46 The new facility would also incorporate suitable protection and other measures to control and mitigate any risks to nearby residential and other property from an incident at the fuel farm. The design of these measures will be discussed and agreed with the Health and Safety Executive.

3.2.47 For ease of access, the facility would have its own access from the highway, and will utilise an existing but improved access from Canterbury Road West. A new airside/landside security facility would be installed in the location of the existing 'emergency access gate' adjacent to the Jentex facility to provide direct airside access for the fuel farm.

Site Access, Highway and Junction Improvements

3.2.48 The roads in the vicinity of the Proposed Development site, including Manston Road, Spitfire Way and the Manston Road/Spitfire Way junction, have been identified as requiring improvement; the Kent County Council (KCC) Highways Department has in place proposals to improve the public highway in this area as part of its Thanet Transport Strategy. The project will work with KCC to provide improvements, which are likely to include a new roundabout at the Manston Road/Spitfire Way junction, and other improvements to the local road network in the vicinity of the site.

3.2.49 It has been identified that a new airport access for the cargo/aircraft maintenance facility is required and, this is proposed on the B2190 (Spitfire Way) to the west of the existing access (**Figure 3.19**). This will be designed with sufficient capacity for the proposed airport operations and current proposals include for a new roundabout to provide access to the airport. The detailed design of this and other highways and junction improvements would be undertaken following the completion of the Transport Assessment and in consultation with KCC Highway Department and Highways England.

3.2.50 A new network of internal roads for the air freight and cargo operations would be constructed. These would include lorry and car parking areas for the air freight operations. These would allow the internal movement of all vehicles, ground service equipment and staff working in the air freight services, and minimise the number of movements on the public road network. Suitable security, customs and border check point facilities would be constructed at the site access points.

3.2.51 A landscaping zone between the new internal access road and the public highway, and along the boundary with Spitfire Way and Manston Road would be provided to screen the Proposed Development. The landscaping scheme would be designed so that is acceptable within the constraints of the aviation environment (see **Figure 3.20**).

3.2.52 An Airport Surface Access Strategy, Staff Travel Plan and Pedestrian and Cycle Access Strategy will be developed as part of the Traffic and Transport assessment (**Chapter 14**); these will identify suitable embedded measures which should be incorporated into the design of the scheme. The new elements to be constructed as part of this are likely to include:

- traffic calming on less desirable routes;
- increased and enhanced facilities for taxis, buses and coaches for passengers and staff;
- a network of internal footpaths and cycle paths for staff use;
- upgrade and/or enhancement of existing pedestrian and cycle provisions within the vicinity of the airport site; and
- additional public service bus stops, and public bus service frequency and route changes (to be agreed with the local authority and bus route operators).

Outline Drainage Strategy

3.2.53 The surface water network would include interception, attenuation (winter and summer ponds) and pollution control facilities designed in accordance with industry best practice and agreed with the key stakeholders. Where appropriate this will utilise Sustainable Drainage Systems (SUDS) for the discharge to ground, existing connections to the public drainage system, or permitted discharge to Pegwell Bay. An outline drainage layout is shown in **Figure 3.21**. The outline drainage strategy is discussed further below.

3.2.54 The outline drainage strategy for the site is to provide positive drainage following the site's natural contours, discharging into two adjacent attenuation ponds (see **Figure 3.5** for the layout of the site). Prior to discharging into the ponds, the water would flow through interceptors (existing and new). The first of these ponds would treat contaminated runoff through the use of aerators, before discharging into the second pond. Flow into the 'clean' pond would be limited; the spillway would have a storage capacity of greater than a 1 in 30-year flood event. From the second pond, the clean water would be transported through the existing pumping system to be discharged from site.

3.2.55 Contaminated water is considered to be any runoff from the airfield or vehicle pavements. This includes roads, taxiways, yard areas and airfield aprons (i.e. de-icer and oil susceptible areas). 'Clean' runoff (i.e. from roof areas) may discharge into the second pond directly. During detailed design, it may be considered favourable to combine the clean/contaminated runoff either to dilute any contaminants, this will be discussed in more detail with the EA and Southern Water.

3.2.56 From the attenuation ponds clean or treated water would be pumped around the site to be discharged into Pegwell Bay via the existing discharge outfall; this runs from the airport site to a discharge point within the former Ramsgate Hoverport site (**Figure 3.24**). The first part of this system requires the pumping of water, but from the edge of the airport boundary the outfall is positive, i.e. gravity fed flow, following the natural land contours.

3.2.57 A survey of the existing storm drainage pipe was conducted from the Proposed Development boundary to the Pegwell Bay outfall. The pipe was found to be in good repair and of a size expected to be sufficient to meet the sites discharge requirements.

3.2.58 Should it be the case that the existing pumping system is unable to accommodate the proposed drainage volumes, two options are available. The first is an upgrade to the existing pumping system, the second is an alternative pump system which could follow the eastern site boundary before connecting to the existing outfall into Pegwell Bay. The detailed design of the drainage, including of the pumping system, will be completed following receipt of consent for the Proposed Developed, if granted.

3.2.59 Ongoing consultation with the Environment Agency (EA) and Southern Water (SW) is informing the drainage strategy and design. An application for a new discharge consent may be required from the Environment Agency, and if so would be applied for following the detailed design of the drainage strategy following DCO consent.

Airport Fire Safety

3.2.60 The airport will require the provision of suitable firefighting facilities in order to meet its operational, safety and regulatory needs. The detailed design will consider the specific regulatory and end user requirements, but the preliminary design has identified the following areas that need to be considered:

- airside fire facilities;
- public firefighting team requirements; and
- internal building fire suppression systems.

Airside Fire Facilities

3.2.61 The airport will require new airside firefighting facilities to meet the increased level of airport operations and activities. The existing fire station, which will accommodate four fire tenders with associated offices and welfare facilities, and includes an observation tower, would be replaced and a new facility constructed in the same location. This would need to be larger than the existing facility in order to incorporate the required number and size of fire tenders.

3.2.62 The existing Emergency Water System (EWS) tanks, of which there are two; each with a posted volume of 45,000l, would be reused. An assessment of their condition will be undertaken and if required new tanks installed using best available techniques.

3.2.63 A new fire training facility would be required on the airfield, and would be constructed at the eastern end of the runway. This will be sized according to the required firefighting code for the airfield and include suitable aircraft frames for mock rescues. The fire training ground will be appropriately sized, constructed with a lined (impermeable base) hardstanding and with a perimeter bund. This will incorporate a connection into the surface water drainage and treatment network to ensure the proper disposal of all fire water.

Public Firefighting Team Requirements

3.2.64 As a standard, fire hydrants are required at 90m intervals around the perimeter of large buildings. Unobstructed access is required to these for the use of firefighting teams. Alternative systems such as pond access or EWS tanks can be considered and would need to be sized and located according to perceived fire requirements.

3.2.65 As part of the detailed design process, fire hydrant locations would be provided around the perimeter of the cargo, terminal and hangar buildings. These would also require potable water connections as part of their general use so provision of these hydrants would utilise this supply.

3.2.66 Alternatives such as additional EWS tanks could also be considered. The attenuation ponds may also provide a source of water for fire teams, detailed design of the attenuation ponds could include crash gates and paved or improved ground access routes to the ponds.

Internal Building Fire Suppression Systems

3.2.67 As a minimum, a mains fed sprinkler system would be required in each new cargo facility. Additional or improved facilities may be required depending on end user requirements and the type of operations occurring. These could include, for example, chemical additives to the water supply providing increased fire suppression if a large quantity of plastics are being stored in a facility.

3.2.68 For the proposed new hangar facilities bespoke fire systems may need to be designed and installed. An example of this may be floor mounted sprinklers designed to reach areas beneath aircraft wings and fuselages which may not be reached via ceiling mounted systems.

Other Development

3.2.69 The airport will require new offices, workshops, stores, welfare, and security facilities for staff. The exact requirements for these will be determined as part of the detailed design, but these would be located within or alongside other airport buildings and facilities, for example the air freight and cargo facilities, passenger terminal or air traffic control tower.

3.2.70 Sufficient staff and visitor parking, including disabled parking, would be provided to meet the relevant design standards. Facilities to encourage staff to cycle to work would also be provided.

3.2.71 The two existing museums on the site, the RAF Manston Museum and the Spitfire and Hurricane Memorial Museum, would remain and be relocated to a new museum area. The design options and siting of these facilities will be determined for the DCO application, but the current proposals are for a new museum to be located on the site of the existing old Air Traffic Control Tower building, which would be demolished, and to incorporate a café and seating area with views across the airport towards the runway. Indicative visuals of the new Spitfire and Hurricane Memorial Museum building have been prepared, these are shown on **Figure 3.16b**.

3.2.72 The area north of Manston Road, the 'Northern Grass' area would be utilised for other aviation related purposes such as warehousing, offices and airport related business units, but will have no direct access for aircraft (**Figure 3.25**). The requirements for facilities airside mean that there will be limited available space within the main site for any expansion of aviation related businesses, and any activities that can be located landside would be located here. This may include any of the businesses or tenants located on the existing airport site.

3.2.73 The initial proposals for this area indicate that it could support multiple business units of various sizes and layouts with an approximate total floor space of 119,000m^2. Two new accesses would be provided from Manston Road to the Northern Grass area, and a new internal highway network created. Loading and turning areas for HGVs, sufficient staff and visitor parking, including disabled parking, to meet the relevant design standards, and associated pedestrian and cycle infrastructure will all be provided within the Northern Grass area. A safeguarding zone around the airport radar installation will be retained. The size of this area will be dependent on the type and specifications of the radar.

3.2.74 The airport would continue to provide facilities for aircraft maintenance, repair and overhaul (MRO). The existing MRO facility and hangar, which is located to the south of the terminal building, will be retained for use during the first years of operation. A new MRO facility, with hangars capable of accommodating the largest types of aircraft (Code F), would be constructed in Construction Phase 2; the old hangar would be demolished at this stage. The MRO facility would be further extended in each of Construction Phases 3 and 4 to provide an additional hangar in each phase.

3.2.75 The current business aviation terminal and hangar, south of the passenger terminal, would be refurnished for use for Fixed Base of Operations (FBO), including for helicopter and heli-charter operations. The facilities for the flight school and training centre would also be retained in their existing location.

Utilities and Services

3.2.76 In order to support the increased level of activity and development on the site additional services will be required; this is likely to include additional internal electrical substations, communication networks, and foul and potable water connections. A utility strategy is currently being developed in order to determine the requirements of the airport for each phase of operation and construction and will be completed in order to inform the final design of the scheme for the DCO; the detailed design will be finalised following the completion of this strategy..

3.2.77 There is an existing internal electricity network that includes at least four substations. An assessment of the further load requirements is being prepared as part of the utility strategy; an initial assessment indicates that it is unlikely that an increase to the internal or external network will be required.

3.2.78 A new foul drainage network will be required for the new cargo facilities. This is currently being assessed within the utility strategy, which will take into account the removal of the existing foul drainage when the buildings along Spitfire Way are removed. Consultation with Southern Water on the requirements of the Proposed Development have commenced, with meeting and discussion held with Southern Water as part of the consultation and stakeholder engagement, and following the completion of the utility strategy they will be further consulted on the requirements and suggested solutions.

3.2.79 The proposed requirement for potable water is also being assessed in the utility strategy. This is being undertaken in consultation with Southern Water.

3.2.80 An integrated Resources Strategy Statement, to include measures to manage, control and limit water and energy use, and waste production will be developed and submitted as part of the DCO application. This will adopt best practice and procedures from the aviation and other related sectors, and feed into the final design of the utilities and the utility strategy.

Construction Phases

3.2.81 As outlined above in **Table 3.1** construction will take place in four phases (see **Figures 3.27-3.30** for construction phasing plans). The initial phase of construction, following the grant of the DCO, will be the longest with an expected duration of 12 months. This phase will see a number of different construction activities undertaken in order to ensure that the airport is returned to operational use in Year 2. Phases 2-4 of the construction process will take place whilst the airfield is operational and will focus on delivering the increased infrastructure and facilities required to meet the demand of the air freight and passenger forecasts.

3.2.82 The phasing of the construction programme has been designed to ensure that the airport has sufficient capacity, in the form of aircraft stands, cargo facilities, access storage and parking areas, and taxiways and aprons to meet the demands of the air traffic forecasts (see **Table 3.7** and **Table 3.8** below). The exact timing of construction phases 2-4 will be dependent on the growth in demand and take-up of capacity, but they are expected to be within the periods outlined in **Table 3.1** above.

3.2.83 **Table 3.2** below summarises how the construction of key components of the Proposed Development, that are required to meet the demands of the forecasts, will be phased:

Table 3.2 Project Construction Phases – Construction Figures by Phase

	Phase 1	Phase 2	Phase 3	Phase 4	Total
Aircraft Stands	8 (cargo), 3 (passenger)	6 (cargo)	2 (cargo)	3 (cargo), 1 (passenger)	23
Cargo Facilities	12,000m^2	16,000m^2	14,000m^2	23,000m^2	65,500m^2
Access, Storage and Parking	14,000m^2	24,371m^2	26,992m^2	34,766m^2	128,129m^2
Taxiway and Aprons	23,000m^2	64,240m^2	89,854m^2	78,346m^2	297,440m^2

3.2.84 The description of the activities to be undertaken during each construction phase, and the likely construction techniques, are indicative of the types of approach suitable for the infrastructure proposed. The information provided here is preliminary, detailed descriptions of these activities will be included within the final ES.

Construction Phase 1

3.2.85 To ensure that Manston Airport has the required infrastructure and facilities for airport operations to resume in Year 2, the majority of the construction for the redevelopment of the airport will be undertaken during Construction Phase 1. Therefore during this period the airport would not be operational, allowing the works to rehabilitate the runway, to install the new navigational aids and safety equipment, as well as the earthworks and taxiway construction, to be completed.

3.2.86 A summary of all of the construction activities, and of their general programming across Construction Phase 1 is provided below:

- site set-up and establishment;
- new site access and internal access roads;
- construction of surface water drainage system, including construction of attenuation ponds;

- installation of new and/or upgrade to existing site services and utilities;
- earthworks to create building platform;
- runway Rehabilitation (asphalt paving);
- construction of new taxiways, aprons and cargo stands (concrete paving);
- highway Improvements (Spitfire Way/Manston Road junction);
- construction of new air freight and cargo facilities;
- construction of new terminal building and car parking facilities;
- construction, refurbishment and/or relocation of existing business aviation, flight school and training, and helicopter/heli-charter services;
- construction/installation of new air traffic control, approach lights, airfield ground lighting, navigational aids and radar;
- construction of new Rescue and Fire Fighting Service facilities, and fire training ground; and
- landscaping along the boundary with Spitfire Way and Manston Road.

3.2.87 A summary description of the construction methodology and techniques for the main construction activities to be undertaken during phase 1 is provided below. These methodologies are based on the preliminary information that is available to date, and where appropriate on worst-case assumptions on techniques and methodologies to be employed.

Earthworks

3.2.88 It is estimated that approximately 300,000m^3 of suitable construction material will be required to provide the EASA compliant building platform for the taxiway, aprons and stands. To minimise any construction waste a balancing of the cut and fill operations could be undertaken to reuse as much excavated material as possible, including utilising any lower lying areas on the Northern Grass area for disposal.

3.2.89 At this stage, there is insufficient information to determine the existing earthwork materials suitability as an engineering fill material for use underneath the aircraft pavements. However, information from the construction of the East Kent Access Road indicates that the material could be suitable.

3.2.90 A complete soils investigation leading to a detailed earthworks strategy will precede any permanent earthworks operation. For the purposes of the PEIR, a worst-case scenario has been assumed, whereby no reuse is possible or appropriate, and all material required is imported.

3.2.91 The existing taxiways, aprons, stands and other areas of hardstanding that are not required would also be removed as part of these operations. It is proposed that much of this material can be broken up and recycled for use as the subbase and base for the new taxiways, aprons and stands. Additional material could also be obtained from other onsite demolition materials. However an assessment of the engineering suitability of any materials would need to be carried out prior to re-use.

3.2.92 In areas where the existing ground levels are suitable the turf and topsoil will be stripped and stockpiled to allow excavation in preparation for pavement foundation works. Once removed the sub-soil would be excavated to a depth of 500mm in the works area to allow for the construction of the subbase and base.

3.2.93 Where ground level reduction is required, this would be undertaken following the removal of the turf and topsoil by earth moving machinery, which includes tracked dozers/shovels, articulated dump trucks and blade levelling vehicles. Excavated material would be stockpiled for reuse on the airport site.

3.2.94 Where the ground level is to be raised this would also be undertaken following the removal of the turf and topsoil. Suitable grade and quality construction material would be used to raise the level, earth moving machinery which includes tracked dozers/shovels and articulated dump trucks would be used. The material would be compacted using compaction rollers to provide the finished platform for the pavement construction.

3.2.95 Existing site contours and proposed contours are shown on **Figure 3.22a** and **Figure 3.22b**, respectively. Cross-sections of the proposed development are shown on **Figure 3.23**.

Concrete Pavement

3.2.96 The paving for the new taxiway, aprons and stands will be constructed out of Pavement Quality Concrete (PQC). It is expected that a concrete batching plant would be set up in the site working area, and the materials and equipment needed stored in the site compound, and laydown area. The batching plant would incorporate a silo for the storage of cement which would have a maximum height of 20m.

3.2.97 The pavement would be completed in stages and will follow a sequential format. The initial stage will be a crushed stone load transfer layer, topped with a waterproof membrane to prevent water ingress to pavement construction.

3.2.98 The second stage would be to place a lean/semi dry concrete layer to absorb load transfer from the pavement to the load transfer layer. This would be followed by the installation of shutters to permit the laying of high strength concrete in sequential 6m bays. The bay layout is required to provide pavement flexibility under load and protect against thermal impact damage.

3.2.99 Once the shutters are placed, a high strength concrete layer approximately 300mm thick would be placed. The installation will be completed in 6m wide sections at a time. During the concrete placement, drainage channels will be placed to connect to the airport surface water drainage network.

Asphalt Pavement

3.2.100 Although the existing runway appears to be in good condition it will likely require rehabilitation in order to improve the pavement structure. The proposed technique will be the application of an asphalt overlay on top of the existing runway. The overlay will be applied across the entire runway width (45m) plus shoulders (2 x 7.5m).

3.2.101 An asphalt batching plant would be established in the site working area, and the materials and equipment needed stored in the site compound and laydown area. The process for the asphalt paving involves the construction of layers of asphalt using asphalt paver and planer truck, and the compaction of the asphalt using rollers to the desired thickness.

3.2.102 The asphalt batching plant and equipment will also be used to provide the materials for the highway improvements, internal road and lorry and car parking areas.

Building Construction and Foundations

3.2.103 The construction of the new air freight and cargo facilities, air traffic control tower, firefighting facilities and passenger terminal would all be undertaken during phase 1. The construction techniques and materials will vary according to the different needs and detailed design of these facilities. For example, the air freight and cargo facilities are likely to be steel portal framed buildings with wall cladding. The equipment to be used during these activities would include mobile cranes and extended working platforms.

3.2.104 The design and construction of the foundations needed for the buildings has not been determined at this stage, and the nature of the foundation design can only be confirmed once the geotechnical investigations, to be undertaken following the granting of the DCO as part of Construction Phase 1, are complete. For the purpose of the assessment it has been assumed that the foundations will be CFA (Continuous Flight Auger) piled foundations and therefore that a piling rig and associated equipment will be required; this represents a worst case solution in terms of potential effects to ground and surface water receptors (see **Chapter 8: Freshwater Environment** and **Chapter 10: Land Quality**).

Construction Phase 2

3.2.105 The airport would be operational for Construction Phase 2, which will constrain subsequent construction activities during this and other phases. Therefore in order to minimise disruption to airport operations, the construction activities that require the closing of the runway will be undertaken during Construction Phase 1, with activities during this and subsequent phases limited to those that can be carried out with minimal disruption to airport operations.

3.2.106 As detailed in **Table 3.2** the main infrastructure to be constructed during this phase would be the cargo aircraft stands, taxiways, aprons and associated cargo facilities, access, storage and parking areas.

3.2.107 In addition during this phase a new aircraft maintenance hangar, to accommodate the largest types of aircraft (Code F), would be constructed and the existing MRO hangar and facilities demolished.

3.2.108 The construction techniques for the concrete pavement and building construction during phase 2 would be the same as those during phase 1.

Construction Phase 3

3.2.109 As detailed in **Table 3.2** the main infrastructure to be constructed during this phase will be the cargo aircraft stands, taxiways, aprons and associated cargo facilities, access, storage and parking areas. To provide these facilities the existing buildings adjacent to Spitfire Way would be demolished, namely the cargo buildings. The internal access road would be constructed in its permanent alignment.

3.2.110 An additional aircraft maintenance hangar would also be provided alongside the MRO facility. The second attenuation pond for the water treatment system, would be constructed during Phase 3.

3.2.111 The construction techniques for the concrete pavement and building construction during phase 3 would be the same as those during phase 1.

Construction Phase 4

3.2.112 As detailed in **Table 3.2** the main infrastructure to be constructed during this phase would be the cargo aircraft stands, taxiways, aprons and associated cargo facilities, access, storage and parking areas.

3.2.113 An additional aircraft passenger stand would be constructed next to the existing passenger apron. A further maintenance hangar would also be provided alongside the existing MRO facility.

3.2.114 The construction techniques for the concrete pavement and building construction during phase 4 would be the same as those during phase 1.

Construction Compound, Equipment and Hours of Operation

3.2.115 Compound areas will comprise offices, welfare facilities, vehicle parking and material storage areas, which will be located within the airport boundary. During Construction Phase 1 a construction compound, storage and working area would be established on an area of existing concrete hardstanding, near to the new access on Spitfire Way. The existing airport hangars and buildings located in this area would be utilised for storage and office space in order to reduce the need for any temporary site cabins or facilities. The batching plants to be used during Construction Phase 1 would also be established in this area. Phase 1 construction operations are shown on **Figure 3.31**.

3.2.116 For subsequent construction phases (2-4), which will require a much smaller compound area, a site compound is proposed in the south east of the site, as shown in **Figure 3.31**.

3.2.117 Batching plants are expected to be utilised during Construction Phase 1 with the rehabilitation of the runway requiring asphalt material and the new apron stands/taxiways requiring concrete. A batching plant incorporates vertical silos for the storage of cement and bitumen. The maximum height of these silos would be 20m.

3.2.118 During Construction Phase 1 the working hours would be Monday to Friday 07:30 to 17:30, and Saturday 07:30 to 13.00. There would be no planned working on Sundays or Bank Holidays. During Construction Phases 2-4, when the airport would also be operational, construction may need to take place outside of these hours including at night. If required all activities undertaken during the night time will be analysed as part of the development of the CEMP, and where possible noise reduction measures would be implemented to prevent noise and other nuisance.

3.2.119 The manpower on-site during Construction Phase 1 is anticipated to average 230, with a maximum of 630 forecast during peak construction period.

3.2.120 To undertake the tasks required in Construction Phase 1 specialised construction plant and equipment will be required; the non-road mobile machinery (NRMM) and equipment likely to be utilised during Construction Phase 1 is set out in **Table 3.3** below:

Table 3.3 NRMM and Equipment by Construction Activity

Activity	Machinery Type	Number
Earthworks	Excavators	6
	Dump trucks	6
	Compaction equipment	4
Concrete Paving	Batching plant and loading shovel for aggregates	1
	Slipform paver and excavator/spreader	1
	Delivery trucks	4
Asphalt Paving	Batching plant and loading shovel for aggregates	1
	Planner and trucks	2
	Asphalt pavers	2
	Compaction rollers	3
Building Construction	Mobile crane	2
	Mobile extended working platform	2
	Pilling rigs (if required)	2
Other	Earth dump trucks	6
	360 tracked excavators	6
	Forklifts/Telescopic forklift/Telescopic man-lift	6
	Pumps	5
	Generators	5
	Pick-up trucks	10
	Small vans	10
	Road sweepers	2
	Skip trucks and skips	6

Construction Traffic Management and Logistics

3.2.121 A construction traffic management plan will be prepared to reduce construction traffic, keep delivery routes to the strategic road network and limit hours of delivery to minimise nuisance and disruption to local communities. This will be included as part of the Construction Environmental Management Plan, a draft of which forms part of the PEIR at Appendix 3.2 and an updated draft of which will form part of the suite of DCO application documents.

3.2.122 Access to the site for all construction vehicles will be from the new site access to be constructed on the B2190 (Spitfire Way), see **Figure 3.27**. From the wider strategic highway network (the A2/M2) construction vehicles will use the A299/Thanet Way (junction 7 of the M2), B2190/Minster Road (Minster Roundabout), and the B2190/Spitfire Way.

3.2.123 Traffic signs would be installed in order to inform local road users of the construction access points and presence of HGVs.

3.2.124 It is estimated that construction traffic movements (with each movement being one arrival or departure to/from site) associated with earth moving operations during Construction Phase 1, would total 120 movements/day with 15,074 movements required for the earthworks during Construction Phase 1. Other construction traffic flow during Construction Phase 1 is estimated at 100 movements per day.

3.2.125 The exact number of construction traffic movements during Construction Phases 2-4 is unknown at this stage, but there will be no major earthwork operations during these phases. Therefore, based on these proposals it has been assumed as a worst-case scenario there will be 100 construction traffic movements per day during Construction Phases 2-4, more detail on these movements will be assessed within the ES.

3.2.126 The timings of deliveries to site would be managed to avoid arrivals and departures during peak morning and evening traffic periods.

3.2.127 As currently proposed the works will require no abnormal traffic loads. There would be a number of wide loads, for which appropriate wide load delivery and management plans will be incorporated into the construction traffic management plan. Wide loads are likely to be required for the following equipment in particular:

- concrete batcher, four number wide loads required;
- asphalt batcher, six number wide loads required; and
- piling rig, two number wide loads required per rig.

3.2.128 The earthmoving equipment and site cabins will travel to site on normal HGV loads not requiring any special arrangements.

3.2.129 A travel plan, which will be included as part of the CEMP, will be put in place which will set out how construction workers will travel to site, including the use of sustainable transport modes.

Construction Materials and Waste

3.2.130 The bulk of the imported material will be hardstone for asphalt and pavement quality concrete, plus sands and gravels for use in the lower layers in the aircraft pavements and drainage.

3.2.131 The likely route for the delivery of the hardstone would be by road from the railhead at Sevington near Ashford or from Whitstable or Ridham. The sands and gravels could be from the same source or from a new processing plant at Ramsgate. There are other opportunities via Dover and The Isle of Grain. The source and travel route for the construction materials will be confirmed for the ES.

3.2.132 Approximate quantities of the main materials required for the construction of the Proposed Development during Construction Phase 1 are given in **Table 3.4** below.

Table 3.4 Construction Materials

Material	Quantity
Aggregates for pavement construction	400,000 tonnes
Fill for earthworks	300,000m^3
Ready mixed concrete	10,000m^3
Asphalt	75,000 tonnes
Building construction	12,000 tonnes
Miscellaneous	10,000 tonnes

3.2.133 Earthworks construction waste could be minimised by balancing the cut and fill operations for the new aircraft cargo stands and warehousing plus utilising any low areas on the grassed area including the Northern Grass area for disposal. At this stage there is not sufficient information to determine the existing earthwork materials' suitability as an engineering fill material underneath the aircraft pavements.

3.2.134 A complete geotechnical site investigation, leading to a detailed earthworks strategy, will precede any permanent earthworks operation.

3.2.135 Demolition arisings, where possible, will be recycled for use on site. This includes the material from the existing taxiways, aprons and stands that will be replaced, as well as any material from the Second World War runway pavement which is no longer needed (see paragraph 3.2.10). If suitable, this material could provide the bulk of the subbase and base for the new stands and taxiway and reduce the volume of required materials and the number of construction related vehicle movements.

3.2.136 Wrapping and packing will be returned to the supplier.

Construction Environmental Management Plan

3.2.137 Each topic chapter identifies a number of embedded environmental measures that have been incorporated into the design of the construction of the Proposed Development in order to mitigate any potentially significant environment effects. In order to manage and minimise environmental effects from construction a Construction Environmental Management Plan (CEMP) will be produced; this is a key document that sets out the measures and how they would be delivered. This provides an overview of the standard construction management measures that would be implemented as part of the proposed development and incorporates the embedded environmental measures that form part of the proposals.

3.2.138 The CEMP aims to ensure that construction activities for the Proposed Development are carried out in accordance with legislation and best practice for minimising the effects of construction on the environment and local communities.

3.2.139 The objectives of the CEMP are to:

- provide a mechanism for delivering many of the embedded environmental measures described in the ES;
- ensure compliance with legislation through consultation with, and by obtaining necessary consents and licences from, statutory bodies;
- provide a framework for compliance auditing and inspection to ensure the agreed environmental aims are being met;
- ensure environmental best practices are adopted throughout the construction stage;
- ensure a prompt response should any unforeseen unacceptable adverse effects be identified during the works; and
- provide a framework for mitigating unforeseen or unidentified effects, should they occur.

3.2.140 A CEMP will be produced, following the structure of the draft CEMP to be submitted with the ES, by each of the appointed contractors for each phase of the development. The CEMP will detail the methodology, objectives, operations, resource management responsibilities, key points of contact, auditing processes to monitor performance, provision of reporting performance and progress updates.

3.2.141 The CEMP will also include a communication strategy to manage public liaison, notification of construction items of note and the management of and responses to complaints.

3.2.142 Contractors selected for tender will be encouraged to be a member of the Considerate Constructors Scheme whereby membership evidences community awareness, competent management, efficiency, awareness of environmental issues and actively demonstrates neighbourliness.

Intrusive Investigations

3.2.143 During Construction Phase 1 any further surveys, investigations or other intrusive works that may be required in order to inform the detailed design of the airport, or to mitigate any potentially significant environmental effects, would be undertaken. These would be programmed to take place alongside, and if required in advance of, the construction activities.

3.2.144 The requirement for, and potential scope of, any surveys or investigations is discussed in more detail in the relevant chapters of this PEIR. But those works that are likely to be required are outlined below:

- Utilities and Services Survey;
- Geotechnical Site Investigations;
- Groundwater Investigations and Monitoring;

- Land Quality Phase 2 Intrusive Investigation;
- Contaminated Land Remediation; and
- Archaeological Mitigations.

Operational Phase

3.2.145 As outlined above, the programme for the Proposed Development will see the full reopening of the airport in Year 2, with passenger services expected to follow in Year 3. There would be some operational activities undertaken in Year 1, for example the development of the airport's operational and management procedures (see below), and the recruitment and training of direct airport staff. However for the purpose of the PEIR assessment it has been assumed that the operation of the Proposed Development will commence in airport Year 2.

3.2.146 The information for the operational phases of the Proposed Development, including the air traffic forecasting, has been prepared for RiverOak by aviation consultants, Azimuth Associates[27] and Northpoint Aviation[28], and is presented in Manston Airport: A National and Regional Aviation Asset Volume III (Azimuth Associates 2017). The information, as relevant to the operational phase of the development and the assessment for the PEIR, is summarised below in the following sections:

- Airspace Routes Operational Procedures;
- Fleet Mix and Aircraft Types;
- Air Freight Forecast;
- Passenger Forecast;
- Other Airport and Aviation Related Services;
- Airport Hours of Operation and Staffing; and
- Airport Operational and Management Procedures.

3.2.147 RiverOak has produced a business plan for the Proposed Development which includes an air traffic forecast on a yearly basis, Manston Airport: A National and Regional Aviation Asset Volume III (Azimuth Associates 2017). The business plan and forecast have been produced through a combination of qualitative and quantitative assessment.

Airspace Route and Operating Procedures

3.2.148 In addition to obtaining approval for development consent under the Planning Act 2008, the Proposed Development will also require approval for the new airspace and operating procedures from the CAA. This approval is obtained via submission of an Airspace Change Proposal in accordance with Regulations laid down in CAA Publication 725. Preliminary discussions on this and other related topics have been held between RiverOak, the project team and the CAA.

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27 http://azimuthassociates.co.uk/
28 http://aviation.wpengine.com/

3.2.149 It will be the Airspace Change Process that ultimately provides permission for the detailed operating procedures and airspace required by the airport and not the DCO. Following discussions with the CAA, it is anticipated that the airspace change application will be submitted as soon as the DCO has been accepted. In this way the consenting regimes will remain complimentary and duplication of effort for both RiverOak and the respective Regulators will be minimised.

Box 3.1 Civil Aviation Authority (CAA) and European Aviation Safety Agency (EASA)

The Civil Aviation Authority (CAA) is the statutory corporation which oversees and regulates, either directly or indirectly, all aspects of civil aviation in the United Kingdom; it is a public coorporation of the Department for Transport. Any airport in the UK which is used for commercial passenger flights, public transport flights and/or flying training in aircraft above a specified weight, is required to obtain, from the CAA, an Aerodrome Licence.

The European Aviation Safety Agency (EASA) is an agency of the European Union (EU) with regulatory and executive tasks in the area of civilian aviation safety. Representatives from the member states national aviation authorities, such as the CAA, sit on the EASA's advisory bodies. From 31 December 2017 aerodromes in the UK which are open to public use and which serve commercial air transport, where operations using instrument approach or departure procedures are provided, and which have a paved runway of 800 metres or above, or exclusively serve helicopters, are required to comply with EASA regulations and obtain an EASA Certificate to replace their CAA Aerodrome Licence.

Until the arrangements for the UKs exit from the EU are finalised, the standards and requirements of the EASA will continue to apply to airports and the aviation sector within the UK.

3.2.150 The final decision on exactly where aircraft will be routed will be decided as part of the CAAs Airspace Change Process. A number of factors will influence this decision including, but not limited to, flight testing, connectivity to the wider air traffic network and route development together with a further round of environmental assessment and public consultation. This does not mean that the assessment made in the ES, or even within this PEIR, are not however, sufficiently robust. What it does mean is that in order that an assessment of the operational effects of the Proposed Development can be undertaken as part of the PEIR (and later the ES) a set of expected flight routes and procedures have been prepared for the project. These provide a 'route envelope' which represent a worst case scenario for the operational airspace effects of the Proposed Development; the final refined design, which will likely result in an improved environmental situation, will then be agreed with the CAA through the Airspace Change Process. This approach of developing initial 'route envelopes' which allow public engagement to inform subsequent detailed route design and refinement is entirely in line with best practice and will be reflected in the CAAs revised airspace change process due for introduction in late 2017.

Flight Timings

3.2.151 Normal operating hours, or 'daytime', for the airport are defined as 07.00 to 23.00, but with limited exceptions during a shoulder period from 06.00 to 07.00 for certain passenger flights departing to Europe of arriving from the United States of America.

3.2.152 Air freight operations would be predominantly during the daytime, 07.00 to 23.00, in accordance with operations at other similar air freight airports. There may be a requirement for a small number of night-time flights, the details of which will be determined as part of the on-going project design, taking account of feedback from the Statutory Consultation, and presented with the DCO and assessed within the Environmental Statement.

3.2.153 For the purpose of the PEIR assessment, and as a worst case, the working assumption is that there might be a maximum of eight (8) aircraft movements at night between the hours of 23.00 and 07.00. The remaining air traffic movements are spread evenly across the daytime period.

Aircraft Taxi Routes, Hold Points and Engine Ground Running Locations

3.2.154 The detailed design of the aircraft taxi routes, hold points and engine ground running locations will be such as to minimise taxi and hold times to ensure that departing aircraft move swiftly from parking stand to runway threshold for take-off and similarly arriving aircraft upon landing move quickly to the parking stand. These will be determined at part of the on-going design and presented, and assessed, within the Environmental Statement.

Airside Ground Support Equipment

3.2.155 The airport will require the following airside ground support equipment (GSE), as listed in **Table 3.5**, as part of general airfield operations, the air freight and passenger operations. The numbers provided are worst case numbers based on the year 20 forecast traffic. Where practicable, electric and hybrid vehicles will be deployed and charging points installed. Aircraft power will be from fixed installations with diesel units only deployed on remote stands. Fuel tankers are included but there is the prospect that a hydrant system could be installed which would significantly reduce the need for these.

Table 3.5 Airside Ground Support Equipment

Activity	GSE Type	Number
Airfield General	4x4 (large)	10
	Sweepers	2
	Sicards	6
	Tractors (4x4)	4
	Mini-buses	5
	Flatbed truck	2
	Towable Av Gas bowsers	2
Firefighting	Major fire appliances	4
Passenger Operations	Unpowered stairs	6
	Powered stairs	2
	Small tugs	4
	Baggage trolleys	16
	Pushback tugs	2

Activity	GSE Type	Number
	Aircraft de-icer	1
	Potable water vehicle	1
	Toilet vehicle	1
	Fuel tankers	2
Freight Operations	Small tugs	24
	Pallet dollies	240
	Diesel Ground Power Units (GPU)	6
	Powered stairs	20
	Unpowered stairs	6
	Fuel tankers (powered)	10
	Fuel tankers (towable)	10
	Aircraft de-icer	10
	Toilet vehicle	4
	Potable water	4
	Forklift trucks	35
	Pushback tugs	6
	High loaders	10

Fleet Mix and Aircraft Types

3.2.156 In preparing the Manston Airport business plan and aircraft forecasts, consideration has been given to the types of aircraft, both air freight and passenger, that are predicted to operate at the airport. This is based on information obtained from existing operations at other similar airports, information from interviews with industry, publically available information on the aircraft used by airline operators, and from the records from the previous operations at Manston Airport prior to its closure.

3.2.157 A list of the different aircraft types, including their International Air Transport Association (IATA) Code, the International Civil Aviation Organization (ICAO) aircraft approach category (a measure of the speed at which an aircraft approaches a runway for landing, but which is also used to classify airport infrastructure), and maximum landing weight (in metric tons), that are expected to operate at Manston Airport, and used in the forecasting, are presented below.

Table 3.6 Manston Airport Aircraft Types

Aircraft Type	IATA Code	ICAO Aircraft Approach Category	Maximum Landing Weight [metric tons]
Airbus A320-100[14]	320	C	66

Aircraft Type	IATA Code	ICAO Aircraft Approach Category	Maximum Landing Weight [metric tons]
Airbus A330-200[10]	332	E	180
Boeing 747-400	744	E	296
Airbus A380-800[2][3]	748	E	391
Boeing 757-200	752	D	90
Boeing 757-300	753	D	102
Boeing 737-800	73H	C	65
Boeing 737-900	73Y	C	66
Boeing 767-300ER	76V	D	136
Boeing 767-400ER	76Y	D	159
Boeing 777F	77X	E	261
Antonov An-124-100M	A4F	E	330
ATR 72-600	AT7	C	22
Boeing C-17 Globemaster III	C17	D	203
Ilyushin IL-86	IL7	D	175
Lockheed Hercules	LOH	D	70
Fokker 70	F70	C	37

Table 3.7 International Civil Aviation Organization (ICAO) aircraft approach speed category

Aircraft category	VAT	Range of speeds for initial approach (and reversal and racetrack procedures)	Range of final approach speeds	Maximum speeds for circling	Maximum speeds for intermediate missed approach	Maximum speeds for final missed approach
A	<91	90 - 150 (110*)	70 - 110	100	100	110
B	91 - 120	120 - 180 (140*)	85 - 130	135	130	150
C	121 - 140	160 - 240	115 - 160	180	160	240
D	141 - 165	185 - 250	130 - 185	205	185	265
E	166 - 210	185 - 250	155 - 230	240	230	275

V_{AT} —Speed at threshold based on 1.3 times stall speed in the landing configuration at maximum certificated landing mass.
'*' Maximum speed for reversal and racetrack procedures.

3.2.158 It is possible that on very rare occasions other types of aircraft may use Manston Airport for unscheduled, emergency or other purposes. However the frequency of these flights is unknown and is considered unlikely to be more than a very small number of occasions per year, therefore they are very unlikely to contribute to the environmental impacts arising.

3.2.159 In order to mitigate the impact from the largest and noisiest types of aircraft, a restriction on certain types of aircraft using Manston Airport, except in emergency or other exceptional circumstances, would be implemented.

3.2.160 In line with standard air traffic forecasting practice, consideration has also been given in the forecast to changes in fleet mix over time. As new makes and models of aircraft become available the older aircraft will gradually be phased out of use and be replaced by new aircraft. Therefore the forecasts include an allowance to replace older aircraft with available new types.

Air Freight Forecast

3.2.161 The primary focus for the Proposed Development will be airfreight and cargo operations, which are planned to resume in Year 2, spring 2020.

3.2.162 The principal types of markets and goods that Manston Airport is likely to service are:

- global import and export for parcels and packages;
- Africa particularly for the import of flowers, fruit and vegetables;
- China for the import of consumer goods and export of luxury items (included under niche freight operations, however, given the lack of firm evidence the forecast is extremely conservative);
- Middle East particularly for export markets including fish and shellfish;
- Pakistan including the import of clothing and the export of consumer goods;
- Russia for gas and oil equipment and the export of luxury items;
- South America for the import of perishable fresh produce; and
- US for a range of import and exports.

3.2.163 The primary focus of the Proposed Development will be to operate as a freight-focused airport to meet the specific need for additional capacity for air freight in the south east of England.

3.2.164 It has been forecast that a reopened and developed Manston Airport, with a focus on airfreight and cargo, could capture in the region of 300-350 thousand tonnes of airfreight by 2040 and provide part of the solution to the problem of a shortfall in aviation capacity in the UK (Manston Airport: A National and Regional Aviation Asset Volume III p11-12 (Azimuth Associates 2017)). This would be from a combination of business returning to Manston Airport, the capturing of market share from other airports (either because of better facilities at Manston Airport, shorter haulage distances from airports outside the UK or pressure for slots at these other airports) and from general market growth.

3.2.165 The air freight forecast has been produced using the following assumptions/calculations, see **Appendix 3.1: Glossary of Abbreviations and Airport Terms**:

- dedicated freight airlines (US) – 80% import/20% export;
- dedicated freight airlines (Africa) – 100% import with a 5% backload from Year 3, rising to 10% in Years 5 and 6, with an additional 5% increase added every two years up to Year 20;
- airfreight integrator movements – 100% outbound with a backload (import) calculation of 20% included in Years 2 and 3, rising by an additional 5% every two years;
- airfreight integrator feeders – 100% inbound (import) traffic with 10% backload possibility added to Year 5, 15% to Year 9, and 20% thereafter;
- fresh fish and spider crabs – 100% export with a backload potential of 5% from Year 3 with an additional 5% added every two years thereafter;
- Middle East airlines – both import and export with backload possibilities;
- live animal operations – both in and outbound to show return journeys for most animals;
- Pakistani airlines – export from Manston with backloads starting at 10% rising slowly to 30%;
- Postal Services – export with a possibility of small backloads starting at 5% and rising gradually to 20%;
- Russian airlines – all export from Manston with strong backload possibilities starting at 50%, rising to 70%;
- niche freight operations – generally imports with backload potential commencing at 10% rising to 30% over time;
- military movements – outbound only; and
- humanitarian and medevac – outbound only.

3.2.166 A summary of the airfreight forecast, by year, for Manston Airport is shown in **Table 3.8** below. This shows air freight movements by aircraft class, the total air freight air traffic movements, total air freight volume in tonnes, and total air freight heavy goods vehicle movements.

Table 3.8 Manston Airport Air Freight Forecast

Year of Operation	Air Freight Class C ATM	Air Freight Class D ATM	Air Freight Class E ATM	Total Air Freight ATM	Total Air Freight Volume (tonnes)	Total Air Freight HGV Movements
1	0	0	0	0	0	0
2	1,882	1,974	1,396	5,252	96,553	9,903
3	2,194	2,052	1,558	5,804	108,554	11,427
4	3,650	4,314	1,736	9,700	167,091	18,064
5	3,754	4,314	1,868	9,936	173,741	19,305
6	3,858	4,392	1,894	10,144	181,436	20,736

Year of Operation	Air Freight Class C ATM	Air Freight Class D ATM	Air Freight Class E ATM	Total Air Freight ATM	Total Air Freight Volume (tonnes)	Total Air Freight HGV Movements
7	4,482	4,470	1,920	10,872	192,908	22,695
8	4,690	4,548	1,946	11,184	200,673	24,324
9	4,898	4,548	1,946	11,392	216,765	27,096
10	5,002	4,626	1,972	11,600	212,351	27,400
11	5,202	4,811	2,051	12,064	222,377	29,650
12	5,410	5,003	2,133	12,547	234,508	32,346
13	5,627	5,204	2,218	13,048	244,690	34,956
14	5,852	5,412	2,307	13,570	256,989	38,072
15	6,086	5,628	2,399	14,113	270,579	41,628
16	6,329	5,853	2,495	14,678	283,904	45,425
17	6,582	6,088	2,595	15,265	296,594	49,432
18	6,846	6,331	2,699	15,875	312,344	54,321
19	7,119	6,584	2,807	16,510	324,838	59,061
20	7,404	6,848	2,918	17,170	340,758	64,906

3.2.167 In developing the forecast for the air freight HGV movements an assumed load of 10 tonnes per HGV has been used for the initial period of the forecast. For later years this is reduced to 5 tonnes to allow for unladen arrivals and departures; however these are considered a worst case as in reality a percentage of the cargo will be tail to tail (arriving on one aircraft and departing on another).

Passenger Forecast

3.2.168 Although the primary focus of the Proposed Development will be to operate as a freight-focused airport, it is anticipated that in addition complimentary passenger services would also be developed to provide an additional revenue stream to the airport, and also to provide a service to people in East Kent and Thanet.

3.2.169 A passenger forecast has been prepared as part of the business plan, Manston Airport: A National and Regional Aviation Asset Volume III p14 (Azimuth Associates 2017). As outlined above, passenger flights are forecast to start in airport Year 3, currently predicted to be Spring 2021.

3.2.170 The passenger forecast has been produced using market intelligence for the short to medium term forecasts, with a 4% increase year-on-year from airport Years 11 to 20. The forecast is based on the following assumptions:

- scheduled carrier operating a twice-daily shuttle service to a major hub Years 3 to 20;

- a low cost carrier basing two aircraft at Manston Airport Years 3 to 5 with 3,276 ATM, and three aircraft Years 6 to 10 with 4,914 ATM, and an annual increase to the ATM of 4% thereafter;
- charter flights operating a number of services equivalent to 200 ATM Year 3, 240 ATM Year 4, 280 ATM Years 5-10, and an annual increase of 4% thereafter; and
- cruise ship flights for 26 weeks of the year with 1 flight (2 movements) per week Years 4 to 6, and 2 flights (4 movements) per week Years 7 to 10, and an annual increase 4% thereafter.

3.2.171 A summary of the passenger forecast, by year, for Manston Airport is shown in **Table 3.8** below. This shows the passenger ATM by aircraft class, the total passenger ATMs per year, and the total passenger numbers.

Table 3.9 Manston Airport Passenger Forecast

Year of Operation	Passenger Class C ATM	Passenger Class D ATM	Total Passenger Flight ATM	Total Passenger Numbers
1	0	0	0	0
2	0	0	0	0
3	4,932	0	4,932	662,768
4	4,972	52	5,024	679,868
5	5,012	52	5,064	686,672
6	6,650	52	6,702	965,295
7	6,650	104	6,754	975,591
8	6,650	104	6,754	975,591
9	6,650	104	6,754	975,591
10	6,650	104	6,754	975,591
11	6,858	108	6,966	1,011,587
12	7,074	112	7,186	1,049,022
13	7,299	117	7,416	1,087,954
14	7,532	122	7,654	1,128,444
15	7,775	127	7,902	1,170,553
16	8,028	132	8,160	1,214,347
17	8,291	137	8,428	1,259,892
18	8,564	142	8,707	1,307,259

Year of Operation	Passenger Class C ATM	Passenger Class D ATM	Total Passenger Flight ATM	Total Passenger Numbers
19	8,849	148	8,997	1,356,521
20	9,144	154	9,298	1,407,753

3.2.172 Based on market intelligence, research from other airports, and historic information from previous operations at Manston Airport the assumptions have been made for the mode of transport for passengers and their UK origins/destinations.

3.2.173 Initially the passenger mode of transport is predicted to be 3% bus (including shuttle bus from Ramsgate mainline train station), 7% taxi, 45% car (parking on site) and 45% car (drop off/pick up). Through travel plan measures the airport would aim to increase the percentage of travel by sustainable modes for the later years of the forecast.

3.2.174 The UK origin/destination for the airport passengers is initially forecast to be from the local area. As the airport and passenger services mature and develop this is expected to change so that the percentage of airport passengers from Mid, North and West Kent, and from London is increased; but the core catchment area is expected to remain East Kent.

Other Airport and Aviation Related Services

3.2.175 In addition to the core business of air freight, and the complimentary passenger services, Manston Airport would also serve as a base for a number of other airport and aviation related services. These are outlined in the following section, although full details of all of these services are not yet available; more details will be provided as part of the DCO application.

3.2.176 Fixed Base of Operations – the airport would provide a base for business aviation and executive travel, including for helicopter and heli-charter flights.

3.2.177 Flight School – it is anticipated that the existing flight school and training facilities, which are operated by TG Aviation, would be retained at the airport.

3.2.178 Maintenance, Repair and Overhaul – a number of businesses including AvMann Engineering, have been based at the airport working in MRO. The airport would continue to support and encourage these operations, and new MRO facilities would be constructed as part of Construction Phase 2.

3.2.179 Aviation Related Business – the Northern Grass area would provide facilities for a range of purposes which do not require direct airside access, such as warehousing, offices and airport related business units. The units available would be flexible to meet the needs of the tenants. The existing businesses and tenants on the airport site who do not need direct airside access will be offered alternative locations on the Northern Grass area.

Airport Hours of Operation and Staffing

3.2.180 The airport will be capable of operating 24 hours a day all year round, and there will therefore need to be essential airport operations staff available at all times. In addition there will need to be a permanent security presence in the airport control room where there will be CCTV monitors and other security related systems. It is anticipated that those essential staff, including air traffic, rescues and firefighting and security as detailed in **Table 3.10**, would be rostered on a 12 hours shift working pattern, with a week of four days on/three days off followed by three days on and four days off.

3.2.181 However the actual operating times of the airport and of ATMs will be dependent on the anticipated air traffic, and the rostering of the staff would be flexible to meet this demand. As outlined above the normal operating hours, or 'daytime', will be 07.00 to 23.00, but with limited exceptions during a shoulder period from 06.00 to 07.00 for certain passenger flights departing to Europe or arriving from the United States of America.

3.2.182 The remaining direct airport and other direct staff will be rostered according to the needs of the airport and the hours of operation. These are likely to be rostered evenly across the daytime hours of 07.00 to 23.00.

3.2.183 The airport administration staff, and the staff based in the aviation related business units on the Northern Grass area would work traditional working hours, typically 08.00 to 18.00.

3.2.184 The forecast of the number of jobs which would be generated by the reopening of Manston Airport is included within the business plan and forecast prepared for RiverOak (Manston Airport: A National and Regional Aviation Asset Volume IV (Azimuth Associates 2017)). There are four categories of economic impact/job creation:

- Direct Economic Impact. The employment, income and GDP associated with the operation and management of activities at the airport, including the airport Resource Management System (RMS) on-site at the airport, and airport-related businesses located elsewhere near the airport. This includes activities by the airport operator, the airlines, airport air traffic control, general aviation, ground handlers, airport security, immigration and customs, aircraft maintenance, and other activities at the airport;
- Indirect Economic Impact. The employment, income and GDP generated by down-stream industries that supply and support the activities at the airport. For example, these could include: wholesalers providing food for in-flight catering, oil refining activities for jet fuel, companies providing accounting and legal services to airlines, travel agents booking flights, etc.;
- Induced Economic Impact. This captures the economic activity generated by the employees of the airport directly or indirectly connected to the airport spending their income in the national economy. For example, an airline employee might spend his/her income on food, restaurants, child care, entertainment, DIY and other items which, in turn, generate employment in a wide range of sectors of the general economy; and

- Catalytic Impacts. Also known as wider economic benefits, catalytic impacts capture the way in which the airport facilitates the business of other sectors of the economy. As such, air transportation facilitates employment and economic development in the national economy through a number of mechanisms.

3.2.185 In summary this forecast uses information and models from a range of different sources and studies to give an estimate for the number of direct, indirect/induced and catalytic jobs that would be generated, for the purpose of this forecast indirect and induced jobs are combined. These are based on the following formula (see Manston Airport: A National and Regional Aviation Asset Volume IV p17 (Azimuth Associates 2017)):

- 887 direct jobs per one million passengers or 100,000 tonnes of freight;
- 2,100 indirect/induced jobs for every 1,000 direct jobs; and
- 4,000 catalytic jobs (6,100 less 2,100) per 1,000 direct jobs.

3.2.186 Using this formula, and the Manston Airport forecasts in **Table 3.8** and **Table 3.9** the estimated total for direct, indirect and catalytic jobs by airport year of operation is shown in **Table 3.10** below.

Table 3.10 Manston Airport Direct, Indirect/Induced and Catalytic Jobs Forecast

Year of Operation	Freight tonnage	Passenger numbers	Direct jobs	Indirect/ induced jobs	Catalytic jobs	Total job creation
1	0	0	116	0	0	116
2	96,553	0	856	1,798	0	2,655
3	108,553	662,768	1,551	3,257	6,203	11,010
4	167,092	679,868	2,085	4,379	8,341	14,805
5	173,741	686,672	2,150	4,515	8,601	15,266
6	181,436	965,295	2,466	5,178	9,862	17,505
7	192,908	975,591	2,576	5,411	10,306	18,293
8	200,673	975,591	2,645	5,555	10,581	18,782
9	203,245	975,591	2,668	5,603	10,673	18,944
10	212,351	975,591	2,749	5,773	10,996	19,517
11	222,377	1,011,587	2,870	6,027	11,479	20,375
12	234,508	1,049,022	3,011	6,322	12,042	21,375
13	244,690	1,087,954	3,135	6,584	12,542	22,261
14	256,989	1,128,444	3,280	6,889	13,122	23,291
15	270,579	1,170,553	3,438	7,220	13,753	24,412

Year of Operation	Freight tonnage	Passenger numbers	Direct jobs	Indirect/ induced jobs	Catalytic jobs	Total job creation
16	283,904	1,214,347	3,595	7,550	14,381	25,527
17	296,594	1,259,892	3,748	7,871	14,993	26,613
18	312,344	1,307,259	3,930	8,253	15,720	27,903
19	324,838	1,356,521	4,085	8,578	16,338	29,000
20	340,758	1,407,753	4,271	8,970	17,085	30,326

3.2.187 Of the direct jobs approximately 25% would be employed by the airport, with the remaining 75% employed by airlines, freight forwarders and integrators, onsite passenger services such as a travel agency, bar and restaurant, shops, as well as government roles in customs and immigration. The full range of the types of direct airport jobs would include:

- airlines;
- ground handling;
- airport and Air Traffic Control;
- retail and other in-terminal services;
- airport security and passenger screening;
- customs, immigration and government jobs;
- ground transport;
- food and beverage;
- MRO; and
- other

3.2.188 The direct airport jobs would be in a range of positions as forecast in **Table 3.10** below:

Table 3.11 Manston Airport Direct Airport Jobs by Position

Year of Operation	Passenger services	Freight Services	Air Traffic Services	Rescue & Firefighting Services	Airport Operations	Airport Maintenance	Motor Transport	Site & Freight Security	Administration	Total
1	0	49	6	14	6	8	8	11	14	116
2	0	196	25	57	24	31	31	45	14	423
3	99	215	25	57	29	38	38	55	15	571

Year of Operation	Passenger services	Freight Services	Air Traffic Services	Rescue & Firefighting Services	Airport Operations	Airport Maintenance	Motor Transport	Site & Freight Security	Administration	Total
4	102	302	25	57	31	41	41	59	15	673
5	103	322	25	57	32	41	41	60	16	697
6	145	256	25	57	33	43	43	62	16	680
7	146	288	25	57	33	43	43	63	16	714
8	146	307	25	57	33	43	43	63	16	733
9	146	357	25	57	34	44	44	64	16	787
10	146	331	25	57	34	44	44	64	16	761
11	152	347	25	57	34	44	44	64	16	783
12	157	361	25	57	34	45	45	65	16	805
13	163	376	25	57	35	45	45	66	16	828
14	169	391	25	57	35	46	46	67	16	852
15	176	413	25	57	36	46	46	68	16	883
16	182	430	25	57	36	47	47	68	16	908
17	189	447	25	57	36	47	47	69	16	933
18	196	469	25	57	37	48	48	70	17	967
19	203	488	25	57	37	48	48	71	17	994
20	211	507	25	57	38	49	49	71	17	1,024

3.2.189 The majority of the direct airport employees would be those working in passenger and freight services. These roles include the ticket collections, passenger check-in, customer service and assistance, and baggage handling for passenger services, and freight handling, loading, packing and transport for the freight service positions. There will also be a number of office/administration roles, as well as management positions for both the passenger and freight services jobs.

3.2.190 The Rescue & Firefighting Services (RFFS) staff will be multi-skilled to allow freight handling and other duties to be carried out. As a general policy, it is anticipated that those recruited to RFFS will have at least one other skill related to either handling and/or maintenance. This approach allows a more stable working pattern prioritising aircraft servicing with default fall back activities during periods of reduced or zero air traffic.

Airport Operational and Management Procedures

3.2.191 In order to comply with the requirements of the CAA, EASA and other licensing authorities the airport will be required to develop and implement a number of management plans, procedures and policies as indicated in **Table 3.12** below. Additional plans and strategy documents will also be prepared as part of the general management of the airport, and/or to ensure implementation of mitigation for potential environmental effects (as embedded environmental measures - **Section 5.3** below). Relevant industry standards, guidance and best practice will be followed, and where appropriate consultation will be undertaken with relevant stakeholders and consultees.

Table 3.12 Airport Management Plans, Procedures and Policies

	Purpose	Standard, Guidance or Best Practice	Consultee	Timeline
Emergency Plan	Details the incident alerting procedures and the initial action responsibilities for airport staff	ADR.OPS.B.005 European Aviation Safety Agency	Kent Fire & Rescue Service, Kent County Constabulary, South East Coast Ambulance Service, Thanet District Council	Post DCO Consent
Emergency Response and Post-Crash Management Plan	Consolidated reference and action document for use of personnel in the event of a major incident or emergency		Kent Fire & Rescue Service, Kent County Constabulary	Post DCO Consent
Environmental Spillage Plan	For use by all company personnel for the identification, notification, containment and clean-up of all spillages, both inside and externally of a building or on the airfield		Kent Fire & Rescue Service, Environment Agency	Post DCO Consent
Wildlife Hazard Management Plan	Procedure to assess and manage the wildlife hazards on and in the vicinity of the aerodrome	CAA CAP 772	Environment Agency, Natural England	Post DCO Consent
Habitat Management Plan	Manage the habitat on the airport site in order to reduce the risks for bird strike	CAA CAP 772	Environment Agency, Natural England	Post DCO Consent
Long Grass Policy	Procedure for the management of all airport grass to deter most common hazardous birds found on an aerodrome	CAA CAP 772	Environment Agency, Natural England	Post DCO Consent

	Purpose	Standard, Guidance or Best Practice	Consultee	Timeline
Waste Management Plan	Plan		Environment Agency	Post DCO Consent
Discharge Monitoring Procedure	Ensure compliance with discharge permit	Environmental Permitting Guidance Groundwater Activities, Environment Agency December 2010	Environment Agency	For DCO Submission
Environmental Policy	Overarching Airport Environmental Policy setting out a commitment to environmental principles			For DCO Submission
Operational Traffic Management Plan, Public Transport Access Strategy, Staff Travel Plan, Pedestrian and Cycle Access Strategy	Minimise, control and manage the traffic and transport effects associated with the operation of the airport		Highways England, Kent County Council Highways, Thanet District Council	For DCO Submission

Decommissioning Phase

3.2.192 It is considered that the airport will be operational long into the future and consequently there will not be any requirement for decommissioning of the airport.

3.2.193 However, as part of the construction phase(s) for the airport there will be a requirement to decommission and remove old and existing equipment, infrastructure and facilities which are no longer required or considered fit for purpose. For the upgrading of aircraft pavements, for example runways, taxiway, aprons and stands, the usual technique is the place a new overlay on top of the existing older paved surfaces. Therefore for these works there is often no requirement for any decommissioning.

3.2.194 In addition across the lifetime of the Proposed Development, which is currently forecast to be 20 years but will very likely extend beyond this date, other equipment, infrastructure and facilities will need to be replaced.

3.2.195 Therefore these effects are considered and assessed, where appropriate, in the topic chapters.

4. Planning policy context

4.1 Introduction

4.1.1 This chapter provides an overview of the relevant national, regional and strategic local planning policies in order to establish the policy context against which the proposals for the reopening of Manston Airport will need to be considered. Further detail is provided in **Appendix 4.1**.

4.2 National Planning Policy

National Planning Practice Guidance (NPPG)

4.2.1 On 6th March 2014, the Department for Communities and Local Government (DCLG) launched the planning practice guidance web-based resource.

4.2.2 In terms of planning practice guidance as it relates to aviation and airport planning, the NPPG does not introduce any additional guidance beyond that which is already captured by the National Planning Policy Framework.

National Planning Policy Framework (NPPF)

4.2.3 The NPPF was published in March 2012 and sets out the Government's planning policies for England and how these are expected to be applied (paragraph 1). It states that planning law requires that applications must be determined in accordance with the Development Plan for the relevant area, unless material considerations indicate otherwise, and that the NPPF, " must be taken into account in the preparation of local and neighbourhood plans, and is a material consideration in planning decisions" (paragraph 2).

4.2.4 Paragraph 3 specifically states that the NPPF does not contain specific policies for nationally significant infrastructure projects for which particular considerations apply. These are to be determined in accordance with the decision-making framework set out in the Planning Act 2008 and relevant national policy statements for major infrastructure, as well as any other matters that are considered both important and relevant (which may include the NPPF). It also states that National Policy Statements form part of the overall framework of national planning policy, and are a material consideration in decisions on planning applications (see **Section 4.3** on the National Policy Statement on Aviation).

4.2.5 At the heart of the NPPF is a presumption in favour of sustainable development which in terms of decision-taking, means approving development proposals that accord with the Development Plan without delay or where the Development Plan is absent, silent or relevant policies are out-of-date, granting planning permission unless any adverse impacts of doing so would significantly and demonstrably outweigh the benefits when assessed against the policies in the NPPF taken as a whole or if specific policies in the NPPF indicate that development should be restricted (paragraph 14).

4.2.6 Within the NPPF, there are various references to the need for Local Authorities to work with other authorities and providers to:

"identify and protect, where there is robust evidence, sites and routes which could be critical in developing infrastructure to widen transport choice; (Paragraph 41)

to assess the quality and capacity of infrastructure for transport, water supply, wastewater and its treatment, energy (including heat), telecommunications, utilities, waste, health, social care, education, flood risk and coastal change management, and its ability to meet forecast demands; (Paragraph 162) and

to take account of the need for strategic infrastructure including nationally significant infrastructure within their areas." (Paragraph 162)

4.2.7 Further detail of those sections of the NPPF that are relevant to the Proposed Development are provided in **Appendix 4.1**.

4.2.8 The NPPF Technical Guidance was archived on 7th March 2013 and replaced by the new NPPG launched on 6th March 2014 (see paragraph 4.2.1).

4.3 National Aviation Policy

Aviation Strategy White Paper (expected 2018)

4.3.1 The Government has announced that the Department for Transport (DfT) is currently progressing work to develop a new strategy for UK aviation (Written Statement to Parliament on Airport Capacity and Airspace Policy – 2 February 2017). The Government will be consulting on this later this year, leading to an expected publication of an Aviation Strategy White Paper in 2018.

Draft Airports National Policy Statement (NPS) – February 2017

4.3.2 The Draft Airports NPS: *"New runway capacity and infrastructure at airports in the South East of England"* was published for consultation on 2 February 2017, together with other supporting documents and analyses, including the draft Appraisal of Sustainability (an appraisal of the potential social, economic and environmental impacts of the proposed policy in the draft Airports NPS) and is included as **Appendix 4.2**. This follows the outcome of the work by the Airports Commission which published its final report in July 2015 and the Government's announcement on 25 October 2016 that a Northwest Runway at Heathrow Airport was its preferred scheme to deliver additional airport capacity in the South East of England. Thus, as set out in section 104(3) of the Planning Act 2008, other than for the preferred scheme at Heathrow, the Airports NPS will not form the basis for determination of DCO applications.

4.3.3 However, although it will not form the basis for determination, the Airports NPS is still a relevant consideration for other applications for airports infrastructure in London and the South East of England[29]. Its policies will be a relevant consideration for the Examining Authority and Secretary of State[30] in determining DCO applications such as that proposed for Manston Airport but it is not the

[29] Paragraph 1.10 and 1.36
[30] Paragraph 1.12.

primary basis of determination in the same way as it is for the Heathrow Northwest Runway[31].

4.3.4 The Airports NPS also does not affect wider aviation issues for which the 2013 Aviation Policy Framework and subsequent policy statements apply (paragraph 1.34). The Governement has also announced that the DfT is currently progressing work to develop a new strategy for UK Aviation. The Government will be consulting on this later in 2017 leading to publication of an Aviation Strategy White Paper in 2018.

4.3.5 The parts of the draft Airports NPS considered to be relevant to RiverOak's DCO application for Manston Airport are set out below:

- the draft NPS reaffirms that international connectivity is important to the success of the UK economy as it facilitates trade in goods and services and is particularly important for many of the fastest growing sectors of the economy[32];
- the UK's airports are the primary gateway for vital time-sensitive freight services[33];
- the aviation sector benefits the UK economy through its direct contribution to GDP and employment, and by facilitating trade and investment, manufacturing supply chains, skills development, and tourism[34]; and
- the importance of freight services is also acknowledged within the draft Airport NPS (see **Appendix 4.2** for further information).

4.3.6 The benefits for freight delivered by the Heathrow Northwest Runway was one of four strategic considerations to which the Government afforded particular weight in selecting it as its preferred scheme.

Airports Commission Final Report (July 2015)

4.3.7 The independent Airports Commission was set up in late 2012 with a brief to find an effective and deliverable solution to increase aviation capacity in the South East as well as supporting the UK, and to make recommendations which will allow the UK to maintain its position as Europe's most important aviation hub.

4.3.8 The Airports Commission short-listed three options for this new capacity: one new northwest runway at Heathrow Airport; a westerly extension of the northern runway at Heathrow Airport; and one new runway at Gatwick Airport. The Commission concluded that the proposal for a new Northwest Runway at Heathrow Airport, in combination with a significant package of measures to address its environmental and community impacts presented the strongest case.

4.3.9 Specifically, in relation to Manston, the Commission throughout their considerations recognised that the air freight sector plays an important role in the UK economy and particularly to trade with emerging markets and other non-EU countries, and to many airlines. The Commission identified that the key sectors for

[31] The need to have regard to other matters which are both important and relevant to the determination of DCO applications is confirmed at Section 104(2)(d) of the Act.
[32] Paragraph 2.1.
[33] Paragraph 2.2.
[34] Paragraph 2.4.

air freight include perishables such as food and flowers and pharmaceutical products and medicines that need to be delivered in controlled environments within short shelf lives, as well as fast evolving high-tech products where several weeks of sea transit from the Far East might represent a significant proportion of the product's sales life (paragraphs 6.65 to 6.69).

Airports Commission Discussion Paper 06: Utilisation of the UK's Existing Airport Capacity (June 2014)

4.3.10 The Airports Commission during its investigation looked at the potential to redistribute demand away from London and South East airports. The study suggested that there is relatively little scope for redistribution, but did recognise that regional airports and those serving London and the South East, other than Gatwick and Heathrow, play a crucial national role, especially at a time when the major London airports are operating very close to capacity.

Airports Commission Interim Report (December 2013)

4.3.11 Further in relation to Manston Airport, the Airports Commission Interim Report (December 2013) in Appendix 2: *Assessment of Long-Term Options*, is supportive of Manston Airport recognising that it:

> ".....presents some potential as a reliever airport, but does not address the larger question of London & South East capacity. The concept of reliever airports is considered in short and medium term work. Please see Appendix 1 for further information."

4.3.12 It goes on to state that:

> "The Commission is supportive of the reliever airports concept. The Commission recognises that this may be the best way to cater for the needs of business users without disrupting the wider airport system..."

Aviation Policy Framework (March 2013)

4.3.13 The Aviation Policy Framework (APF) was published in March 2013. It sets out the Government's objectives and principles to guide plans and decisions on airport developments.

4.3.14 Further detail of those sections of the APF that are relevant to the proposed development are provided in **Appendix 4.1**.

4.4 Regional Policy

4.4.1 This section sets out the regional policy that is relevant in the consideration of any future development at Manston Airport.

Draft Local Transport Plan for Kent 4: Delivering Growth without Gridlock 2016-2031

4.4.2 Kent County Council is in the process of consulting on its new Local Transport Plan. The revised plan was presented to the County Council's Environment and Transport Cabinet Committee in March 2017, the next stage is for it to be presented to Cabinet with a recommendation to adopt, this is expected to take place in late May 2017. Once adopted, it will replace the Local Transport Plan for Kent 2011-2016 (see below).

4.4.3 The plan sets out the County Council's position on aviation which is to maximize use of existing regional airport capacity, along with some expansion of existing airports and improved rail connections. In respect of Manston Airport, the plan recognises that it ceased to operate on 15th May 2014 and that the County Council's position as set out in the meeting of the County Council on 16th July 2015 is:

> "That we the elected members of KCC wish it to be known that we fully support the continued regeneration of Manston and East Kent and will keep an open mind on whether that should be a business park or an airport, depending upon the viability of such plans and their ability to deliver significant economic growth and job opportunity."

4.4.4 The County Council is also seeking to deliver a new railway station to significantly improve rail connectivity to the area (Thanet Parkway Rail Station). The station will provide access to greater employment opportunities for local residents, and increase the attractiveness for investment in Discovery Park Enterprise Zone and numerous surrounding business parks in Thanet. It will also support local housing and any reopened airport at Manston. The estimated journey time from Thanet Parkway to London St Pancras will be just over 20 minutes shorter than that from Deal to London St Pancras; therefore the new station enhances the accessibility of the wider area of East Kent.

Local Transport Plan for Kent 2011-2016 (April 2011)

4.4.5 The current Local Transport Plan for Kent, covering the five-year period between 2011 and 2016 sets out the future strategy of the transport related matters for the County based on the current and expected transport demand.

4.4.6 The Local Transport Plan for Kent states that Manston Airport (referred to as one of Kent's airports) has plans to expand and is an essential catalyst in regenerating the local areas[35].

4.4.7 It recognises the significant impact that Manston Airport has on the County's residents, both positive and negative. It states that Kent County Council is keen to work with airport operators and Central Government to ensure that these negative externalities are minimised whilst supporting managed expansion where it aligns with the County Council's economic growth and regeneration objectives[36].

4.4.8 The Local Transport Plan for Kent states that Manston Airport has significant potential to develop into a regional airport and become one of the largest single generators of economic activity in the County[37].

The London Plan, 2015 (Consolidated with Alterations since 2011)

4.4.9 Under legislation establishing the Greater London Authority (GLA), the London Mayor has to produce a 'Spatial Development Strategy', which is known as 'The London Plan'. The London Plan was first adopted in July 2011, and has since been updated in 2013 and most recently in 2015.

[35] The Local Transport Plan for Kent 2011-2016, April 2011, Executive Summary
[36] The Local Transport Plan for Kent 2011-2016, April 2011, Paragraph 1.16, Page 5
[37] The Local Transport Plan for Kent 2011-2016, April 2011, Paragraph 2.18, Page 18

4.4.10 Further detail of those sections of the London Plan 2015 that are relevant to the proposed development are provided in **Appendix 4.1**.

4.5 Local Planning Policy

4.5.1 In this section, summaries of the relevant planning policies contained within the statutory Development Plans of the following Local Planning Authorities are provided:

- Thanet District Council;
- Dover District Council; and
- Canterbury City Council.

Thanet District Council

4.5.2 The Manston Airport site is located entirely within the administrative authority of Thanet District Council.

4.5.3 The statutory Development Plan for Thanet District Council comprises:

- Thanet Local Plan (2006) (Saved Policies);
- Local Plan Proposals Map;
- Cliftonville Development Plan Document (February 2010); and
- Kent Waste and Minerals Local Plan (Saved Policies).

4.5.4 In addition Thanet District Council are preparing a new Thanet Local Plan to 2031, at present this comprises:

- Draft Thanet Local Plan to 2031 Preferred Options (January 2015); and
- Proposed Revisions to Draft Local Plan (Preferred Options) (January 2017).

Thanet Local Plan Saved Policies and Proposals Map

4.5.5 An extract from the Local Plan Proposals Map showing the Manston Airport site is provided below in **Figure 4.1**.

4.5.6 The key planning policy designations that affect the Manston Airport site and the area adjoining it as shown on the Local Plan Proposals Map are as follows:

- The airport boundary is defined on the Proposals Map (Policy EC2 – Kent International Airport);
- Policy EC4 – Airside Development Area;
- Policy EP13 – Groundwater Protection Zone;
- Policy CC2 – Central Chalk Plateau;
- The land to the east is designated for terminal related purposes (Policy EC5 – Land at, and east of the Airport Terminal); and

- The land to the west is designated for economic development (Policy EC1 – Manston Park, Manston).

4.5.7 Full details of these policies are provided in **Appendix 4.1**. In addition, details of relevant economic development and regeneration, housing and transport Local Plan saved policies are also provided in **Appendix 4.1**.

Environmental Protection

4.5.8 Full details of key relevant saved policies, including Policy EP5 (Local Air Quality Monitoring) and Policy EP7 (Aircraft Noise), are provided in **Appendix 4.1**

Draft Thanet Local Plan to 2031 Preferred Options (January 2015)

4.5.9 Within the Draft Local Plan, Strategic Priority 1 looks to create additional employment and training opportunities, to strengthen and diversify the local economy and improve local earning power and employability.

4.5.10 The Council recognises that various options are available with regards to the future use of the Manston Airport site, as an operational airport and for aviation activities, as well as for other developments. It is acknowledged that these need to be explored and assessed for the wider area of the airport and its environs through the Development Plan making process. The Council is therefore seeking to designate the area as an “opportunity area” for which the District Council will prepare an Area Action Plan (AAP) Development Plan Document. The AAP for Manston Airport will set out the development framework for the development and regeneration of the area. A consideration of the AAP should be the promotion, retention, development and expansion of the airport and aviation related operations. This should be supported by a feasibility study and a viable business plan.

4.5.11 The alternative option for the AAP should be to assess mixed-use development that will deliver significant new high quality skilled and semi-skilled employment opportunities, residential development, sustainable transport and community facilities.

4.5.12 Full details of the key relevant draft policies are provided in **Appendix 4.1**.

Proposed Revisions to Draft Local Plan (Preferred Options) (January 2017)

4.5.13 Following the publication of the draft Thanet Local Plan to 2031 Preferred Options (January 2015), the local planning authority has suggested some focused changes to key policies, some of which are relevant to Manston Airport. These changes have been set out in the Proposed Revisions to Draft Local Plan (Preferred Options) (January 2017) and were the subject of a public consultation exercise, running from the 19th January 2017 to the 17th March 2017.

4.5.14 The local planning authority has significantly amended site specific draft Policy SP05 (Manston Airport). The Council commissioned an airport viability study by Avia Solutions. This was to look at whether an airport was a viable option for the site within the plan period to 2031. This report took into account national and international air travel and transport and the way in which it is likely to develop over the next 15 to 20 years and looked at previous reports and developments in national aviation. The report (September 2016) concluded that airport operations at Manston are very unlikely to be financially viable in the longer term, and almost certainly not possible in the period to 2031.

4.5.15 Taking on board the conclusions of the airport viability report and given the level of objectively assessed housing need, the Council considers that the best use for the 320ha brownfield airport site is for a mixed use development primarily focused on residential. Revised Policy SP05 seeks to create an attractive sustainable free standing new settlement with a district centre and featuring all the amenities needed for a town. The development will also deliver important links across Thanet and improved access to and from the site and provide open space and community facilities that the whole of Thanet can access.

4.5.16 Full details of key relevant revised draft policies are provided in **Appendix 4.1**

4.5.17 Based on the amendment to draft Policy SP05 (Former Airport Site) to provide a mixed-use settlement with residential provision, draft Policy SP11 (Housing Provision) has been revised to provide 2,500 residential dwellings at the Former Airport Site.

4.5.18 Section 8 of the Proposed Revisions state that land is safeguarded for key road schemes and junction improvements to support implementation of the Thanet Transport Strategy. The B2050 Manston Road and B2190 Spitfire Way by the airport are proposed for widening, junction improvements are proposed at Manston Road/Spitfire Way and at Manston Road/Manston Court Road. A new road is also proposed from Columbus Way (Manston Business Park) to Manston Road, Birchington.

4.5.19 TDC have advised that they are not expecting to adopt their New Local Plan before Spring 2019 at the earliest. In this context, and with reference to Paragraph 216 of the NPPF, very little weight can be given to the emerging plan policies. There are still unresolved objections including towards the approach to be taken towards Manston Airport and whether the new Local Plan is based on adequate, up-to-date and relevant evidence about the economic, social and environmental characteristics and prospects of the area.

Dover District Council

4.5.20 The statutory Development Plan for Dover District Council comprises:

- Dover District Core Strategy (adopted September 2010);
- Dover District Land Allocations Local Plan (adopted January 2015);
- Dover District Proposals Map; and
- Dover District Local Plan (Saved Policies) (2002).

4.5.21 A review of Dover District's planning policy has not identified any planning policy of relevance to the reopening of Manston Airport. The Core Strategy only contains a reference to the location of Manston Airport.

4.5.22 Dover District Council is about to commence a review of the Local Plan and has identified Manston Airport as a cross-boundary strategic priority for planning.

Canterbury City Council

4.5.23 The statutory Development Plan for Canterbury City Council comprises:

- Canterbury City Local Plan (Saved Policies) (2009);
- Herne Bay Area Action Plan (adopted April 2010); and
- Canterbury City Proposals Map.

4.5.24 A review of Canterbury City's planning policy has not identified any planning policy of relevance to the reopening of Manston Airport. The Local Plan (Saved Policies) (2009) places some expectation on increased air traffic from London to Manston Airport.

4.5.25 Canterbury City Council is currently updating the Local Plan, which has undergone an Examination in Public. Following this process, changes to the Local Plan have been proposed which the Inspector considers are necessary to rectify matters of soundness and/or legal compliance. These changes, set out in the Main Modifications of the Canterbury District Local Plan were the subject of a public consultation exercise between the 10th February and the 24th March 2017.

4.6 Other relevant plans and policies

4.6.1 The following plans and policies are also deemed to be relevant, further details of which are given in **Appendix 4.1**:

- Kent and Medway Growth and Infrastructure Framework (September 2015);
- Kent and Medway's Growth Plan: 'Unlocking the Potential: Going for Growth'; and
- Kent County Council - Manston Airport under private ownership: The story to date and the future prospects (March 2015).

4.7 Other Consents Needed

4.7.1 As outlined in **Section 1.1**, the principal legislation under which permission is required to enable the development to go ahead is the Planning Act 2008 and a DCO application will be submitted to PINS later this year.

4.7.2 The proposed Manston Airport Development will also require other consents, licences, permits, etc. to enable it to be constructed and / or operated, and for which PINS is not the authorising body. These will be identified during the course of the EIA and appropriate consultations will take place with organisations such as the local planning and highway authorities, Civil Aviation Authority, Natural England, the Environment Agency and others as appropriate.

4.8 Habitats Regulations Assessment

4.8.1 One Natura 2000 (European wildlife) site is located within 10km of the proposed development:

- Thanet Coast & Sandwich Bay Special Protection Area and Ramsar Site.

4.8.2 In addition to the assessment of potential effects on this site that will need to be addressed in the ES, there is a requirement under *The Conservation of Habitats and Species Regulations 2010 (SI 2010 No. 490)* (the 'Habitats Regulations') to undertake a screening exercise to determine whether this (or any other) site is likely to be significantly affected by the Proposed Development, either alone or in combination with other plans and projects. If significant effects are likely, there will be a need for an Appropriate Assessment to be carried out. The screening, any Appropriate Assessment and subsequent assessment form part of what is known as the Habitats Regulations Assessment (HRA) process.

4.8.3 Screening and any subsequent Appropriate Assessment will be undertaken by PINS (the 'competent authority'), drawing upon information about the likely effects of the Proposed Development on European sites that will be provided to it by RiverOak. In undertaking its assessment, PINS is required to consult with Natural England (NE). To facilitate the HRA process, Amec Foster Wheeler will also liaise with NE, and other interested parties as appropriate in the preparation of an Evidence Plan[38] for the HRA.

[38] The Evidence Plan process is a non-statutory, voluntary process, which is used to agree with PINS, and other consultees, the information that needs to be supplied as part of the DCO application in order to ensure compliance with the Habitats Regulations Assessment.

5. Approach to the PEIR

5.1 Scoping and scheme evolution

5.1.1 The approach followed in this PEIR mirrors that taken for an EIA Development and therefore has drawn from the EIA Scoping Report (**Appendix 1.1**) that was completed at an early stage of the project.

5.1.2 Schedule 4, Part 1 of the 2009 EIA Regulations, provides a checklist of topics to include in EIA derived from the relevant European Directives which are those aspects of the environment which are considered likely to be significantly affected by the Proposed Development. The aspects of the environment that have been considered in this PEIR are shown in **Table 1.1**.

5.1.3 The Scoping Report for the Proposed Development of Manston Airport set out what had been identified at that time to be the potentially significant environmental effects that needed to be considered in the ES and to outline the approach to undertaking the assessments of these effects. The report was issued to PINS to inform its Scoping Opinion under the EIA Regulations. The scoping stage also enabled statutory and non-statutory organisations, and others with an interest in the Proposed Development ('stakeholders') to comment on the proposed scope of the assessment. The PINS Scoping Opinion was issued on 10 August 2016 and is available on the PINS National Infrastructure Planning website[39] and included as **Appendix 1.2**.

5.1.4 Drawing on the Scoping Report and subsequent assessment work, the ES will include an assessment of the potential environmental effects of the Proposed Development that it is considered could be significant. This PEIR provides information about the work that has already been undertaken to inform the preparation of the ES and what further work is underway.

5.2 PEIR

5.2.1 As described in **Section 1.4** this PEIR has been prepared as part of the consultation process required under the Planning Act 2008. It is preliminary information which will subsequently be provided in full and final form in the ES. The approach taken in this PEIR accords with PINS Advice Note Seven.

5.2.2 The 2009 EIA Regulations state that an ES should not cover every aspect of the Proposed Development's environmental effects, but should focus on the aspects likely to have significant environmental effects. This has been followed for the PEIR. Government guidance contained in DCLG EIA Planning Practice Guidance (which as of 6th March 2014 has superseded the previous guidance contained within DETR Circular 02/99 EIA), states that:

5.2.3 *"Whilst every Environmental Statement should provide a full factual description of the development, the emphasis of Schedule 4 is on the "main" or "significant"*

[39] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR020002/TR020002-000308-Scoping%20Opinion

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

5.3 Project evolution

5.3.1 Opportunities to avoid or reduce potential adverse effects, or to deliver environmental enhancements, may be identified even before the start of the EIA process. Further opportunities have been identified whilst preparing the Scoping Report and PEIR. Some of these opportunities will become part of the Proposed Development for which consent is being sought.

5.3.2 The iterative process of design evolution, whereby design changes are made in response to environmental information and the amended Proposed Development is then subject to further assessment work, leading to further design changes continues through to the finalised proposals upon which the DCO application will be based, at which stage detailed work to assess the effects of the finalised Proposed Development can be completed. Consideration of alternatives is part of this iterative process. Monthly project meetings have been held since the inception of the project in January 2016 to discuss the design evolution and development, and during the preparation of the PEIR fortnightly technical design meetings, including RiverOak, members of the airport and airspace design teams, the EIA team, and other project team members have been held.

5.3.3 The approach taken to the PEIR has been to assess the effects of the Proposed Development as it currently is, as set out in **Chapter 3: Description of the Proposed Development**, incorporating the environmental measures that have been identified to date. This PEIR explains what measures have been incorporated into the Proposed Development so far.

5.3.4 Following statutory consultation in Summer 2017 (in accordance with Sections 42 and 47 of the Planning Act) it is possible that further design changes and environmental measures will be identified and these will be considered and then reported in the ES.

5.4 Identification of baseline conditions

Current baseline

5.4.1 A description of the aspects of the environment likely to be significantly affected by the Proposed Development is given in each of the topic chapters (6-15). Desktop studies, consultation and field surveys have been used to identify the current conditions and environmental character of the area for each topic.

5.4.2 Work has been completed, and for a small number of topics is on-going, in order to identify the current baseline conditions. The information obtained to date is summarised in this PEIR. Baseline data varies between topics, but reflects the most up to date information for that topic that is available for inclusion in the PEIR.

5.4.3 The assessment of potentially significant effects requires a comparison to be made between the likely environmental conditions in the presence of the Proposed Development and in its absence (i.e. the 'baseline').

Future baseline

5.4.4 Whilst the baseline environment provides a description of the current baseline conditions, due to the length of the construction and operational programmes (see **Section 3.2** and **Table 3.1**) it is appropriate to consider the changing nature of the environment in the event that the Proposed Development is not constructed or operated. This is referred to as the 'future baseline' and represents a 'do nothing' scenario. It cannot be assumed that the baseline conditions in the absence of the Proposed Development would be the same as at present (2017). This reflects changes resulting from human influences, such as new development or increased traffic which have the potential to modify the current environmental conditions.

5.4.5 The baseline data/ information are being used to predict the likely future baseline conditions when the Proposed Development would be constructed and operated. It is against these predicted baseline conditions that the assessment has been carried out.

5.4.6 The nature of the future baseline will vary between the environmental topic chapters and is influenced by a combination of natural and man-made processes.

5.4.7 As only specific aspects of the environment are affected by differences between the current baseline and the future baseline, not all assessments will be influenced in the same way or to the same extent. For many topics, the future baseline will be the same as the current baseline. Specific features of the future baseline which affect the assessment are therefore discussed in the relevant technical topic chapters of this PEIR.

5.4.8 The consideration of a future baseline introduces the potential for additional receptors (to those identified from the current baseline) to be potentially affected by the Proposed Development. For example, a new residential development (with a valid planning permission) would have the potential to result in additional residential receptors during the construction (for example construction noise, visual effects) and operation (affected by, for example operational noise, visual effects) of the Proposed Development.

5.4.9 For some of the environmental topics, an assessment against a set threshold was more appropriate due to the nature of the environmental topic and the availability of guidance documents typically used for such assessments.

5.5 Assessment years

5.5.1 The anticipated construction and operational programme for the Proposed Development is provided in Section 3.2. The construction works will be undertaken in four phases in accordance with the growth in demand and take up of capacity, with the first phase anticipated to start in Spring 2019 and be completed by Spring 2020, airport Year 1.

5.5.2 The assessment year (or years) for the assessment of construction effects varies between environmental topics and is dependent on a number of factors; for example, the geographical location of a receptor (or a group of receptors) and the specific Proposed Development component (or components) which are considered to give rise to an effect (or effects). Effects on receptors also have the potential to arise for a part of the construction phase or the entirety of the construction phase, for one of the construction phases or for all construction phases.

5.5.3 The assessment year (or years) for the assessment of operational effects also varies between environmental topics. The standard approach is for an 'opening or completion year' to be used as the basis of assessment of operational effects at which time the Proposed Development would be fully commissioned and operational. The 'opening year' for the Proposed Development is 2020, project Year 2. The operational assessment will also consider Year 6 and Year 20, as these represent the first year that 10,000 freight ATMs, and maximum capacity, would be reached, respectively.

5.5.4 Certain environmental topics have considered alternative years where appropriate, to consider a reasonable worst case scenario and to consider effects both before and after the implementation of environmental measures.

5.6 Overview of assessment methodology

Introduction

5.6.1 For each topic, (e.g. landscape and visual, noise etc.), the detailed assessment of likely significant effects is being completed by those with relevant specialist skills, drawing on their experience of working on other development projects, good practice in EIA and on relevant published information. For some topics, use will be made of modelling or other methodologies.

5.6.2 Each topic chapter in this report follows a common format (which will also be adopted for the ES), as outlined below.

1. Introduction – which includes the limitations or assumptions that have been made in preparation of the PEIR.
2. Policy and legislative context – which provides a summary of the national and local planning policy information relevant to the particular topic.
3. Data gathering methodology – explains the approach taken to baseline data collection including desk based and survey work completed and any relevant consultation on the approach.
4. Overall baseline (where appropriate, further detail will be set out under section 8 on the assessment of potential effects).
5. Environmental measures incorporated into the proposed development – which have been assumed to be implemented in order to avoid, reduce or compensate for

adverse effects of the proposals. The assessment is therefore completed for a mitigated scheme.

6. Scope of the assessment – this sets out the likely significant effects that have been given further consideration in the PEIR and those that have been scoped out as the effects are unlikely to be significant.
7. Assessment methodology – each technical chapter explains the methodology used to predict the effects of the Proposed Development, including quantitative methods where relevant. An explanation is also provided as to how significance of effects has been determined with reference to published guidance, including draft guidance, where appropriate. The approach that has been used in evaluating the significance of effects is also explained. This involves a combination of professional judgement and a topic-specific significance evaluation methodology that draws on the results of the assessment work that has been carried out.
8. Assessment of effects - where appropriate, dealing separately with each receptor or category of receptors that could be significantly affected – the assessment is made against the predicted future baseline and, in so doing, incorporates consideration of any cumulative effects. The need for any additional mitigation (over and above the measures that have been incorporated into the scheme) is also considered.
9. Conclusions of significance evaluation.

5.7 Combined and Cumulative Effects

5.7.1 The EIA process includes a requirement to give consideration to 'any indirect, secondary, **cumulative**, short, medium and long-term, permanent and temporary, positive and negative effects of the development'[40]; within EIA the approach usually taken, and the one that will be adopted for the Manston Airport EIA, is to distinguish between combined effects, and cumulative effects, see **Box 5.2**. This approach is consistent with the advice contained within PINS Advice Note 9[41].

Box 5.2 Combined Effects and Cumulative Effects – PINS Advice Note Nine
Combined effects are defined as the inter-relationships between topics which occur where a number of separate effects, eg. noise and air quality, affect a single receptor such as fauna. These will be assessed, where appropriate, within the topic chapters. Cumulative effects are defined as the interaction of the proposed development and other 'major' developments (as defined by PINS Advice Note 9: Rochdale Envelope, p7) where there is the potential for combined environmental effects. Within the Manston Airport Environmental Statement cumulative cffects will be assessed within a separate Cumulative Effects chapter. The approach adopted for Cumulatvie Effects Assessment is that presented within PINS Advice Note 17: Cumulative Effects Assessment.

Combined Effects

5.7.2 Typically, **combined effects** occur when different activities associated with a project act upon the same environmental receptor (e.g. the additive effect of noise from different sources upon local residents for example noise from piling activities may occur at the same time as transport related noise and may act upon the same

[40] Schedule 4, Part 1, Paragraph 20 EIA Regulations
[41] Advice Note Nine, Rochdale Envelope (version 2). Planning Inspectorate, April 2012.

receptor(s) during the construction phase). In determining such effects, consideration would be given to the sensitivity of the receptor and the magnitude of environmental change. Combined effects are assessed in relation to a specific receptor, but here the effect could be caused by the interactions of different effects from project activities even if individually these are insignificant (e.g. the interaction of noise disturbance and light pollution on bat foraging). Where appropriate, interactive combined effects across topic areas will be assessed, where the nature of the effect allows professional judgment to be applied.

5.7.3 The approach most commonly taken within EIA and that will be adopted for the combined assessment, is that effects such as increased noise or effects on visual receptors are assessed individually, against topic-specific criteria that are well established within standard EIA. Threshold limits for effects such as noise and air pollution are, for the purposes of establishing effects on human receptors, set at levels that, if exceeded, can have health or nuisance implications for the receptor. Therefore, if effects are concluded as 'acceptable' (i.e. noise levels at residential receptors meet acceptable noise criteria) and are therefore considered to be not significant, then the significance of the effect will not change when considered collectively with other non-significant effects. This is because such effects do not together, for the most part, cause combined effects. For example, increases in noise do not make the effects caused by an adverse effect on views worse for a human receptor.

Cumulative Effects

5.7.4 The EIA will consider the potential for **cumulative effects** associated with other development, i.e. whether the effects from the Proposed Development could be combined with similar effects from other schemes to result in significant cumulative effects. It is important to recognise that the baseline assessments in the EIA will include existing development. It is EIA best practise to consider the future baseline situation, which includes other schemes that are likely to be constructed or have not yet commenced but have a valid planning permission. In addition, proposed schemes which are the subject of a planning application (at the time of preparing the EIA) will also be considered.

5.7.5 The process for undertaking a Cumulative Effects Assessment (CEA) for a NSIP has been defined by the PINS and is set out within PINS Advice Note 17[42]. The guidance defines a four-stage process for a CEA as follows:

- Stage 1: establish the NSIP Zone of Influence (ZOI) and identify long list of 'other development';
- Stage 2: Identify short list of 'other development' for CEA;
- Stage 3: Information gathering; and
- Stage 4: Assessment.

5.7.6 Stage 1 and 2 of the CEA has been completed as part of this PEIR; the results of this are presented below.

[42] Advice Note Seventeen, Cumulative Effects Assessment (version 1). Planning Inspectorate, December 2015.

Cumulative Effects Assessment: Stage 1

5.7.7 As part of stage 1 of the CEA, a draft ZOI for each of the EIA topics has been established and will be agreed through consultation with relevant statutory stakeholders and through reference to accepted industry guidance and standards relevant to the environmental topic. A summary of the draft ZOI are shown in **Table 5.1**.

Table 5.1 Environmental topics CEA ZOI

Environmental Topics	Zone of Influence	Spatial ZOI
Air Quality	Construction related air quality effects	All developments within 5km
	Operational related air quality effects	All developments within 5km
Ecology	Noise effects on ecological receptors	All developments within 5km
	Air quality effects on ecological receptors	All developments within 5km
Ground & Surface Water	Groundwater effects on the underlying Thanet Aquifer, ZOI defined by the Southern Water Drinking Water Safeguarding Zone	Extent of Thanet Aquifer Source Protection Zone
	Surface water effects on the water quality in Sandwich and Pegwell Bays	Any development resulting in discharges to River Stour catchment up to Plucks Gutter
Historic Environment	Physical effects on buried archaeological remains	All developments within 5km
	Effects on the setting of designated heritage assets	Any development that is within the project Zone of Theoretical Visibility (ZTV)
Land Quality	Effects on controlled waters: principle aquifer in bedrock	Extent of Thanet Aquifer Source Protection Zone
	Effects on controlled waters: surface water drains	Any development resulting in discharges to River Stour catchment up to Plucks Gutter
Landscape and Visual Impact	Effects on landscape and visual receptors	Any development that is within the project Zone of Theoretical Visibility (ZTV)
Noise	Construction related noise effects	All developments within 5km
	Operational related noise effects	All developments within 5km
Socio-economic	Effects of businesses, local and sub-regional economy, and local receptors	All of Thanet District
	Employment creation	All of Thanet District

Environmental Topics	Zone of Influence	Spatial ZOI
Traffic & Transport	Construction vehicle effects	All developments using the same local road network
	Increases in vehicles during operational phase	All developments using the same local road network

5.7.8 Having established the ZOI for each environmental topic, a long-list of ‘other developments’ to be considered as part of the CEA has been produced. Box 5.3 below outlines ‘other development’ types to be considered in the CEA as per PINS Advice Note 17.

Box 5.3	**‘Other Development’ for inclusion in Cumulative Effects Assessment**	
Tier 1	▶ under construction;	Decreasing level of detail likely to be available ↓
	▶ permitted application(s), but not yet implemented;	
	▶ submitted application(s) not yet determined;	
Tier 2	▶ projects on the PINS Programme of Projects where a scoping report has been submitted;	
Tier 3	▶ projects on the PINS Programme of Projects where a scoping report has not been submitted;	
	▶ identified in the relevant Development Plan (and emerging Development Plans - with appropriate weight being given as they move closer to adoption) recognising that much information on any relevant proposals will be limited;	
	▶ identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward.	

5.7.9 The long list of present consented, and proposed major developments which have been identified within the agreed CEA ZOI study area are presented in **Appendix 5.1** and shown on **Figure 5.1**. The consented developments include developments currently under construction, whilst the proposed developments are those which have not yet gained planning consent but are considered likely to proceed. All relevant development which has been submitted or permitted since 1st April 2014 is included in the long list.

Cumulative Effects Assessment: Stage 2

5.7.10 The long list of ‘other development’ presented in **Appendix 5.1** has been assessed against a series of criteria in order to compile the short list of ‘other development’ as part of the Stage 2 CEA, giving consideration to the following aspects of these developments:

- the temporal scope of ‘other development’
- the scale and nature of ‘other development’; and
- any other relevant factors

5.7.11 In the context of the scale and nature of ‘other development’, the criterion for developments to be included on the short list is whether they constitute ‘major developments' as defined in Regulation 2 of the *Town and Country Planning (Development Management Procedure) (England) Order 2010* (i.e. development of 10 or more dwellings, over 1ha in area, buildings of more than 1,000m^2, waste development or development which involves the winning and working of minerals or the use of land for mineral working deposits).

5.7.12 The temporal scope of other developments will be considered in relation to both the construction and operational phases of the Proposed Development. The current anticipated programme which is presented in **Chapter 3: Description of the Proposed Development** commences with the granting of the DCO in Spring 2019, and provides a breakdown of project activities from project years 1 to 20.

5.7.13 There are proposed to be four construction phases. The first, which will last for 12 months, will commence in Airport Year 1 (Spring 2019) and will focus on the installing the essential infrastructure required to reopen the airport and to meet the demands for the first phase of the airport operations (years 2-6). The three following phases will be undertaken alongside the operation of the Proposed Development as needed to meet the demands and requirements of the operational phase forecast, they are currently expected to be

- Construction Phase 2 – Years 2-4 (2020 to 2023);
- Construction Phase 3 – Years 4-10 (2023 to 2030); and
- Construction Phase 4 – Years 10-15 (2030 to 2036).

5.7.14 The operational phases of the project are planned to commence in Airport Year 2 (2020) with the air freight services, and in Airport Year 3 (2021) with the start of passenger services. For each operational year a forecast has been prepared up to Airport Year 20 (2040); this includes details of ATMs (both freight and passenger), freight volumes, freight heavy goods vehicle movements, passenger numbers and associated transport movements, and airport staff levels and associated transport movements.

5.7.15 Stage 2 of the CEA has been informed by a review of the planning portal and the type of potential environmental impacts that had been raised for each respective application.

5.7.16 Some developments have been scoped out of the CEA for the following reasons:

- they are understood to have already undergone construction or will be complete and operational before construction of the Manston Airport project and therefore is part of the current baseline or will form part of the future baseline conditions;
- they are unlikely to have commenced prior to the completion of the Manston Airport project and insufficient information is available to complete an assessment at this time. Therefore, any cumulative effects assessment would need to be completed by that Applicant; or,
- they are of sufficient distance from the Manston Airport project that significant cumulative effects are not likely to occur.

5.7.17 A summary of the projects to be taken forward to Stage 3 of the CEA is presented below, the results of this assessment will be presented in the ES to be submitted as part of the DCO application. Stage 1 and Stage 2 of the CEA will be repeated for the ES in order to identify any new relevant development proposals that may have been submitted following publication of the PEIR.

Table 5.2 'Other Development' for Stage 3 CEA

ID	Application Reference	Brief Description	Scale and nature of development likely to give rise to significant cumulative effects with proposed development?
3	OL/TH/16/0967	Outline application for the erection of 12 detached dwellings with access via Southall Close including access, layout and scale. Land adjacent 15 Southall Close Minister Ramsgate Kent	Potential to give rise to construction phase air quality, noise and traffic effects.
5	OL/TH/16/0417	Outline application for mixed use residential and business development comprising 19 dwellings, 4 live-work units, and a detached building incorporating a shop and café, together with associated access roads, paths and vehicle parking, including access and layout.	Potential to give rise to cumulative ecological (N.E. cons. resp.), transport, drainage (GW and SW), and archaeological and cultural heritage impacts (noise and AQ - should const. phases overlap)
8	F/TH/15/1256	Variation of conditions 6 and 20 of OL/TH/13/0624 for residential development including access, to allow an increase to 40 dwellings and alterations to site plan	Potential to give rise to cumulative historic environment, transport and noise effects
11	F/TH/14/0742	Change of use of 4.2 ha of agricultural land to provide an extension to St John's Cemetery	Potential to give rise to cumulative biodiversity, freshwater environment, historic environment, landscape & visual, and traffic effects.
13	OL/TH/15/0187	Outline application for the redevelopment of the existing site for up to 120 dwellings including access, following demolition of existing buildings	Potential to give rise to cumulative biodiversity, freshwater environment, noise, and traffic effects.
14	R/TH/15/0250	Application for approval of access, appearance, landscaping, layout and scale pursuant to condition 1 of planning permission reference F/TH/12/0964 for the development of phase 5 of a mixed use urban extension comprising residential, community and commercial use, open space, infrastructure and new access. Total 469 houses and 1642m2 of non-residential development.	Potential to give rise to cumulative air quality (dust), biodiversity, freshwater environment, historic environment, landscape & visual, noise and traffic effects.
15	OL/TH/15/0537	Outline application for the erection of 31 dwellings and retail unit, including access	Potential to give rise to cumulative air quality, biodiversity (bird distribution), freshwater environment (drainage), historic environment, landscape and visual, and transport
16	OL/TH/15/0020	Outline application for the erection of a block of 56no. extra care units, 56no. dwellings and community use building with retail unit, following demolition of	Potential to give rise to cumulative biodiversity (effects on SPA & SSSI), freshwater environment (drainage,

ID	Application Reference	Brief Description	Scale and nature of development likely to give rise to significant cumulative effects with proposed development?
		existing buildings and structures, including access	surface water quality), historic environment, and noise.
17	F/TH/15/0353	Application for variation of condition 2 attached to planning permission F/TH/11/0893 for the change of use of nurse's home to 29no. flats with erection of 5 storey extension to allow alterations to internal layout to existing building	Potential to give rise to cumulative biodiversity effects
19	F/TH/15/0181	Erection of 19 no. single storey light industrial units (Use Class B1) together with formation of vehicular access, associated parking and external alterations to existing building, site accessed via Enterprise Road (meets the A254).	Potential for cumulative noise and traffic effects
24	OL/TH/16/1416	Outline application for erection of 14No. detached dwellings including access, layout and scale	Potential for cumulative air quality (dust), biodiversity, noise and traffic effects
26	OL/TH/16/0934	Erection of three and four storey flat roof building containing 10 apartments with access and parking provision	Potential for cumulative construction phases noise and traffic effects.
27	F/TH/16/1160	Erection of 10no. dwellings together with formation of vehicular access to Tivoli Raod	Potential to give rise to cumulative air quality, biodiversity, freshwater environment (drainage), historic environment, noise, and traffic.
29	OL/TH/16/1715	Outline application for 48 dwellings including access with all other matters reserved	Potential to give rise to cumulative air quality, biodiversity, freshwater environment (drainage), historic environment, and traffic.
30	OL/TH/16/1752	Outline application for the development of 14 houses and retention of existing dwelling with access from Spratling Lane including details of access with all other matters reserved	Potential to give rise to cumulative construction phase air quality (dust), biodiversity, freshwater environment (drainage), noise, and traffic.
31	OL/TH/17/0151	Outline application for the erection of up to 41no. dwellings including access with all other matters reserved	Potential to give rise to cumulative construction phase air quality (dust), biodiversity, freshwater environment (drainage, flood risk), historic environment, noise, and traffic.
32	OL/TH/17/0150	Outline application for the erection of up to 23no. dwellings including access with all other matters reserved. Land Adjacent To Oakland Court Cottington Road	Potential to give rise to cumulative biodiversity, freshwater environment (drainage, flood risk), historic environment, landscape & visual, and traffic.
33	OL/TH/17/0152	Outline Application for the erection of up to 62no. dwellings including access with all other matters reserved. Land East Of 40 Canterbury Road West	Potential to give rise to cumulative biodiversity, freshwater environment (drainage, flood risk), historic

ID	Application Reference	Brief Description	Scale and nature of development likely to give rise to significant cumulative effects with proposed development?
			environment, landscape & visual, and traffic.
34	OL/TH/16/1765	Outline application for residential development of up to 250 dwellings and alterations to the surrounding highway network, including details of Access with all other matters reserved (Appearance, Landscaping, Layout, Scale)	Potential to give rise to cumulative air quality, biodiversity, freshwater environment (flood risk), historic environment, landscape & visual, and traffic.
35	KCC/DO/0171/2015	Development of a waste management facility for the sorting of skip waste	Potential to give rise to cumulative biodiversity, noise and landscape & visual effects
37	KCC/SCR/DO/0399/2015	Request for a screening opinion as to whether the proposed replacement wastewater rising requires an Environmental Impact Assessment	Potential to give rise to cumulative construction phase freshwater environment, noise and traffic effects.
133	EN010084	Thanet Extension Offshore Wind Farm. A offshore wind generating station of capacity up to 340 MW	Potential to give rise to cumulative biodiversity, historic environment., landscape & visual, and traffic effects
134	EN020017	Richborough Connection. Proposed 400kV electricity transmission connection between Richborough and Canterbury in Kent to connect the proposed new UK to Belgium interconnector (Known as a Nemo Link)	Potential to give rise to cumulative air quality, biodiversity, historic environment, noise, landscape & visual and traffic effects
135	TR010006	M20 Junction 10a. New Junction and Associated Improvement - South of Ashford	Potential to give rise to cumulative traffic and transport effects
138	N/A	Thanet Parkway Railway Station	Potential to give rise to cumulative biodiversity, freshwater environment, historic environment, noise, landscape & visual, socio-economic and traffic effects.

5.8 Topics scoped out of the PEIR

Health Impact Assessment/Public Health

5.8.1 The PINS Scoping Opinion states in relation to public health and the need for a Health Impact Assessment:

> *"The Secretary of State considers that it is a matter for the Applicant to decide whether or not to submit a stand-alone Health Impact Assessment (HIA). However, the Applicant should have regard to the responses received from the relevant consultees regarding health, and in particular to the comments from Public Health England, including in relation to electric and magnetic fields (see Appendix 3)".*

5.8.2 *The methodology for the HIA, if prepared, should be agreed with the relevant statutory consultees and take into account mitigation measures for acute risks."*

5.8.3 A HIA has not been prepared as part of the PEIR, but consultation will be undertaken with Public Health England in advance of the submission of the DCO in order to establish the need for, and scope of a HIA. If required this will be prepared and submitted in support of the DCO application.

5.8.4 This PEIR does not have a chapter entitled 'Public health impacts' as there is no requirement under the 2011 EIA Regulations (Schedule 4) to include a health based assessment.

5.8.5 As explained in paragraph 1.2.1, although the 2014 EIA Directive, which applies in the UK from 16 May 2017, does include a need to consider health, this will not apply to this project as it only applies to those projects for which a Scoping Opinion has not been requested from the Secretary of State before 16 May 2017. A Scoping Opinion for this project was requested in June 2016, and received in August 2016, and so the previous Directive will continue to apply.

5.8.6 The PEIR does however, consider the potential for significant effects of the Proposed Development on public health within the air quality and noise technical chapters.

Waste

5.8.7 The PINS scoping response states in relation to waste:

> *"The Secretary of State considers it essential to take account of materials to be moved to and from the site during construction and operation and to identify where related potential traffic movements would be routed.*
>
> *The Secretary of State advises that the ES should clarify and quantify the types of operational wastes to be generated by the airport (including dismantling wastes)."*

5.8.8 An assessment of the traffic movements associated with the construction and operational phases of the Proposed Development, including of those associated with the delivery and transport of materials, is included as part of **Chapter 14: Traffic and Transportation**.

5.8.9 An estimate of the likely quantities and types of materials and waste that are anticipated to arise from the construction of the proposed development are included in **Section 3.2**. The management and control of waste generated during construction phase of the proposed development will form part of the CEMP.

5.8.10 An airport Resources Strategy Statement, which will cover a range of topics including energy, water and waste, is being prepared for submission as part of the DCO application. As part of the operational plans and procedures the airport will develop an overarching environmental policy, which will include a commitment to review all waste disposals against the waste hierarchy, and also a to produce a Waste Management Policy.

EU Directive 2014/52/EU

5.8.11 The PINS Scoping Opinion draws attention to the EU Directive 2014/52/EU (the ‘2014 EIA Directive’), which was made in April 2014.

5.8.12 The PINS Scoping Opinion states, this directive has not yet been transposed into UK law, and Member States are not required to bring into force the laws, regulations and administrative provisions necessary to comply with the Directive until 16 May 2017. This UK government has now transposed EU Directive 2014/52/EU, which took effect from 16 May 2017. However the new EIA Directive will not have retrospective effect.

5.8.13 Therefore at present this EIA Directive, and the requirements to provide a description of the additional aspects of the environment likely to be significantly affected and the likely significant effects that are not already covered by the existing EIA Directive, are not considered applicable to this application.

Contents

6. Air quality

6.1 Introduction

6.1.1 This chapter sets out the results of a preliminary assessment of the effects of the Proposed Development on air quality.

6.1.2 This chapter should be read in conjunction with the description of the Proposed Development (**Chapter 3**). Following a summary of the limitations of the PEIR, the chapter outlines the relevant policy, legislation and guidance that has informed the preliminary assessment, and the data gathering methodology that was adopted as part of air quality preliminary assessment. This leads on to a description of the overall baseline conditions, the scope of the assessment, and the assessment methodology. The chapter concludes with a summary of the results of the assessment at this point in time.

6.1.3 The principal sources of air quality impacts are:

- Plant and equipment used during the construction phase;
- Road traffic generated during the construction phase;
- Aircraft and airside plant and equipment during the operation phase; and
- Road traffic generated during the operation phase.

6.1.4 The assessment calculates rates of emissions of air pollutants and uses a dispersion model to calculate the resulting ground-level concentrations of air pollutants, averaged over both short and long time periods. These concentrations are then evaluated for significance in relation to the air quality standards and assessment levels set in legislation and in Government and international guidance.

Limitation of the PEIR

6.1.5 The assessment is based on design data available in March 2017. Where data has not yet been established at this stage of the design, assumptions based on best practice or typical values have been adopted.

6.1.6 At the time of writing, it is considered likely that an assessment of the effects of road traffic emissions to atmosphere will be required, but it is unclear which road sections will be assessed and which receptors will be most vulnerable. This will become clear once the road traffic modelling is completed.

Glossary and abbreviations

6.1.7 Table 6.1 provides a list of abbreviations and glossary of terms used in this chapter.

Table 6.1 Glossary and abbreviations

Term	Definition
APIS	Air Pollution Information System, www.apis.ac.uk.
AQAL	Air quality assessment level. A generic term to embrace air quality standards, air quality objectives, targets, limit values, critical levels, critical loads, etc. This term is promulgated by IAQM/EPUK.
AQMA	Air Quality Management Area.
Local nature site	An ancient wood, local wildlife site, national nature reserve or local nature reserves. This term is promulgated by the Environment Agency.
Major environmental site	A Ramsar, SPA, SAC or SSSI site. This grouping (in distinction to local nature sites) is used by the Environment Agency but the term is non-standard.
N	Nitrogen.
NO	Nitrous oxide, also called nitrogen monoxide.
NO_2	Nitrogen dioxide.
NO_x	Oxides of nitrogen, equal to the sum of NO plus NO_2.
PC	Process contribution: the concentration or deposition rate resulting from the installation activities only, excluding other sources. This term is promulgated by the Environment Agency.
PEC	Predicted environmental concentration: the total modelled concentration, equal to the PC plus the background contribution. This term is promulgated by the Environment Agency. Also used, by analogy, to refer to total modelled deposition rates. This usage is promulgated by APIS.
PEIR	Preliminary Environmental Information Report.
PM_{10}	Particulate matter smaller than 10 µm in diameter.
$PM_{2.5}$	Particulate matter smaller than 2.5 µm in diameter.
Ramsar	A site designated under the Ramsar Convention.
S	Sulphur.
SAC	Special Area of Conservation. A site designated under the European Habitats Directive.
SPA	Special Protection Area. A site designated under the European Directive on the Conservation of Wild Birds.
SSSI	Site of Special Scientific Interest. A designation under English law.

6.2 Policy, legislative and guidance context

6.2.1 A study of planning policy, legislation and guidance at the national, regional and local level has been undertaken for the site and its locality in order to highlight any requirements which the Proposed Development needs to consider. It is always important that policies, legislation and guidance are taken into consideration as they help to define the scope of assessment and can inform the identification of particular local issues. Full details of all national and local planning policies relevant to the Proposed Development can be found in **Appendix 4.1**.

EU legislation

Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe

6.2.2 Directive 2008/50/EC (the 'Directive')[43], which came into force in June 2008, consolidates existing EU-wide air quality legislation (with the exception of Directive 2004/107/EC relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons) and provides a new regulatory framework for $PM_{2.5}$.

6.2.3 The Directive sets limits, or target levels, for selected pollutants that are to be achieved by specific dates and details procedures EU Member States should take in assessing ambient air quality. The limit and target levels relate to concentrations in ambient air. At Article 2(1), the Directive defines ambient air as:

6.2.4 *"…outdoor air in the troposphere, excluding workplaces as defined by Directive 89/654/EEC where provisions concerning health and safety at work apply and to which members of the public do not have regular access."*

6.2.5 In accordance with Article 2(1), Annex III, Part A, paragraph 2 details locations where compliance with the limit values does not need to be assessed:

6.2.6 *"Compliance with the limit values directed at the protection of human health shall not be assessed at the following locations:*

6.2.7 *a) any locations situated within areas where members of the public do not have access and there is no fixed habitation;*

6.2.8 *b) in accordance with Article 2(1), on factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply; and*

6.2.9 *c) on the carriageway of roads; and on the central reservation of roads except where there is normally pedestrian access to the central reservation."*

UK legislation

The Air Quality Standards Regulations 2010

6.2.10 The Air Quality Standards Regulations 2010 (the 'Regulations')[44] came into force on the 11 June 2010 and transpose Directive 2008/50/EC into UK legislation. The Directive's limit values are transposed into the Regulations with attainment dates in line with the Directive. The limit values in the Regulations are generally referred to as Air Quality Standards (AQS).

6.2.11 These standards are legally binding concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects of sensitive groups or on ecosystems.

6.2.12 Similarly to Directive 2008/50/EC, the Regulations define ambient air as;

[43] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe. http://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX:32008L0050
[44] The Air Quality Standards Regulations 2010. Statutory Instrument 2010 No. 1001. http://www.legislation.gov.uk/uksi/2010/1001/pdfs/uksi_20101001_en.pdf

6.2.13 *"…outdoor air in the troposphere, excluding workplaces where members of the public do not have regular access."*

6.2.14 with direction provided in Schedule 1, Part 1, Paragraph 2 as to where compliance with the AQS (limit value) does not need to be assessed:

6.2.15 *"Compliance with the limit values directed at the protection of human health does not need to be assessed at the following locations:*

6.2.16 *a) any location situated within areas where members of the public do not have access and there is no fixed habitation;*

6.2.17 *b) on factory premises or at industrial locations to which all relevant provisions concerning health and safety at work apply; and*

6.2.18 *c) on the carriageway of roads and on the central reservation of roads except where there is normally pedestrian access to the central reservation."*

The Air Quality Strategy for England, Scotland, Wales and Northern Ireland

6.2.19 The 2007 Air Quality Strategy for England, Scotland Wales and Northern Ireland[45] provides a framework for improving air quality at a national and local level and supersedes the previous strategy published in 2000.

6.2.20 Central to the Air Quality Strategy are health-based criteria for certain air pollutants; these criteria are based on medical and scientific reports on how and at what concentration each pollutant affects human health. The Air Quality Objectives (AQOs) derived from these criteria are policy targets often expressed as a maximum ambient concentration not to be exceeded, either without exception or with a permitted number of exceedances, over a specified averaging period. At paragraph 22 of the 2007 Air Quality Strategy, the point is made that the objectives are:

6.2.21 *"…a statement of policy intentions or policy targets. As such, there is no legal requirement to meet these objectives except where they mirror any equivalent legally binding limit values…"*

6.2.22 The AQOs, based on a selection of the objectives in the Air Quality Strategy, were incorporated into UK legislation through the Air Quality Regulations 2000, as amended.

6.2.23 Paragraph 4(2) of The Air Quality (England) Regulations 2000 states:

6.2.24 *"The achievement or likely achievement of an air quality objective prescribed by paragraph (1) shall be determined by reference to the quality of air at locations -*

6.2.25 *a) which are situated outside of buildings or other natural or man-made structures above or below ground; and*

6.2.26 *b) where members of the public are regularly present."*

[45] Defra et al (2007) The Air Quality Strategy for England, Scotland Wales and Northern Ireland. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69336/pb12654-air-quality-strategy-vol1-070712.pdf

6.2.27 Consequently, compliance with the AQOs should focus on areas where members of the general public are present over the entire duration of the concentration averaging period specific to the relevant objective.

The Environment Act 1995

6.2.28 Part IV of the Environment Act 1995[46] requires that Local Authorities periodically review air quality within their individual areas. This process of Local Air Quality Management (LAQM) is an integral part of delivering the Government's AQOs.

6.2.29 To carry out an air quality Review and Assessment under the LAQM process, the Government recommends a three-stage approach. This phased review process uses initial simple screening methods and progresses through to more detailed assessment methods of modelling and monitoring in areas identified to be at potential risk of exceeding the objectives in the Regulations. At the time of writing, Defra is consulting on proposals to streamline the process with a single Annual Status Report.

6.2.30 Review and assessments of local air quality aim to identify areas where national policies to reduce vehicle and industrial emissions are unlikely to result in air quality meeting the Government's air quality objectives by the required dates.

6.2.31 For the purposes of determining the focus of Review and Assessment, Local Authorities should have regard to those 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.

6.2.32 Where the assessment indicates that some or all of the objectives may be potentially exceeded, the Local Authority has a duty to declare an Air Quality Management Area (AQMA). The declaration of an AQMA requires the Local Authority to implement an Air Quality Action Plan (AQAP), to reduce air pollution concentrations so that the required AQOs are met.

Other guideline values

6.2.33 In the absence of statutory standards for the other prescribed substances that may be found in the emissions, there are several sources of applicable air quality guidelines.

Air Quality Guidelines for Europe, the World Health Organisation (WHO)

6.2.34 The aim of the WHO Air Quality Guidelines for Europe[47] is to provide a basis for protecting public health from adverse effects of air pollutants and to eliminate or reduce exposure to those pollutants that are known or likely to be hazardous to human health or well-being. These guidelines are intended to provide guidance and information to international, national and local authorities making risk management decisions, particularly in setting air quality standards.

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[46] Environment Act 1995. http://www.legislation.gov.uk/ukpga/1995/25/contents
[47] World Health Organization (2000) Air Quality Guidelines for Europe, Second Edition. http://www.euro.who.int/__data/assets/pdf_file/0005/74732/E71922.pdf

Environmental Assessment Levels (EALs)

6.2.35 The Environment Agency's guidance note "Air emissions risk assessment for your environmental permit"[48] contains long and short-term Environmental Assessment Levels (EALs) for releases to air derived from a number of published UK and international sources. For the pollutants considered in this study, these EALs are equivalent to the AQS and AQOs set in force by the Air Quality Strategy for England, Scotland Wales and Northern Ireland.

6.2.36 The guidance note includes two additional EALs of relevance to this assessment. The first is a limit of 75 µg m^{-3} on the maximum daily mean NO_x at ecological receptors. This is based on guidance from the World Health Organization[47], which states:

6.2.37 *"Experimental evidence exists that the CLE [critical level] decreases from around 200 µg m^{-3} to 75 µg m^{-3} when in combination with O_3 or SO_2 at or above their critical levels. In the knowledge that short-term episodes of elevated NO_x concentrations are generally combined with elevated concentrations of O_3 or SO_2, 75 µg m^{-3} is proposed for the 24 h mean."*

National Planning Policy Framework (NPPF)

6.2.38 The National Planning Policy Framework is a key part of the government's reforms to make the planning system less complex and more accessible. The framework acts as guidance for local planning authorities and decision-takers, both in drawing up plans and making decisions about planning applications.

6.2.39 Paragraph 124 of the NPPF states:

6.2.40 "*Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan*."

6.2.41 Further detail in relation to air quality is contained in the air quality section of the planning practice guidance webs site (https://www.gov.uk/guidance/air-quality--3).

Thanet District Council's Local Plan

6.2.42 Thanet District Council's Local Plan was adopted in 2006, and 93 of the policies have been saved and remain in force. Of these, the policy with direct relevance to air quality is EP5 Local Air Quality Monitoring. Relevant excerpts from the Environmental Protection chapter of the Local Plan are:

6.2.43 *"Objectives*

6.2.44 *1. To maintain the overall environmental quality of the district;*

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[48] 'Air emissions risk assessment for your environmental permit'. https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit, dated 2 August 2016.

6.2.45 *2. To ensure that development is only permitted where the district council is satisfied that adverse physical and other conditions likely to affect human health and safety, or the environment are not present or can be satisfactorily overcome;...*

6.2.46 *13.4 Strategic Policy Background*

6.2.47 *PPS23 states that the planning system and the pollution control systems are separate, but complementary, in their operation. The planning system should not therefore operate so as to duplicate controls that are the statutory responsibility of other bodies. The complementary role of the planning system is to:*

6.2.48 *1.determine the location of development which may give rise to pollution, either directly or from traffic generated, and in ensuring that other developments are, as far as possible, not affected by major existing, or potential sources of pollution; and*

6.2.49 *2.focus on whether a development is an acceptable use of the land and the impact of those uses.*

6.2.50 *13.5 Regional Planning Guidance recognises that the quality of the Region's environment is underpinned by the key elements of land, air and water*

6.2.51 *13.6. The Kent and Medway Structure Plan also seeks to avoid or minimise the pollution impacts of new development requiring a pollution impact assessment for proposals likely to have adverse implications for pollution, and opposing development which would be sensitive to adverse levels of pollution where mitigation measures would not afford satisfactory protection (NR4 and NR5)...*

6.2.52 *13.35 Air Quality*

6.2.53 *In general terms, Thanet enjoys good air quality. The Environment Act 1995 created new duties for local authorities in dealing with poor air quality. The National Air Quality Strategy, published in January 2000, identifies the planning system as one of the key means of improving local air quality. PPS23 (2004) provides guidance on Air Quality and Land Use Planning.*

6.2.54 *13.36. All local authorities are required to carry out three-yearly Updating and Screening Assessments. This involves a general review and assessment of the seven national priority pollutants in relation to the national air-quality objectives. If it is concluded, on the basis of local circumstances and professional judgement, that there is a risk that one or more of the air-quality objectives may not be reached, a Detailed Assessment is required.*

6.2.55 *13.37. The Updating and Screening Assessment requires the use of simple monitoring and modelling techniques to estimate the levels of the various air pollutants*

6.2.56 *, which should provide a quantitative assessment of whether the air quality objectives may be met or not. Where the Updating and Screening Assessment identifies a risk of exceeding an Air-Quality Objective, a Detailed Assessment will be required. The Detailed Assessment involves monitoring, data collection and predictive modelling with an aim of estimating the magnitude and geographical extent of air quality potentially exceeding the objective. If the Detailed Assessment indicates that the air-quality objectives will not be fully met, local authorities are* *required, under the 1995 Act, to declare an Air Quality Management Areas (AQMAs) and prepare an Air Quality Action Plan.*

6.2.57 *13.38. In the case of Thanet, the last Updating and Screening Assessment completed in May 2003 indicated that there were unlikely to be any such instances of air quality exceeding the objectives. However, following the conclusions of an Annual Review of monitoring data in May 2004, a Detailed Assessment of air quality at seven busy junctions confirmed that The Square, Birchington had failed objectives for nitrogen dioxide and fine particles. An AQMA will be declared and an Action Plan developed with an aim of achieving the air quality objectives within this area. The third round of review and assessment is due to begin in 2006 which will continue to reflect any changes in air quality resulting from variations in traffic flows, the development of Kent International Airport and the business parks and any technological advances that might result in lower levels of pollution. This may require a review of Local Plan policies relating to air quality at that time.*

6.2.58 *13.39. The current Government guidance PPS23 makes it clear that air quality is nevertheless a "material consideration" in dealing with development proposals and the following policy will be applied where there is a risk that a particular proposal might cause the national air quality objectives to be exceeded.*

6.2.59 *Policy EP5 - Local Air Quality Monitoring*

6.2.60 *Proposals for new development that would result in the national air-quality objectives being exceeded will not be permitted.*

6.2.61 *Development proposals that might lead to such an exceedance, or to a significant deterioration in local air quality resulting in unacceptable effects on human health, local amenity or the natural environment, will require the submission of an air quality assessment, which should address:*

6.2.62 *1.the existing background levels of air quality;*

6.2.63 *2.the cumulative effect of further emissions;*

6.2.64 *3.the feasibility of any measures of mitigation that would prevent the national air quality objectives being exceeded, or would reduce the extent of air quality deterioration."*

6.2.65 Thanet District Council is preparing an updated Local Plan, with a draft issued for consultation in 2015[49]. In this draft, policy SP05 addresses Manston Airport, and says on the subject of air quality:

6.2.66 *"Proposals at the airport, that would support the development, expansion and diversification of Manston Airport, will be permitted subject to all of the following requirements.*

6.2.67 *... 5) The provision of an air quality assessment in compliance with the Air Quality Management Plan to demonstrate that the development will not lead to a harmful deterioration in air quality. Permission will not be given for development that would result in national air quality objectives being exceeded."*

[49] Thanet District Council. Draft Thanet Local Plan to 2031 Preferred options consultation. January 2015.

6.2.68 The draft plan's main section on air quality states:

6.2.69 *"Air Quality*

6.2.70 *16.18 Thanet generally has very good air quality; however there are areas at The Square in Birchington, the junction of Hereson Road/Boundary Road and High Street St Lawrence, Ramsgate where air quality is poor due to pollution from road transport.*

6.2.71 *16.19 An urban wide Air Quality Management Area has been declared to enable effective management of air quality.*

6.2.72 *16.20 The Council has an Air Quality Action Plan to address the Urban Air Quality Management Area (AQMA) that was declared in 2011 where air quality fails to meet required standards. The Action Plan considers a broad approach to strategic planning, transport planning, sustainability and climate change.*

6.2.73 *16.21 Planning is an effective tool to improve air quality. It can be used to locate development to reduce emissions overall, and reduce the direct impacts of new development, through policy requirements.*

6.2.74 *16.22 An AQMA makes consideration of the air quality impacts of a proposed development important. However, there is still a need to regard air quality as a material factor in determining planning applications in any location. This is particularly important where the proposed development is not physically within the AQMA, but could have adverse impacts on air quality within it, or where air quality in that given area is close to exceeding guideline objectives itself.*

6.2.75 *16.23 Developments that may require the submission of an Air Quality Assessment include the following:*

6.2.76 *1) If the development is likely to have a significant impact upon an AQMA*

6.2.77 *2) If the development has the potential to cause a deterioration in local air quality (i.e. once completed it will increase pollutant concentrations)*

6.2.78 *3) If the development is located in an area of poor air quality (i.e. it will expose future occupiers to unacceptable pollutant concentrations) whether the site lies within a Designated AQMA or, if so advised by the Local Authority, or a "candidate" AQMA*

6.2.79 *4)If the demolition/construction phase will have a significant impact on the local environment (e.g. through fugitive dust and exhaust emissions)*

6.2.80 *16.24 The types of development that are likely to require an air quality assessment are identified in the Kent and Medway Air Quality Partnerships Technical Planning Guide. These are listed in Appendix D Table 01.*

6.2.81 *Proposals for new residential development should, wherever possible and appropriate, include an electric car charging point.*

6.2.82 *Policy SE05 - Air Quality*

6.2.83 *All major development schemes should promote a shift to the use of sustainable low emission transport to minimise the impact of vehicle emissions on air quality, particularly within the designated Urban Air Quality Management Area.*

Development will be located where it is accessible to support the use of public transport, walking and cycling.

6.2.84 *Development proposals that might lead to a significant deterioration in air quality or an exceedence of air quality national objectives or to a worsening of air quality within the urban Air Quality Management Area will require the submission of an Air Quality Assessment, which should address:*

6.2.85 *1) The cumulative effect of further emissions;*

6.2.86 *2) The proposed measures of mitigation through good design and offsetting measures that would prevent the National Air Quality Objectives being exceeded or reduce the extent of the air quality deterioration. These will be of particular importance within the urban AQMA, associated areas and areas of lower air quality.*

6.2.87 *Proposals that fail to demonstrate these will not be permitted."*

Kent and Medway Air Quality Partnership

6.2.88 The Kent and Medway Air Quality Partnership has prepared Air Quality Planning Guidance[50] aimed at local authorities, developers and consultants. The document pulls together planning policy and guidance, summarises the information that is required to support an application, describes the air quality assessment process, and discusses approaches to mitigation.

6.3 Data gathering methodology

6.3.1 This section describes the desk study undertaken to inform the air quality assessment. In order to establish the baseline situation, air quality data was obtained from the sources listed in **Table 6.2** to identify existing data about the site and the surrounding area.

Desk Study

6.3.2 Information on the current concentrations of air pollutants was obtained from published monitoring and modelling studies, as summarised in **Table 6.2**.

Table 6.2 Information used in the preparation of the PEIR

Source	Data
Thanet District Council	Monitoring data.
Defra	Mapped background concentrations.
APIS	Mapped background deposition rates. Critical level and critical load information.
Environment Agency	Locations of sensitive ecological receptors.

[50] Kent & Medway Air Quality Partnership. Air Quality Planning Guidance. December 2015.

Survey work

6.3.3 In view of the extensive monitoring data available from Thanet District Council (detailed below), it was not considered that any additional monitoring is required for determining baseline concentrations. This was stated in the scoping document; the scoping opinion[51] did not raise any objection to this intention. Note that it is likely to be a condition of permission that the ZH3 Thanet Airport continuous monitor be reinstated.

Consultation

6.3.4 Since 2015 and throughout the undertaking of the survey and assessment work, RiverOak has engaged with consultees with an interest in potential air quality effects. A scoping report (**Appendix 1.1**), including a chapter covering air quality, was produced and submitted to PINS who provided a scoping opinion (**Appendix 1.2**).

6.3.5 Organisations that were consulted include:

- The Planning Inspectorate;
- Thanet District Council; and
- Natural England.

6.3.6 A summary of the consultee comments and responses provided is provided in **Table 6.3** below along with a response to identify how the matter is dealt with in this report.

Table 6.3 Consultee comments

Consultee	Comments and considerations	How addressed in this PEIR
PINS	It is proposed to scope out effects from pollutants such as SO_2, CO and VOCs on the basis of low background concentrations and low emission rates. The Secretary of State does not agree to scope this out. There is a lack of detailed justification to support scoping out of these pollutants based on the geographical distribution of likely pollutant sources, e.g. engine ground runs, relative to sensitive receptors and therefore the likelihood of short or long term exposure and exceedance of the relevant air quality objective.	Further discussion and justification is given in Section 6.4, Paragraphs 6.4.16ff.
	It is proposed to scope out effects on workplace locations (Scoping Report paragraph 5.6.16). The Secretary of State does not agree to scope these effects out. The ES should provide an assessment of all receptors likely to be exposed to elevated levels of pollutants unless otherwise exempted under other legislation.	It is clear, both in the EU Directive (2008/50/EC) and in the Air Quality Standards Regulations 2010, that workplaces are not considered as relevant receptor locations. They are considered under Health & Safety legislation, where Workplace Exposure Levels (WELs) are set for certain air pollutants of occupational concern. This is the justification for scoping-out these locations as relevant receptors.

[51] The Planning Inspectorate. Scoping Opinion: Proposed Manston Airport. August 2016.

Consultee	Comments and considerations	How addressed in this PEIR
	It is proposed to scope out odour assessment from the air quality assessment based on the relatively small size of the development. The Secretary of State does not agree to scoping this out and considers that further justification is required based on the geographic location of potential odour sources and any potential sensitive receptors. The Applicant's attention is drawn to TDC's comments, contained in Appendix 3, in this regard. This justification must include reference to the potential for movement of contaminated material during construction. Otherwise, the applicant should provide an assessment in accordance with the relevant Institute of Air Quality Management (IAQM) standards.	It is proposed to include a qualitative assessment of odour in the Environmental Statement, in accordance with the IAQM Guidance.
	The Applicant identifies that the Proposed Development has potential to give rise to air quality effects during construction and operation from a range of sources. The Secretary of State agrees that changes in air quality should be assessed in relation to compliance with the European air quality limit values and with particular reference to AQMAs, such as the Thanet Urban Area AQMA. The Applicant should set out within the ES the proposed measures to minimise emissions from construction and operational activities.	The ES will include measures to minimise emissions from construction and operational activities.
	The Secretary of State is generally satisfied with the methodology proposed, which is based on industry standard methods and includes the assessment of effects on both human and non-human receptors. Specific sensitive human and non-human receptors are not identified within the scope. The ES must justify the choice of receptors selected and these must be identified and agreed with TDC and Natural England (NE) respectively.	The identification of receptors, and the methodology used in their identification is set out within this PEIR. Consultation will be undertaken in order to reach agreement on the final selection of the receptors for the ES with TDC and NE.
	Scoping Report paragraph 5.6.12 states that dispersion modelling 'may' be undertaken for operational activity and is unclear regarding the exact scope of the pollutants proposed to be assessed. The Secretary of State considers that dispersion modelling using the Aviation Environmental Design Tool (AEDT), as indicated in paragraph 5.6.13, is appropriate and should be based on the worst case scenario, assumed to be full operation by 2035. This should include on- and off-airport effects where relevant.	This assessment details the dispersion modelling carried out.
	The Secretary of State agrees that traffic emissions should be assessed using ADMS-Roads, subject to the relevant EPUK/IAQM thresholds. Such information should inform the ecological assessments. In light of the proximity of the site to the Thanet Urban Area AQMA, the decision regarding whether detailed air quality assessment is undertaken should be based on all of the relevant indicative threshold criteria set out in Tables 6.1 and 6.2 of the EPUK/IAQM guidance, 'Land-Use Planning & Development control: Planning For Air Quality', May 2015.	The air quality road traffic assessment will consider the potential for impacts upon biodiversirt and protected ecological resources, in relation the Critical Levels and Critical Loads of nitrogen and nitrogen-related acidity. The threshold and magnitude of effect and significance criteria included in the EPUK/IAQM Guidance will be used.

Consultee	Comments and considerations	How addressed in this PEIR
	The Applicant should set out in the ES any proposals for long term air quality monitoring of airport-related activities.	Proposals for long term air quality monitoring will be set out within the ES.
	The Applicant's attention is drawn to TDC's comments, contained in Appendix 3, in relation to potential impacts of emissions on climate change. The applicant should give consideration to the carbon footprint of the Proposed Development during construction and operation, demonstrating how the development will contribute to achieving the objective of reducing global greenhouse gas emissions set out in the Aviation Policy Framework (Department for Transport (2013).	A quantitative assessment of changes in emissions of carbon dioxide arising from the Proposed Development will be made and a comparison with national UK emissions will be made, together with an evaluation in relation to the proposed (CCC) cap on aviation emissions of 37.5 Mt by 2050.
Thanet District Council	Odour assessment - it is agreed that there is not accepted methodology for undertaking odour assessment but noted that this work has been undertaken at other airports, and therefore there could be further assessment of the potential odour effects from the operation of the airport in order to allow for the effect to be scoped out from further assessment.	It is proposed to include a qualitative assessment of odour in the Environmental Statement, in accordance with the IAQM Guidance.
	There is no reference to CO_2 emissions and climate change which is now general considered within EIA as best practice. The scale of the development is such that an assessment of the projects impact on the regions and the UK's carbon budget should be provided.	A quantitative assessment of changes in emissions of carbon dioxide arising from the Proposed Development will be made and a comparison with national UK emissions will be made, together with an evaluation in relation to the proposed (CCC) cap on aviation emissions of 37.5 Mt by 2050.
Natural England	Natural England welcomes the recognition in this chapter that there is the potential for air quality impacts on vegetation and ecosystems as well as human health. We are generally satisfied with the methodology proposed where it relates to the assessment of impacts on the natural environment and we would be happy to work with the applicant to identify and agree appropriate, sensitive non-human receptors as recommended in paragraph 3.46 of your Scoping Opinion.	The assessment of air quality impacts on designated nature conservation sites will be carried out in accordance with the appropriate methodology from the DMRB.
	We are pleased to see that air quality impacts will be assessed not only from the aircraft themselves but also from the additional traffic that will be associated with the airport during both the construction and operational phases of the development. Paragraph 5.6.2 of the Scoping Report provides criteria from the Design Manual for Roads and Bridges (DMRB) guidance on when a formal air quality assessment of vehicular emissions is likely to be required. Such an assessment will need to be carried out for designated nature conservation sites sensitive to air quality impacts where they fall within 200m of a road meeting one or more of the criteria listed here.	Noted and agreed.

6.4 Scope of the assessment

6.4.1 This section sets out information on: the process whereby receptors are identified; the potential receptors that could be affected by the development; and the potential effects on receptors that could be caused by the development.

6.4.2 The scope of assessment has been informed by: the scoping study; consultee responses to the Scoping Report; the results the work detailed in **Section 6.4**; and the preliminary design of the Proposed Development.

Approach to identifying receptors

6.4.3 The modelled domain covers both a set of gridded receptors (to enable contour plots to be generated and interpolation to intermediate locations if required) and sets of specific receptors representing individual sensitive human and ecological locations.

Gridded receptors

6.4.4 A 7 km × 4 km Cartesian grid centred on the airport was modelled, with a receptor resolution of 100 m, to assess the impact of atmospheric emissions from the site on local air quality at locations where specific receptors were not included. This resolution is considered suitable for capturing the maximum process contribution from site emissions, given that the emissions sources are spread over an area of several kilometres in extent, and receptors of interest are more than 200 m from the nearest sources. This grid does not cover the full extent of the specific receptors, but is considered sufficient to cover the locations where the impacts are expected to be greatest.

Human receptors

6.4.5 The receptors considered were chosen based on locations where people may be located and judged in terms of the likely duration of their exposure to pollutants and proximity to the site, following the guidance given in **Section 6.2** of this report. Not every location has been included as a specific receptor, but a selection has been made that covers the locations most likely to be affected by the Proposed Development and representative of wider locations. The gridded receptors can be used to fill in gaps if required.

6.4.6 While most human receptors are likely to have both long-term (annual mean) and short-term (typically hourly mean) exposure, a number of receptors will have only short-term exposure (e.g. churches, shops, museums). In addition, receptors have been selected representing the nearest edges of the AQMA. Details of the locations of human receptors are given in **Table 6.4** and **Figure 6.1** to **Figure 6.4**.

6.4.7 For the purposes of assessing air quality impacts, workplace locations have been excluded from the assessment in accordance with Schedule 1, Part 1, and Paragraph 2 of the Air Quality Standards Regulations 2010. These Regulations are detailed in **Section 6.2** of this report and do not differentiate between whether this is a workplace location under the control of the operator, or an off-site workplace location.

Table 6.4 Human receptor locations

ID	Description	Easting	Norting	Height	Notes
H01	Garden Cottage	631215	166224	1.6	Long- and short-term
H02	Cleve Court	631165	166314	1.6	Long- and short-term
H03	Cleve Court Farm	631186	166424	1.6	Long- and short-term
H04	Oast Cottages	631003	166651	1.6	Long- and short-term
H05	Acol	630864	166832	1.6	Long- and short-term
H06	Alland Grange	632086	166298	1.6	Long- and short-term
H07	Alland Grange Lane	632159	166430	1.6	Long- and short-term
H08	Rose Farm	632489	166193	1.6	Long- and short-term
H09	Pouces Cottages	632629	166210	1.6	Long- and short-term
H10	Bell Davies Drive 1	633019	166385	1.6	Long- and short-term
H11	Bell Davies Drive 2	633039	166403	1.6	Long- and short-term
H12	Manston Road 1	633126	166502	1.6	Long- and short-term
H13	Defence Centre	633285	166619	1.6	Long- and short-term
H14	Coach House	633912	166981	1.6	Long- and short-term
H15	Manston Court Road	634183	166374	1.6	Long- and short-term
H16	Wood Farm	634509	166374	1.6	Long- and short-term
H17	Manston Road 2	634621	166241	1.6	Long- and short-term
H18	Manston Road 3	634640	166153	1.6	Long- and short-term
H19	High Street 1	634680	166079	1.6	Long- and short-term
H20	High Street 2	634651	165954	1.6	Long- and short-term
H21	High Street 3	634584	165938	1.6	Long- and short-term
H22	High Street 4	634694	165880	1.6	Long- and short-term
H23	High Street 5	634455	165807	1.6	Long- and short-term
H24	Highlands Glade	635028	166030	1.6	Long- and short-term
H25	Spratling Court Farm	635479	166321	1.6	Long- and short-term
H26	Spratling Lane	635757	166282	1.6	Long- and short-term
H27	Auckland Avenue	636106	166044	1.6	Long- and short-term
H28	Manston Road 4	636063	165787	1.6	Long- and short-term
H29	Ozengell Grange 1	635661	165661	1.6	Long- and short-term
H30	Ozengell Grange 2	635606	165627	1.6	Long- and short-term
H31	Kentmere Avenue	635903	165323	1.6	Long- and short-term

ID	Description	Easting	Norting	Height	Notes
H32	Canterbury Road East	635777	165134	1.6	Long- and short-term
H33	Sea View Road	634774	165056	1.6	Long- and short-term
H34	Windsor Road	634770	165249	1.6	Long- and short-term
H35	Arundel Road 1	634726	165251	1.6	Long- and short-term
H36	Arundel Road 2	634682	165251	1.6	Long- and short-term
H37	King Arthur Road 1	634646	165253	1.6	Long- and short-term
H38	King Arthur Road 2	634602	165260	1.6	Long- and short-term
H39	King Arthur Road 3	634603	165217	1.6	Long- and short-term
H40	King Arthur Road 4	634601	165182	1.6	Long- and short-term
H41	King Arthur Road 5	634599	165138	1.6	Long- and short-term
H42	King Arthur Road 6	634596	165101	1.6	Long- and short-term
H43	Canterbury Road West 1	634450	165100	1.6	Long- and short-term
H44	Canterbury Road West 2	634382	165134	1.6	Long- and short-term
H45	Clive Road	634518	164793	1.6	Long- and short-term
H46	Thorne Farm 1	633418	164980	1.6	Long- and short-term
H47	Thorne Farm 2	633287	164842	1.6	Long- and short-term
H48	Red Cottages	633076	164912	1.6	Long- and short-term
H49	Ivy Cottage Hill 1	632465	165443	1.6	Long- and short-term
H50	Ivy Cottage Hill 2	632426	165384	1.6	Long- and short-term
H51	Ivy Cottage Hill 3	632378	165324	1.6	Long- and short-term
H52	Way Hill 1	632242	165162	1.6	Long- and short-term
H53	Way Hill 2	632166	165091	1.6	Long- and short-term
H54	Dellside	632064	165515	1.6	Long- and short-term
H55	Wayborough House	632023	165273	1.6	Long- and short-term
H56	Tothill Street 1	631079	165231	1.6	Long- and short-term
H57	Fairfield Road	630849	165341	1.6	Long- and short-term
H58	Burgess Close	631238	165328	1.6	Long- and short-term
H59	Hill House Drive	631258	165433	1.6	Long- and short-term
H60	Southall Close	631203	165516	1.6	Long- and short-term
H61	Premier Inn	631139	165561	1.6	Long- and short-term
H62	Holiday Inn	631045	165700	1.6	Long- and short-term
H63	Mount Pleasant 1	631091	165778	1.6	Long- and short-term

ID	Description	Easting	Norting	Height	Notes
H64	Mount Pleasant 2	631111	165805	1.6	Long- and short-term
H65	Mount Pleasant 3	631115	165852	1.6	Long- and short-term
H66	Tothill Street 2	631061	165470	1.6	Long- and short-term
S01	Air Cadets	633172	166482	1.6	Short-term only
S02	RAF Museum	633258	166471	1.6	Short-term only
S03	Memorial Museum	633351	166555	1.6	Short-term only
S04	Church	634633	165956	1.6	Short-term only
S05	St Stephens	635743	166131	1.6	Short-term only
S06	Tesco	636110	165647	1.6	Short-term only
S07	Smugglers Retreat	631121	165603	1.6	Short-term only
S08	Coop	631189	165670	1.6	Short-term only
A01	AQMA 1	628199	169135	1.6	AQMA
A02	AQMA 2	629810	168213	1.6	AQMA
A03	AQMA 3	630337	168165	1.6	AQMA
A04	AQMA 4	631554	168915	1.6	AQMA
A05	AQMA 5	632410	169167	1.6	AQMA
A06	AQMA 6	633542	169294	1.6	AQMA
A07	AQMA 7	635052	169313	1.6	AQMA
A08	AQMA 8	635998	168591	1.6	AQMA
A09	AQMA 9	635909	167560	1.6	AQMA
A10	AQMA 10	635754	166743	1.6	AQMA
A11	AQMA 11	635574	165975	1.6	AQMA
A12	AQMA 12	635125	165203	1.6	AQMA
A13	AQMA 13	634752	165243	1.6	AQMA
A14	AQMA 14	634369	165285	1.6	AQMA
A15	AQMA 15	634356	165091	1.6	AQMA
A16	AQMA 16	634362	164473	1.6	AQMA
A17	AQMA 17	634276	164112	1.6	AQMA
A18	AQMA 18	634556	163810	1.6	AQMA
A19	AQMA 19	634834	164066	1.6	AQMA
A20	AQMA 20	635064	163939	1.6	AQMA
A21	AQMA 21	635416	164358	1.6	AQMA

ID	Description	Easting	Norting	Height	Notes
A22	The Square Birchington 1	630226	169070	1.6	AQMA
A23	The Square Birchington 2	630235	169089	1.6	AQMA
A24	The Square Birchington 3	630253	169081	1.6	AQMA
A25	The Square Birchington 4	630270	169076	1.6	AQMA
A26	The Square Birchington 5	630288	169071	1.6	AQMA
A27	The Square Birchington 6	630308	169071	1.6	AQMA
A28	The Square Birchington 7	630308	169058	1.6	AQMA
A29	The Square Birchington 8	630290	169050	1.6	AQMA
A30	The Square Birchington 9	630276	169045	1.6	AQMA
A31	The Square Birchington 10	630254	169033	1.6	AQMA
A32	St Lawrence 1	637052	165324	1.6	AQMA
A33	St Lawrence 2	637046	165372	1.6	AQMA
A34	St Lawrence 3	637074	165376	1.6	AQMA
A35	St Lawrence 4	637065	165340	1.6	AQMA
A36	St Lawrence 5	637075	165331	1.6	AQMA
A37	St Lawrence 6	637104	165345	1.6	AQMA
A38	St Lawrence 7	637140	165328	1.6	AQMA
A39	St Lawrence 8	637119	165323	1.6	AQMA
A40	St Lawrence 9	637099	165327	1.6	AQMA
A41	St Lawrence 10	637082	165319	1.6	AQMA
A42	St Lawrence 11	637085	165289	1.6	AQMA
A43	St Lawrence 12	637063	165280	1.6	AQMA

Figure 6.1 Locations of long-term human receptors

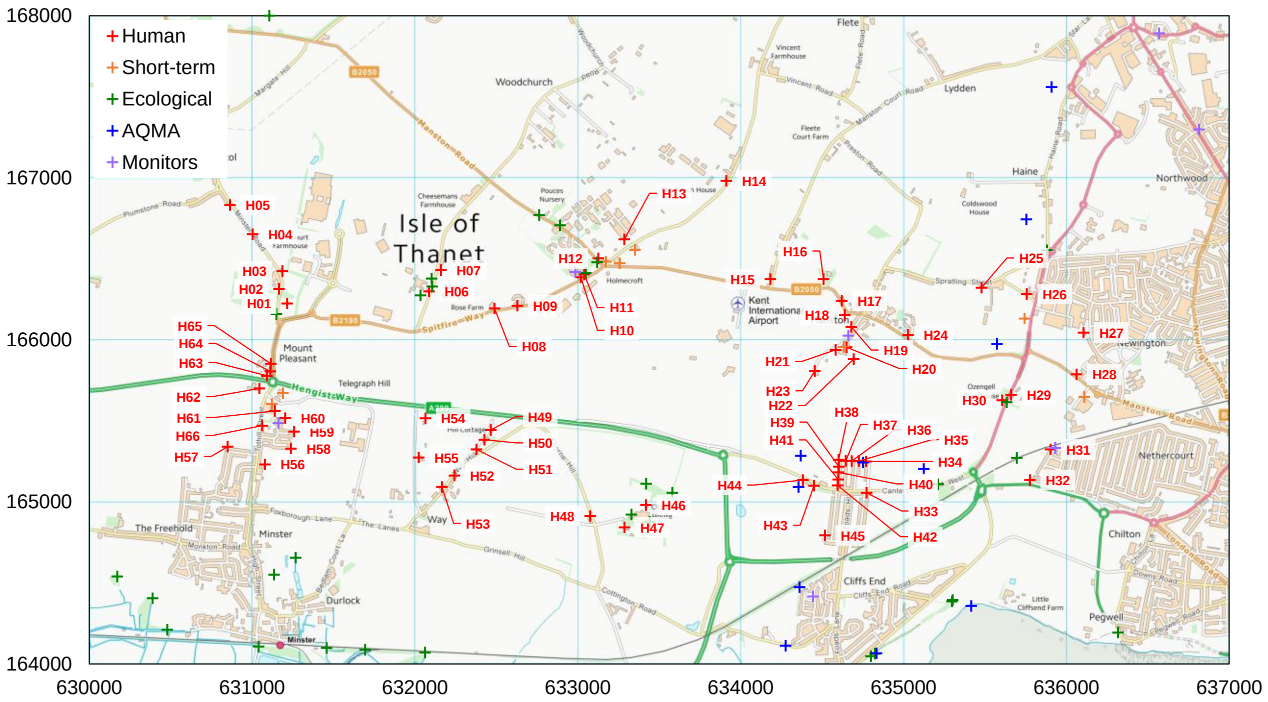

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Figure 6.2 Locations of short-term human receptors

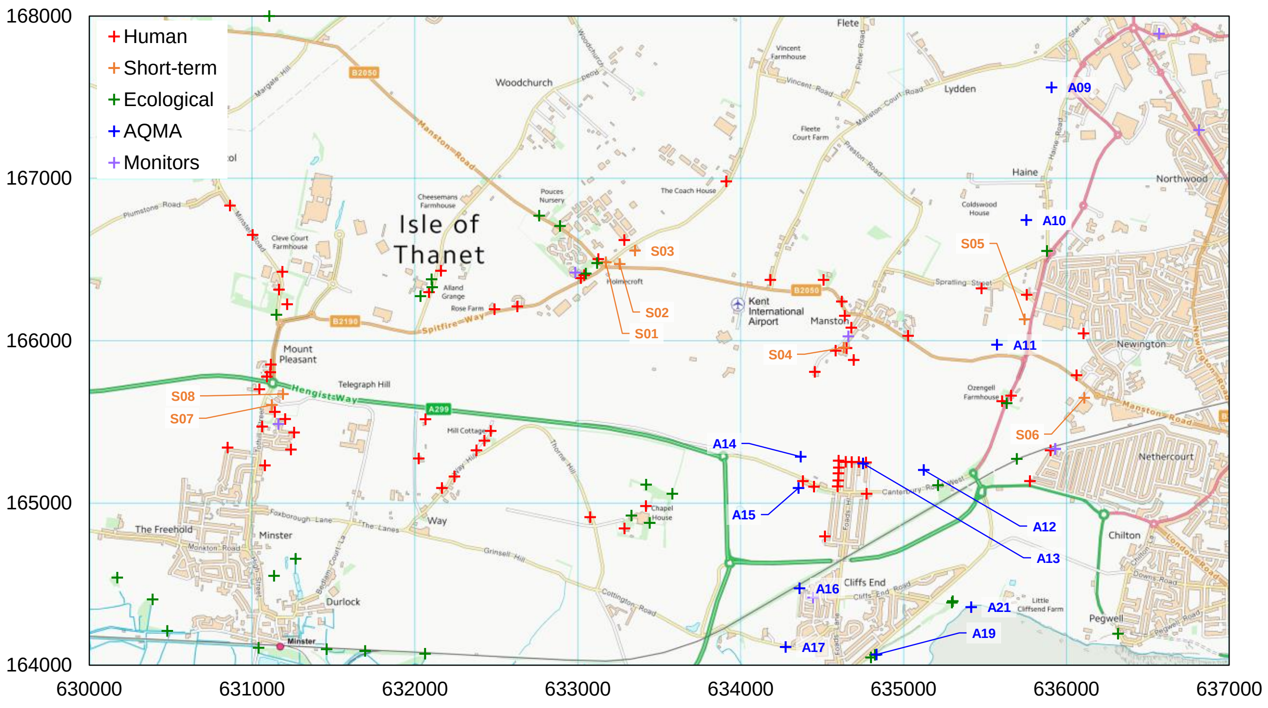

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Figure 6.3 Locations of AQMA receptors (near)

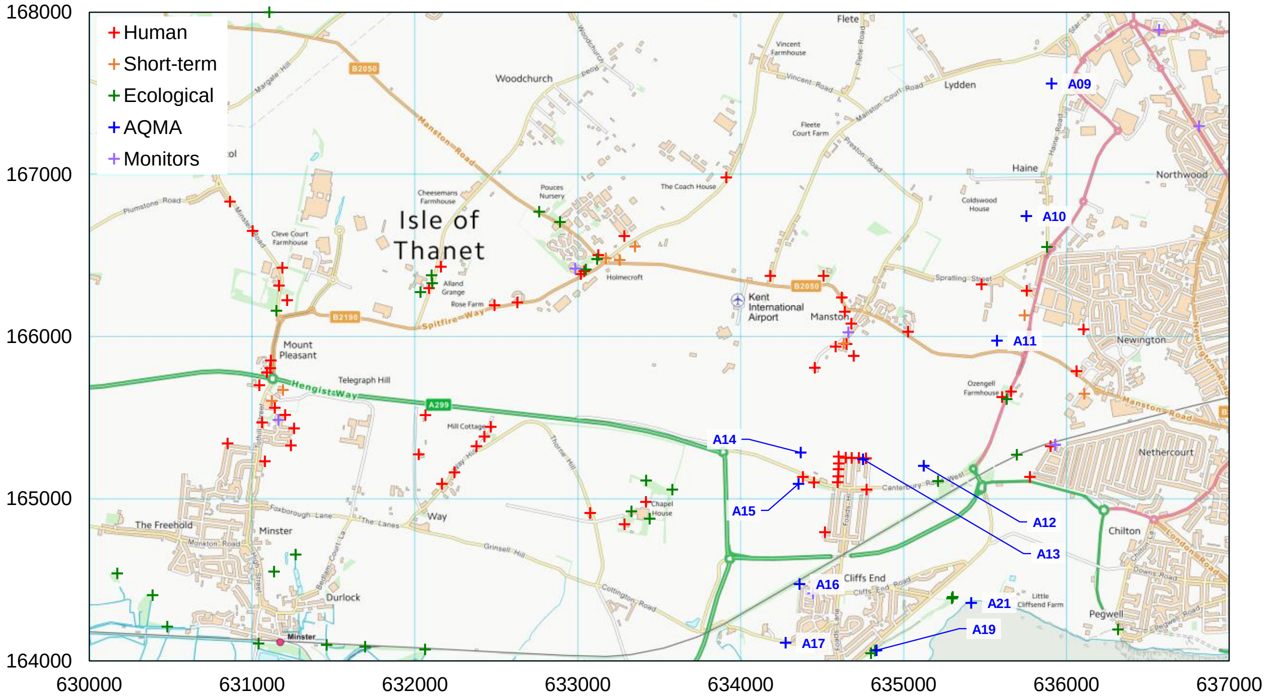

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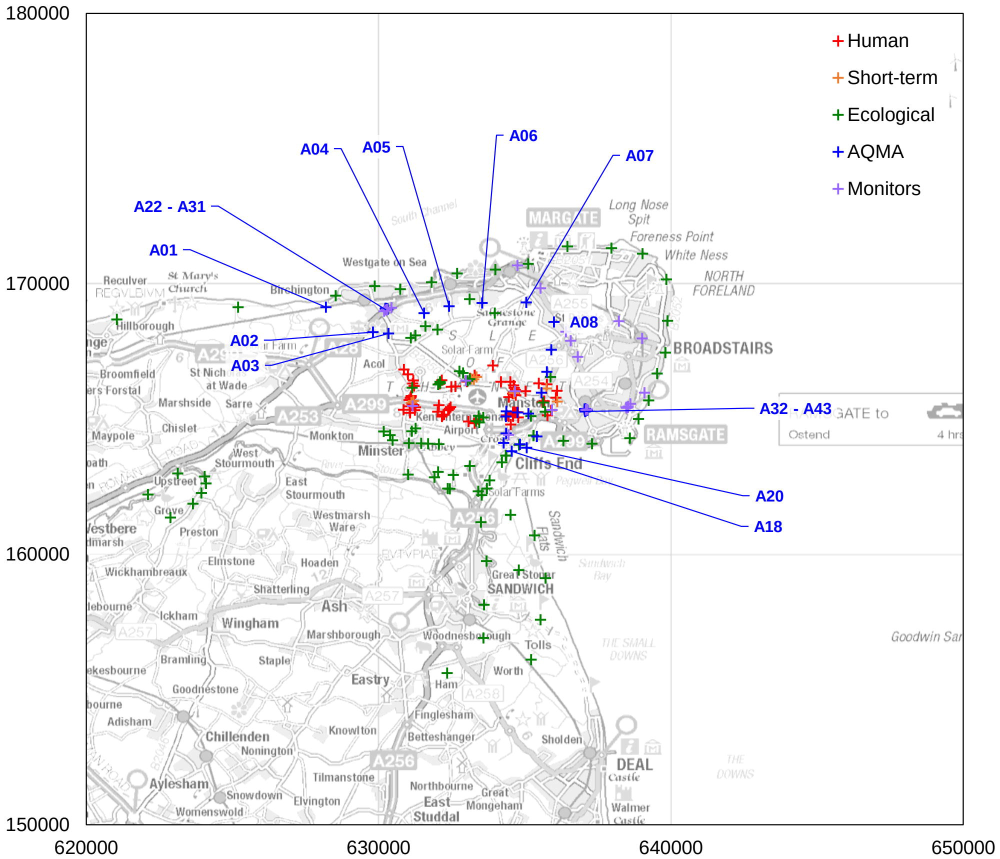
Figure 6.4 Locations of AQMA receptors (far)



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Ecological receptors

6.4.8 The Environment Agency's guidance note "Air emissions risk assessment for your environmental permit"[52] indicates that the impact of the installation should be evaluated at protected conservation areas that meet the following criteria:

- Special Protection Areas (SPAs), Special Areas of Conservation (SACs) or Ramsar sites within 10 km of the installation (or within 15 km of coal or oil fired power stations); and
- Sites of Special Scientific Interest (SSSIs) or local nature sites (ancient woods, local wildlife sites and national and local nature reserves (NNRs and LNRs) within 2 km of the location.

6.4.9 Following the above guidance, suitable ecological receptors have been included in the assessment. Local wildlife sites and local habitat sites were identified by a screening assessment provided by the Environment Agency. The receptors are detailed in **Table 6.5** and **Figure 6.5** and **Figure 6.6**.

6.4.10 Much of the northeast Kent coast is designated SPA, SAC, Ramsar, SSSI and/or NNR. The various designated areas have considerable overlap but do not coincide exactly. In view of the complexity of the designations, **Table 6.5** makes only brief efforts to identify which designated areas each receptor is in. The major designated areas are:

- Ramsar:
  - UK11070 Thanet Coast and Sandwich Bay;
  - UK11066 Stodmarsh;
- SAC:
  - UK0013107 Thanet Coast;
  - UK0013077 Sandwich Bay;
  - UK0030283 Stodmarsh;
  - UK0030371 Margate and Long Sands;
- SPA:
  - UK9012071 Thanet Coast and Sandwich Bay;
  - UK9012121 Stodmarsh;
  - UK9020309 Outer Thames Estuary;
- SSSI:
  - 1000403 Thanet Coast;
  - 1000318 Sandwich Bay to Hacklinge Marshes;

[52] Environment Agency (2016) 'Air emissions risk assessment for your environmental permit'. https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit, dated 2 August 2016.

  - 1000324 Stodmarsh;
- NNR:
  - 1007228 Sandwich & Pegwell Bay.

Table 6.5 Ecological receptor locations

ID	Description	Easting	Northing	Height	Notes
E01	Ramsar, SPA, SSSI	621048	168683	0	UK9012071
E02	Ramsar, SPA, SSSI	625191	169137	0	UK9012071
E03	Ramsar, SPA, SAC, SSSI	628533	169560	0	UK0013107, UK9012071
E04	Ramsar, SPA, SAC, SSSI	629867	169917	0	UK0013107, UK9012071
E05	Ramsar, SPA, SAC, SSSI	630740	169804	0	UK0013107, UK9012071
E06	Ramsar, SPA, SAC, SSSI	631813	170059	0	UK0013107, UK9012071
E07	Ramsar, SPA, SAC, SSSI	632683	170381	0	UK0013107, UK9012071
E08	Ramsar, SPA, SAC, SSSI	633993	170521	0	UK0013107, UK9012071
E09	Ramsar, SPA, SAC, SSSI	635116	170740	0	UK0013107, UK9012071
E10	Ramsar, SPA, SAC, SSSI	636457	171381	0	UK0013107, UK9012071
E11	Ramsar, SPA, SAC, SSSI	637964	171321	0	UK0013107, UK9012071
E12	Ramsar, SPA, SAC, SSSI	639028	171113	0	UK0013107, UK9012071
E13	Ramsar, SPA, SAC, SSSI	639841	170161	0	UK0013107, UK9012071
E14	Ramsar, SPA, SAC, SSSI	639882	168631	0	UK0013107, UK9012071
E15	Ramsar, SPA, SAC, SSSI	639810	167452	0	UK0013107, UK9012071
E16	Ramsar, SPA, SAC, SSSI	639527	166684	0	UK0013107, UK9012071
E17	Ramsar, SPA, SAC, SSSI	639241	165688	0	UK0013107, UK9012071
E18	SAC	638891	165003	0	UK0013107
E19	SAC	638595	164294	0	UK0013107
E20	Ramsar (30 m distant), SPA (30 m distant), SAC, SSSI, NNR	637303	164087	0	UK0013077, UK9012071
E21	Ramsar (70 m distant), SPA (70 m distant), SAC, SSSI, NNR (70 m distant)	636318	164194	0	UK0013077, UK9012071
E22	Ramsar, SPA, SAC, SSSI, NNR	635298	164386	0	UK0013077, UK9012071
E23	Ramsar, SPA, SAC, SSSI, NNR	634800	164047	0	UK0013077, UK9012071
E24	Ramsar, SPA, SAC, SSSI, NNR	634346	163650	0	UK0013077, UK9012071
E25	Ramsar, SPA, SSSI, NNR	633796	162733	0	UK9012071

ID	Description	Easting	Northing	Height	Notes
E26	Ramsar, SPA, SSSI, NNR	633703	162425	0	UK9012071
E27	Ramsar, SPA, SAC, SSSI, NNR	634513	161455	0	UK0013077, UK9012071
E28	Ramsar, SPA, SAC, SSSI	633502	161188	0	UK0013077, UK9012071
E29	Ramsar, SPA, SAC, SSSI, NNR	635337	160698	0	UK0013077, UK9012071
E30	Ramsar, SPA, SAC, SSSI	633692	159746	0	UK0013077, UK9012071
E31	SAC, SSSI	634794	159415	0	UK0013077
E32	Ramsar, SPA, SAC, SSSI, NNR	635708	159117	0	UK0013077, UK9012071
E33	SAC, SSSI	633607	158133	0	UK0013077
E34	SAC, SSSI	635539	157577	0	UK0013077
E35	Ramsar, SSSI	633584	156906	0	1001128
E36	Ramsar, SPA, SSSI	635214	156105	0	UK9012071
E37	Ramsar, SSSI	632347	155607	0	1001128
E38	SSSI	632033	163044	0	1001128
E39	SSSI	632554	162933	0	1001128
E40	SSSI	633412	162328	0	1001128
E41	SSSI	633527	162189	0	1001128
E42	SSSI	632364	162425	0	1001128
E43	Ramsar, SPA, SAC, SSSI	622112	162206	0	UK0030283, UK9012121
E44	Ramsar, SPA, SAC, SSSI, NNR	623126	162989	0	UK0030283, UK9012121
E45	SAC, SSSI, NNR	624052	162872	0	UK0030283
E46	SAC, SSSI, NNR	624096	162621	0	UK0030283
E47	SAC, SSSI, NNR	623938	162268	0	UK0030283
E48	Ramsar, SPA, SAC, SSSI	623648	161865	0	UK0030283, UK9012121
E49	Ramsar, SPA, SAC, SSSI	622879	161358	0	UK0030283, UK9012121
E50	LWS	631694	164088	0	
E51	LWS	631458	164099	0	
E52	LWS	631039	164107	0	
E53	LWS	632436	162421	0	
E54	LWS	631908	162848	0	
E55	LWS	631008	162944	0	
E56	LWS	630479	164211	0	

ID	Description	Easting	Northing	Height	Notes
E57	LWS	630389	164405	0	
E58	LWS	630172	164540	0	
E59	Habitat	633116	169430	0	
E60	Habitat	633976	168913	0	
E61	Habitat	635881	166552	0	
E62	Habitat	635634	165614	0	
E63	Habitat	635696	165271	0	
E64	Habitat	635212	165108	0	
E65	Habitat	635302	164394	0	
E66	Habitat	634825	164063	0	
E67	Habitat	634369	163647	0	
E68	Habitat	634218	163399	0	
E69	Habitat	633122	163264	0	
E70	Habitat	633581	165056	0	
E71	Habitat	633420	165112	0	
E72	Habitat	633441	164876	0	
E73	Habitat	633330	164922	0	
E74	Habitat	632062	164071	0	
E75	Habitat	631267	164655	0	
E76	Habitat	631135	164551	0	
E77	Habitat	631149	166159	0	
E78	Habitat	632034	166274	0	
E79	Habitat	632106	166329	0	
E80	Habitat	632102	166377	0	
E81	Habitat	633049	166413	0	
E82	Habitat	633119	166478	0	
E83	Habitat	632891	166706	0	
E84	Habitat	632763	166769	0	
E85	Habitat	631105	168000	0	
E86	Habitat	631260	168095	0	
E87	Habitat	631603	168434	0	
E88	Habitat	632016	168303	0	

Figure 6.5 Locations of ecological receptors (near)

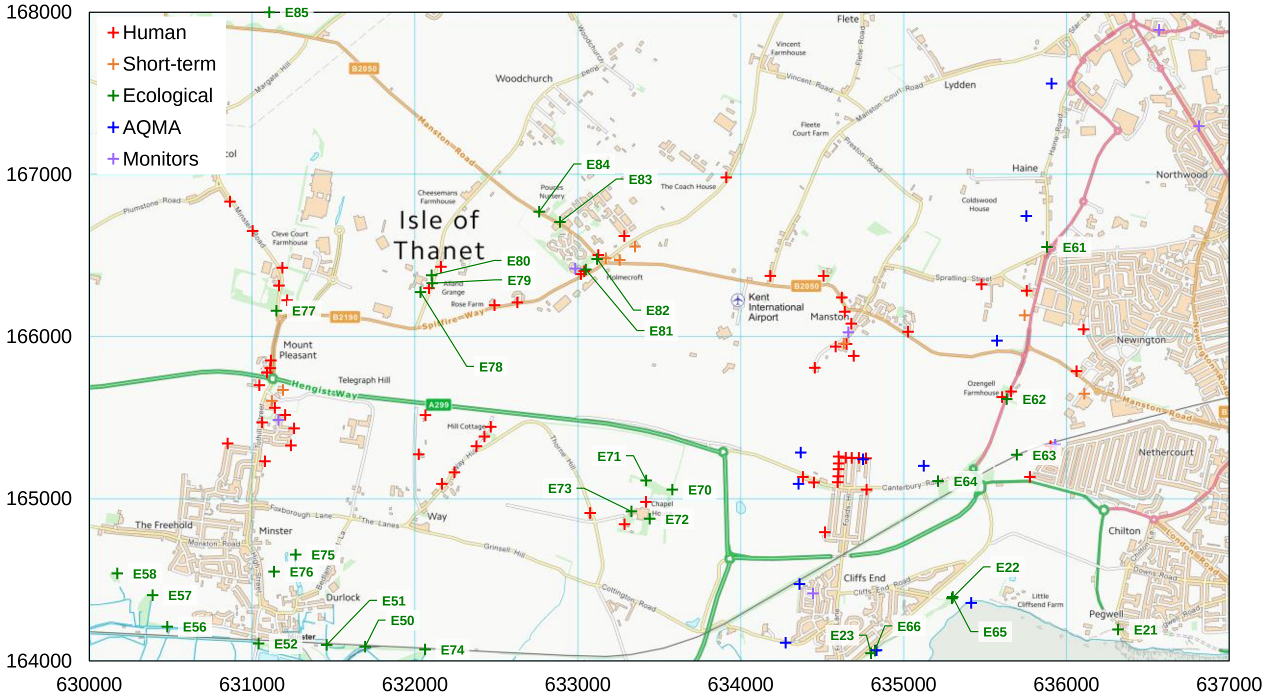

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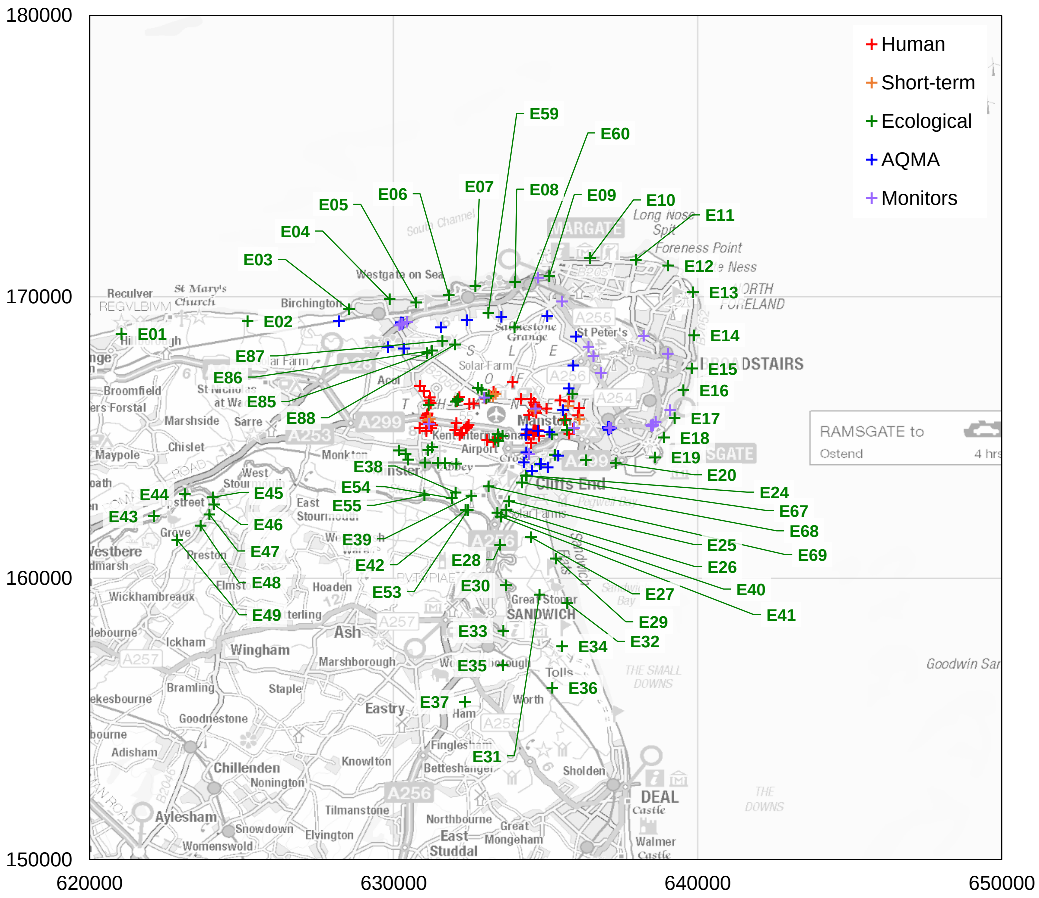
Figure 6.6 Locations of ecological receptors (far)



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Monitor receptors

6.4.11 In order to allow modelled results to be compared against monitoring data, the monitoring locations have also been included as receptors, as detailed in **Table 6.6** and **Figure 6.7** and **Figure 6.8**.

Table 6.6 Monitor receptor locations

ID	Description	Easting	Northing	Height	Notes
M01	ZH3 Thanet Airport	635931	165331	1.6	Monitor
M02	ZH4 Thanet Ramsgate	638483	165430	1.6	Monitor
M03	ZH5 Thanet Birchington	630284	169052	1.6	Monitor
M04	TH05	639019	167981	1.6	Monitor
M05	TH10	635539	169840	1.6	Monitor
M06	TH13/46/47	630254	169037	1.6	Monitor
M07	TH16	634445	164416	1.6	Monitor
M08	TH26	638492	165410	1.6	Monitor

ID	Description	Easting	Northing	Height	Notes
M09	TH27	639097	165971	1.6	Monitor
M10	TH31	634662	166026	1.6	Monitor
M11	TH32	632984	166419	1.6	Monitor
M12	TH33	631161	165486	1.6	Monitor
M13	TH34	636570	167891	1.6	Monitor
M14	TH36	636405	168227	1.6	Monitor
M15	TH37/38/45	635932	165333	1.6	Monitor
M16	TH48	630438	169111	1.6	Monitor
M17	TH49	630186	168983	1.6	Monitor
M18	TH50/61/62	638616	165564	1.6	Monitor
M19	TH51/52/53	638472	165432	1.6	Monitor
M20	TH54/64/65	637135	165354	1.6	Monitor
M21	TH55	636815	167297	1.6	Monitor
M22	TH59	638220	168614	1.6	Monitor
M23	TH66	637112	165331	1.6	Monitor
M24	TH67/68/69	638536	165465	1.6	Monitor
M25	TH70/71/72	637092	165340	1.6	Monitor
M26	TH73/74/75	638528	165426	1.6	Monitor
M27	TH76	634752	170679	1.6	Monitor

Figure 6.7 Locations of monitor receptors (near)

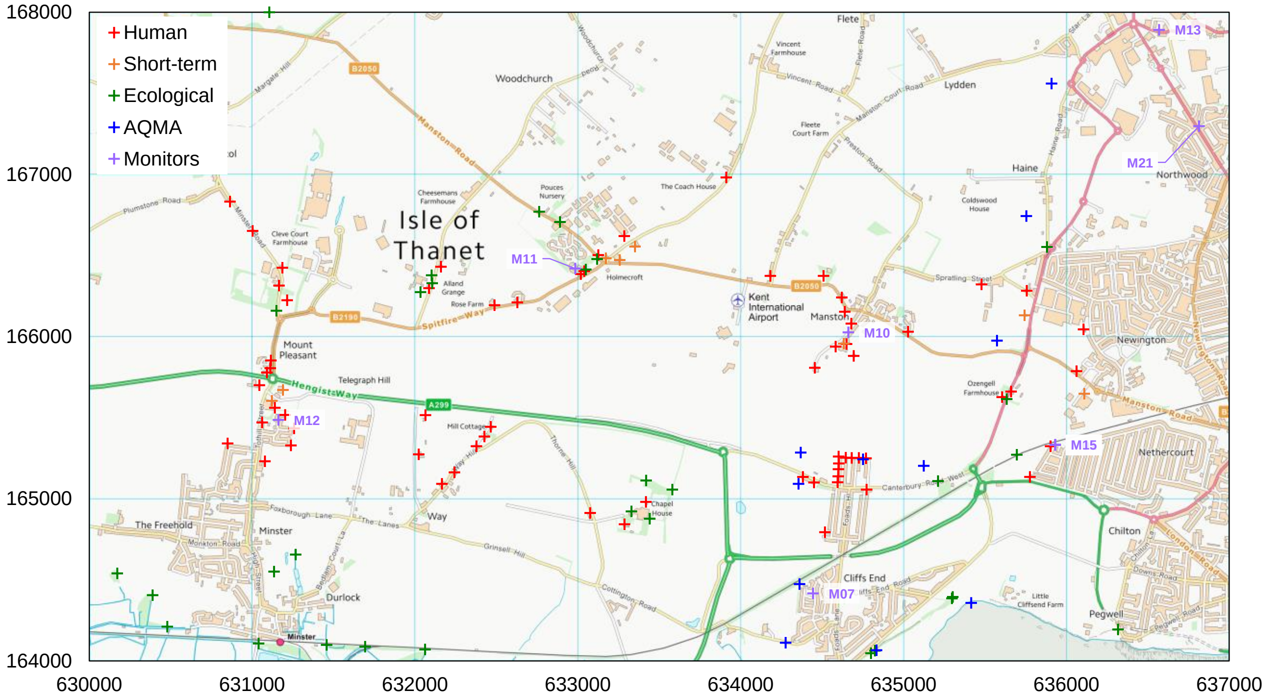

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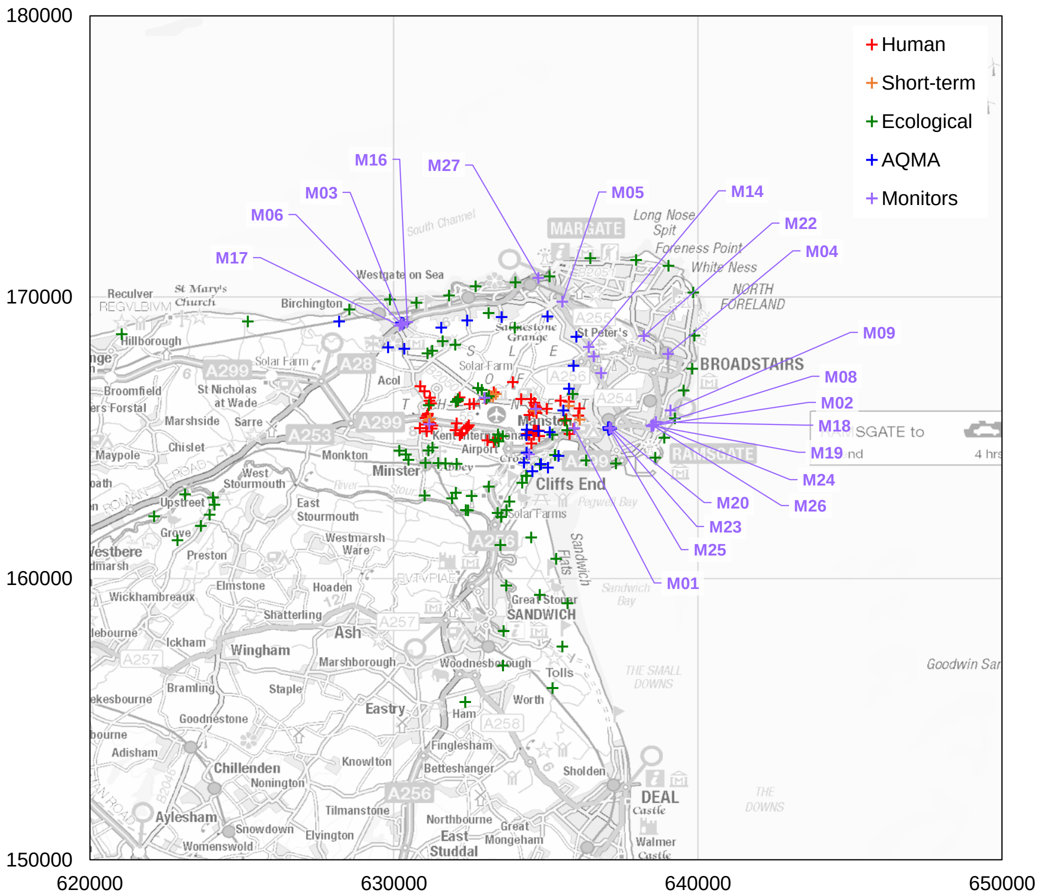
Figure 6.8 Locations of monitor receptors (far)



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Roadside receptors

6.4.12 The list of receptors near modelled road links will be finalised following the production of the Transport Assessment (TA), which is being prepared as part of **Chapter 14: Traffic and Transportation**. As detailed in **Chapter 14**, the scope of the TA is currently being discussed and finalised with the relevant stakeholders and consultees. Therefore the selection of the receptors near modelled road links will be dependent on the outcome of these discussions. Once the lists and groupings of receptors have been agreed and the changes in traffic flows arising from the development have been finalised, the road traffic air quality modelling can be commenced. The results from this modelling will also have to be combined with the dispersion modelling of emissions from aircraft and a combined magnitude and significance assessment at receptors undertaken.

Spatial and temporal scope

6.4.13 The spatial scope of the assessment is defined by the receptors identified above.

6.4.14 In terms of temporal scope, it is proposed to assess the following calendar years:

- For construction, the peak construction year (to be confirmed but expected to be during Phase 1);

6.4.15 For operation, the opening year (Year 2), Year 6 (being the year at which the airport reaches 10,000 movements per year), and Year 20 (being the year of peak capacity).

Potentially significant effects

6.4.16 The potentially significant effects from the Proposed Development, which are subject to further discussion in this chapter, are summarised below.

Potentially significant effects on human health

6.4.17 Of the potential impacts on human health, the most likely to constrain the acceptability of the Proposed Development is annual mean nitrogen dioxide (NO_2). Given that the airport will operate at a steady level over time (except for daytime/night-time differences), it is much less likely that short-term (i.e. hourly mean) NO_2 concentrations will be constraining. Similarly, concentrations of other pollutants such as PM_{10} or $PM_{2.5}$ are unlikely to be the most constraining criteria. However, they will be included in the assessment to provide confidence in this conclusion.

6.4.18 Other pollutants may also be emitted from airport and associated operations, including sulphur dioxide (SO_2), carbon monoxide (CO) and volatile organic compounds (VOCs). The justification for scoping out other pollutants is based largely on the Project for the Sustainable Development of Heathrow (PSDH). This project was set up by the Department for Transport in 2006 to investigate the environmental effects of a third runway at Heathrow Airport. Among other things, it convened a panel of experts in air quality, aircraft technology, airport operations and related fields to develop a best practice methodology for assessing the air quality impacts of a third runway at Heathrow. Among the conclusions of the project[53] it states:

6.4.19 *What are the pollutants of concern for all Panels?*

6.4.20 *Summary*

6.4.21 *Key pollutants for assessment: NO_x, NO_2 and PM.*

6.4.22 *Ozone: for role in atmospheric chemistry in dispersion models.*

6.4.23 *Not required: benzene, 1,3-butadiene, carbon monoxide, lead, PAHs and sulphur dioxide.*

6.4.24 *... Given the importance of ozone in the formation of nitrogen dioxide, the Panels decided that it would be appropriate to collate monitoring data for ozone within the study area. While ozone information is important for atmospheric chemistry effects in dispersion modelling, the technical Panels did not consider a priority area to be modelling the impact of Heathrow emissions on ozone concentrations.*

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[53] Department for Transport. Project for the Sustainable Development of Heathrow - Report of the Air Quality Technical Panels. Undated. http://webarchive.nationalarchives.gov.uk/20080306053058/http://www.dft.gov.uk/print_view/3b723f5b612c85bc79a526ca27c9d370

6.4.25 *In summary, the pollutants for which subsequent assessments would be undertaken for DfT are therefore recommended to be nitrogen oxides (NO_X), nitrogen dioxide (NO_2), and particulate matter (PM).*

6.4.26 According to Defra's background concentration maps[54], background concentrations of SO_2, CO, benzene and 1,3-butadiene are lower in east Kent than in west London. (Background concentration maps of PAHs and lead are not available.) Emissions from the proposed activity at Manston Airport will at its peak be roughly 10% of emissions from Heathrow Airport[55]. Like Manston Airport, Heathrow Airport has sensitive receptors close to its boundary. It is therefore clear that the PSDH arguments for screening out pollutants apply even more strongly to Manston Airport.

6.4.27 Concentrations are sufficiently low across the country that Defra has not felt the need to update the background concentration maps for SO_2, CO, benzene and 1,3-butadiene since 2001. Monitoring of benzene was carried out by Thanet District Council until 2014, which found concentrations consistently within legal limits. Thanet District Council[56] states:

6.4.28 *In June 2014 the laboratory used for the supply and analysis of benzene tubes ceased providing a service because Thanet was the only Local Authority monitoring the pollutant which meant is was [sic] no longer viable. With the closure of the airport and consistently low levels since monitoring began the decision was taken to discontinue benzene analysis.*

6.4.29 Moreover, Defra's guidance on local air quality management[57] includes advice on incorporating the effects of airports on local air quality management. This guidance states that only NO_x/NO_2 from airports need be assessed, saying:

6.4.30 *7.16 Aircraft are potentially significant sources of NO_x emissions, especially during take-off, and therefore the main risk is related to potential exceedances of the NO_2 air quality objectives.*

6.4.31 In summary, a clear expert consensus shows that NO_x/NO_2, and to a lesser extent PM, are the only air quality pollutants of potential concern from airport operations. If concentrations of NO_2 can be shown to be acceptable around the airport, it is not credible that other pollutants will be unacceptable. Therefore, they have not been assessed further.

Potentially significant effects on ecological sites

6.4.32 Concentrations of nitrogen oxides (NO_x) in air are associated with adverse effects on plant growth, and are included in this assessment.

6.4.33 In addition, emissions of nitrogen oxides and sulphur oxides to the air may result in deposition onto ecological sites, which may be sensitive to both nutrifying nitrogen and acid deposition. As discussed above, emissions of sulphur oxides are

[54] Defra. Background mapping data for local authorities. https://uk-air.defra.gov.uk/data/laqm-background-home.
[55] Based on preliminary calculations using early forecasts of air traffic.
[56] Thanet District Council. LAQM progress report. September 2014.
[57] Defra. Local Air Quality Management Technical Guidance (TG16). April 2016.

expected to be negligible, but the impact of nitrogen oxides on nitrifying and acid deposition are included in the assessment.

Pollutants considered

6.4.34 The atmospheric emissions of a number of pollutants have been identified as requiring detailed dispersion modelling. The emitted pollutants of primary concern to the local environment are:

- Oxides of nitrogen (NO_x as NO_2); and
- Particulate matter less than 10 µm and 2.5 µm (PM_{10} and $PM_{2.5}$).

6.4.35 A brief description of each pollutant is given in **Table 6.7**.

Table 6.7 Summary of the pollutants assessed

Pollutant	Description and effect on human health and the environment	Principal Sources
Oxides of nitrogen (NO_x)	Nitrogen dioxide (NO_2) and nitric oxide (NO) are collectively referred to as oxides of nitrogen (NO_x). It is NO_2 that is associated with adverse effects on human health. Most atmospheric emissions are in the form of NO which is converted to NO_2 in the atmosphere through reactions with ozone. The oxidising properties of NO_2 theoretically could damage lung tissue, and exposure to very high concentrations of NO_2 can lead to inflammation of lung tissue and affect the ability to fight infection. The greatest impact of NO_2 is on individuals with asthma or other respiratory conditions, but consistent impacts on these individuals is at levels of greater than 564 µg m^{-3}, much higher than typical UK ambient concentrations.	All combustion processes produce NO_x emissions. The principal sources of NO_x in the UK are road transport and power stations, each of which accounted for about a third of total UK emissions in 2013.
Particulate matter (PM_{10} and $PM_{2.5}$)	Particulate matter is the term used to describe all suspended solid matter. Particulate matter with an aerodynamic diameter of less than 10 µm (PM_{10}) is the subject of health concerns because of its ability to penetrate and remain deep within the lungs. The health effects of particles are difficult to assess, and evidence is mainly based on epidemiological studies. Evidence suggests that there may be associations between increased PM_{10} concentrations and increased mortality and morbidity rates, changes in symptoms or lung function, episodes of hospitalisation or doctors consultations. Recent reviews by the World Health Organisation (WHO) and Committee on the Medical Effects of Air Pollutants (COMEAP) have suggested exposure to a finer fraction of particles ($PM_{2.5}$) give a stronger association with the observed health effects. $PM_{2.5}$ typically makes up around two-thirds of PM_{10} emissions and concentrations.	Road transport, industrial processes and electricity generation. Other pollutants, including NO_2 and SO_2, have the potential to form secondary particulates which are often smaller than PM_{10}.

6.5 Overall Air Quality baseline

Current baseline

Thanet District Council's monitoring

6.5.1 Under Part IV of the Environment Act 1995, Thanet District Council is required to periodically review and assess air quality within its area of jurisdiction. This process of Local Air Quality Management (LAQM) is an integral process for achieving national air quality objectives (AQOs). Thanet's 2014 progress report[58] summarised the air quality in the district thus:

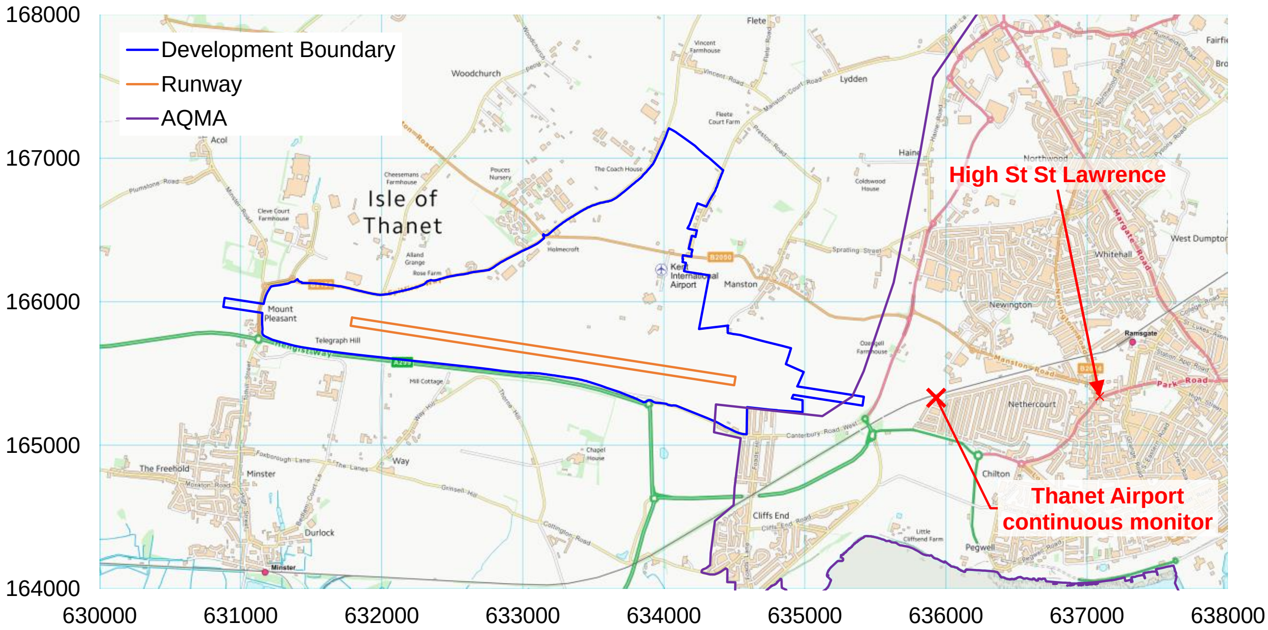
[58] Thanet District Council, LAQM Progress Report, September 2014.

6.5.2 *"Thanet generally has very good air quality; however there are areas at The Square in Birchington, High Street St Lawrence, Ramsgate and the junction of Hereson Road / Boundary Road, Ramsgate where air quality is poor due to pollution from road transport.*

6.5.3 *"An urban wide AQMA has been declared to enable effective management of air quality."*

6.5.4 The boundary of the Air Quality Management Area (AQMA) abuts the boundary of the airport and at its nearest point is just 180 m from the centre of the runway (see **Figure 6.9**). However, the nearest of the locations identified as having poor air quality (High Street St Lawrence, A255) is a roadside location approximately 2 km east of the eastern end of the airport.

Figure 6.9 The vicinity of the Proposed Development, showing AQMA and continuous monitor



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6.5.5 Thanet undertakes a combination of continuous and passive monitoring within its jurisdictional area. There are currently two continuous monitoring stations, and a third was decommissioned in March 2016 following closure of the airport. Until March 2016, the nearest continuous monitoring station to the site was ZH3 Thanet Airport, which measured NO and NO_2 (the two components of NO_x) only. This was located approximately 1400 m east of the eastern end of the runway, on the edge of the built-up area of the conurbation (see **Figure 6.9**). Triplicate NO_2 diffusion tubes were collocated at this site.

6.5.6 The two continuous monitors which are still in operation are both roadside sites, and both measure fine particulate matter (PM_{10}) as well as NO_x (NO and NO_2). These are ZH4 Thanet Ramsgate Roadside, located in central Ramsgate, and ZH5 Thanet Birchington Roadside, located in Birchington. Concentrations at roadside locations are very sensitive to local conditions, notably traffic levels, proportion of heavy-duty vehicles, congestion, queues and canyon effects. As a result monitoring at these two continuous monitors may or may not be representative of other roadside locations.

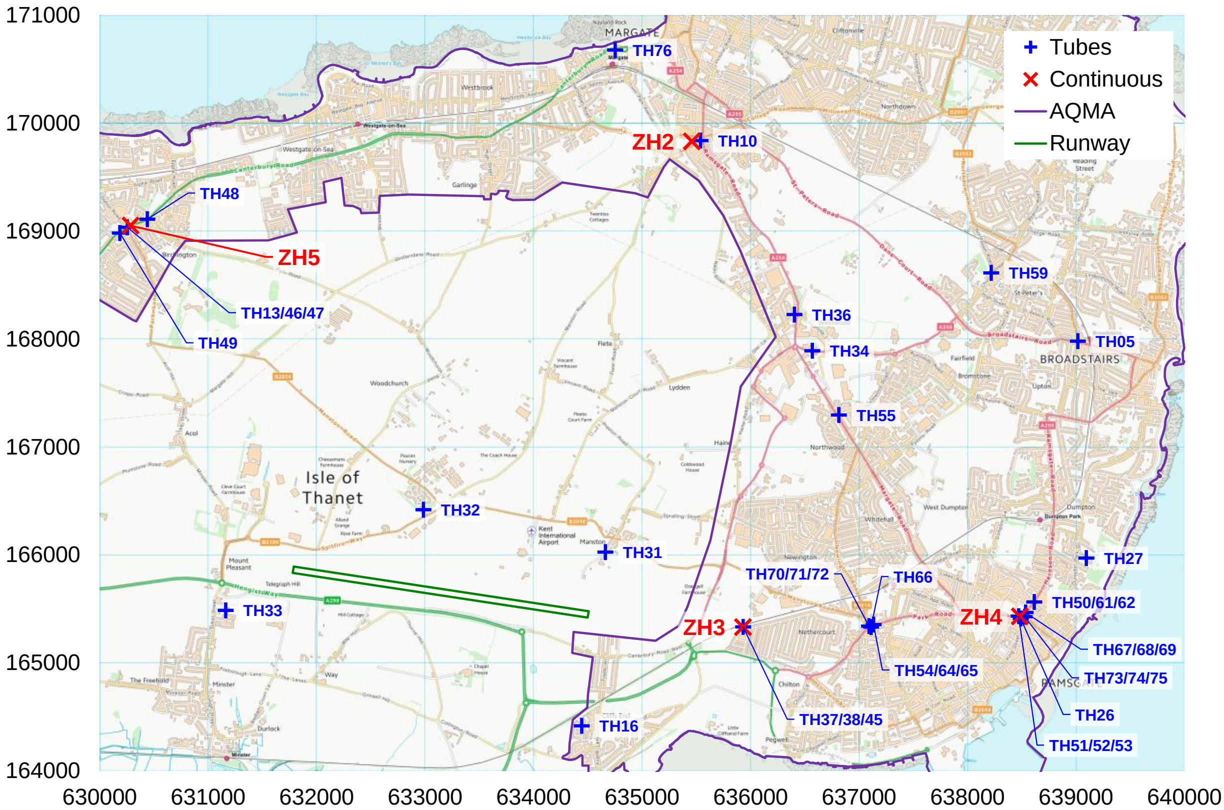
6.5.7 The ZH2 Thanet Margate Background continuous monitor was closed at the end of March 2013. It was located at Salmestone Primary School and was classified as an urban background site. This station monitored NO_x (NO and NO_2) only.

6.5.8 Details of the continuous monitors are summarised in **Table 6.8**, and their locations are shown in **Figure 6.10**.

Table 6.8 Continuous monitor details

Name	Coordinates	Classification	Pollutants monitored	Notes
ZH2 Thanet Margate Background	635460, 169833	Urban background	NO_x (i.e. NO, NO_2)	Closed March 2013.
ZH3 Thanet Airport	635931, 165331	Suburban	NO_x (i.e. NO, NO_2)	Closed March 2016.
ZH4 Thanet Ramsgate Roadside	638483, 165430	Roadside	NO_x (i.e. NO, NO_2), PM_{10}	
ZH5 Thanet Birchington Roadside	630284, 169052	Roadside	NO_x (i.e. NO, NO_2), PM_{10}	

Figure 6.10 Monitoring locations



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6.5.9 Thanet also measures NO_2 at 24 passive monitoring (diffusion tube) locations (including eight triplicate sites), as summarised in **Table 6.9** and shown on

Figure 6.10. Two of these were first commissioned in 2015; the others have been in place since at least 2009.

Table 6.9 Diffusion tube details

Name	Coordinates	Classification	Notes
TH05	639019, 167981	Kerbside	
TH10	635539, 169840	Kerbside	
TH13/46/47	630254, 169037	Kerbside	
TH16	634445, 164416	Background	
TH26	638492, 165410	Kerbside	
TH27	639097, 165971	Urban background	
TH31	634662, 166026	Urban background	
TH32	632984, 166419	Urban background	
TH33	631161, 165486	Urban background	
TH34	636570, 167891	Roadside	
TH36	636405, 168227	Kerbside	
TH37/38/45	635932, 165333	Kerbside	
TH48	630438, 169111	Kerbside	
TH49	630186, 168983	Roadside	
TH50/61/62	638616, 165564	Roadside	
TH51/52/53	638472, 165432	Roadside	
TH54/64/65	637135, 165354	Roadside	
TH55	636815, 167297	Roadside	
TH59	638220, 168614	Kerbside	From 2015 only.
TH66	637112, 165331	Roadside	
TH67/68/69	638536, 165465	Roadside	
TH70/71/72	637092, 165340	Roadside	
TH73/74/75	638528, 165426	Roadside	
TH76	634752, 170679	Roadside	From 2015 only.

6.5.10 Measured annual mean NO_2 concentrations from Thanet's monitoring programme between 2007 and 2015 are summarised in **Table 6.10**. There is a modest decreasing trend at most monitors, averaging roughly 1 µg m^{-3} per year, which is consistent with trends elsewhere in the UK.

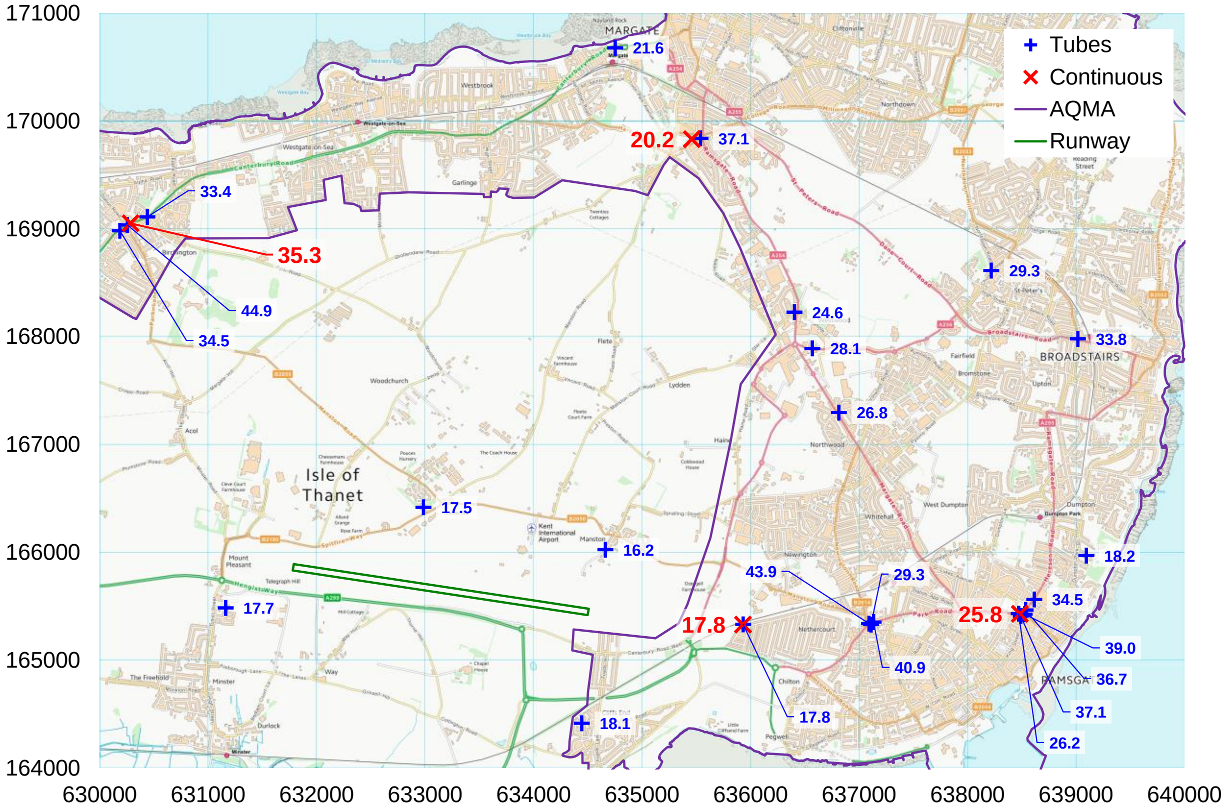
6.5.11 **Figure 6.11** shows the locations of the monitors labelled with the annual mean NO_2 concentration averaged over the available measurement years. This clearly shows that concentrations above 20 µg m^{-3} are confined to roadside and urban centre locations.

Table 6.10 Annual mean NO_2 concentrations (µg m^{-3}) from monitors

Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	Average
ZH2	21	21	21	20	19.5	19.5*	19.3*	N/A	N/A	**20.2**
ZH3	18	19	21	18	18.7	18.1	16.0	16.5	14.7	**17.8**
ZH4	25	26	30	26	26.8	25.1	25.2	25.6	22.9	**25.8**
ZH5	37	39	40	35	35.9	40.8	34.8	30.8	24.6	**35.3**
TH05	N/A	N/A	40	31	34.4	34.7	31.2	34.8	30.3	**33.8**
TH10	N/A	N/A	43	37	40.4	35.4	33.7	35.3	34.9	**37.1**
TH13/46/47	N/A	N/A	49	41	46.6	45.1	43.0*	47.4	42.4	**44.9**
TH16	N/A	N/A	21	18	17.2	18.9	16.6	20.0	14.7	**18.1**
TH26	N/A	N/A	42	36	38.5	36.1	34.9	37.1	35.3	**37.1**
TH27	N/A	N/A	22	19	19.0	18.4	17.9	17.1	14.1	**18.2**
TH31	N/A	N/A	19	17	17.4	15.0	15.6	16.4	12.9	**16.2**
TH32	N/A	N/A	22	19	19.2	16.6	15.9	15.7	14.4	**17.5**
TH33	N/A	N/A	22	18	19.1	16.1	18.3	15.2	14.9	**17.7**
TH34	N/A	N/A	33	26	32.2	27.9	25.5	27.7	24.1	**28.1**
TH36	N/A	N/A	26	24	26.1	24.0	23.8	25.7	22.5	**24.6**
TH37/38/45	N/A	N/A	21	19	19.4	17.2	16.7	16.4	14.8	**17.8**
TH48	N/A	N/A	37	31	32.8	34.2	33.3	33.7	31.9	**33.4**
TH49	N/A	N/A	43	36	38.8	37.1	32.8	33.7	20.3	**34.5**
TH50/61/62	N/A	N/A	38	35	34.7	33.7	33.1	34.4	32.3	**34.5**
TH51/52/53	N/A	N/A	30	26	25.5	26.4	23.6	28.1	23.7	**26.2**
TH54/64/65	N/A	N/A	45	40	42.3	41.7	38.0	41.2	**38.2**	**40.9**
TH55	N/A	N/A	30	28	28.3	26.6	25.9	26.6	21.9	**26.8**
TH59	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	29.3	**29.3**
TH66	N/A	N/A	31	29	29.0	28.1	28.3	28.5	**31.1**	**29.3**
TH67/68/69	N/A	N/A	42	38	37.7	36.5	34.4	34.4	33.7	**36.7**
TH70/71/72	N/A	N/A	47	42	43.4	44.3	43.7	44.4	**42.8**	**43.9**
TH73/74/75	N/A	N/A	N/A	37	39.5	36.0	43.7*	42.1	35.7	**39.0**
TH76	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	21.6	**21.6**

*Low data capture. Data capture information is not available for 2007–2011.

Figure 6.11 Monitored annual mean NO_2 (µg m^{-3}), averaged 2007–2015



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6.5.12 For context, the legal limit for annual mean NO_2 concentrations is 40 µg m^{-3}. The monitoring shows that at rural and urban background locations, concentrations are well below the legal limit. There are some exceedances of the legal limit alongside busy roads. These results are typical of such locations in England.

6.5.13 Measured annual mean NO_x concentrations from Thanet's monitoring programme between 2007 and 2015 are summarised in **Table 6.12**.

Table 6.11 Annual mean NO_x concentrations (µg m^{-3}) from monitors

Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	Average
ZH2	32	32	29	28	26	N/A	N/A	N/A	N/A	**29.4**
ZH3	24	24	26	24	23	22	20	20	18	**22.3**
ZH4	42	42	47	41	41	41	40	41	36	**41.2**
ZH5	83	84	88	78	81	93	79	71	54	**79.0**

6.5.14 Measured annual mean PM_{10} concentrations from Thanet's monitoring programme between 2007 and 2015 are summarised in **Table 6.12**. These are both roadside sites.

Table 6.12 Annual mean PM_{10} concentrations (µg m^{-3}) from monitors

Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	Average
ZH4	N/A	N/A	29	28	34.0	27.6	30.7*	24.7	24.3	**28.3**
ZH5	N/A	N/A	23	24	28.8	25.4	25.6*	20.8	22.3	**24.3**

*Low data capture. Data capture information is not available for 2007–2011.

6.5.15 The legal limit for annual mean PM_{10} concentrations is 40 µg m^{-3}. The monitoring shows that at the monitoring locations, concentrations are well below the legal limit.

Defra's background mapped concentrations

6.5.16 Defra, through its contractor Ricardo, maintains a nationwide model (the Pollution Climate Mapping (PCM) model) of existing and future background air quality concentrations at a 1 km grid square resolution. The data sets include annual average concentration estimates for NO_x, NO_2, PM_{10} and $PM_{2.5}$, as well as other pollutants. The PCM model is semi-empirical in nature: it uses data from the national atmospheric emissions inventory (NAEI) to model the concentrations of pollutants at the centroid of each 1 km grid square but then calibrates these concentrations in relation to actual monitoring data. Concentrations represent background locations, not roadside locations or those particularly influenced by point sources.

6.5.17 The dataset was updated in 2016. Data are available for years from 2013 to 2030; modelled concentrations are generally decreasing over that time period.

6.5.18 The dataset for the Thanet area includes a contribution from existing aircraft and other activity on the airport. Defra provides a mechanism for subtracting out particular contributions, but for the present purposes the small amount of double-counting would be acceptable.

6.5.19 Concentrations of NO_2, NO_x, PM_{10} and $PM_{2.5}$ from the Defra data are given in **Table 6.13** to **Table 6.16** for a selection of grid squares in the vicinity of the airport, and concentrations of NO_2 are shown graphically in **Figure 6.12**, showing that concentrations are higher in urban areas than low-population areas. These are all well below the corresponding legal limits and typical of rural locations in England.

Table 6.13 Annual mean NO_2 concentrations (µg m^{-3}) from Defra data

	629500	630500	631500	632500	633500	634500	635500	636500	637500	638500	639500
169500	8.9	9.5	9.5	9.9	10.0	9.4	10.6	10.1	9.9	10.4	9.1
168500	8.8	9.0	8.4	8.7	8.6	8.7	9.3	10.9	10.5	11.1	10.2
167500	8.7	8.5	9.0	9.6	8.6	8.9	9.4	11.4	13.3	11.0	11.3
166500	8.3	8.5	11.5	9.8	9.8	9.5	10.9	11.2	11.2	10.9	10.2
165500	8.9	9.3	10.3	10.0	10.1	10.0	11.7	11.8	12.5	12.3	10.1
164500	8.0	8.5	8.5	8.4	8.9	9.4	10.2	12.0	12.1	11.2	N/A
163500	7.7	7.8	7.9	8.0	8.6	9.3	10.0	10.8	11.0	10.9	N/A

Table 6.14 Annual mean NO_x concentrations (µg m^{-3}) from Defra data

	629500	630500	631500	632500	633500	634500	635500	636500	637500	638500	639500
169500	11.9	12.8	12.8	13.4	13.6	12.7	14.4	13.7	13.4	14.1	12.3
168500	11.7	12.1	11.2	11.6	11.5	11.6	12.5	14.8	14.3	15.2	13.8
167500	11.6	11.4	12.1	13.1	11.6	11.9	12.7	15.6	18.6	15.0	15.5
166500	11.1	11.4	15.9	13.3	13.3	12.8	14.9	15.3	15.3	14.9	13.8
165500	12.0	12.5	14.0	13.5	13.7	13.6	16.0	16.2	17.3	17.0	13.7
164500	10.6	11.4	11.4	11.2	12.0	12.6	13.8	16.5	16.7	15.4	N/A
163500	10.3	10.4	10.5	10.7	11.5	12.5	13.6	14.8	15.1	15.0	N/A

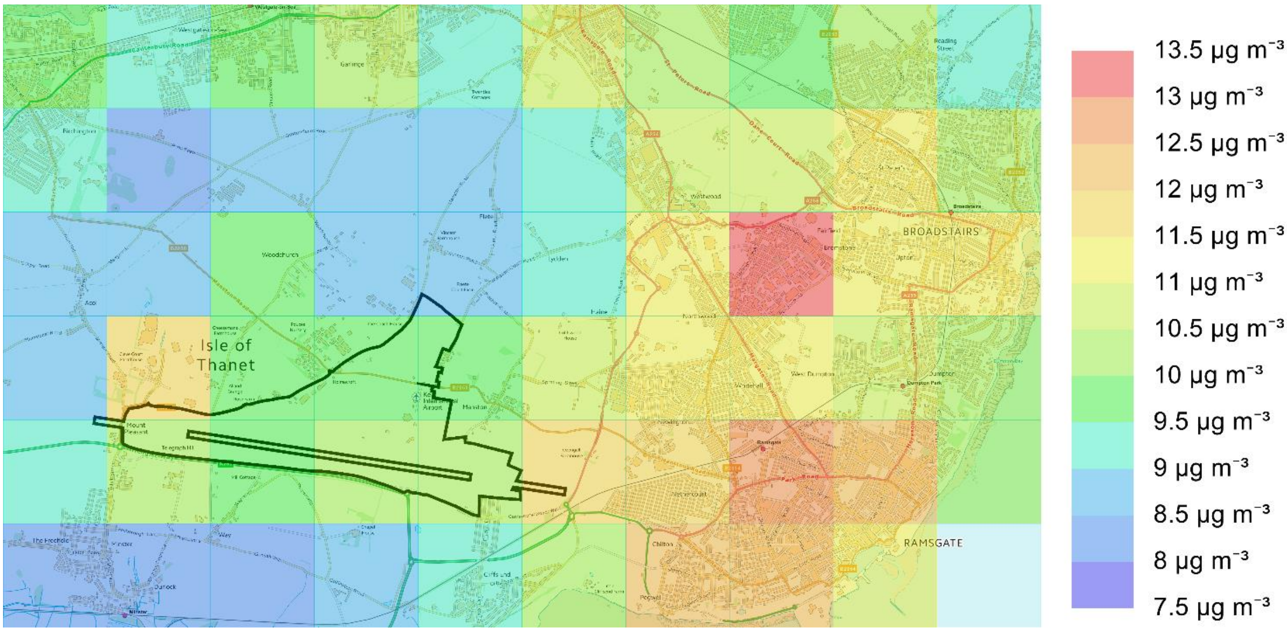
Table 6.15 Annual mean PM_{10} concentrations (µg m^{-3}) from Defra data

	629500	630500	631500	632500	633500	634500	635500	636500	637500	638500	639500
169500	14.8	14.9	15.3	15.7	15.9	15.5	15.0	15.6	15.7	15.6	14.9
168500	16.2	15.8	16.6	16.1	16.5	15.4	16.3	16.8	16.6	15.2	14.5
167500	16.9	16.5	16.8	16.7	16.0	16.4	16.8	16.4	17.0	15.2	14.9
166500	16.6	17.1	18.6	16.2	14.9	16.0	16.8	15.5	15.8	15.1	14.7
165500	17.0	16.7	17.1	16.6	16.8	15.9	17.2	15.5	15.4	15.1	13.9
164500	16.3	16.1	15.9	16.9	16.7	16.0	16.1	15.7	15.2	14.1	N/A
163500	16.1	16.4	16.8	16.5	16.3	14.7	14.1	14.0	13.9	13.7	N/A

Table 6.16 Annual mean $PM_{2.5}$ concentrations ($\mu g\ m^{-3}$) from Defra data

	629500	630500	631500	632500	633500	634500	635500	636500	637500	638500	639500
169500	10.6	10.6	10.8	11.1	11.2	10.9	10.8	11.0	11.1	11.1	10.6
168500	11.2	11.1	11.4	11.2	11.4	10.8	11.3	11.7	11.6	11.0	10.6
167500	11.6	11.4	11.6	11.5	11.2	11.4	11.6	11.5	11.8	10.9	10.8
166500	11.4	11.7	12.8	11.3	10.7	11.2	11.7	11.1	11.3	10.9	10.6
165500	11.6	11.5	11.8	11.5	11.6	11.2	11.8	11.1	11.1	11.0	10.2
164500	11.3	11.2	11.1	11.6	11.5	11.1	11.2	11.1	10.9	10.3	N/A
163500	11.1	11.3	11.5	11.4	11.3	10.5	10.2	10.1	10.1	10.0	N/A

Figure 6.12 Annual mean NO_2 concentrations ($\mu g\ m^{-3}$) from Defra data



Comparison of monitoring with Defra data

6.5.20 Measured NO_2 concentrations at non-roadside monitors (for 2015) are compared with the Defra concentrations (for 2016) for the corresponding grid square in **Table 6.17**. The measured concentrations are consistently significantly higher than the Defra concentrations, by 3 to 9 $\mu g\ m^{-3}$. The magnitude of this difference is broadly consistent with comparisons in other parts of the country for similar air quality assessments, although the ZH2 monitor shows an unusually large discrepancy.

Table 6.17 Monitored concentrations vs Defra concentrations for NO_2 ($\mu g\ m^{-3}$)

Name	Classification	Measured (2015)	Defra (2016)	Difference
ZH2 Thanet Margate Background	Urban background	19.3*	10.6	8.7
ZH3 Thanet Airport	Suburban	14.7	11.7	3.0
TH16	Background	14.7	9.4	5.3
TH27	Urban background	14.1	10.1	4.0
TH31	Urban background	12.9	9.5	3.4
TH32	Urban background	14.4	9.8	4.6
TH33	Urban background	14.9	10.3	4.6

*For 2013.

6.5.21 Measured NO_X concentrations at non-roadside monitors (for 2015) are compared with the Defra concentrations (for 2016) for the corresponding grid square in **Table 6.18**. The measured concentrations are slightly higher than the Defra concentrations at ZH3 Thanet Airport, and considerably higher at ZH2 Margate Background.

Table 6.18 Monitored concentrations vs Defra concentrations for NO_x ($\mu g\ m^{-3}$)

Name	Classification	Measured (2015)	Defra (2016)	Difference
ZH2 Thanet Margate Background	Urban background	26.0*	14.4	11.6
ZH3 Thanet Airport	Suburban	18.0	16.0	2.0

*For 2011.

APIS background mapped deposition rates

6.5.22 The Air Pollution Information System (APIS) website[59] provides information on background deposition of nitrogen and sulphur at sensitive ecological sites in the UK. APIS is widely recognised as the primary source of this information and will be used for the air quality assessment.

Proposed baseline data selection

6.5.23 In view of the fact that monitored NO_2 concentrations at background locations are somewhat higher than Defra concentrations, it is proposed to use monitored concentrations from the non-roadside monitors for the background contribution to total NO_2 concentrations. In 2015[60], monitored concentrations at these locations are in the range 12.9–19.3 $\mu g\ m^{-3}$, with an average of 15.0 $\mu g\ m^{-3}$. The higher concentrations are representative of built-up, non-roadside locations which characterise most of the sensitive human receptors. It is therefore proposed to use the highest value, 19.3 $\mu g\ m^{-3}$, as a conservative estimate of the background

[59] www.apis.ac.uk
[60] Using 2013 values for ZH2 Thanet Margate Background, the last year of monitoring at that site.

concentration of annual mean NO_2 at all receptors, except as stated in the following paragraph.

6.5.24 An exception are the receptors at The Square Birchington and St Lawrence, with a significant contribution from local, non-modelled roads, for which monitoring from nearby locations will be used for the NO_2 background. Specifically, for receptors at The Square Birchington, a background NO_2 concentration of 35.3 µg m^{-3} (equal to the 2007–2015 average measured at the ZH5 Thanet Birchington Roadside monitor) will be used; and for receptors at St Lawrence, a background NO_2 concentration of 38.0 µg m^{-3} (equal to the average of the 2007–2015 measurements at the TH54/64/65, TH66 and TH70/71/72 diffusion tube locations) will be used

6.5.25 For NO_x, the same approach is appropriate. It is therefore proposed to use 25.9 µg m^{-3} (equal to the average of the 2007–2011 average measured at ZH2 Thanet Margate Background and the 2007–2015 average measures at ZH3 Thanet Airport) as a conservative estimate of the background concentration of annual mean NO_x at all receptors.

6.5.26 For PM_{10} and $PM_{2.5}$, monitoring data is available for roadside locations only. The only background information comes from the Defra data. The Defra data will therefore be used to estimate the background concentration of annual mean PM_{10} and $PM_{2.5}$ at all receptors.

6.5.27 At the time of writing, it is considered likely that an assessment of road traffic will be required, but it is unclear which road sections will be assessed and which receptors will be most vulnerable. Where roadside receptors need to be assessed, an estimate of the road contribution will be derived from suitable monitoring data, if available, or from traffic data.

6.5.28 Background deposition rates of all pollutants will be taken from the APIS website, based on the most sensitive habitat feature at that designated site.

Concentrations at specific receptors

The background concentrations at each of the specific receptors is given in **Table 6.19**.

Table 6.19 Background air concentrations (µg m^{-3})

Receptor	NO_x	NO_2	PM_{10}	$PM_{2.5}$	Receptor	NO_x	NO_2	PM_{10}	$PM_{2.5}$
H01	26.0	19.3	18.5	12.7	**E43**	26.0	19.3	14.8	10.5
H02	26.0	19.3	18.5	12.7	**E44**	26.0	19.3	14.1	10.0
H03	26.0	19.3	18.5	12.7	**E45**	26.0	19.3	15.8	10.9
H04	26.0	19.3	18.5	12.7	**E46**	26.0	19.3	15.8	10.9
H05	26.0	19.3	16.9	11.5	**E47**	26.0	19.3	14.1	10.0
H06	26.0	19.3	16.0	11.1	**E48**	26.0	19.3	14.7	10.3
H07	26.0	19.3	16.0	11.1	**E49**	26.0	19.3	14.3	10.2
H08	26.0	19.3	16.0	11.1	**E50**	26.0	19.3	15.7	10.9

Receptor	NO_x	NO_2	PM_{10}	$PM_{2.5}$	Receptor	NO_x	NO_2	PM_{10}	$PM_{2.5}$
H09	26.0	19.3	16.0	11.1	**E51**	26.0	19.3	15.7	10.9
H10	26.0	19.3	14.7	10.5	**E52**	26.0	19.3	15.7	10.9
H11	26.0	19.3	14.7	10.5	**E53**	26.0	19.3	14.8	10.4
H12	26.0	19.3	14.7	10.5	**E54**	26.0	19.3	15.2	10.6
H13	26.0	19.3	14.7	10.5	**E55**	26.0	19.3	15.2	10.6
H14	26.0	19.3	14.7	10.5	**E56**	26.0	19.3	15.8	11.0
H15	26.0	19.3	15.7	11.0	**E57**	26.0	19.3	15.8	11.0
H16	26.0	19.3	15.7	11.0	**E58**	26.0	19.3	15.8	11.0
H17	26.0	19.3	15.7	11.0	**E59**	26.0	19.3	15.7	11.0
H18	26.0	19.3	15.7	11.0	**E60**	26.0	19.3	16.3	11.2
H19	26.0	19.3	15.7	11.0	**E61**	26.0	19.3	16.6	11.5
H20	26.0	19.3	15.7	11.0	**E62**	26.0	19.3	16.9	11.6
H21	26.0	19.3	15.7	11.0	**E63**	26.0	19.3	16.9	11.6
H22	26.0	19.3	15.7	11.0	**E64**	26.0	19.3	16.9	11.6
H23	26.0	19.3	15.7	11.0	**E65**	26.0	19.3	15.9	11.0
H24	26.0	19.3	16.6	11.5	**E66**	26.0	19.3	15.7	10.9
H25	26.0	19.3	16.6	11.5	**E67**	26.0	19.3	14.5	10.3
H26	26.0	19.3	16.6	11.5	**E68**	26.0	19.3	14.5	10.3
H27	26.0	19.3	15.2	10.8	**E69**	26.0	19.3	16.1	11.1
H28	26.0	19.3	15.2	10.8	**E70**	26.0	19.3	16.5	11.4
H29	26.0	19.3	16.9	11.6	**E71**	26.0	19.3	16.5	11.4
H30	26.0	19.3	16.9	11.6	**E72**	26.0	19.3	16.5	11.3
H31	26.0	19.3	16.9	11.6	**E73**	26.0	19.3	16.5	11.3
H32	26.0	19.3	16.9	11.6	**E74**	26.0	19.3	16.7	11.4
H33	26.0	19.3	15.7	11.0	**E75**	26.0	19.3	15.7	10.9
H34	26.0	19.3	15.7	11.0	**E76**	26.0	19.3	15.7	10.9
H35	26.0	19.3	15.7	11.0	**E77**	26.0	19.3	18.5	12.7
H36	26.0	19.3	15.7	11.0	**E78**	26.0	19.3	16.0	11.1
H37	26.0	19.3	15.7	11.0	**E79**	26.0	19.3	16.0	11.1
H38	26.0	19.3	15.7	11.0	**E80**	26.0	19.3	16.0	11.1
H39	26.0	19.3	15.7	11.0	**E81**	26.0	19.3	14.7	10.5
H40	26.0	19.3	15.7	11.0	**E82**	26.0	19.3	14.7	10.5

Receptor	NO_x	NO_2	PM_{10}	$PM_{2.5}$	Receptor	NO_x	NO_2	PM_{10}	$PM_{2.5}$
H41	26.0	19.3	15.7	11.0	**E83**	26.0	19.3	16.0	11.1
H42	26.0	19.3	15.7	11.0	**E84**	26.0	19.3	16.0	11.1
H43	26.0	19.3	15.7	11.0	**E85**	26.0	19.3	16.4	11.2
H44	26.0	19.3	15.7	11.0	**E86**	26.0	19.3	16.4	11.2
H45	26.0	19.3	15.7	10.9	**E87**	26.0	19.3	16.4	11.2
H46	26.0	19.3	16.5	11.3	**E88**	26.0	19.3	15.9	11.0
H47	26.0	19.3	16.5	11.3	**A01**	26.0	19.3	14.3	10.1
H48	26.0	19.3	16.5	11.3	**A02**	26.0	19.3	16.0	11.0
H49	26.0	19.3	16.4	11.3	**A03**	26.0	19.3	15.5	10.9
H50	26.0	19.3	16.4	11.3	**A04**	26.0	19.3	16.4	11.2
H51	26.0	19.3	16.4	11.3	**A05**	26.0	19.3	15.4	10.9
H52	26.0	19.3	16.4	11.3	**A06**	26.0	19.3	15.7	11.0
H53	26.0	19.3	16.4	11.3	**A07**	26.0	19.3	14.7	10.6
H54	26.0	19.3	16.4	11.3	**A08**	26.0	19.3	16.0	11.1
H55	26.0	19.3	16.4	11.3	**A09**	26.0	19.3	16.5	11.4
H56	26.0	19.3	16.9	11.6	**A10**	26.0	19.3	16.6	11.5
H57	26.0	19.3	16.4	11.3	**A11**	26.0	19.3	16.9	11.6
H58	26.0	19.3	16.9	11.6	**A12**	26.0	19.3	16.9	11.6
H59	26.0	19.3	16.9	11.6	**A13**	26.0	19.3	15.7	11.0
H60	26.0	19.3	16.9	11.6	**A14**	26.0	19.3	15.7	11.0
H61	26.0	19.3	16.9	11.6	**A15**	26.0	19.3	15.7	11.0
H62	26.0	19.3	16.9	11.6	**A16**	26.0	19.3	15.7	10.9
H63	26.0	19.3	16.9	11.6	**A17**	26.0	19.3	15.7	10.9
H64	26.0	19.3	16.9	11.6	**A18**	26.0	19.3	14.5	10.3
H65	26.0	19.3	16.9	11.6	**A19**	26.0	19.3	15.7	10.9
H66	26.0	19.3	16.9	11.6	**A20**	26.0	19.3	13.9	10.0
S01	26.0	19.3	14.7	10.5	**A21**	26.0	19.3	15.9	11.0
S02	26.0	19.3	14.7	10.5	**A22**	26.0	35.3	14.6	10.4
S03	26.0	19.3	14.7	10.5	**A23**	26.0	35.3	14.6	10.4
S04	26.0	19.3	15.7	11.0	**A24**	26.0	35.3	14.6	10.4
S05	26.0	19.3	16.6	11.5	**A25**	26.0	35.3	14.6	10.4
S06	26.0	19.3	15.2	10.8	**A26**	26.0	35.3	14.6	10.4

Receptor	NO_x	NO_2	PM_{10}	$PM_{2.5}$	Receptor	NO_x	NO_2	PM_{10}	$PM_{2.5}$
S07	26.0	19.3	16.9	11.6	**A27**	26.0	35.3	14.6	10.4
S08	26.0	19.3	16.9	11.6	**A28**	26.0	35.3	14.6	10.4
E01	26.0	19.3	15.1	10.5	**A29**	26.0	35.3	14.6	10.4
E02	26.0	19.3	14.5	10.2	**A30**	26.0	35.3	14.6	10.4
E03	26.0	19.3	14.3	10.1	**A31**	26.0	35.3	14.6	10.4
E04	26.0	19.3	14.6	10.4	**A32**	26.0	38.0	15.1	10.9
E05	26.0	19.3	14.6	10.4	**A33**	26.0	38.0	15.1	10.9
E06	26.0	19.3	13.6	9.8	**A34**	26.0	38.0	15.1	10.9
E07	26.0	19.3	14.0	10.1	**A35**	26.0	38.0	15.1	10.9
E08	26.0	19.3	14.3	10.3	**A36**	26.0	38.0	15.1	10.9
E09	26.0	19.3	15.1	10.7	**A37**	26.0	38.0	15.1	10.9
E10	26.0	19.3	14.0	10.1	**A38**	26.0	38.0	15.1	10.9
E11	26.0	19.3	13.7	9.9	**A39**	26.0	38.0	15.1	10.9
E12	26.0	19.3	13.3	9.6	**A40**	26.0	38.0	15.1	10.9
E13	26.0	19.3	13.7	9.9	**A41**	26.0	38.0	15.1	10.9
E14	26.0	19.3	14.3	10.4	**A42**	26.0	38.0	15.1	10.9
E15	26.0	19.3	14.7	10.6	**A43**	26.0	38.0	15.1	10.9
E16	26.0	19.3	14.5	10.4	**M01**	26.0	19.3	16.9	11.6
E17	26.0	19.3	13.7	9.9	**M02**	26.0	19.3	14.9	10.7
E18	26.0	19.3	14.9	10.7	**M03**	26.0	19.3	14.6	10.4
E19	26.0	19.3	13.9	10.0	**M04**	26.0	19.3	14.7	10.6
E20	26.0	19.3	14.9	10.7	**M05**	26.0	19.3	14.7	10.6
E21	26.0	19.3	15.4	10.9	**M06**	26.0	19.3	14.6	10.4
E22	26.0	19.3	15.9	11.0	**M07**	26.0	19.3	15.7	10.9
E23	26.0	19.3	15.7	10.9	**M08**	26.0	19.3	14.9	10.7
E24	26.0	19.3	14.5	10.3	**M09**	26.0	19.3	13.7	9.9
E25	26.0	19.3	15.2	10.6	**M10**	26.0	19.3	15.7	11.0
E26	26.0	19.3	15.2	10.6	**M11**	26.0	19.3	16.0	11.1
E27	26.0	19.3	14.3	10.1	**M12**	26.0	19.3	16.9	11.6
E28	26.0	19.3	15.4	10.7	**M13**	26.0	19.3	16.2	11.3
E29	26.0	19.3	13.6	9.8	**M14**	26.0	19.3	16.6	11.5
E30	26.0	19.3	15.7	10.9	**M15**	26.0	19.3	16.9	11.6

Receptor	NO_x	NO_2	PM_{10}	$PM_{2.5}$	Receptor	NO_x	NO_2	PM_{10}	$PM_{2.5}$
E31	26.0	19.3	15.1	10.6	**M16**	26.0	19.3	14.6	10.4
E32	26.0	19.3	13.7	9.8	**M17**	26.0	19.3	15.5	10.9
E33	26.0	19.3	15.2	10.8	**M18**	26.0	19.3	14.9	10.7
E34	26.0	19.3	14.3	10.1	**M19**	26.0	19.3	14.9	10.7
E35	26.0	19.3	15.3	10.7	**M20**	26.0	19.3	15.1	10.9
E36	26.0	19.3	15.2	10.6	**M21**	26.0	19.3	16.2	11.3
E37	26.0	19.3	15.6	10.9	**M22**	26.0	19.3	15.0	10.8
E38	26.0	19.3	16.3	11.2	**M23**	26.0	19.3	15.1	10.9
E39	26.0	19.3	14.8	10.4	**M24**	26.0	19.3	14.9	10.7
E40	26.0	19.3	15.2	10.6	**M25**	26.0	19.3	15.1	10.9
E41	26.0	19.3	15.2	10.6	**M26**	26.0	19.3	14.9	10.7
E42	26.0	19.3	14.8	10.4	**M27**	26.0	19.3	14.5	10.4

Deposition rates at specific receptors

The background deposition rates at each of the specific ecological receptors is given in **Table 6.20**.

Table 6.20 Background deposition rates (µg m^{-3})

Receptor	N deposition (kg N ha^{-1} y^{-1})	N component of acid deposition (keq ha^{-1} y^{-1})	S component of acid deposition (keq ha^{-1} y^{-1})	Feature	Broad habitat
E01	12.60	0.90	0.20	Pluvialis apricaria [North-western Europe - breeding] - European golden plover	Montane habitats
E02	12.74	0.91	0.19	Pluvialis apricaria [North-western Europe - breeding] - European golden plover	Montane habitats
E03	12.74	0.91	0.19	Reefs	Inshore sublittoral rock
E04	12.74	0.91	0.19	Reefs	Inshore sublittoral rock
E05	13.02	0.93	0.20	Reefs	Inshore sublittoral rock
E06	10.36	0.74	0.19	Reefs	Inshore sublittoral rock
E07	10.36	0.74	0.19	Reefs	Inshore sublittoral rock
E08	10.36	0.74	0.19	Reefs	Inshore sublittoral rock

Receptor	N deposition (kg N ha^{-1} y^{-1})	N component of acid deposition (keq ha^{-1} y^{-1})	S component of acid deposition (keq ha^{-1} y^{-1})	Feature	Broad habitat
E09	10.78	0.77	0.20	Reefs	Inshore sublittoral rock
E10	10.78	0.77	0.20	Reefs	Inshore sublittoral rock
E11	10.78	0.77	0.20	Reefs	Inshore sublittoral rock
E12	10.78	0.77	0.20	Reefs	Inshore sublittoral rock
E13	10.78	0.77	0.20	Reefs	Inshore sublittoral rock
E14	13.16	0.94	0.23	Reefs	Inshore sublittoral rock
E15	13.16	0.94	0.23	Reefs	Inshore sublittoral rock
E16	13.16	0.94	0.23	Reefs	Inshore sublittoral rock
E17	13.16	0.94	0.23	Reefs	Inshore sublittoral rock
E18	13.16	0.94	0.23	Reefs	Inshore sublittoral rock
E19	10.78	0.77	0.21	Reefs	Inshore sublittoral rock
E20	10.78	0.77	0.21	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)
E21	10.78	0.77	0.21	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)
E22	10.78	0.77	0.21	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)
E23	13.44	0.96	0.20	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)
E24	13.44	0.96	0.20	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)
E25	13.44	0.96	0.20	Pluvialis apricaria [North-western Europe - breeding] - European golden plover	Montane habitats
E26	13.44	0.96	0.20	Pluvialis apricaria [North-western Europe - breeding] - European golden plover	Montane habitats
E27	13.44	0.96	0.20	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)

Receptor	N deposition (kg N ha^{-1} y^{-1})	N component of acid deposition (keq ha^{-1} y^{-1})	S component of acid deposition (keq ha^{-1} y^{-1})	Feature	Broad habitat
E28	13.44	0.96	0.20	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)
E29	10.78	0.77	0.21	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)
E30	15.68	1.12	0.25	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)
E31	15.68	1.12	0.25	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)
E32	12.04	0.86	0.23	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)
E33	15.68	1.12	0.25	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)
E34	12.04	0.86	0.23	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)
E35	15.68	1.12	0.25	Feature: Pluvialis apricaria - Golden Plover	Broad Habitat: Neutral grassland
E36	12.04	0.86	0.23	Pluvialis apricaria [North-western Europe - breeding] - European golden plover	Montane habitats
E37	15.68	1.12	0.25	Feature: Pluvialis apricaria - Golden Plover	Broad Habitat: Neutral grassland
E38	13.44	0.96	0.20	Feature: Pluvialis apricaria - Golden Plover	Broad Habitat: Neutral grassland
E39	13.44	0.96	0.20	Feature: Pluvialis apricaria - Golden Plover	Broad Habitat: Neutral grassland
E40	13.44	0.96	0.20	Feature: Pluvialis apricaria - Golden Plover	Broad Habitat: Neutral grassland
E41	13.44	0.96	0.20	Feature: Pluvialis apricaria - Golden Plover	Broad Habitat: Neutral grassland
E42	13.44	0.96	0.20	Feature: Pluvialis apricaria - Golden Plover	Broad Habitat: Neutral grassland
E43	14.28	1.02	0.22	Vertigo moulinsiana - Desmoulin`s whorl snail	Rivers and streams
E44	14.28	1.02	0.22	Vertigo moulinsiana - Desmoulin`s whorl snail	Rivers and streams
E45	14.28	1.02	0.22	Vertigo moulinsiana - Desmoulin`s whorl snail	Rivers and streams
E46	14.28	1.02	0.22	Vertigo moulinsiana - Desmoulin`s whorl snail	Rivers and streams

Receptor	N deposition (kg N ha^{-1} y^{-1})	N component of acid deposition (keq ha^{-1} y^{-1})	S component of acid deposition (keq ha^{-1} y^{-1})	Feature	Broad habitat
E47	14.28	1.02	0.22	Vertigo moulinsiana - Desmoulin`s whorl snail	Rivers and streams
E48	14.28	1.02	0.22	Vertigo moulinsiana - Desmoulin`s whorl snail	Rivers and streams
E49	14.28	1.02	0.22	Vertigo moulinsiana - Desmoulin`s whorl snail	Rivers and streams
E50	12.60	0.90	0.20	Neutral Grassland	N/A
E51	12.74	0.91	0.19	Neutral Grassland	N/A
E52	12.74	0.91	0.19	Neutral Grassland	N/A
E53	12.74	0.91	0.19	Neutral Grassland	N/A
E54	13.02	0.93	0.20	Neutral Grassland	N/A
E55	10.36	0.74	0.19	Neutral Grassland	N/A
E56	17.64	1.26	0.23	Broadleaved. Mixed and Yew Woodland	N/A
E57	17.64	1.26	0.23	Broadleaved. Mixed and Yew Woodland	N/A
E58	18.62	1.33	0.24	Broadleaved. Mixed and Yew Woodland	N/A
E59	18.62	1.33	0.24	Broadleaved. Mixed and Yew Woodland	N/A
E60	18.62	1.33	0.24	Broadleaved. Mixed and Yew Woodland	N/A
E61	18.62	1.33	0.24	Broadleaved. Mixed and Yew Woodland	N/A
E62	18.62	1.33	0.24	Broadleaved. Mixed and Yew Woodland	N/A
E63	22.68	1.62	0.28	Broadleaved. Mixed and Yew Woodland	N/A
E64	22.68	1.62	0.28	Broadleaved. Mixed and Yew Woodland	N/A
E65	22.68	1.62	0.28	Broadleaved. Mixed and Yew Woodland	N/A
E66	22.68	1.62	0.28	Broadleaved. Mixed and Yew Woodland	N/A
E67	13.16	0.94	0.23	Neutral Grassland	N/A
E68	10.78	0.77	0.21	Neutral Grassland	N/A
E69	18.48	1.32	0.26	Broadleaved. Mixed and Yew Woodland	N/A
E70	18.48	1.32	0.26	Broadleaved. Mixed and Yew Woodland	N/A

Receptor	N deposition (kg N ha^{-1} y^{-1})	N component of acid deposition (keq ha^{-1} y^{-1})	S component of acid deposition (keq ha^{-1} y^{-1})	Feature	Broad habitat
E71	18.48	1.32	0.26	Broadleaved. Mixed and Yew Woodland	N/A
E72	22.96	1.64	0.24	Broadleaved. Mixed and Yew Woodland	N/A
E73	22.96	1.64	0.24	Broadleaved. Mixed and Yew Woodland	N/A
E74	22.96	1.64	0.24	Broadleaved. Mixed and Yew Woodland	N/A
E75	22.96	1.64	0.24	Wood-Pasture & Parkland	N/A
E76	22.96	1.64	0.24	Wood-Pasture & Parkland	N/A
E77	22.96	1.64	0.24	Wood-Pasture & Parkland	N/A
E78	18.48	1.32	0.26	Wood-Pasture & Parkland	N/A
E79	25.90	1.85	0.29	Broadleaved. Mixed and Yew Woodland	N/A
E80	25.90	1.85	0.29	Broadleaved. Mixed and Yew Woodland	N/A
E81	19.32	1.38	0.27	Broadleaved. Mixed and Yew Woodland	N/A
E82	25.90	1.85	0.29	Broadleaved. Mixed and Yew Woodland	N/A
E83	19.32	1.38	0.27	Broadleaved. Mixed and Yew Woodland	N/A
E84	25.90	1.85	0.29	Wood-Pasture & Parkland	N/A
E85	19.32	1.38	0.27	Wood-Pasture & Parkland	N/A
E86	25.90	1.85	0.29	Broadleaved. Mixed and Yew Woodland	N/A
E87	22.96	1.64	0.24	Broadleaved. Mixed and Yew Woodland	N/A
E88	22.96	1.64	0.24	Wood-Pasture & Parkland	N/A

Future baseline

6.5.29 As noted above, there is a slight trend in the monitoring data for concentrations to reduce over the years. This trend will be ignored for conservatism. The future baseline will therefore be assumed to be the same as the current baseline.

6.5.30 No information is available on future deposition rates, so these too will be assumed to be the same as the current baseline.

6.6 Environmental measures incorporated into the Proposed Development

6.6.1 This section lists the environmental measures relevant to air quality which have been incorporated into the Proposed Development.

6.6.2 How these environmental measures influence the assessment of significance is discussed in **Section 6.6**. However the broad approach adopted is that where achievable and agreed environmental measures have been incorporated into the Proposed Development, the effect that those environmental measures have on the significance of potential effects is taken into account during the assessment. In some cases a potential effect may require no further consideration following incorporation of appropriate environmental measures.

6.6.3 A summary of the environmental measures that have been incorporated into the development proposals to date in order to avoid, reduce or compensate for potential adverse air quality effects is provided below in **Table 6.21**.

Table 6.21 Rationale for incorporation of environmental measure

Potential receptor	Predicated changes and potential effects	Incorporated measure
Construction Phase Measures		
Local road network	Dust soiling of the local road network as a result of trackout of dust and mud from vehicles entering and leaving the site during the construction phase	As part of the CEMP the contractor will produce and implement a Dust Management Plan (DMP); this will include details of measures to identify and reduce the risk, monitoring any dust and identify appropriate clean-up measures. Measures will include the use of a wheel wash, covering of all loads entering/leaving the site, and the use of water-assisted dust sweeper(s).
Human health and ecological receptors	Potential effect on human health and ecological receptors from dust during the construction phase	As part of the CEMP the contractor will produce and implement a DMP this will include details of measures to identify and reduce the risk, monitoring any dust and identify appropriate clean-up measures. Measures will include locating stockpiles away from site boundary/receptors, covering or damping down stockpiles, stockpile maintenance/management, and removal of materials from site.
Human health and ecological receptors	Potential effect on human health and ecological receptors from air quality effects from Non-Road Mobile Machinery, and vehicles during the construction phase	As part of the CEMP the contractor will include measures to reduce or limit air quality effects during the construction phase of the Proposed Development. Measures will include avoiding the use of diesel or petrol-powered generators and use mains electricity or battery-powered equipment where practicable; ensuring all vehicles switch off engines when stationary - no idling vehicles.
Operational Phase Measures		
Local Road Network	Congestion on the local road network	Agree and enforce a strict routeing agreement for incoming and outgoing HGV, avoiding, where possible, peak traffic flow hours.
Human health and ecological receptors	Potential effects upon human health and ecological resources from vehicle emissions.	Agree and enforce delivery and dispatch schedules for HGV that avoid, where possible, causing congestion on the local road network and excessive emissions to atmosphere. Also, enforce a “no unnecessary idling” policy for all vehicles on the development site.

Potential receptor	Predicated changes and potential effects	Incorporated measure
Human health and ecological receptors	Potential effects upon human health and ecological resources a s a result of emissions from aircraft movements on the ground and during the LTO cycle.	Planning of aircraft arrival and departure scheduling to avoid, where possible, over-long idling, taxiing and hold times.
Human health and ecological receptors	Potential effects upon human health and ecological resources as a result of emissions from aircraft ground support equipment (GSE).	Planning of aircraft arrival and departure scheduling to avoid, where possible, over-long operation of liquid fossil-fuelled GSE.

6.7 Assessment methodology

Methodology for predicted effects

6.7.1 There are two principal sets of recommendations for carrying out an airport air quality study. The first arises from the Project for the Sustainable Development of Heathrow (PSDH), a programme run by the DfT in about 2005–07, the objective of which was to develop the best practical methodology for assessing the air quality impacts of a third runway at Heathrow. This came up with a number of specific recommendations, but contains significant omissions where the best approach depends on data availability. For example, PSDH does not make any recommendations about times in mode as there are various potential data sources, and it is left to the analyst to use their judgement as to the best way of extracting suitable times in mode. Few of the PSDH recommendations are specific to Heathrow and the methodology can be used for other airports of comparable size with similar aircraft types.

6.7.2 The PSDH methodology was implemented by Heathrow Airport for its 2008/9 emissions inventory[61], modelling study[62] and model evaluation study[63]. The reports give a detailed description of the methodology used and form a useful reference. The model evaluation found that it gave a generally good agreement with the extensive monitoring data around Heathrow, and formed a suitable basis for evaluating the impacts of future airport developments there. Subsequent Heathrow inventories have used essentially the same methodology, with some updates where new airport-specific data has become available (e.g. for taxiing times).

6.7.3 The second methodology was published by ICAO in 2011[64]. This document deals with producing emission inventories for historic years, with very little attention paid to how inventories for future years might be produced, and as such is less directly relevant to the present Manston work. The ICAO methodology offers different levels of assessment, described as ‘simple’, ‘advanced’ and ‘sophisticated’, requiring increasingly detailed data. For example, the sophisticated approach generally requires movement-by-movement data on times, engine settings and so

[61] B Y Underwood, C T Walker and M J Peirce, Heathrow Airport Emission Inventory 2008/9. AEAT/ENV/R/2906 Issue 1, July 2010.
[62] B Y Underwood, C T Walker and M J Peirce, Air Quality Modelling for Heathrow Airport 2008/9: Methodology. AEAT/ENV/R/2915 Issue 1, July 2010.
[63] B Y Underwood, C T Walker and M J Peirce, Air Quality Modelling for Heathrow Airport 2008/9: Results and Model Evaluation. AEAT/ENV/R/2948 Issue 1, July 2010.
[64] ICAO, Airport Air Quality Manual. Doc 9889. 2011

forth, so it clearly unsuitable for modelling future cases. The advanced approach is rather similar to the PSDH recommendations in terms of data requirements, and can generally be adapted to future cases given suitable forecast data.

6.7.4 Many of the specific recommendations are the same or similar between PSDH and ICAO.

6.7.5 A third “standard” is the Aviation Environmental Design Tool (AEDT), promulgated by the FAA for airport air quality inventories and noise studies. Detailed documentation of the methodology used by the tool is not readily available.

6.7.6 While various research groups have suggested ways in which parts of the inventory calculation can be improved, few of these have been generally incorporated into received methodologies. One notable exception is the FOA 3a method for calculating PM_{10} emissions from smoke number emissions.

6.7.7 Defra issues technical guidance on air quality management[65], which is an important source of guidance on approaching common sources of air pollution. However other than providing a screening threshold of 10 million passengers per annum or 1 million tonnes of freight, it does not provide recommendations on the technical issues of modelling air quality around large airports.

6.7.8 The methodology used here is generally consistent with the ICAO advanced and PSDH recommendations, with decisions about the best approach being led by the availability of data.

The dispersion model

6.7.9 The PSDH carried out a model intercomparison study to compare the use of various dispersion modelling tools for airport air quality modelling. As a result, the PSDH endorsed the use of ADMS-Airport, a version of the long-established dispersion modelling tool ADMS adapted to account for the momentum and buoyancy fluxes from jet engines. However, the use of the regular version of ADMS with suitable initial dispersion characteristics was also found to be acceptable.

6.7.10 AEDT uses AERMOD for the dispersion modelling. AERMOD was developed in the United States by the American Meteorological Society (AMS)/United States Environmental Protection Agency (USEPA) Regulatory Model Improvement Committee (AERMIC). ADMS was developed in the UK by Cambridge Environmental Research Consultants (CERC) in collaboration with the Meteorological Office, National Power and the University of Surrey. Both AERMOD and ADMS are termed ‘new generation’ models, parameterising stability and turbulence in the planetary boundary layer by the Monin-Obukhov length and the boundary layer depth. This approach allows the vertical structure of the planetary boundary layer to be more accurately defined than by the stability classification methods of earlier dispersion models such as R91 or ISC. Like R91 and ISC, ADMS and AERMOD adopt a symmetrical Gaussian profile of the concentration distribution in the vertical and crosswind directions in neutral and stable conditions. However, unlike R91 or ISC, the ADMS and AERMOD vertical concentration profile in convective conditions adopts a skewed Gaussian

[65] Defra et al, Local Air Quality Management Technical Guidance (TG16), April 2016.

distribution to take account of the heterogeneous nature of the vertical velocity distribution in the convective boundary layer.

6.7.11 Numerous model inter-comparison studies have demonstrated little difference between the output of ADMS and AERMOD, except in certain complex terrain scenarios. The principal difference between ADMS and ADMS-Airport is the jet engine module, which tends to reduce modelled ground-level concentrations from aircraft engines, especially at high thrust settings, as a result of the heat of the plume.

6.7.12 Taking the above into consideration, ADMS (Version 5.2) has been selected as the most appropriate model to use for the purposes of this particular study.

Emissions sources: Aircraft emissions

Main engine emissions: Engine assignments

6.7.13 For each aircraft type in the movement data, a single engine was assigned, and a single entry (identified by UID or unique identifier) in the ICAO databank or FOI database (see below) was chosen. Engine models were based on the most commonly fitted engines in the current worldwide fleet, with operator-specific information used where available. Where an engine model has more than one entry in the ICAO databank with significantly different emission factors, an entry was chosen with a test date in the mid-1990s where available; this reflects the typical age of aircraft in the cargo fleet and is conservative.

6.7.14 For the A320, the fleet is divided approximately equally between the CFM CFM56-5B4 and the IAE V2527-A5, with the former having a slightly greater market share. However, the CFM56-5B4 has evolved significantly over the years, making it hard to choose a suitable ICAO entry. Instead, the V2527-A5 has been assumed, since this engine represents a substantial minority of the fleet and has NO_x emissions at the higher end of the CFM56-5B4 range, and is therefore conservative.

6.7.15 The aircraft engine assignments are summarised in **Table 6.22**.

Table 6.22 Aircraft data

Aircraft type	Aircraft description	MTOW (kg)	Number of engines	UID	Engine description
320	A320	77,000	2	1IA003	V2527-A5
332	A330-200	233,000	2	3RR030	Trent 772
73H	B737-800 pax	70,533	2	8CM064	CFM56-7B24/3
73Y	B737-300 freighter	63,276	2	1CM005	CFM56-3B-2
744	B747-400	396,893	4	2GE045	CF6-80C2B1F
748	B747-800	442,252	4	11GE139	GEnx-2B67
752	B757-200	113,400	2	1RR012	RB211-535C
753	B757-300	122,470	2	1RR012	RB211-535C

Aircraft type	Aircraft description	MTOW (kg)	Number of engines	UID	Engine description
76V	B767	185,065	2	2GE044	CF6-80C2B6
76Y	B767-300 freighter	185,065	2	2GE044	CF6-80C2B6
77X	B777-200 freighter	347,451	2	7GE097	GE90-110B1
A4F	Antonov An-124 Ruslan	391,994	4	1GE006	CF6-50C
AT7	ATR 72	22,000	2	PW127	PW127
C17	C-17 Globemaster	265,350	4	4PW073	PW2040
F70	Fokker 70	38,100	2	1RR020	TAY Mk620-15
IL7	Il-76	190,000	4	1AA005	PS-90A
LOH	Lockheed L-182 / 282 / 382 (L-100) Hercules	70,306	4	T56-A-15	T56-A-15

Main engine emissions: Emission factors

6.7.16 Emission factors for jet engines are taken from the ICAO databank, version 23[66]. The databank provides emission indices for NO_x, CO and HC, fuel flow rates and smoke numbers; each of these is given at four power settings (100%, 85%, 30% and 7% of rated thrust). Emission indices are multiplied by fuel flow rates to obtain an emission factor in g s^{-1}.

6.7.17 The ICAO databank gives smoke numbers which need to be converted to emission indices. This is done using the FOA3a method[67], with the amendment that the factor of (1 − bypass ratio) in equation 7a is only applied to mixed turbofan engines[68]. For some engines, smoke number data points at certain thrust settings are missing, so an approach originally developed by Qinetiq has been used in which factors are applied to the maximum smoke number[68].

6.7.18 For turboprop engines, emission factors are taken from the Swedish FOI database[69].

Main engine emissions: Times in mode

6.7.19 In the absence of airport-specific data or detailed modelling on times in mode, the following assumptions have been made. It is assumed that times in mode are independent of aircraft type. It is also assumed that any dependence on time of day or time of year (e.g. congestion during busy periods resulting in increased taxi

[66] ICAO Aircraft Engine Emissions Databank, version 23. https://www.easa.europa.eu/document-library/icao-aircraft-engine-emissions-databank
[67] J Kinsey and R L Wayson, Appendix C PM methodology discussion paper. In: G Ratliff *et al.*, Aircraft Impacts on Local and Regional Air Quality in the United States. PARTNER Project 15 final report. PARTNER-COE-2009-002, October 2009.
[68] B Underwood, C Walker and M Peirce, Heathrow Airport Emission Inventory 2008/9. AEAT/ENV/R/2906/Issue 1, July 2010.
[69] Aircraft Engine Emissions Database. Available on request from http://www.foi.se/en/Our-Knowledge/Aeronautics/FOIs-Confidential-database-for-Turboprop-Engine-Emissions/.

or hold times) is negligible. These times are considered to be realistic best estimates, rather than being intentionally conservative.

6.7.20 Taxi times are based on a speed of 10 m s^{-1} (20 knots). Other times are given in **Table 6.23**, based on Heathrow data[68]. By design, aircraft of the types proposed for Manston have very similar times for take-off, climb, approach and landing. These are tightly constrained to be uniform in order to manage and optimise separation distances, so there is very little variation in these times between airports or between (large) aircraft.

Table 6.23 Times in mode

Mode	Time in mode (s)	Notes
Pushback	120	Estimate.
Taxi-out	See text	
Hold	60	Estimate. Assumes congestion is slight.
Take-off roll	35	Based on Heathrow data[68.]
Initial climb	30	Based on Heathrow data[68.]
Climb-out	70	Based on Heathrow data[68.]
Approach	230	Based on Heathrow data[68.]
Landing roll	60	Based on Heathrow data[68.]
Taxi-in	See text	

Main engine emissions: Thrust settings

6.7.21 In the absence of airport-specific data, the ICAO standard thrust settings have been used for each mode: take-off roll and initial climb at 100%, climb-out at 85%, approach at 30% and other modes at 7%.

6.7.22 It is common for aircraft to take off at less than 100% thrust, sometimes as low as 75%, primarily to reduce wear on the engines. This can reduce total NO_x emissions by as much as 25% relative to full thrust take-offs. However, in the absence of airport-specific information, especially regarding issues such as load factors which can affect the take-off thrust setting chosen, a conservative assumption has been adopted.

APU emissions

6.7.23 As well as their main engines, many aircraft have auxiliary power units (APUs) which are small engines used to generate electrical power for purposes such as starting the main engines, powering air conditioning and other services. Little Manston-specific information on APUs is available at this stage in development, so the ICAO advanced methodology has been used which relies on generic information. ICAO provide emission factors for different aircraft size and age groups and three APU operating modes, along with typical operating times for each operating mode. These have been used to calculate emissions per arrival and per departure. For PM, ICAO does not provide emission factors as g s^{-1} but recommend their simple methodology, which consists of a simple factor of 25 g per movement for narrow-bodied aircraft and 40 g per movement for wide-bodied aircraft.

6.7.24 It is unclear whether cargo aircraft will have the same APU duty cycles as passenger aircraft, as requirements for air conditioning for example are likely to be different. It has been assumed that the same emission rates apply, which is likely to be conservative.

Brake and tyre wear emissions

6.7.25 Emissions of PM from brake and tyre wear are calculated using the PSDH methodology (ICAO omits this source). Brake wear emissions, in g PM_{10} per arrival, are calculated as $2.53 \times 10^{-4} \times$ MTOW, where MTOW is the maximum take-off weight in kg. Tyre wear emissions, in g PM_{10} per arrival, are calculated as $2.23 \times 10^{-3} \times \text{MTOW} - 87.4$ for aircraft with an MTOW > 50,000 kg, and 24.1 × MTOW / 50000 for smaller aircraft.

6.7.26 $PM_{2.5}$ emissions are calculated by multiplying the PM_{10} emission by 0.4 for brake wear and 0.7 for tyre wear.

Aircraft emissions: Spatial disaggregation

6.7.27 Aircraft emissions are treated as volume sources with an initial vertical extent of 20 m. Stand-based emissions (pushback and APUs) are assigned to polygons covering the cargo and passenger apron areas. Taxiway- and runway-based emissions are treated as long boxes with a width of 50 m and a length dependent on the mode, as detailed below.

6.7.28 Large aircraft typically require about 1500–2000 m of runway for their landing roll. At Manston, this implies that most aircraft will not be able to exit the runway before the end of the runway. From the touchdown points to the end of the runway is approximately 2300 m (in both directions). From the touchdown points to the penultimate exit is approximately 1400 m (Runway 28) or 1630 m (Runway 10). This suggests that some aircraft would be able to use the penultimate exit in easterlies but many would find this difficult. In westerlies, all aircraft would need to go to the end of the runway. For simplicity, therefore, it has been assumed that all arriving aircraft leave the runway at the end, in both directions.

6.7.29 Taxi routes are assumed to be the most direct route between the apron and the runway. The cargo and passenger aprons are each small and simple enough that it is reasonable to assume a single point in the centre of the respective aprons as the end point of all taxiing activity. In other words, a total of four taxi routes have been defined, between the two aprons and the two runway ends. Taxi-in routes are the reverse of taxi-out routes. Each taxi route is divided into straight-line sections, and a volume source has been built around each straight-line section, of vertical extent 20 m, width 50 m, and length equal to the straight-line length.

6.7.30 It is assumed that there is at most one aircraft in the hold area at any time, so the hold queues have been assumed to be 70 m long. The hold emissions are assumed to occur in a rectangular box of this length, and 50 m wide.

6.7.31 In the absence of other information, it has been assumed that the take-off roll requires 1500 m of runway, starting 50 m from the end of the runway (to allow for aircraft straightening up when joining the runway). The roll is divided into ten volume sources, each 150 m long, 50 m wide and 20 m in vertical extent. The departing aircraft is assumed to accelerate at a constant rate, and the emissions are partitioned between the ten volume sources accordingly (so about 32% of the emissions are assigned to the first volume source).

6.7.32 The PSDH recommended a more elaborate methodology for take-off roll, accounting for non-uniform acceleration, effects of the forward speed on the engine thrust, etc. It found that these made a difference of a few percent at most to emissions. Unfortunately, the data that underlie these methodologies were not published and remain proprietary. In view of the small difference that these effects make to emissions, they have been omitted from this assessment.

6.7.33 Initial climb is assumed to start where the take-off roll ends, i.e. 1550 m from the end of the runway. Aircraft are assumed to climb at an angle of 10° to a height of 457 m (1500 feet) at constant speed. The constant speed assumption is conservative, since in reality, the continuing acceleration of the aircraft means a greater proportion of the emissions will occur at a greater height. ADMS is unable to model inclined sources, so the initial climb phase is again divided into ten volume sources, each of length 259 m (= 457 / tan(10°) / 10). The bottom of the first volume source is assumed to be at ground level, with successive volume sources 45.7 m higher. This tends to put the emissions closer to the ground than in reality, so is a conservative assumption.

6.7.34 The climb-out phase is treated similarly, and is assumed to start where the initial climb ends. Aircraft are assumed to climb at the same angle from a height of 457 m to 914 m (3000 feet) at constant speed. Again, the climb-out is divided into ten volume sources, each of length 259 m.

6.7.35 The approach phase is treated similarly. Approach is assumed to start at a height of 914 m above the runway and to finish at the runway touchdown point, with aircraft descending at a constant speed and a constant angle of 3°. The approach is divided into a number of volume sources; to reduce the number of these, the approach length is divided into ten equal sections of 150 m horizontal (7.86 vertical) plus ten equal sections of 1594 m horizontal (83.5 m vertical). It should be noted that emissions from approaching aircraft more than a few tens of metres above the ground make very little contribution to ground-level concentrations.

6.7.36 The landing roll is assumed to extend from the touchdown point to the end of the runway, and is divided into ten volume sources of length 232 m each. Uniform deceleration is assumed, and emissions are assigned to the volume sources accordingly, in the same way as for the take-off roll.

6.7.37 Brake wear emissions are assigned to the length of the runway from touchdown to runway end, and uniform along that length (it is assumed that a higher brake wear emission rate at the start of the landing roll will cancel out the reduced dwell time). Tyre wear emissions are assigned to a single volume source of length 200 m centred on the touchdown point.

6.7.38 Schematics of the disaggregation are given in **Figure 6.13** to **Figure 6.16**.

Figure 6.13 Schematic of emission disaggregation for approach

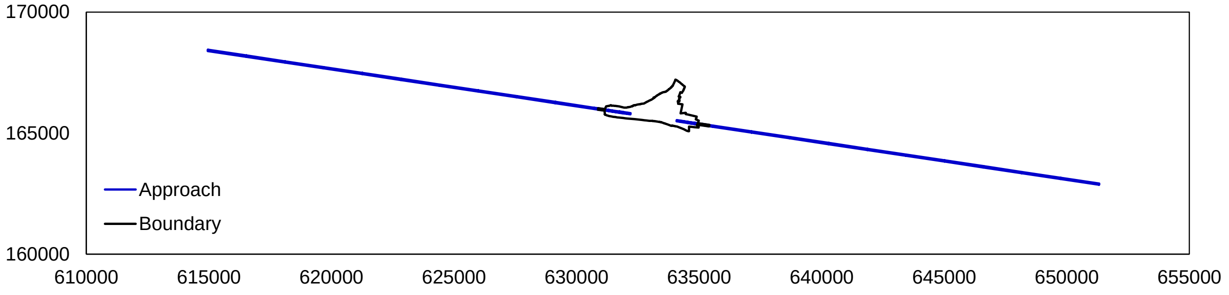


Figure 6.14 Schematic of emission disaggregation for initial climb and climb-out

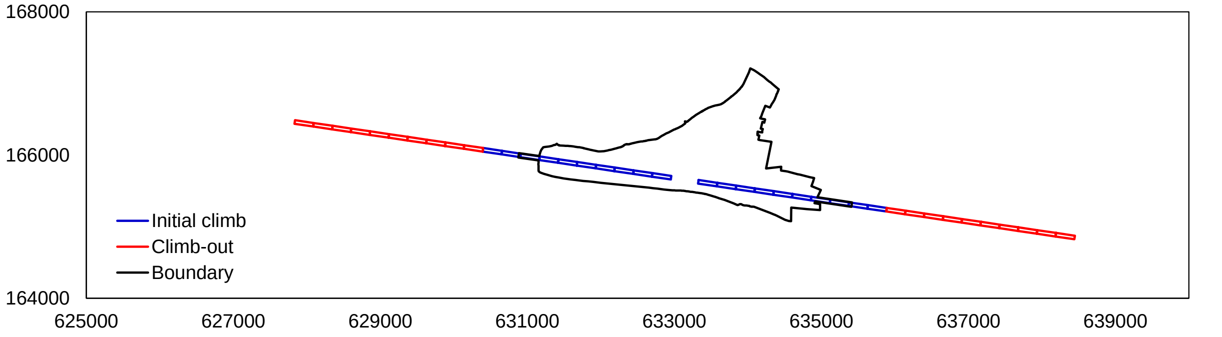


Figure 6.15 Schematic of emission disaggregation for taxiing, hold, take-off roll, pushback and APU

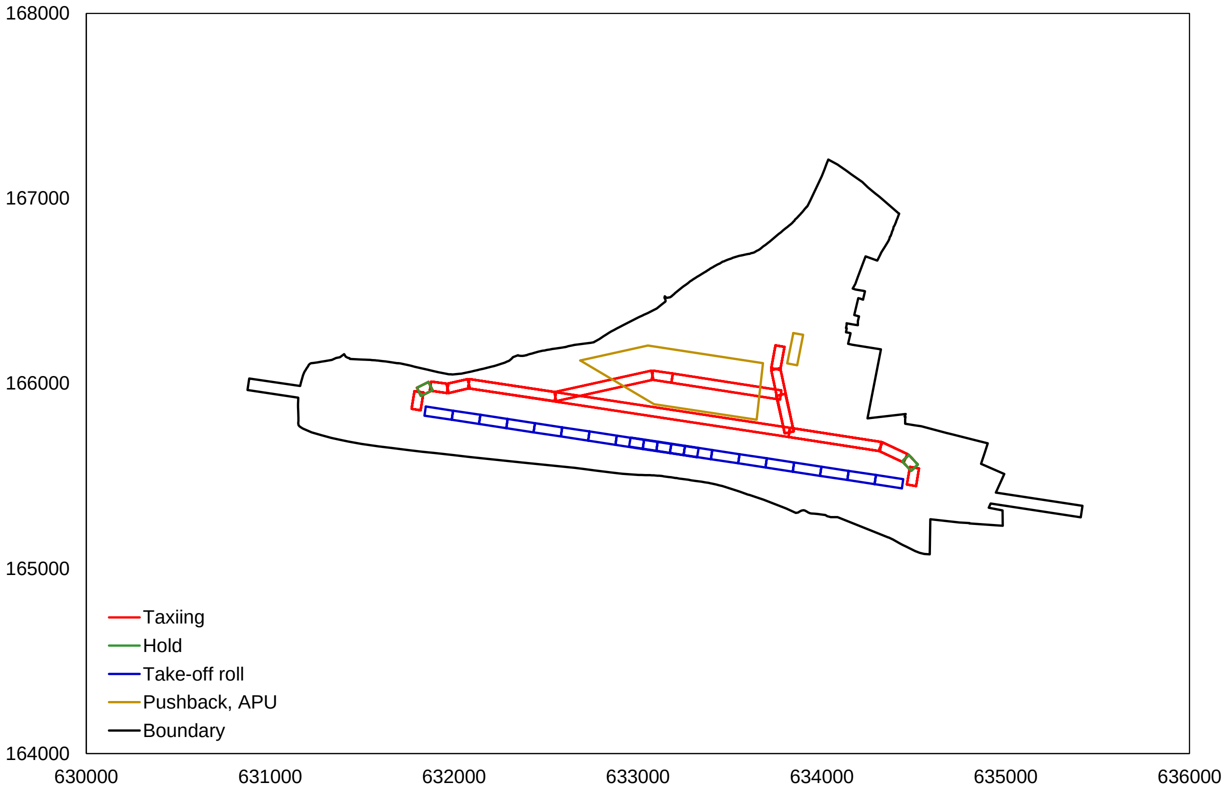
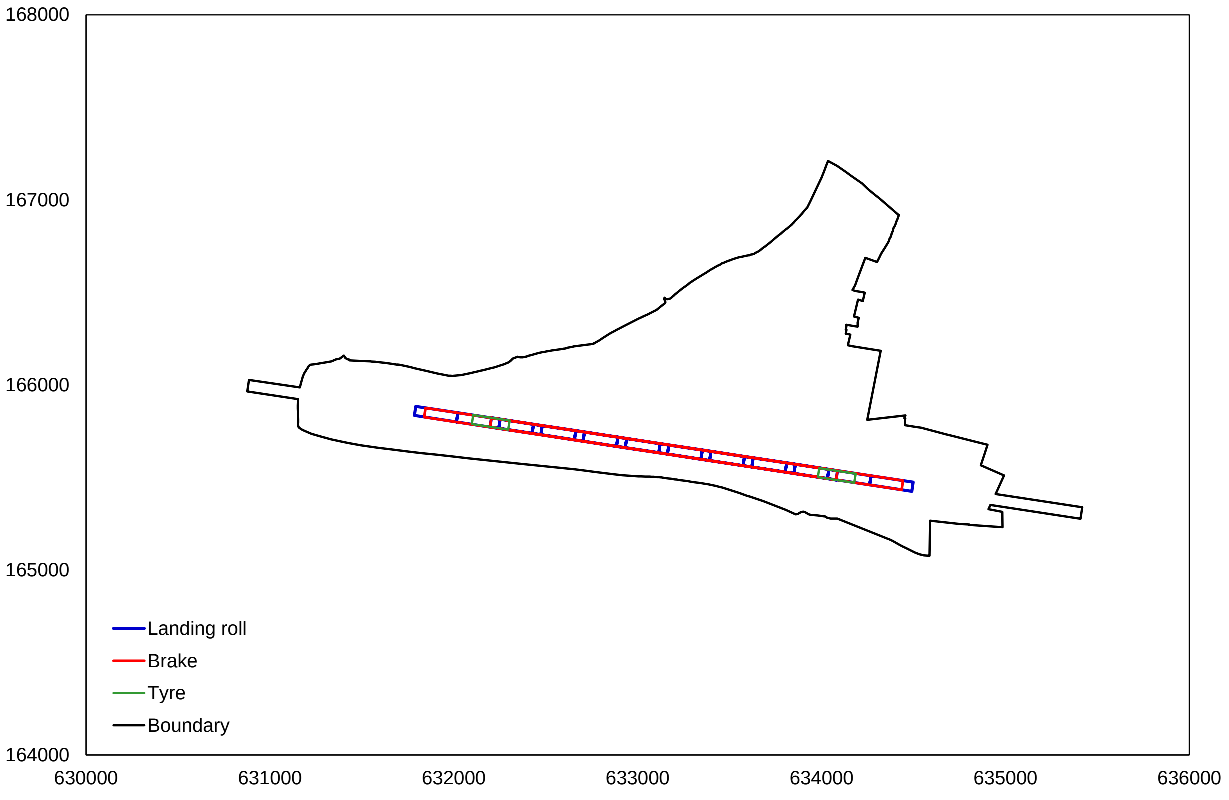


Figure 6.16 Schematic of emission disaggregation for landing roll, brake wear and tyre wear



Aircraft emissions: Runway assignments

6.7.39 Manston Airport has a single runway but it can be used in two directions, with aircraft moving along it either roughly eastwards (referred to as Runway 10) or westwards (Runway 28). In general, the choice of runway direction is determined by the weather, with both arriving and departing aircraft heading into the wind.

6.7.40 For the present modelling, therefore, ADMS was configured so that emissions sources for Runway 10 operations (including associated taxiing, but not apron-based sources such as pushback and APUs) are only modelled when the wind is in the direction range 9–188°, and sources for Runway 28 operations are only modelled when the wind is in the direction range 189–8° (angles are clockwise from north, directions the wind is blowing from).

6.7.41 This is an approximation, since aircraft can typically operate with a small tailwind, and may be instructed to do so to avoid the operational difficulties associated with changing runway direction too frequently. No information is available on how frequent such operations are likely to be at Manston. Since tailwinds tend to blow emissions onto the airfield rather than towards receptors, this approximation is generally conservative.

Aircraft emissions: Temporal variation

6.7.42 At the time of this assessment, little information on the temporal variation in aircraft operations is available, so no temporal variation has been included in the modelling.

6.7.43 This assumption will overestimate the emissions occurring during the night, since while there will be some night flights, they will be less frequent than during the daytime. This is generally conservative, since concentrations tend to be higher during the night due to the greater frequency of stable weather conditions which tends to reduce dispersion.

6.7.44 Similarly, it is assumed that there will be no variation in activity over the course of the year. In reality, it is likely that passenger movements may be somewhat higher in the summer than the winter, but it is doubtful that there will be any significant seasonal difference in cargo movements. Heathrow Airport shows a small increase in movements over the summer months compared to the winter, and modelling work as part of its submission to the Airports Commission[70] found that assuming a flat seasonal profile slightly overestimates modelled concentrations. This assumption is therefore considered to be conservative.

Operation and emission scenarios

6.7.45 Three operational years have been assessed:

- Year 2, representing the first year of aircraft operation;
- Year 6, representing the point at which the aircraft exceeds 10,000 movements per year; and
- Year 20, representing the peak forecast year in terms of movements.

Model input data

6.7.46 c

6.7.47 c

6.7.48 c

Calculation of short-period average concentrations

6.7.49 As described previously, the emissions are assigned to about 200 volume sources. ADMS is unable to handle this many volume sources in a single run, so runs have been split into phase-specific runs with concentrations being combined externally. This makes it possible to obtain the total annual mean concentration of each pollutant at each receptor (and assists checking and source apportionment). However, it means ADMS cannot calculate concentrations over short-term averaging periods, e.g. for comparison with the hourly mean NO_2 limit value.

6.7.50 Therefore, the empirical relationships suggested in Defra's TG(16) guidance is used to estimate short-period concentrations, as follows:

- *"Exceedances of the NO_2 1-hour mean are unlikely to occur where the annual mean is below 60µg/m^3."*

6.7.51 and:

[70] B Y Underwood, C T Walker and M J Peirce, Air Quality Modelling for Heathrow Airport 2008/9: Methodology. AEAT/ENV/R/2915 Issue 1, July 2010.

- *"To estimate potential exceedances of the PM_{10} 24-hour mean objective, local authorities should use the following relationship, provided in previous Technical Guidance, but still considered adequate:*
- *No. 24-hour mean exceedances = -18.5 + 0.00145 × annual mean3 + (206/annual mean)"*

Meteorology

6.7.52 For meteorological data to be suitable for dispersion modelling purposes, a number of meteorological parameters need to be measured on an hourly basis. These parameters include wind speed, wind direction, cloud cover and temperature. There are only a limited number of sites where the required meteorological measurements are made. The year of meteorological data that is used for a modelling assessment can also have a significant effect on ground level concentrations.

6.7.53 This assessment has used meteorological data recorded at the Manston Airport meteorological station for the five calendar years between 2012 and 2016 inclusive. The meteorological station is located on the airfield and is the nearest synoptic station to the site offering data in a suitable format for the model. A full set of wind roses for each year modelled is presented in **Figure 6.17** to **Figure 6.21**. Most large meteorological datasets contain rows which cannot be used by the dispersion model, because of instrument faults or because of very low wind speeds. **Table 6.24** shows the number of hours that could not be used for each of the five years. The number of hours with inadequate met data was very low in each year.

Table 6.24 Meteorological data adequacy

Year	Number of hours in year	Number of hours used by ADMS	Percentage of hours used
2012	8784	8719	99.26
2013	8760	8658	98.84
2014	8760	8683	99.12
2015	8760	8662	98.88
2016	8784	8662	98.61

Figure 6.17 2012 wind rose

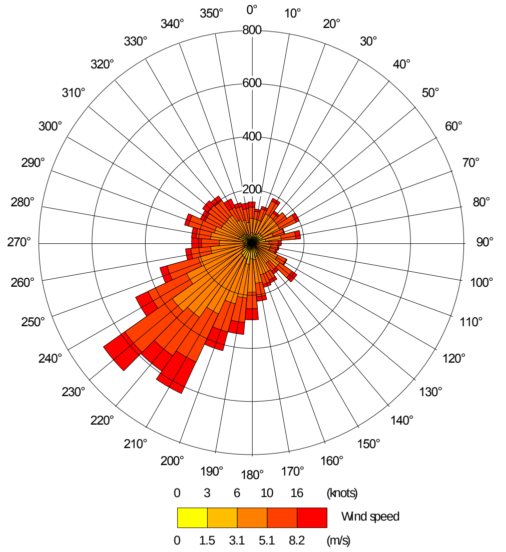


Figure 6.18 2013 wind rose

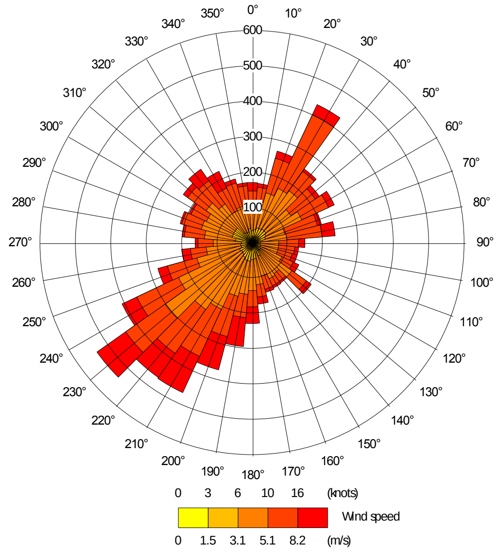


Figure 6.19 2014 wind rose

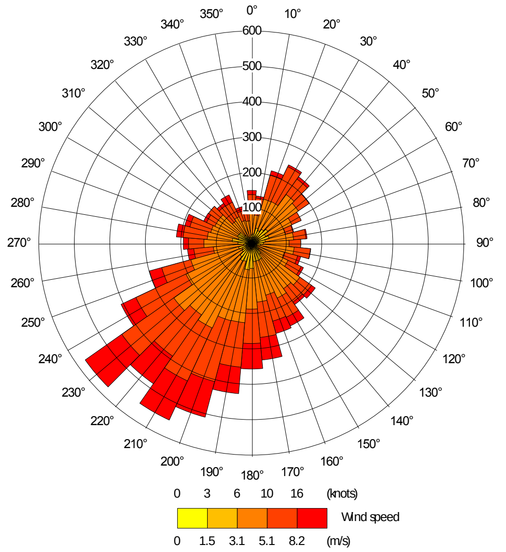


Figure 6.20 2015 wind rose

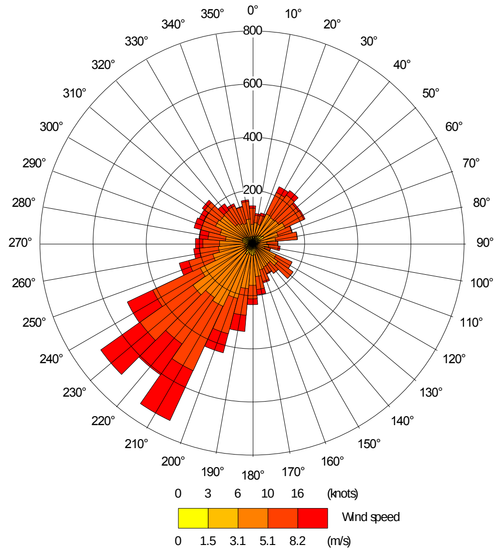
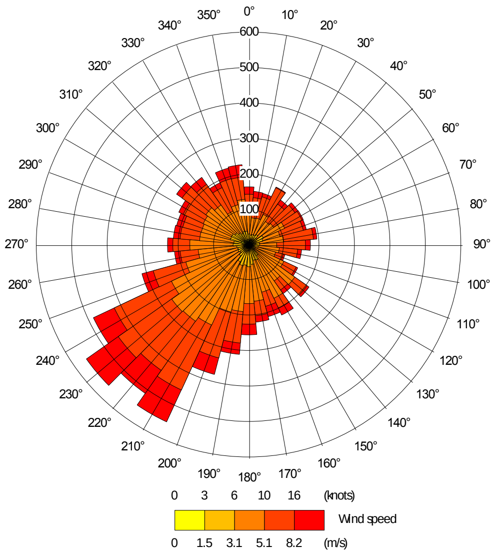


Figure 6.21 2016 wind rose



6.7.54 The wind roses show that winds are very predominantly from the southwest, with relatively few low wind speeds. There is little variation between years.

6.7.55 c

6.7.56 c

Complex terrain

6.7.57 The predominant surface characteristics and land use in a model domain have an important influence in determining turbulent fluxes and, hence, the stability of the boundary layer and atmospheric dispersion. The most important of these are surface roughness length and topography/landform. These are discussed below.

Terrain

6.7.58 The concentrations of an emitted pollutant found in elevated, complex terrain differ from those found in simple level terrain. There have been numerous studies on the effects of topography on atmospheric flows. The UK ADMLC provides a summary of the main effects of terrain on atmospheric flow and dispersion of pollutants[71]:

- *"Plume interactions with windward facing terrain features:*
  - *Plume interactions with terrain features whereby receptors on hills at a similar elevation to the plume experience elevated concentrations;*
  - *Direct impaction of the plume on hill slopes in stable conditions;*
  - *Flow over hills in neutral conditions can experience deceleration forces on the upwind slope, reducing the rate of dispersion and increasing concentrations; and*

[71] Hill et al., 2005

    - *Recirculation regions on the upwind side of a hill can cause partial or complete entrainment of the plume, resulting in elevated ground level concentrations.*
- *Plume interactions with lee sides of terrain features:*
    - *Regions of recirculation behind steep terrain features can rapidly advect pollutants towards the ground culminating in elevated concentrations; and*
    - *As per the upwind case, releases into the lee of a hill in stable conditions can also be recirculated, resulting in increased ground level concentrations.*
- *Plume interactions within valleys:*
    - *Releases within steep valleys experience restricted lateral dispersion due to the valley sidewalls. During stable overnight conditions, inversion layers develop within the valley essentially trapping all emitted pollutants. Following sunrise and the erosion of the inversion, elevated ground level concentrations can result during fumigation events; and*
    - *Convective circulations in complex terrain due to differential heating of the valley side walls can lead to the impingement of plumes due to crossflow onto the valley sidewalls and the subsidence of plume centrelines, both having the impact of increasing ground level concentrations."*

6.7.59 These effects are most pronounced when the terrain gradients exceed 1 in 10, i.e. a 100 m change in elevation per 1 km step in the horizontal plane.

6.7.60 Gradients in the region around Manston are at most 1 in 25, so no terrain modelling is necessary.

Surface roughness length

6.7.61 Roughness length, z_0, represents the aerodynamic effects of surface friction and is defined as the height at which the extrapolated surface layer wind profile tends to zero. This value is an important parameter used by meteorological pre-processors to interpret the vertical profile of wind speed and estimate friction velocities which are, in turn, used to define heat and momentum fluxes and, consequently, the degree of turbulent mixing.

6.7.62 The surface roughness length is related to the height of surface elements; typically, the surface roughness length is approximately 10% of the height of the main surface features. Thus, it follows that surface roughness is higher in urban and congested areas than in rural and open areas. Oke[72] and CERC[73] suggest typical roughness lengths for various land use categories **(Table 6.25**).

[72] Oke, T.R., (1987) ‘Boundary Layer Climates’. 2nd Edition, Methuen.
[73] CERC (2003) ‘The Met Input Module’. ADMS Technical Specification.

Table 6.25 Typical surface roughness lengths for various land use categories

Type of Surface	z_0 (m)
Ice	0.00001
Smooth snow	0.00005
Smooth sea	0.0002
Lawn grass	0.01
Pasture	0.2
Isolated settlement (farms, trees, hedges)	0.4
Parkland, woodlands, villages, open suburbia	0.5–1.0
Forests/cities/industrialised areas	1.0–1.5
Heavily industrialised areas	1.5–2.0

6.7.63 Increasing surface roughness increases turbulent mixing in the lower boundary layer. With respect to elevated sources under neutral and stable conditions, increasing the roughness length can have complex and conflicting effects on ground level concentrations:

- The increased mixing can bring portions of an elevated plume down towards ground level, resulting in increased ground level concentrations close to the emission source; and
- The increased mixing increases entrainment of ambient air into the plume and dilutes plume concentrations, resulting in reduced ground level concentrations further downwind from an emission source.

6.7.64 The overall impact on ground level concentration is, therefore, strongly correlated to the distance of a receptor from the emission source.

6.7.65 We have used a roughness length of 0.1 m to represent the airport and its vicinity. Most of the key receptors are close to the airfield and within the rural landscape, so using a low roughness length will be conservative. Receptors in urban locations are further away and will experience a lower level of influence from emissions on the airport; they will be less sensitive to roughness length as the plume will be generally well-mixed within the boundary layer by the time it reaches these receptors.

Surface energy budget

6.7.66 One of the key factors governing the generation of convective turbulence is the magnitude of the surface sensible heat flux. This, in turn, is a factor of the incoming solar radiation. However, not all solar radiation arriving at the Earth's surface is available to be emitted back to atmosphere in the form of sensible heat. By adopting a surface energy budget approach, it can be identified that, for fixed values of incoming short and long wave solar radiation, the surface sensible heat flux is inversely proportional to the surface albedo and latent heat flux.

6.7.67 The surface albedo is a measure of the fraction of incoming short-wave solar radiation reflected by the Earth's surface. This parameter is dependent upon surface characteristics and varies throughout the year. Oke[72] recommends average surface albedo values of 0.6 for snow covered ground and 0.23 for non-snow covered ground, respectively.

6.7.68 The latent heat flux is dependent upon the amount of moisture present at the surface. Areas where moisture availability is greater will experience a greater proportion of incoming solar radiation released back to atmosphere in the form of latent heat, leaving less available in the form of sensible heat and, thus, decreasing convective turbulence. The modified Priestly-Taylor parameter (α) can be used to represent the amount of moisture available for evaporation. Holstag and van Ulden[74] suggest values of 0.45 and 1.0 for dry grassland and moist grassland respectively.

6.7.69 A detailed analysis of the effects of surface characteristics on ground level concentrations by Auld et al.[75] led them to conclude that, with respect to uncertainty in model predictions:

6.7.70 "…the energy budget calculations had relatively little impact on the overall uncertainty".

6.7.71 In this regard, it is not considered necessary to vary the surface energy budget parameters spatially or temporally, and annual averaged values have been adopted throughout the model domain for this assessment.

6.7.72 As snow covered ground is only likely to be present for a small fraction of the year, the surface albedo of 0.23 for non-snow covered ground advocated by Oke[72] has been used whilst the model default α value of 1.0 has also been retained.

Buildings

6.7.73 Any large object has an impact on atmospheric flow and air turbulence within the locality of the object. This can result in maximum ground level concentrations that are significantly different (generally higher) from those encountered in the absence of buildings. The building 'zone of influence' is generally regarded as extending a distance of 5L (where L is the lesser of the building height or width) from the foot of the building in the horizontal plane and three times the height of the building in the vertical plane.

6.7.74 Gaussian plume models are generally unable to model flows around complex arrangements of buildings; typically this requires some form of computational fluid dynamics model, which presents other difficulties to the modeller. It is therefore common for air quality studies to model only simple arrangements of buildings close to the key emissions sources.

6.7.75 While numerous buildings will be present on site, in general they will be at a distance from the principal sources of emissions, especially from the runway. For

[74] Holstag and van Ulden (1983) 'The Stability of the Atmospheric Surface Layer during Nighttime'. American Met. Soc., 6th Symposium on Turbulence and Diffusion.
[75] Auld, V., Hill, R. and Taylor, T.J. (2002) 'Uncertainty in Deriving Dispersion Parameters from Meteorological Data'. Atmospheric Dispersion Modelling Liaison Committee (ADMLC). Annual Report 2002-2003.

this assessment, therefore, no attempt has been made to include buildings directly into the model. Instead, the effects of buildings are included by suitable choice of surface roughness length.

Conversion of NO to NO_2

6.7.76 Emissions of NO_x from combustion processes are predominantly in the form of nitric oxide (NO). Excess oxygen in the combustion gases and further atmospheric reactions cause the oxidation of NO to nitrogen dioxide (NO_2). NO_x chemistry in the lower troposphere is strongly interlinked in a complex chain of reactions involving Volatile Organic Compounds (VOCs) and Ozone (O_3). Two of the key reactions interlinking NO and NO_2 are detailed below:

$$NO_2 + O_2 \xrightarrow{h\nu} NO + O_3 \qquad (R1)$$

$$NO + O_3 \rightarrow NO_2 + O_2 \qquad (R2)$$

where $h\nu$ is used to represent a photon of light energy (i.e. sunlight).

6.7.77 Taken together, reactions R1 and R2 produce no net change in O_3 concentrations, and NO and NO_2 adjust to establish a near steady state reaction (photo-equilibrium). However, the presence of VOCs and CO in the atmosphere offer an alternative production route of NO_2 for photolysis, allowing O_3 concentrations to increase during the day with a subsequent decrease in the NO_2:NO_x ratio.

6.7.78 However, at night, the photolysis of NO_2 ceases, allowing reaction R2 to promote the production of NO_2, at the expense of O_3, with a corresponding increase in the NO_2:NO_x ratio.

6.7.79 Near to an emission source of NO, the result is a net increase in the rate of reaction R2, suppressing O_3 concentrations immediately downwind of the source, and increasing further downwind as the concentrations of NO begin to stabilise to typical background levels[76].

6.7.80 Given the complex nature of NO_x chemistry, the Environment Agency's Air Quality Modelling and Assessment Unit (AQMAU) have adopted a pragmatic, risk based approach in determining the conversion rate of NO to NO_2 which dispersion model practitioners can use in their detailed assessments[77]. AQMAU guidance advises that the source term should be modelled as NO_x (as NO_2) and then suggests a tiered approach when considering ambient NO_2:NO_x ratios:

- **Screening Scenario:** 50% and 100% of the modelled NO_x process contributions should be used for short-term and long-term average concentration, respectively. That is, 50% of the predicted NO_x concentrations should be assumed to be NO_2 for short-term assessments and 100% of the predicted NO_x concentrations should be assumed to be NO_2 for long-term assessments;

- **Worst Case Scenario:** 35% and 70% of the modelled NO_x process contributions should be used for short-term and long-term average

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[76] Gillani, M V and Pliem, J E.(1996) Sub-grid scale features of anthropogenic emissions of NOx and VOC in the context of regional Eulerian models. Atmospheric Environment, 30, 2043–2059.

[77] Environment Agency (2005) 'Conversion ratios for NO_X and NO_2'. http://webarchive.nationalarchives.gov.uk/20140328084622/http://www.environment-agency.gov.uk/static/documents/Conversion_ratios_for__NOx_and_NO2_.pdf.

concentration, respectively. That is, 35% of the predicted NO_x concentrations should be assumed to be NO_2 for short-term assessments and 70% of the predicted NO_x concentrations should be assumed to be NO_2 for long-term assessments; and

- **Case Specific Scenario:** Operators are asked to justify their use of percentages lower than 35% for short-term and 70% for long-term assessments in their application reports.

6.7.81 The current guidance from the Environment Agency[78] gives guidance on the screening stages of an assessment only, with very little guidance on how to carry out a detailed assessment. It therefore only gives the above "screening scenario" proportions. However, this is a detailed assessment, so the screening scenario factors are not relevant. In line with the AQMAU guidance, therefore, this assessment has used the 'Worst Case Scenario' approach in determining the conversion rate of NO to NO_2 as a robust assumption.

Deposition

6.7.82 The predominant route by which emissions to air will affect land is by deposition of atmospheric emissions. Ecological receptors can potentially be sensitive to the deposition of pollutants, particularly nitrogen and sulphur compounds, which can affect the character of the habitat through eutrophication and acidification.

6.7.83 Deposition processes in the form of dry and wet deposition remove material from a plume and alter the plume concentration. Dry deposition occurs when particles are brought to the surface by gravitational settling and turbulence. They are then removed from the atmosphere by deposition on the land surface. Wet deposition occurs due to rainout scavenging (within clouds) and washout scavenging (below clouds) of the material in the plume. These processes lead to a variation with downwind distance of the plume strength, and may alter the shape of the vertical concentration profile as dry deposition only occurs at the surface.

6.7.84 Near to sources of pollutants (<2 km), dry deposition is generally the predominant removal mechanism for pollutants such as NO_x, SO_2 and NH_3[79,80]. Dry deposition may be quantified from the near-surface plume concentration and the deposition velocity[81]:

$$F_d = v_d\, C(x,y,0)$$

where:

F_d = dry deposition flux (µg m^{-2} s^{-1})

v_d = deposition velocity (m s^{-1})

$C(x,y,0)$ = ground level concentration (µg m^{-3})

[78] Environment Agency (2016) 'Air emissions risk assessment for your environmental permit'. https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit, last updated 2 August 2016.

[79] Fangmeier, A. et al., (1994) '*Effects of atmospheric ammonia on vegetation – a review*', Environmental Pollution, 86, 43–82.

[80] Environment Agency (2014) 'Technical Guidance on Detailed Modelling Approach for an Appropriate Assessment for Emissions to Air', Approved March 2014.

[81] Chamberlin and Chadwick (1953). 'Deposition of Airborne Radioiodine Vapour.' Nucleonics, 2, 22-25.

6.7.85 Environment Agency guidance AQTAG06[80] recommends deposition velocities for various pollutants dependent upon the habitat type, reproduced as **Table 6.26**.

Table 6.26 Environment Agency recommended deposition velocities

Pollutant	**Deposition Velocity (m s^{-1})**	
	Grassland	**Forest**
NO_2	0.0015	0.003
SO_2	0.012	0.024
HCl	0.025	0.06
NH_3	0.02	0.03
HNO_3	0.04	0.04
SO_4^{2-} (sulphate aerosol)	0.01	0.01

6.7.86 In order to assess the impacts of deposition, habitat-specific critical loads and critical levels have been created. These are generally defined similarly to:

6.7.87 *"...a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge."*[82]

6.7.88 It is important to distinguish between a critical load and a critical level. The critical load relates to the quantity of a material deposited from air to the ground, whilst critical levels refer to the concentration of a material in air. The UK Air Pollution Information System (APIS) provides critical load data for designated ecological sites (SPAs, SACs and SSSIs) in the UK.[83]

6.7.89 The critical loads used to assess the impact of compounds deposited to land which result in eutrophication and acidification are expressed in terms of kilograms of nitrogen deposited per hectare per year (kg N ha^{-1} y^{-1}) and kilo-equivalents deposited per hectare per year (keq ha^{-1} y^{-1}). The unit of 'equivalents' (eq) is used for the purposes of assessing acidification, rather than a unit of mass. The unit eq (1 keq ≡ 1,000 eq) refers to molar equivalent of potential acidity resulting from e.g. sulphur, oxidised and reduced nitrogen, as well as base cations. Essentially, it means 'moles of charge' and is a measure of how acidifying a particular chemical species can be.

6.7.90 To convert the predicted concentration in air of NO_2, SO_2, NH_3, or HNO_3, the following formula is used:

$DR_i = C_i \, v_{di} \, f_i$

where:

DR_i = annual deposition of N or S (kg N ha^{-1} y^{-1} or kg S ha^{-1} y^{-1})

C_i = annual mean concentration of the ith chemical species (µg m^{-3})

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[82] Nilsson J. and Grennfelt P. (Eds) 1988. 'Critical Loads for Sulphur and Nitrogen'. Miljorapport 1988:15. Nordic Council of Ministers, Copenhagen.

[83] APIS also has information on critical levels. Critical Levels for air pollutants are not habitat specific (as critical loads are), but have been set to cover broad vegetation types.

v_{di} = deposition velocity of ith species (Table 6.26)
f_i = factor to convert from µg m^{-2} s^{-1} to kg ha^{-1} y^{-1} for the ith species (**Table 6.27**).

6.7.91 Table 6.27 provides the relevant conversion factors as extracted from AQTAG06[80].

Table 6.27 Environment Agency factors for converting modelled deposition rates

Pollutant	Conversion factor (µg m^{-2} s^{-1} to kg ha^{-1} y^{-1})	
	Of	f_i
NO_2	N	96
SO_2	S	157.7
HNO_3	N	70.1
NH_3	N	259.7

Source: Environment Agency [80]

6.7.92 In order to convert deposition of N or S to acid equivalents, the following relationships can be used:

- 1 keq ha^{-1} y^{-1} = 14 kg N ha^{-1} y^{-1}; and
- 1 keq ha^{-1} y^{-1} = 16 kg S ha^{-1} y^{-1}.

6.7.93 With respect to wet deposition, Environment Agency[80] states:

6.7.94 *“It is considered that wet deposition of SO_2, NO_2 and NH_3 is not significant within a short range.”*

6.7.95 Therefore, the assessment only considers dry deposition of nutrifying and acidifying N and S compounds.

6.7.96 **Table 6.28** lists the ecologically designated sites for which deposition is calculated, and says which of the deposition velocities from **Table 6.26** are used.

Table 6.28 Deposition velocity class for ecological sites

Receptor	Class	Receptor	Class	Receptor	Class	Receptor	Class
E01	Grassland	**E23**	Grassland	**E45**	Grassland	**E67**	Grassland
E02	Grassland	**E24**	Grassland	**E46**	Grassland	**E68**	Grassland
E03	Grassland	**E25**	Grassland	**E47**	Grassland	**E69**	Forest
E04	Grassland	**E26**	Grassland	**E48**	Grassland	**E70**	Forest
E05	Grassland	**E27**	Grassland	**E49**	Grassland	**E71**	Forest
E06	Grassland	**E28**	Grassland	**E50**	Grassland	**E72**	Forest
E07	Grassland	**E29**	Grassland	**E51**	Grassland	**E73**	Forest
E08	Grassland	**E30**	Grassland	**E52**	Grassland	**E74**	Forest
E09	Grassland	**E31**	Grassland	**E53**	Grassland	**E75**	Forest

Receptor	Class	Receptor	Class	Receptor	Class	Receptor	Class
E10	Grassland	**E32**	Grassland	**E54**	Grassland	**E76**	Forest
E11	Grassland	**E33**	Grassland	**E55**	Grassland	**E77**	Forest
E12	Grassland	**E34**	Grassland	**E56**	Forest	**E78**	Forest
E13	Grassland	**E35**	Grassland	**E57**	Forest	**E79**	Forest
E14	Grassland	**E36**	Grassland	**E58**	Forest	**E80**	Forest
E15	Grassland	**E37**	Grassland	**E59**	Forest	**E81**	Forest
E16	Grassland	**E38**	Grassland	**E60**	Forest	**E82**	Forest
E17	Grassland	**E39**	Grassland	**E61**	Forest	**E83**	Forest
E18	Grassland	**E40**	Grassland	**E62**	Forest	**E84**	Forest
E19	Grassland	**E41**	Grassland	**E63**	Forest	**E85**	Forest
E20	Grassland	**E42**	Grassland	**E64**	Forest	**E86**	Forest
E21	Grassland	**E43**	Grassland	**E65**	Forest	**E87**	Forest
E22	Grassland	**E44**	Grassland	**E66**	Forest	**E88**	Forest

Special treatments

Other treatments

6.7.97 Specialised model treatments, for short-term (puff) releases, coastal models, fluctuations or photochemistry were not used in this assessment.

Sensitivity analysis and uncertainty

Sensitivity analysis

6.7.98 Wherever possible, this assessment has used worst-case scenarios, which will exaggerate the impact of the emissions on the surrounding area, including emissions, operational profile, ambient concentrations, meteorology and surface roughness. This assessment has considered five years of meteorological data, with data reported from the year(s) predicting the highest ground-level concentrations at each receptor.

Model uncertainty

6.7.99 Process emissions have been modelled under expected operation using the standard steady state algorithms in ADMS to determine the impact on local receptors. In order to model atmospheric dispersion using standard Gaussian methods, the following assumptions and limitations have to be made:

- Conservation of mass: the entire mass of emitted pollutant remains in the atmosphere and no allowance is made for loss due to chemical reactions or deposition processes (although the standard Gaussian model can be modified to include such processes). Portions of the plume reaching the ground are assumed to be dispersed back away from the ground by turbulent eddies (eddy reflection);

- steady state emissions: emission rates are assumed to be constant and continuous over the time averaging period of interest; and
- steady state meteorology: no variations in wind speed, direction or turbulent profiles occur during transport from the source to the receptor. This assumption is reasonable within a few kilometres of a source but may not be valid for receptor distances in the order of tens of kilometres. For example, for a receptor 50 km from a source and with a wind speed of 5 m s^{-1} it will take nearly three hours for the plume to travel this distance during which time many different processes may change (e.g., the sun may rise or set and clouds may form or dissipate affecting the turbulent profiles). For this reason, Gaussian models are practically limited to predicting concentrations within ~20 km of a source.

6.7.100 As a result of the above, and in combination with other factors, not least attempting to replicate stochastic processes (e.g., turbulence) by deterministic methods, dispersion modelling is inherently uncertain, but is nonetheless a useful tool in plume footprint visualisation and prediction of ground level concentrations. Dispersion models have been widely used in the UK for both regulatory and compliance purposes for a number of years and this is an accepted approach for this type of assessment.

6.7.101 This assessment has incorporated a number of worst-case assumptions, as described above, which will result in an overestimation of the predicted ground level concentrations from the process. As a result of these worst-case assumptions, the predicted results should be considered the upper limit of model uncertainty for a scenario where the actual site impact is determined. Therefore, the actual predicted ground level concentrations would be expected to be lower than those reported in this assessment and, in some cases, significantly lower.

Significance evaluation methodology

Air Quality Assessment Levels

6.7.102 As documented above, there are a number of sources of legislation and guidance. These use a wide range of terms for assessment level — AQS, AQO, limit value, EAL, target, critical level, critical load and more. There are differences of meaning between terms, but often different sources refer to effectively the same assessment level under different names. This document follows IAQM/EPUK (2015) in using the term “Air Quality Assessment Level (AQAL)” (or just “assessment level”) as a generic term for any of these things. A more specific term is used where it is helpful to do so (e.g. to clarify its legal status or to distinguish concentrations from deposition rates).

6.7.103 **Table 6.29** and **Table 6.30** set out those air quality assessment levels (Standards, Objectives, Guidelines and Critical Levels) that are relevant to this assessment, for concentrations in air at human and ecological receptors respectively.

Table 6.29 Air Quality Assessment Levels for human receptors

Pollutant	Type of standard	Averaging Period	Value (µg m^{-3})
NO_2	AQS	Annual mean	40
NO_2	AQS	1 hour mean, not to be exceeded more than 18 times a year (equivalent to 99.79th percentile)	200
PM_{10}	AQS	Annual mean	40
PM_{10}	AQS	24 hour mean, not to be exceeded more than 35 times a year (equivalent of 90.41th percentile)	50
$PM_{2.5}$	AQS	Annual mean	25

Table 6.30 Air Quality Assessment Levels for concentrations in air at ecological receptors

Pollutant	Type of standard	Averaging Period	Value (µg m−3)
NO_x	AQS	Annual mean	30
NO_x	Target for protected conservation areas	Daily mean	75

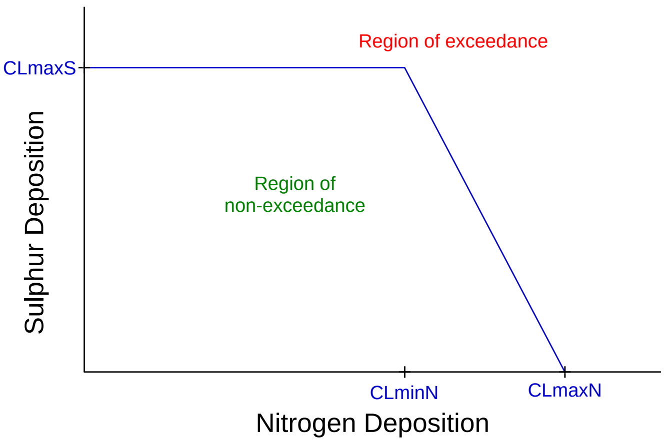
6.7.104 The Air Pollution Information Service (APIS) contains information on applicable critical loads for various habitats and species.

6.7.105 Eutrophication critical loads are given as a range and have units of kg N ha^{-1} y^{-1}. Generally, the lower end of the range should be used as a conservative assessment. The critical loads for acidification are more complicated, in that both the nitrogen and sulphur deposition fluxes must be considered at the same time. Therefore, a critical load function is specified for acidification, via the use of three critical load parameters:

- $CL_{max}S$ — the maximum critical load of sulphur, above which the deposition of sulphur alone would be considered to lead to an exceedance;
- $CL_{min}N$ — a measure of the ability of a system to “assimilate” deposited nitrogen (e.g. via immobilisation and uptake of the deposited nitrogen); and
- $CL_{max}N$ — the maximum critical load of acidifying nitrogen, above which the deposition of nitrogen alone would be considered to lead to an exceedance.

6.7.106 These three quantities define the critical load function shown in **Figure 6.22**.

Figure 6.22 Specimen Critical Load function for acidity



6.7.107 Information held on the APIS website has been reviewed in order to identify the main habitat/species features and their site relevant critical loads. **Table 6.31** and **Table 6.32** summarise this information.

Table 6.31 Critical Load data for nutrient nitrogen deposition

Receptor	Minimum critical load (kg N ha^{-1} y^{-1})	Feature	Relevant Nitrogen Critical Load Class
E01–E17, E25, E26, E36	8	Sterna albifrons (Eastern Atlantic - breeding) - Little tern (A195)	Coastal stable dune grasslands - acid type
E18, E19	Not sensitive	Reefs (H1170)	N/A
E20–E24, E27–E34	8	Fixed coastal dunes with herbaceous vegetation ("grey dunes") (H2130)	Coastal stable dune grasslands - acid type
E35, E37–E42	Not assessed	Supralittoral sediment (Ammophila arenaria - arrhenatherum elatius dune grassland)	No critical load has been assigned for this feature
E43, E44, E48, E49	5	Gallinago gallinago (Europe - breeding) - Common snipe (A153)	Raised and blanket bogs
E45–E47	No critical load	Vertigo moulinsiana - Desmoulin`s whorl snail (S1016)	No comparable habitat with established critical load estimate available
E50–E55, E67, E68	20	Low and medium altitude hay meadows	N/A
E56–E66, E69–E88	10	Broadleaved deciduous woodland	N/A

Table 6.32 Critical Load data for acid deposition

Receptor	CLmaxS (kg N ha^{-1} y^{-1})	CLminN (kg N ha^{-1} y^{-1})	CLmaxN (kg N ha^{-1} y^{-1})	Feature	Acidity Class
E01–E17, E25, E26, E36	0.88	0.223	1.13	Pluvialis apricaria [North-western Europe - breeding] - European golden plover (A140)	Acid grassland
E18, E19	Not sensitive	Not sensitive	Not sensitive	Reefs (H1170)	N/A

Receptor	CLmaxS (kg N ha^{-1} y^{-1})	CLminN (kg N ha^{-1} y^{-1})	CLmaxN (kg N ha^{-1} y^{-1})	Feature	Acidity Class
E20–E24, E27–E34	0.9	0.223	1.123	Fixed coastal dunes with herbaceous vegetation ("grey dunes") (H2130)	Acid grassland
E35, E37–E42	0.321	0.248	0.526	Pluvialis apricaria - Golden Plover	Bogs
E43, E44, E48, E49	0.227	0.321	0.542	Gallinago gallinago (Europe - breeding) - Common snipe (A153)	Bogs
E45–E47	No critical load	No critical load	No critical load	Vertigo moulinsiana - Desmoulin`s whorl snail (S1016)	Freshwater
E50–E55, E67, E68	3.93	0.85	4.79	Calcareous grassland (using base cation)	N/A
E56–E58, E66, E75, E76	1.77	0.14	1.91	Broadleafed/Coniferous unmanaged woodland	N/A
E59, E85–E88	1.67	0.14	1.81	Broadleafed/Coniferous unmanaged woodland	N/A
E60	10.81	0.14	10.96	Broadleafed/Coniferous unmanaged woodland	N/A
E61, E77	1.68	0.14	1.82	Broadleafed/Coniferous unmanaged woodland	N/A
E62–E64, E70, E71	10.83	0.14	10.97	Broadleafed/Coniferous unmanaged woodland	N/A
E65	1.72	0.14	1.86	Broadleafed/Coniferous unmanaged woodland	N/A
E69, E72–E74	1.77	0.14	1.92	Broadleafed/Coniferous unmanaged woodland	N/A
E78–E84	10.82	0.14	10.97	Broadleafed/Coniferous unmanaged woodland	N/A

Significance criteria

IAQM/EPUK guidance

6.7.108 Although no official procedure exists for classifying the magnitude and significance of air quality effects from a new development for planning purposes, guidance issued by the Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK)[84] suggests ways to address the issue. In the IAQM/EPUK guidance, the magnitude of impact due to an increase/decrease in annual mean NO_2 and PM_{10} is described using the criteria in **Table 6.33**. These criteria take into account both the change in concentration at a receptor brought about by a new development as a percentage of the assessment level, and the actual concentration at that receptor. It should be noted that an equivalent set of the descriptors in the IAQM/EPUK guidance is available for those developments that would result in a decrease in concentrations. However, as the Proposed

[84] EPUK and IAQM, 2017. 'Land-use Planning and Development Control: Planning for Air Quality', v1.2.

Development will increase the pollutant loading, only the 'Increase with Proposed Development descriptors are given here.

Table 6.33 Impact descriptors for increases in annual mean NO_2 and PM_{10} concentration (assessment level = 40 µg m^{-3})

Absolute concentration with Proposed Development, relative to assessment level	Increase in concentration relative to assessment level				
	0% (<0.2 µg m^{-3})	1% (0.2–0.6 µg m^{-3})	2–5% (0.6–2.2 µg m^{-3})	6-10% (2.2–4.0 µg m^{-3})	>10% (>4.0 µg m^{-3})
75% or less (<30.2 µg m^{-3})	Negligible	Negligible	Negligible	Slight	Moderate
76–94% (30.2–37.8 µg m^{-3})	Negligible	Negligible	Slight	Moderate	Moderate
95–102% (37.8–41.0 µg m^{-3})	Negligible	Slight	Moderate	Moderate	Substantial
103–109%(41.0–43.8 µg m^{-3})	Negligible	Moderate	Moderate	Substantial	Substantial
110% or more (>43.8 µg m^{-3})	Negligible	Moderate	Substantial	Substantial	Substantial

The table is intended to be used by calculating percentages relative to the assessment level and then rounding the percentages to whole numbers. For convenience, the above table gives equivalent absolute concentrations for the case where the assessment level is 40 µg m^{-3} (e.g. for annual mean NO_2 or annual mean PM_{10}).

6.7.109 It must be emphasised that these descriptors are not intended to be used robotically as a measure of the significance of a Proposed Development. As the IAQM/EPUK guidance states:

6.7.110 *“The overall significance is determined using professional judgement. For example, a ‘moderate’ adverse impact at one receptor may not mean that the overall impact has a significant effect. Other factors need to be considered.”*

Environment Agency guidance

6.7.111 Environment Agency guidance[85] gives criteria for screening out source contributions in the context of environmental permit applications. This guidance suggests applicants first perform a screening assessment, and if the results of that do not meet the screening-out criteria, then perform a detailed modelling assessment. For human receptors, there is no need for further assessment if the screening calculation finds that:

- both the following are met:
  - the short-term process contribution (PC) is less than 10% of the short-term AQAL; **and**
  - the long-term PC is less than 1% of the long-term AQAL;
- **or** both the following:
  - the short-term predicted environmental concentration (PEC, equal to PC plus background) is less than 20% of the short-term AQAL; **and**

[85] Environment Agency (2016) ‘Air emissions risk assessment for your environmental permit’. https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit, dated 2 August 2016.

  - the long-term PEC is less than 70% of the long-term AQAL

6.7.112 where the short-term PEC is calculated as the PC plus twice the long-term background concentration.

6.7.113 For SPAs, SACs, Ramsar sites and SSSIs, there is no need for further assessment if the screening calculation finds that:

- both the following are met:
  - the short-term PC is less than 10% of the short-term AQAL; **and**
  - the long-term PC is less than 1% of the long-term AQAL;
- **or**:
  - the long-term PEC is less than 70% of the long-term AQAL.

6.7.114 For local nature sites, emissions are insignificant if:

- the short-term PC is less than 100% of the short-term AQAL; **and**
- the long-term PC is less than 100% of the long-term AQAL.

6.7.115 Following detailed dispersion modelling, no further action is required if:

- the proposed emissions comply with BAT associated emission levels (AELs) or the equivalent requirements where there is no BAT AEL; and
- the resulting PECs won’t exceed AQALs.

Public exposure

6.7.116 Guidance from the UK Government and Devolved Administrations makes clear that exceedances of the health based objectives should be assessed at outdoor locations where members of the general public are regularly present over the averaging time of the objective. As in **Section 6.2** this also excludes workplaces. **Table 6.34** provides an indication of those locations that may or may not be relevant for each averaging period.

Table 6.34 Examples of where the Air Quality Objectives should apply for human receptors

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
Annual mean	All locations where members of the public might be regularly exposed. Building facades of residential properties, schools, hospitals, care homes etc.	Building facades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
8-hour mean	All locations where the annual mean objectives would apply, together with hotels. Gardens of residential properties[1].	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
Hourly mean	All locations where the annual mean and 24 and 8-hour mean objectives would apply. Kerbside sites (e.g. pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where the public might reasonably be expected to spend one hour or more. Any outdoor locations at which the public may be expected to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.

[1] For gardens, such locations should represent parts of the garden where relevant public exposure is likely, for example where there is a seating or play areas. It is unlikely that relevant public exposure would occur at the extremities of the garden boundary, or in front gardens, although local judgement should always be applied.

Sources of model conservatism

6.7.117 The model methodology aims to be realistic and accurate as far as possible. However there are areas where the information available is sufficiently uncertain (especially about the future) that it is necessary to ensure that assumptions err on the side of being conservative — that is, they will tend to overpredict environmental impacts to avoid the risk of underpredicting them.

6.7.118 These have been detailed above, but are summarised here to help provide a picture of the degree of conservatism in the model.

6.7.119 Key sources of conservatism include:

- Background concentrations are based on the higher of Defra’s modelled forecasts and current monitoring data, where available and suitable.
- The assumed background non-roads NO_2 is taken as the upper range of monitoring results.
- Where monitoring data is used to obtain background concentrations, the average of the 2007–2015 data is used, disregarding a tendency of concentrations to fall over the years.
- Similarly, background data is assumed to be either recent monitoring data or 2016 Defra modelled data, with no account taken of expected reductions in future years.
- Where critical loads are given as a range, the lower end of the range is used as the assessment level.

- Aircraft engines are chosen conservatively, with a general assumption that engines will be those that entered into service in the mid-1990s. For the A320, the V2527-A5 engine has been assumed, which has emissions at the high end of the possible engines.
- For aircraft emissions of PM, the FOA3a method is used, which gives higher emission rates than the FOA3 method.
- Aircraft are assumed to take off using 100% thrust. Reduced thrust is ignored.
- Measures to reduce emissions on the ground such as reduced-engine taxiing are ignored.
- Cargo aircraft are assumed to have the same APU operation as passenger aircraft.
- Climb and approach emissions are modelled within volume sources, the bottom of which is at the lower end of the height range represented (in other words, elevated emissions are modelled closer to the ground than in reality).
- Estimates of total NO_2 concentrations are based on the worst-case scenario NO_2:NO_x ratios.

6.8 Assessment of Operational phase effects from aircraft: Year 20

6.8.1 This section sets out the results of the dispersion modelling and compares predicted ground level concentrations against the assessment criteria detailed in **Section 6.7**. The predicted concentrations resulting from the process (i.e. the process contribution (PC)) are presented along with background concentrations and the percentage contribution that the predicted environmental concentrations (PEC) would make towards the relevant standard, objective or guideline value.

6.8.2 All concentrations in the following tables and figures are the highest of five years of meteorology, for each receptor or grid point.

6.8.3 Please note that in the following tables, results are given to several significant figures. This is to enable comparison between receptors and between PC and PEC contributions. The number of significant figures should not be taken as providing any indication of the accuracy of the results.

6.8.4 This section presents results for Year 20, the year with the peak number of aircraft movements.

Human health effects: Nitrogen dioxide (NO_2)

6.8.5 In view of the large number of modelled receptors, the following results are grouped by the general location of the receptors, and results are given for only a selection of receptors (those with the highest concentrations). Full results are provided in a spreadsheet of supplementary information.

6.8.6 Predicted concentrations of annual mean NO_2 at receptors around the airport are given in **Table 6.35**, for those modelled receptors with an impact of “slight” or “moderate”. At all other modelled receptors, the impact is “negligible”. Contours of

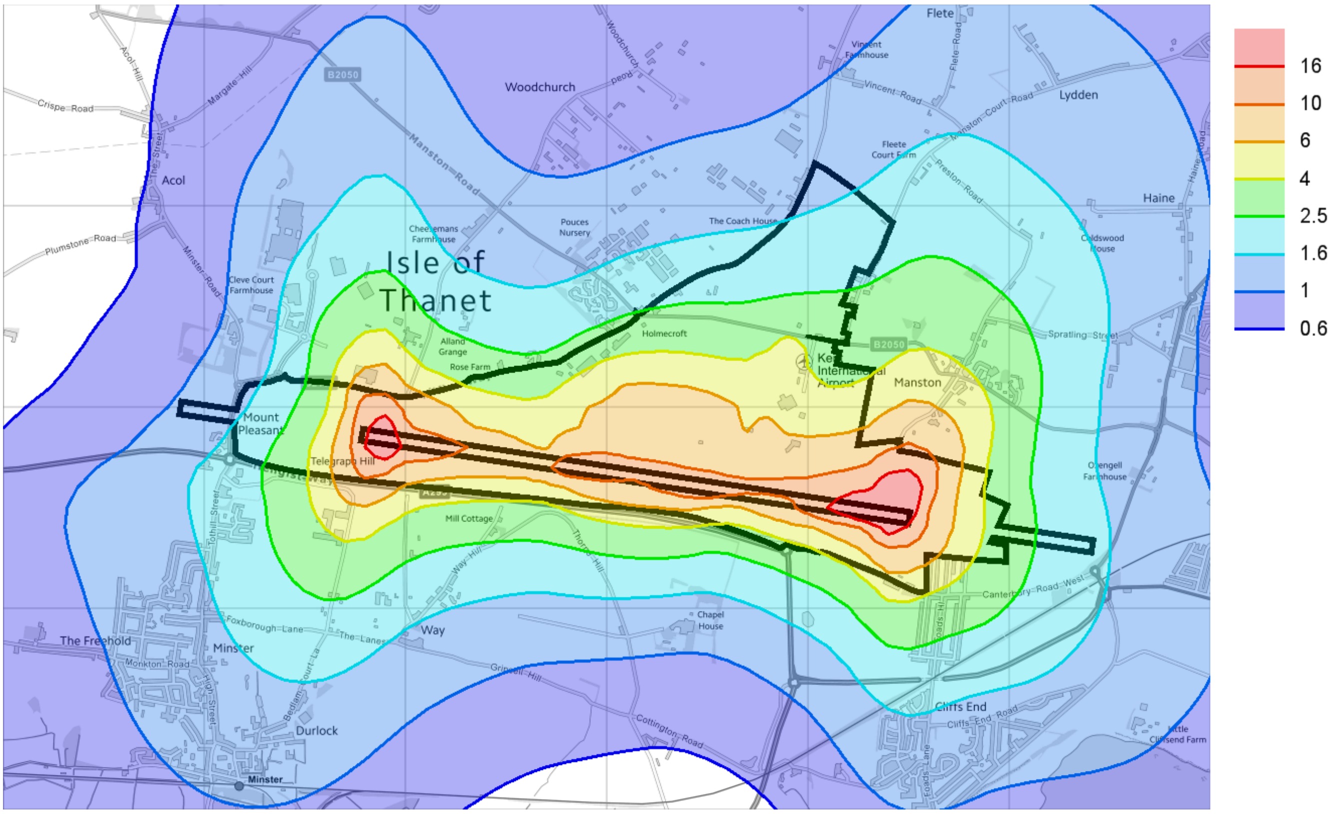
NO_2 PC (calculated as 70% of the NO_x PC) in the vicinity of the airport are shown in **Figure 6.23**.

Table 6.35 Maximum PCs and PECs for annual mean NO_2, Year 20, receptors close to airport

Receptor	AQAL (μg m^{-3})	PC (μg m^{-3})	PEC (μg m^{-3})	% PC of AQAL	% PEC of AQAL	Impact
H06	40	3.26	22.56	8.2%	56.4%	Slight
H07	40	2.41	21.71	6.0%	54.3%	Slight
H08	40	2.88	22.18	7.2%	55.5%	Slight
H09	40	2.71	22.01	6.8%	55.0%	Slight
H10	40	2.71	22.01	6.8%	55.0%	Slight
H11	40	2.64	21.94	6.6%	54.9%	Slight
H12	40	2.32	21.62	5.8%	54.1%	Slight
H15	40	3.03	22.33	7.6%	55.8%	Slight
H16	40	3.56	22.86	8.9%	57.1%	Slight
H17	40	4.23	23.53	10.6%	58.8%	Moderate
H18	40	4.71	24.01	11.8%	60.0%	Moderate
H19	40	5.09	24.39	12.7%	61.0%	Moderate
H20	40	6.41	25.71	16.0%	64.3%	Moderate
H21	40	7.10	26.40	17.8%	66.0%	Moderate
H22	40	6.79	26.09	17.0%	65.2%	Moderate
H23	40	10.05	29.35	25.1%	73.4%	Moderate
H24	40	3.17	22.47	7.9%	56.2%	Slight
H33	40	3.31	22.61	8.3%	56.5%	Slight
H34	40	4.47	23.77	11.2%	59.4%	Moderate
H35	40	4.91	24.21	12.3%	60.5%	Moderate
H36	40	5.39	24.69	13.5%	61.7%	Moderate
H37	40	5.85	25.15	14.6%	62.9%	Moderate
H38	40	6.55	25.85	16.4%	64.6%	Moderate
H39	40	5.78	25.08	14.5%	62.7%	Moderate
H40	40	5.26	24.56	13.1%	61.4%	Moderate
H41	40	4.67	23.97	11.7%	59.9%	Moderate
H42	40	4.27	23.57	10.7%	58.9%	Moderate
H43	40	4.78	24.08	11.9%	60.2%	Moderate
H44	40	4.97	24.27	12.4%	60.7%	Moderate

Receptor	AQAL (µg m⁻³)	PC (µg m⁻³)	PEC (µg m⁻³)	% PC of AQAL	% PEC of AQAL	Impact
H45	40	2.48	21.78	6.2%	54.4%	Slight
H49	40	3.12	22.42	7.8%	56.1%	Slight
H50	40	2.76	22.06	6.9%	55.1%	Slight
H51	40	2.48	21.78	6.2%	54.5%	Slight
H54	40	4.16	23.46	10.4%	58.6%	Moderate
H55	40	2.62	21.92	6.5%	54.8%	Slight
H59	40	2.29	21.59	5.7%	54.0%	Slight
S01	N/A	2.46	21.76	6.2%	54.4%	Slight
S02	N/A	2.60	21.90	6.5%	54.8%	Slight
S03	N/A	2.31	21.61	5.8%	54.0%	Slight
S04	N/A	6.52	25.82	16.3%	64.6%	Moderate
A12	40	2.42	21.72	6.1%	54.3%	Slight
A13	40	4.59	23.89	11.5%	59.7%	Moderate
A14	40	8.30	27.60	20.7%	69.0%	Moderate
A15	40	4.20	23.50	10.5%	58.8%	Moderate
M10	40	5.62	24.92	14.0%	62.3%	Moderate
M11	40	2.46	21.76	6.1%	54.4%	Slight

Figure 6.23 Annual mean NO_2 process contribution, Year 20, near the airport



6.8.7 The maximum annual mean NO_2 PEC at any relevant human receptor location near the airport is predicted as 29 µg m^{-3} or 73% of the AQAL at the H23 High Street 5 receptor, representing Bush Farm at the very southern end of Manston High Street. The modelled contribution from the airport here is 10 µg m^{-3}, which is the greatest PC at any of the modelled receptors. Under the IAQM/EPUK criteria, the impact at this receptor is classed as moderate.

6.8.8 The receptors classed as having a moderate impact are those with a PC greater than 4 µg m^{-3} (top right cell in **Table 6.33**). These are shown by the yellow contour in **Figure 6.23**, and include the southwestern half of Manston village (approximately 40 residential properties) and most of the King Arthur Road/Arundel Road/Windsor Road estate (approximately 45 properties), and the isolated property of Dellside (receptor H54) on Wayborough Hill.

6.8.9 The modelled annual mean NO_2 concentrations are all below 40 µg m^{-3} and well below 60 µg m^{-3}. Under the Defra TG(16) guidance, it is highly unlikely that there will be an exceedance of the 99.79 percentile hourly mean NO_2 AQAL.

6.8.10 No existing or new exceedances are predicted, and the maximum concentrations are well below the AQALs.

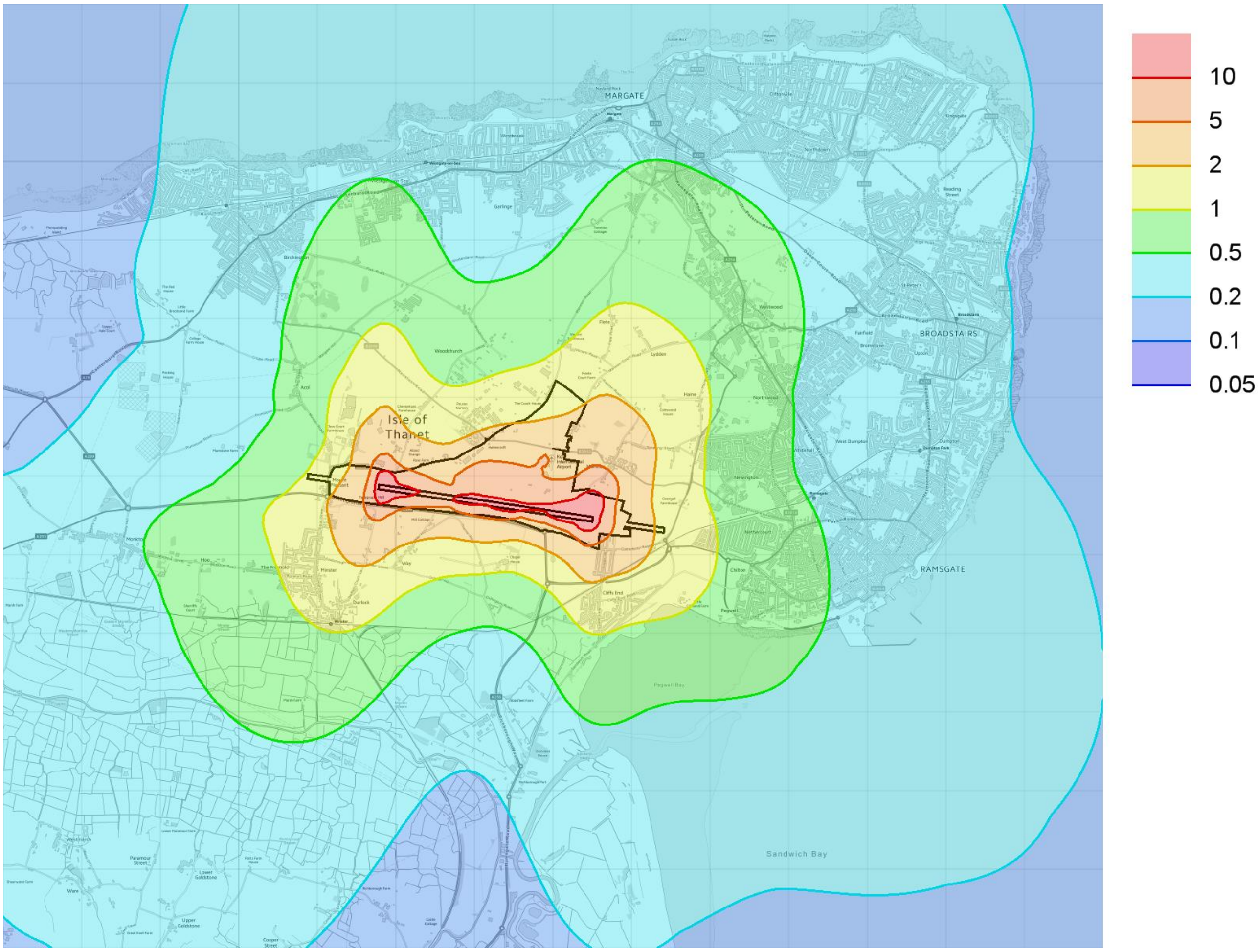
6.8.11 Considering receptors further away from the airport, the PC reduces but there are locations where the background is higher. Concentrations have been modelled at groups of receptors in areas identified by Thanet District Council as being of particular concern, around the High Street St Lawrence and The Square Birchington. Modelled concentrations at these receptors are given in **Table 6.36**, and contours covering the urban area of Thanet district are shown in **Figure 6.24**.

6.8.12

Table 6.36 Maximum PCs and PECs for annual mean NO_2, Year 20, receptors in urban centres

Receptor	AQAL (µg m⁻³)	PC (µg m⁻³)	PEC (µg m⁻³)	% PC of AQAL	% PEC of AQAL	Impact
A22	40	0.36	35.66	0.9%	89.2%	Negligible
A23	40	0.36	35.66	0.9%	89.2%	Negligible
A24	40	0.37	35.67	0.9%	89.2%	Negligible
A25	40	0.37	35.67	0.9%	89.2%	Negligible
A26	40	0.37	35.67	0.9%	89.2%	Negligible
A27	40	0.37	35.67	0.9%	89.2%	Negligible
A28	40	0.38	35.68	0.9%	89.2%	Negligible
A29	40	0.37	35.67	0.9%	89.2%	Negligible
A30	40	0.37	35.67	0.9%	89.2%	Negligible
A31	40	0.37	35.67	0.9%	89.2%	Negligible
A32	40	0.58	38.58	1.5%	96.5%	Slight
A33	40	0.58	38.58	1.5%	96.5%	Slight
A34	40	0.57	38.57	1.4%	96.4%	Slight
A35	40	0.58	38.58	1.4%	96.4%	Slight
A36	40	0.58	38.58	1.4%	96.4%	Slight
A37	40	0.57	38.57	1.4%	96.4%	Slight
A38	40	0.56	38.56	1.4%	96.4%	Slight
A39	40	0.57	38.57	1.4%	96.4%	Slight
A40	40	0.57	38.57	1.4%	96.4%	Slight
A41	40	0.58	38.58	1.4%	96.4%	Slight
A42	40	0.58	38.58	1.4%	96.4%	Slight
A43	40	0.58	38.58	1.5%	96.5%	Slight

Figure 6.24 Annual mean NO_2 process contribution, Year 20 (wider area)



6.8.13 The maximum annual mean NO_2 PEC of these receptors is predicted as 38.6 µg m^{-3} or 96% of the AQAL at the A43 St Lawrence 12 receptor, representing a property on Forge Lane. The modelled contribution from the airport here is just 0.58 µg m^{-3}, which is the greatest PC at any of the modelled receptors in this group. Under the IAQM/EPUK criteria, the impact at this receptor is classed as slight.

6.8.14 Impacts at the other modelled St Lawrence receptors are also classed as slight. Impacts at the receptors on The Square Birchington are classed as negligible.

6.8.15 It should be emphasised that the modelled PECs are dominated by the background contribution, which in turn is largely due to road vehicle emissions along busy and congested roads, and it is assumed that the background concentrations are unchanged from current (2007–2015) monitored concentrations at roadside locations. This is a highly conservative assumption, given that the monitoring data over that period shows a small but steady reduction in concentrations (about 0.4 µg m^{-3} per year at St Lawrence), and given the active measures to further reduce emissions from road vehicles which are expected to bite over the next twenty years. A reduction of just 1 µg m^{-3} in the background concentration at St Lawrence would result in the airport impact at these receptors being classed as negligible.

Human health effects: PM_{10}

6.8.16 In view of the large number of modelled receptors, results are given for only a selection of receptors (those with the highest concentrations). Full results are provided in a spreadsheet of supplementary information.

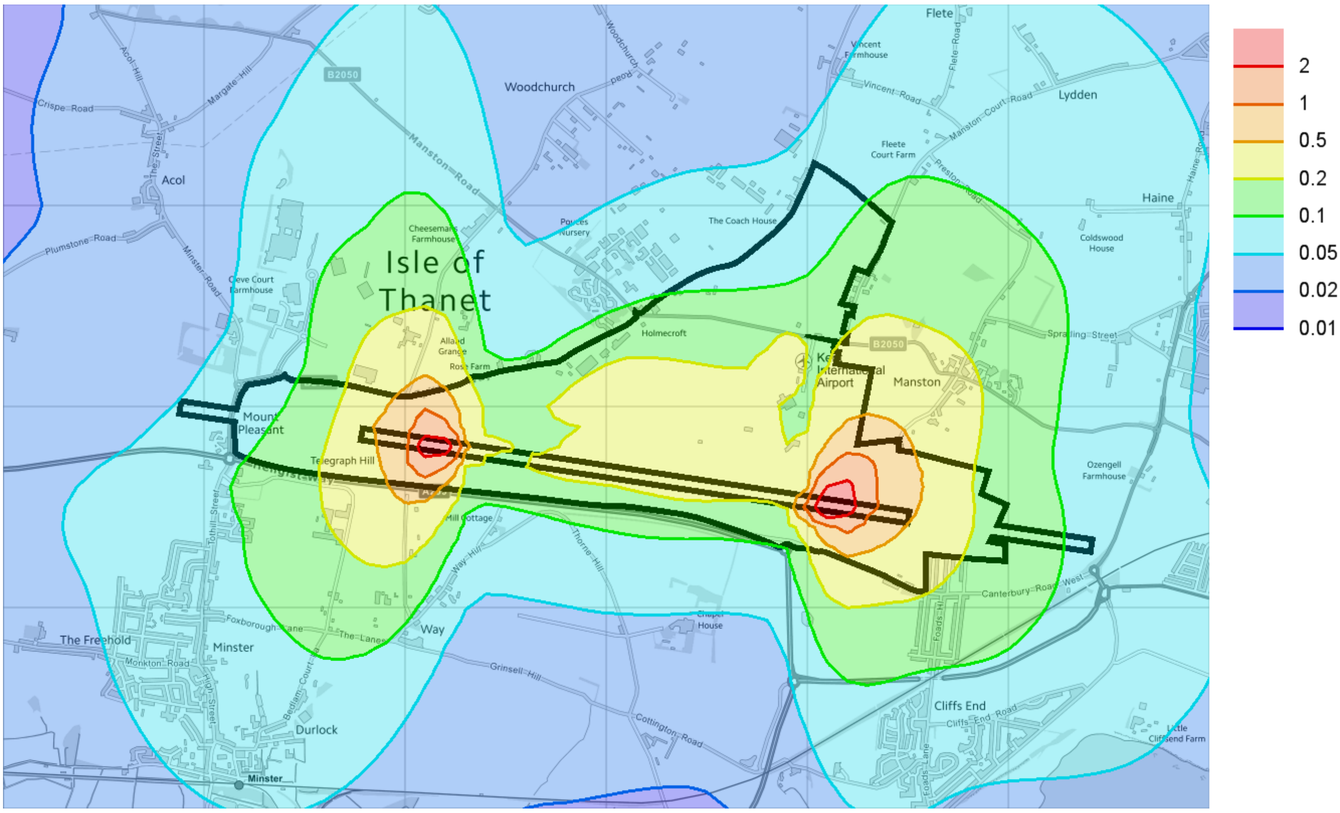
6.8.17 Predicted concentrations of annual mean PM_{10} at all the modelled receptors have an impact of negligible under the IAQM/EPUK criteria. Concentrations for those receptors with the five greatest PCs and the five greatest PECs are given in **Table 6.37**.

6.8.18 Contours of PM_{10} PC in the vicinity of the airport are shown in **Figure 6.25**. The contour plot clearly shows that the principal sources of PM_{10} are tyre and brake wear.

Table 6.37 Maximum PCs and PECs for annual mean PM_{10}, Year 20, worst receptors

Receptor	AQAL (μg m^{-3})	PC (μg m^{-3})	PEC (μg m^{-3})	% PC of AQAL	% PEC of AQAL	Impact
H01	40	0.06	18.51	0.2%	46.3%	Negligible
H02	40	0.06	18.51	0.1%	46.3%	Negligible
H03	40	0.05	18.50	0.1%	46.3%	Negligible
H04	40	0.04	18.49	0.1%	46.2%	Negligible
H20	40	0.33	16.01	0.8%	40.0%	Negligible
H21	40	0.38	16.07	1.0%	40.2%	Negligible
H23	40	0.59	16.27	1.5%	40.7%	Negligible
H54	40	0.49	16.88	1.2%	42.2%	Negligible
A12	40	0.12	17.03	0.3%	42.6%	Negligible
A14	40	0.46	16.14	1.1%	40.4%	Negligible

Figure 6.25 Annual mean PM_{10} process contribution, Year 20, near the airport



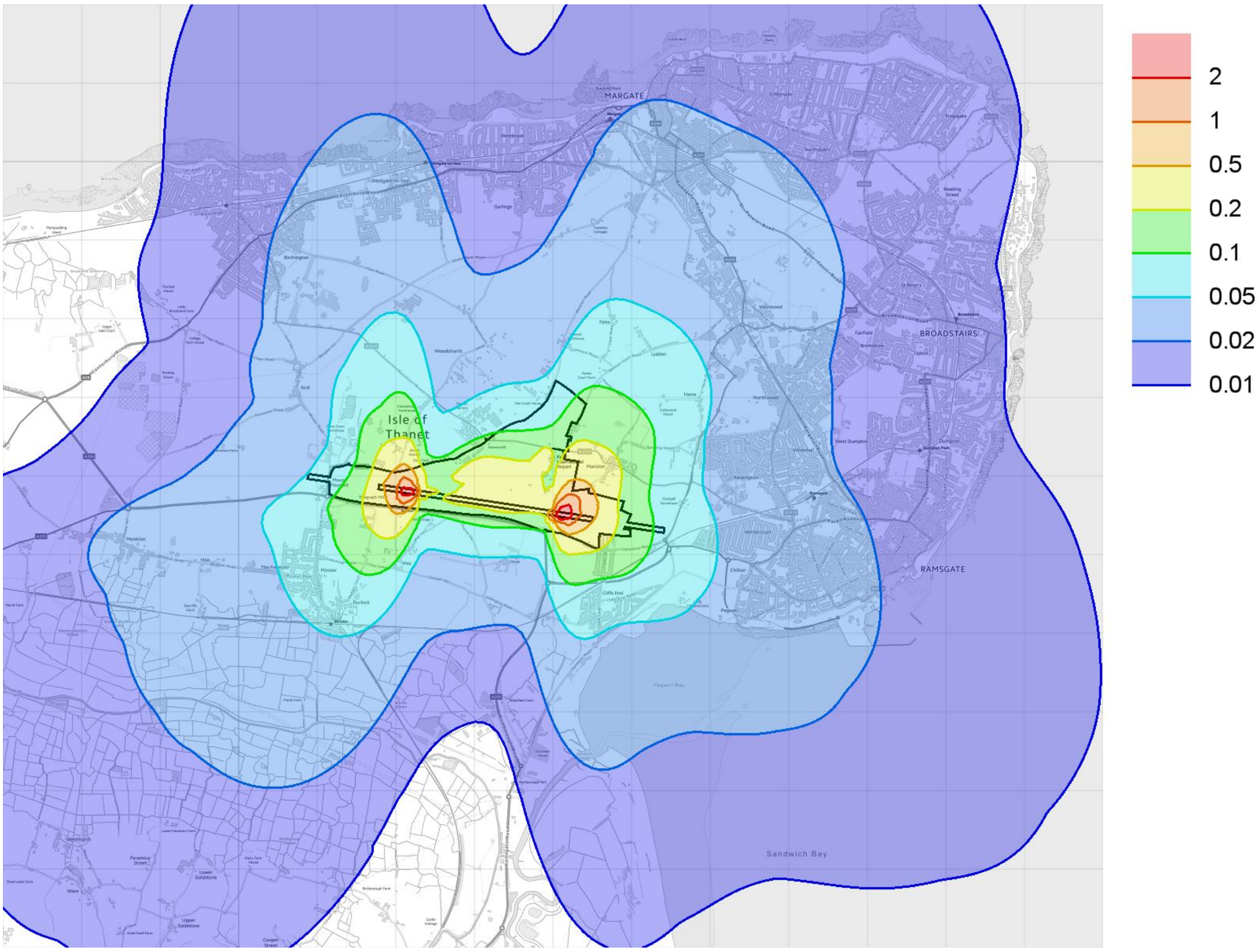
6.8.19 The maximum annual mean PM_{10} PEC at any relevant human receptor location is predicted as 19 µg m^{-3} or 46% of the AQAL at the H01 Garden Cottage receptor. The modelled contribution from the airport here is just 0.06 µg m^{-3}. The greatest PC is 0.6 µg m^{-3} at the H23 High Street 5 receptors, representing Bush Farm at the very southern end of Manston High Street, where the total PEC is 16 µg m^{-3} or 41% of the AQAL.

6.8.20 Using the Defra formula to estimate the number of days where the daily mean PM_{10} is greater than 50 µg m^{-3}, no more than 2 days per year are greater than 50 µg m^{-3}. This compares with 35 days per year permitted to be greater than 50 µg m^{-3}. There is therefore no likelihood of an exceedance of the daily mean PM_{10} AQAL.

6.8.21 No existing or new exceedances are predicted, and the maximum concentrations are well below the AQALs.

6.8.22 Contours covering the urban area of Thanet district are shown in **Figure 6.26**.

Figure 6.26 Annual mean PM_{10} process contribution, Year 20 (wider area)



Human health effects: $PM_{2.5}$

6.8.23 In view of the large number of modelled receptors, results are given for only a selection of receptors (those with the highest concentrations). Full results are provided in a spreadsheet of supplementary information.

6.8.24 Predicted concentrations of annual mean $PM_{2.5}$ at all the modelled receptors have an impact of negligible under the IAQM/EPUK criteria. Concentrations for those receptors with the five greatest PCs and the five greatest PECs are given in **Table 6.38**.

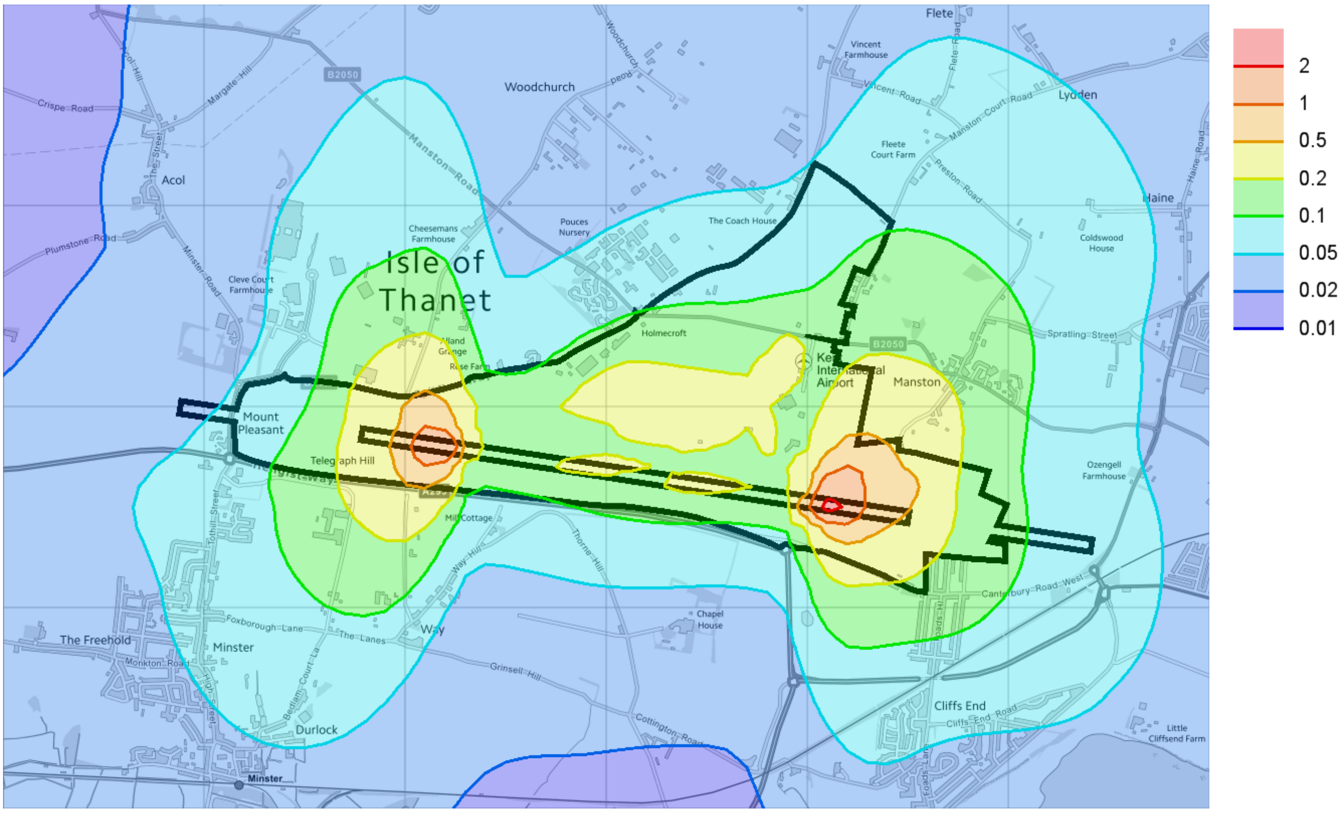
6.8.25 Contours of $PM_{2.5}$ PC in the vicinity of the airport are shown in **Figure 6.27**. The contour plot clearly shows that the principal sources of $PM_{2.5}$ are tyre and brake wear.

Table 6.38 Maximum PCs and PECs for annual mean $PM_{2.5}$, Year 20, worst receptors

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	% PC of AQAL	% PEC of AQAL	Impact
H01	25	0.05	12.77	0.2%	51.1%	Negligible
H02	25	0.04	12.77	0.2%	51.1%	Negligible

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	% PC of AQAL	% PEC of AQAL	Impact
H03	25	0.04	12.77	0.2%	51.1%	Negligible
H04	25	0.03	12.76	0.1%	51.0%	Negligible
H20	25	0.26	11.21	1.0%	44.8%	Negligible
H21	25	0.30	11.25	1.2%	45.0%	Negligible
H23	25	0.45	11.40	1.8%	45.6%	Negligible
H54	25	0.35	11.67	1.4%	46.7%	Negligible
A12	25	0.09	11.69	0.4%	46.8%	Negligible
A14	25	0.35	11.30	1.4%	45.2%	Negligible

Figure 6.27 Annual mean $PM_{2.5}$ process contribution, Year 20, near the airport

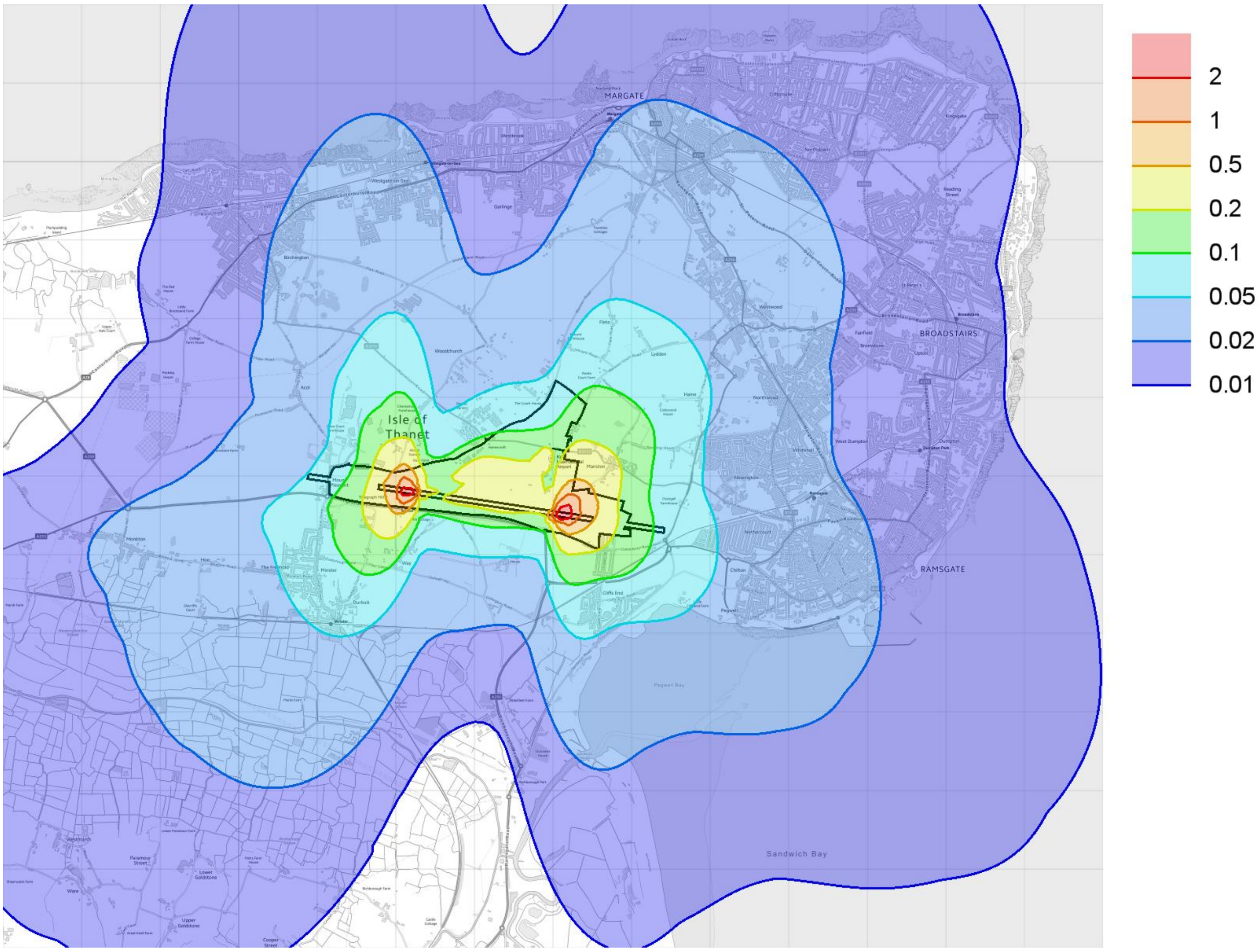


6.8.26 The maximum annual mean $PM_{2.5}$ PEC at any relevant human receptor location is predicted as 13 µg m^{-3} or 51% of the AQAL at the H01 Garden Cottage receptor. The modelled contribution from the airport here is just 0.05 µg m^{-3}. The greatest PC is 0.45 µg m^{-3} at the H23 High Street 5 receptors, representing Bush Farm at the very southern end of Manston High Street, where the total PEC is 11 µg m^{-3} or 46% of the AQAL.

6.8.27 No existing or new exceedances are predicted, and the maximum concentrations are well below the AQALs.

6.8.28 Contours covering the urban area of Thanet district are shown in **Figure 6.28**.

Figure 6.28 Annual mean $PM_{2.5}$ process contribution, Year 20 (wider area)



Ecological effects: Nitrogen oxides (NO_x) concentrations in air

6.8.29 In view of the large number of modelled receptors, results are given for only a selection of receptors, namely the major environmental sites (SPAs, SACs, Ramsar sites and SSSIs) with the five highest PCs and PECs, and the local nature sites with the five highest PCs and PECs. Full results are provided in a spreadsheet of supplementary information.

6.8.30 Predicted concentrations of annual mean NO_x at these selected receptors are given in **Table 6.39**. Contours of NO_x PC in the vicinity of the airport are shown in **Figure 6.29**, and over a wider area are shown in **Figure 6.30**.

Table 6.39 Maximum PCs and PECs for annual mean NO_x, Year 20, worst receptors

Receptor	AQAL (μg m^{-3})	PC (μg m^{-3})	PEC (μg m^{-3})	% PC of AQAL	% PEC of AQAL	Site type
E20	30	0.75	26.65	2.5%	88.8%	Major
E21	30	1.08	26.98	3.6%	89.9%	Major
E22	30	1.71	27.61	5.7%	92.0%	Major
E23	30	1.43	27.33	4.8%	91.1%	Major

Receptor	AQAL (μg m^{-3})	PC (μg m^{-3})	PEC (μg m^{-3})	% PC of AQAL	% PEC of AQAL	Site type
E24	30	1.05	26.95	3.5%	89.8%	Major
E78	30	5.35	31.25	17.8%	104.2%	Local
E79	30	4.30	30.20	14.3%	100.7%	Local
E80	30	4.00	29.90	13.3%	99.7%	Local
E81	30	3.73	29.63	12.4%	98.8%	Local
E82	30	3.45	29.35	11.5%	97.8%	Local

Figure 6.29 Annual mean NO_x process contribution, Year 20, near the airport

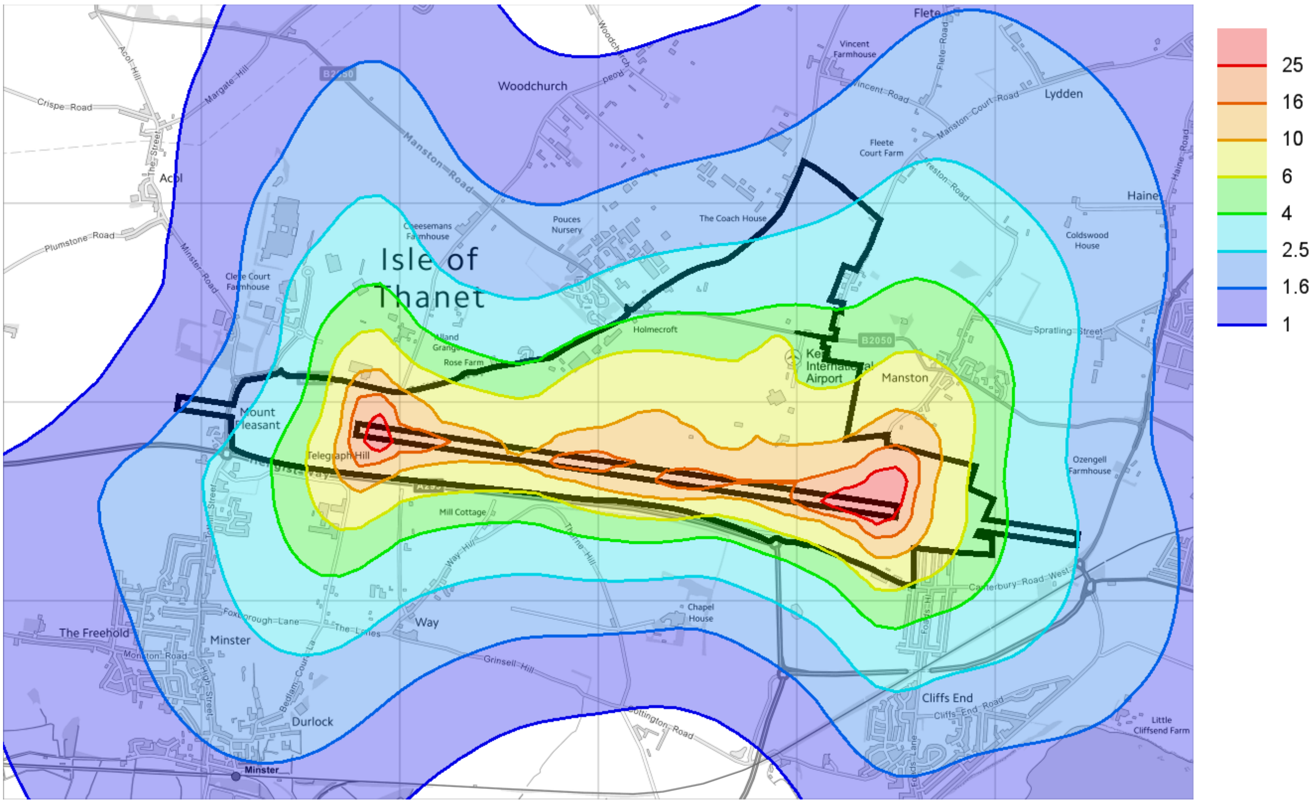
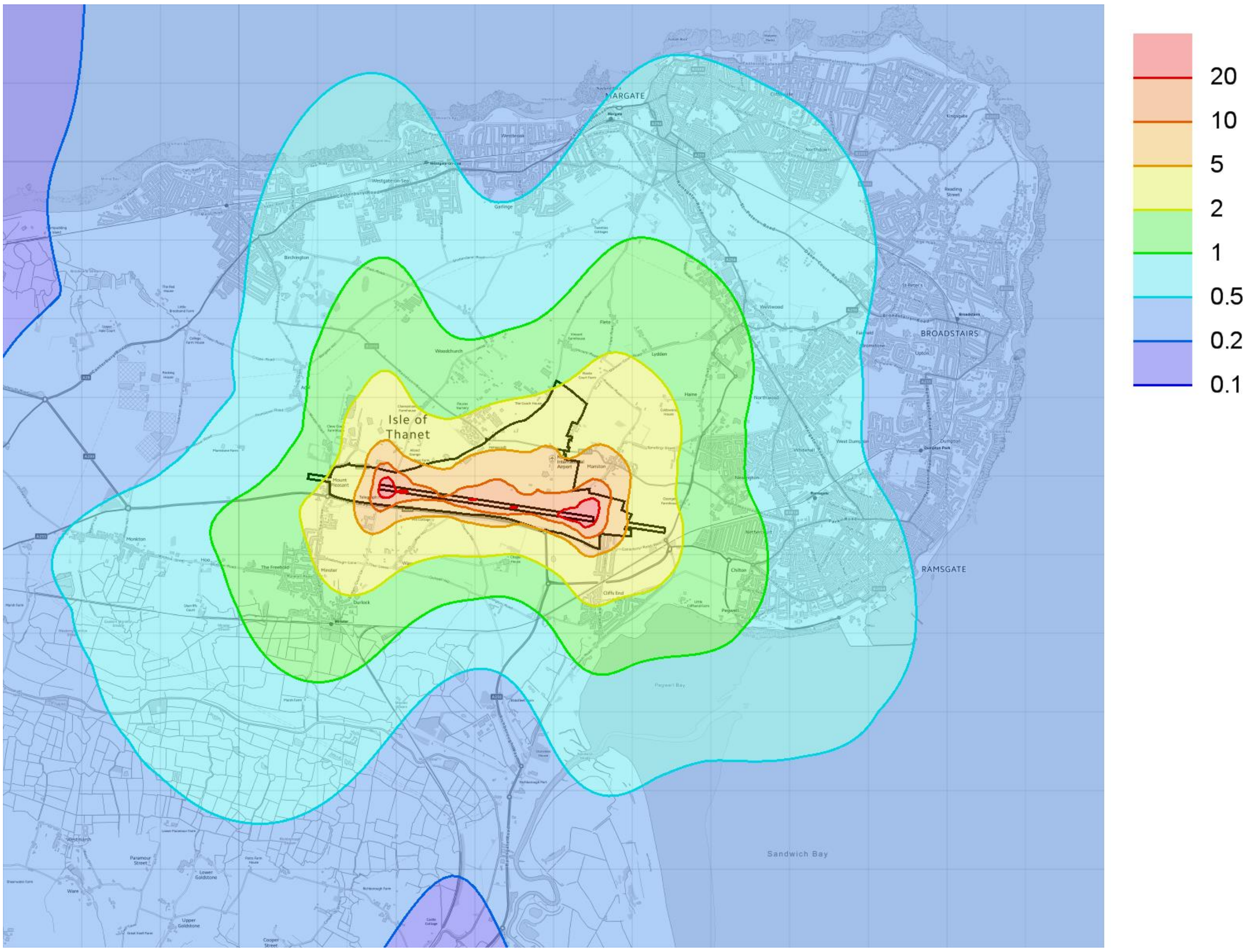


Figure 6.30 Annual mean NO_x process contribution, Year 20 (wider area)



6.8.31 The maximum annual mean NO_x PEC at any relevant major environmental receptor (Ramsar, SPA, SAC and SSSI) is predicted as 28 µg m^{-3} or 92% of the AQAL at the E22 receptor, representing Pegwell Bay. The modelled contribution from the airport here is 1.7 µg m^{-3}, which is the greatest PC at any of the modelled nationally- or internationally-designated ecological receptors.

6.8.32 The maximum annual mean NO_x PEC at any relevant local nature receptor (i.e. excluding Ramsar, SPA, SAC and SSSI sites) is predicted as 31 µg m^{-3} or 104% of the AQAL at the E78 receptor, representing deciduous woodland in the Priority Habitat Inventory at Alland Grange. The modelled contribution from the airport here is 5.3 µg m^{-3}, which is the greatest PC at any of the modelled local nature receptors. The other receptor with a PEC over 100% of the AQAL is an adjacent part of the Alland Grange site. At all other sites, the modelled PEC is less than 100% of the AQAL. Under Environment Agency guidance[86], the PC at all local nature sites is less than 100% of the AQAL so can be screened out from further assessment.

6.8.33 It should be emphasised that the modelled PECs are dominated by the background contribution, and it is assumed that the background concentrations are unchanged from current (2007–2015) monitored concentrations. This is a very

[86] 'Air emissions risk assessment for your environmental permit'. https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit, dated 2 August 2016.

conservative assumption, given that the monitoring data over that period shows a steady reduction in concentrations (about 1.4 µg m^{-3} per year at the ZH2 and ZH3 monitors), and in fact the assumed background concentration assumed here (25.9 µg m^{-3}, the 2007–2015 average at the two monitors) has not been exceeded since 2010. Moreover, the active measures are in place nationally and internationally to further reduce emissions from road vehicles which are expected to bite over the next twenty years.

6.8.34 Except at Alland Grange, no existing or new exceedances are predicted.

Ecological effects: Nutrient nitrogen deposition

6.8.35 In view of the large number of modelled receptors, results are given for only a selection of receptors, namely the major environmental sites (SPAs, SACs, Ramsar sites and SSSIs) with the five highest PCs and PECs (as a percentage of the receptor-specific critical load), and the local nature sites with the five highest PCs and PECs. Full results are provided in a spreadsheet of supplementary information.

6.8.36 Modelled nutrient nitrogen deposition rates at these selected receptors are given in Table 6.40, along with the receptor-specific critical loads. (Note that of the Local receptors, E79, E80 and E82 are in the top five for both PC and PEC.) Nutrient nitrogen background deposition rates at most of the modelled receptors are modelled to be at exceedance already, based on background deposition rates from APIS and without any additional contribution from the airport; no account is taken of reductions in deposition rates in future years.

6.8.37 At the major environmental sites, the additional process contribution is at most 2.2% of the critical load at the E22 receptor representing Pegwell Bay. The PEC here is 137% of the critical load.

6.8.38 At the local nature sites, the additional PC is at most 10.8% of the critical load, at the E78 receptor, which represents deciduous woodland in the Priority Habitat Inventory at Alland Grange. This is less than 100% of the assessment level, so under Environment Agency guidance, it can be considered insignificant and does not need to be assessed further.

Table 6.40 Critical Loads assessment of nitrogen deposition, Year 20, worst receptors

Receptor	AQAL (kg N ha^{-1} y^{-1})	PC (kg N ha^{-1} y^{-1})	PEC (kg N ha^{-1} y^{-1})	% PC of AQAL	% PEC of AQAL	Site type
E20	8	0.08	10.86	0.9%	135.7%	Major
E21	8	0.11	10.89	1.4%	136.1%	Major
E22	8	0.17	10.95	2.2%	136.9%	Major
E23	8	0.14	13.58	1.8%	169.8%	Major
E24	8	0.11	13.55	1.3%	169.3%	Major
E31	8	0.03	15.71	0.3%	196.3%	Major
E43	5	0.02	14.30	0.3%	285.9%	Major

Receptor	AQAL (kg N ha^{-1} y^{-1})	PC (kg N ha^{-1} y^{-1})	PEC (kg N ha^{-1} y^{-1})	% PC of AQAL	% PEC of AQAL	Site type
E44	5	0.02	14.30	0.4%	286.0%	Major
E48	5	0.02	14.30	0.4%	286.0%	Major
E49	5	0.02	14.30	0.4%	286.0%	Major
E78	10	1.08	19.56	10.8%	195.6%	Local
E79	10	0.87	26.77	8.7%	267.7%	Local
E80	10	0.81	26.71	8.1%	267.1%	Local
E81	10	0.75	20.07	7.5%	200.7%	Local
E82	10	0.70	26.60	7.0%	266.0%	Local
E84	10	0.39	26.29	3.9%	262.9%	Local
E86	10	0.21	26.11	2.1%	261.1%	Local

Ecological effects: Acid deposition

6.8.39 In view of the large number of modelled receptors, results are given for only a selection of receptors, namely the major environmental sites (SPAs, SACs, Ramsar sites and SSSIs) with the five highest PCs and PECs (as a percentage of the receptor-specific critical load function), and the local nature sites with the five highest PCs and PECs. Full results are provided in a spreadsheet of supplementary information.

6.8.40 Modelled process contribution and background deposition rates are given in **Table 6.41**. A comparison with the critical load function is given in **Table 6.42**[87].

6.8.41 Modelled acid deposition rates at these selected receptors are given in Table 6.41, along with the receptor-specific critical loads. (Note that of the Local receptors, E66, E87 and E88 are in the top five for both PC and PEC.) Background acid deposition rates at many of the modelled receptors are modelled to be at exceedance already, based on background deposition rates from APIS and without any additional contribution from the airport; no account is taken of reductions in deposition rates in future years.

6.8.42 At the major environmental sites, the additional process contribution is at most 1.1% of the critical load function at the E22 receptor representing Pegwell Bay. The PEC here is 88% of the critical load. This is the only receptor where the PC is greater than 1% of the critical load function and the PEC is greater than 70% of the critical load function, so under the Environment Agency criteria, this is the only major environmental site which requires further assessment.

6.8.43 The major receptor with the greatest PEC is E35, representing the Thanet Coast Ramsar site, where the PEC is 260% of the critical load function, but the PC is just 0.2% of the critical load function.

[87] These are calculated using the same formulas as the APIS critical load function tool, but without rounding of intermediate values, so results differ slightly from those generated by the website tool.

6.8.44 At the local nature sites, the additional PC is at most 1.7% of the critical load, at the E75 receptor, which represents deciduous woodland in the Priority Habitat Inventory near Minster. This is less than 100% of the assessment level, so under Environment Agency guidance, it can be considered insignificant and does not need to be assessed further.

Table 6.41 Acid deposition rates, Year 20, worst receptors

Receptor	Sulphur PC (keq ha^{-1} y^{-1})	Nitrogen PC (keq ha^{-1} y^{-1})	Sulphur background (keq ha^{-1} y^{-1})	Nitrogen background (keq ha^{-1} y^{-1})	Site type
E21	0	0.0078	0.21	0.77	Major
E22	0	0.0123	0.21	0.77	Major
E23	0	0.0103	0.20	0.96	Major
E24	0	0.0076	0.20	0.96	Major
E38	0	0.0040	0.20	0.96	Major
E35	0	0.0010	0.25	1.12	Major
E37	0	0.0007	0.25	1.12	Major
E44	0	0.0014	0.22	1.02	Major
E48	0	0.0015	0.22	1.02	Major
E49	0	0.0013	0.22	1.02	Major
E56	0	0.0176	0.23	1.26	Local
E57	0	0.0178	0.23	1.26	Local
E66	0	0.0207	0.28	1.62	Local
E87	0	0.0159	0.24	1.64	Local
E88	0	0.0170	0.24	1.64	Local
E74	0	0.0149	0.24	1.64	Local
E86	0	0.0152	0.29	1.85	Local

Table 6.42 Critical Loads assessment of acid deposition, Year 20, worst receptors

Receptor	Exceedance (keq ha^{-1} y^{-1})			Percent of critical load function			Site type
	PC	Background	PEC	PC	Background	PEC	
E21	No exceedance	No exceedance	No exceedance	0.7	87.3	88.0	Major
E22	No exceedance	No exceedance	No exceedance	1.1	87.3	88.4	Major
E23	No exceedance	0.04	0.05	0.9	103.3	104.2	Major
E24	No exceedance	0.04	0.04	0.7	103.3	104.0	Major
E38	No exceedance	0.63	0.64	0.8	220.5	221.3	Major

Receptor	Exceedance (keq ha^{-1} y^{-1})			Percent of critical load function			Site type
	PC	Background	PEC	PC	Background	PEC	
E35	No exceedance	0.84	0.84	0.2	260.5	260.6	Major
E37	No exceedance	0.84	0.84	0.1	260.5	260.6	Major
E44	No exceedance	0.70	0.70	0.3	228.8	229.0	Major
E48	No exceedance	0.70	0.70	0.3	228.8	229.1	Major
E49	No exceedance	0.70	0.70	0.2	228.8	229.0	Major
E56	No exceedance	No exceedance	No exceedance	0.9	78.0	78.9	Local
E57	No exceedance	No exceedance	No exceedance	0.9	78.0	78.9	Local
E66	No exceedance	No exceedance	0.01	1.1	99.5	100.6	Local
E87	No exceedance	0.07	0.09	0.9	103.9	104.7	Local
E88	No exceedance	0.07	0.09	0.9	103.9	104.8	Local
E74	No exceedance	No exceedance	No exceedance	0.8	97.9	98.7	Local
E86	No exceedance	0.33	0.35	0.8	118.2	119.1	Local

6.9 Assessment of air quality effects from construction activity on site

Construction phase effects

6.9.1 Various types of diesel-powered construction plant and equipment will be deployed on the development site during the earthworks, concrete and asphalt pavement and building erection works. These items will consist of excavators, dump trucks, concrete and asphalt batching plants, cranes, piling rigs, pumps and generators. An emissions inventory for the air pollutants NOx and fine particulate matter will be compiled and a dispersion model will be set-up to estimate the ambient air quality effects arising from these emissions, in combination with background air quality and the emissions from construction-related road traffic.

6.9.2 During the earthworks and concreting phases of the development, a risk-based construction dust assessment will be carried out, in accordance with the IAQM Guidance and the results will be presented in the Air Quality Chapter of the ES.

Decommissioning phase effects

6.9.3 It is envisaged that decommissioning phase effects would be similar to construction phase effects, with use of similar diesel-powered construction plant and equipment and the potential for dust associated with the demolition activities. If required an assessment of the air quality effects from the construction activity on site during the decommissioning phase of the Proposed Development will be presented within the Environmental Statement.

6.10 Assessment of air quality effects from traffic & transportation

Construction phase effects

6.10.1 Although the transport assessment is yet to be finalised, the initial indications from a screening exercise (paragraph 3.2.125) are that construction-related vehicle movements, mainly heavy goods vehicle – HGV movements will be of the order 100 to 120 vehicles per day during the peak construction periods. The potential air quality effects arising from additional traffic flows on the local road network of this magnitude will require assessment, as these are in excess of the threshold criteria stated in the EPUK/IAQM Guidance. A dispersion modelling assessment, using the ADMS-Roads model will be carried out to assess the scale and significance of effects on receptors adjacent to those affected links on the local road network. It is likely that the combined effects of emissions from construction road traffic movements and emissions from construction plant on the site will require consideration for some receptor locations.

Operational phase effects

6.10.2 Indications from the initial output of the transport assessment screening exercise are that some of the local road links experiencing changes in traffic flows will require to be assessed. This will be carried out using the ADMS-Roads dispersion model. It is also likely that, for some receptor locations, the combined effects of emissions from road traffic and aircraft movements will need to be assessed.

Decommissioning phase effects

6.10.3 It is not yet known what the level of road traffic movements will be during the decommissioning phase of the Proposed Development. Once the levels of traffic movements are known, the need for an assessment will be determined and, if necessary, an assessment included in the ES.

6.11 Conclusions of preliminary significance evaluation

6.11.1 The Conclusions on the significance of all those effects that have been subject to assessment in **Sections 6.8** to **6.10** are summarised in **Table 6.42**.

Table 6.43 Summary of significance of effects: Year 20

Impact type	Significance Level	Rationale
Human health effects: Annual mean NO_2	Not significant	There are no predicted exceedances of the AQAL at receptors around the airport. The impact is classified as moderate under IAQM/EPUK criteria at approximately 85 properties, but remains below 75% of the AQAL. In view of the conservatism of the modelling, this impact is considered to be of low to medium significance. At receptors where the existing concentrations of NO_2 are high, around High Street St Lawrence and The Square Birchington, the modelled contribution from the airport is less than 0.6 µg m^{-3}, which is classified as a slight impact under the IAQM/EPUK criteria. However, this assumes that there is no reduction from current levels, whereas the current trend is for concentrations to fall by approximately 0.4 µg m^{-3} per year, and a drop of just 1 µg m^{-3} in background concentrations will reduce the impact classification to negligible. This impact is therefore not considered significant.
Human health effects: Hourly mean NO_2	Not significant	Given that the annual mean NO_2 concentrations are well within the 40 µg m^{-3} AQAL, it is not considered credible that there will be any exceedance of the hourly mean NO_2 AQAL.
Human health effects: Annual mean PM_{10}	Not significant	Annual mean PM_{10} concentrations are everywhere well below the AQAL and the impact of the airport is negligible under the IAQM/EPUK criteria. This impact is therefore not considered significant.
Human health effects: Daily mean PM_{10}	Not significant	The daily meanPM_{10} is estimated to be greater than 50 µg m^{-3} on no more than 2 days per year. The AQAL specifies that there should be no more than 35 days per year greater than 50 µg m^{-3}, so it is not considered credible that there will be any exceedance of the daily mean PM_{10} AQAL.
Human health effects: Annual mean $PM_{2.5}$	Not significant	Annual mean $PM_{2.5}$ concentrations are everywhere well below the AQAL and the impact of the airport is negligible under the IAQM/EPUK criteria. This impact is therefore not considered significant.
Human health effects: Other pollutants	Not significant	As discussed in Section 6.4, it is highly unlikely that any other pollutants will be as significant as NO_2, so other pollutants are no considered significant.
Ecological effects: Annual mean NO_x	Significance not yet established	Some Ramsar, SAC, SPA and SSSI receptors do not meet the Environment Agency's criteria for not requiring further assessment, largely because of existing background concentrations. These sites will be considered further as part of the Habitat Regulations Assessment. All modelled local nature sites meet the Environment Agency's criteria for not requiring further assessment.
Ecological effects: Nutrient nitrogen deposition	Significance not yet established	Some Ramsar, SAC, SPA and SSSI receptors do not meet the Environment Agency's criteria for not requiring further assessment, largely because of existing background deposition rates. These sites will be considered further as part of the Habitat Regulations Assessment. All modelled local nature sites meet the Environment Agency's criteria for not requiring further assessment.
Ecological effects: Acid deposition	Not significant	All modelled receptors meet the Environment Agency's criteria for not requiring further assessment, except (in Year 20) for E22 representing a small portion of the Pegwell Bay Ramsar, SAC, SPA and SSSI site. This site will be considered further as part of the Habitat Regulations Assessment.

Impact type	Significance Level	Rationale
Air quality effects: NO_x and particulates from construction activity on site	Significance not yet established	For each item of diesel-powered construction plant and equipment to be used on site, an emissions inventory for the air pollutants NOx and fine particulate matter will be compiled and a dispersion model will be set-up to estimate the ambient air quality effects arising from these emissions. The results of this assessment will be presented in the Environmental Statement.
Air quality effects: construction dust	Significance not yet established	A risk-based construction dust assessment, in accordance with the IAQM Guidance, will be carried out and the results presented in the Environmental Statement.
Air quality effects: traffic & transportation	Significance not yet established	The transport assessment, which is being prepared to support **Chapter 14: Traffic & Transportation**, has not yet been completed; therefore the information on additional traffic flows on the local road network as a result of both the construction and operational phases of the Proposed Development has not yet been undertaken. However initial screening, based on the number of vehicle movements for each phase presented within **Chapter 3: Description of the Proposed Development**, indicated that these potential effects will require assessment as they are in excess of the threshold criteria stated in the EPUK/IAQM Guidance. Therefore a dispersion modelling assessment, using the ADMS-Roads model will be carried out, and the results will be presented in the Environmental Statement.