RSP

RiverOak Strategic Partners

5.2-1 Environmental Statement Volume 1: Main Text – Chapters 1– 10

TR020002/APP/5.2-1

Project Name:	Manston Airport Development Consent Order
Regulation:	Regulation 5(2)(a) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009, as amended
Date:	July 2018

RiverOak Strategic Partners

Manston Airport DCO EIA

Environmental Statement

July 2018

Amec Foster Wheeler Environment
& Infrastructure UK Limited

Report for

George Yerrall
RiverOak Strategic Partners
Audley House
London
W1K 6WF

Main contributors

Toby Gibbs
Nick Hilton
Rachel Hicks
Kate Godsmark
Angela Schembri
Chris Johnson
Tom Wilson
Sally Dixon
Martin Peirce
Mark Linsley
Mike Raven
Liz Buchanan
Tim Haines
Ben Fretwell
Jackie Pitt
John Mabbitt
Vanessa Dahmoun
Barry Mitcheson
Steve Wright
Kate Ward
John Cookson
Oliver Bewes
Colin Carter
Glyn Price
Bev Coupe
Tom Dearing
Kate Duff
Christopher Harris

Issued by

....
Nick Hilton

Approved by

.....
Toby Gibbs

Amec Foster Wheeler

Floor 12
25 Canada Square
Canary Wharf
London E14 5LB
United Kingdom
Tel +44 (0) 203 215 1610

38199

Management systems

This document has been produced by Amec Foster Wheeler Environment & Infrastructure UK Limited in full compliance with the management systems, which have been certified to ISO 9001, ISO 14001 and OHSAS 18001 by LRQA.

Document revisions

No.	Details	Date
1	Draft 1	February 2018
2	Final Version 1	March 2018
3	Final Version 2	July 2018

Volume 1 Contents

Evidence of Competent Experts

In March 2016 RiverOak engaged the services of Amec Foster Wheeler Environment & Infrastructure UK Limited ('the Environmental Consultants') to carry out an Environmental Impact Assessment in respect of the Proposed Development and to prepare this Environmental Statement. In accordance with the Regulation 15(5)(a), (b) of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (the '2017 EIA Regulations'), RiverOak confirms that to the best of their knowledge and belief, the Environmental Consultants are competent experts within the meaning of the 2017 EIA Regulations. This belief is based on the Environmental Consultants' relevant expertise, level of experience and qualifications in preparing environmental statements. The evidence of the Environmental Consultants' competence is demonstrated in the table below.

Individual	Qualifications	Relevant Experience	Contribution to Environmental Statement
Toby Gibbs Director	CEnv CCIEEM BSc (Hons) Countryside Management	Toby is currently the Environmental Service Line lead for Europe. His role is to ensure the delivery of high technical quality across the European environmental business, and to set the strategy for its growth. Toby has worked on the environmental aspects of aviation projects in the UK and internationally for over 10 years. This includes working for Heathrow Airport for more than 10 years having had significant environmental roles on Terminal 2; the Ending of the Cranford Agreement and the Airports proposals for expansion.	Project Director Overseeing and Reviewing
Nick Hilton Technical Director	CEnv MIEMA LLM International Law MBA BSc Environmental and Life Science	Nick is a Chartered Environmentalist and Full Member of the Institute of Environmental Management and Assessment. He has 20 years of consulting experience and has held senior leadership positions within a number of consulting firms. Nick has led numerous EIA and Development Planning projects for a broad range of developments in the UK and internationally. His work spans numerous sectors including transport, energy, water, waste and mixed-use development.	Project Manager Co-ordinating, overseeing and reviewing
Emma North Senior Consultant	MEnvSci Environmental Science	Over 8 years consultancy experience specialising in EIA and environmental appraisal across a wide range of sectors. Her experience includes the preparation and co-ordination of EIAs and environmental deliverables to support a wide range of planning applications.	Author of Chapter 18: Cumulative Impact Assessment
Rachel Hicks Consultant	MSc. Environmental Dynamics and Climate Change BSc. (Hons) Geography Certificate of Competence in Environmental Noise Management	Four years' experience in writing ES chapters, specialising in air quality.	Project Manager Co-ordinating, overseeing and reviewing Author of Non-Technical Summary Author of Chapters 1-5
Kate Godsmark Consultant	Practitioner status with IEMA MSc. Integrated Environmental Studies	Eighteen months experience in the management of EIAs for highways and urban regeneration schemes, inclusive of writing ES chapters.	Project Manager Co-ordinating, overseeing and reviewing

	BSc. (Hons) Geography with a Year Abroad	Authorship of Construction Environmental Management Plans and Non-Technical Summaries for highways and urban regeneration schemes.	Author of Construction Environmental Management Plan Author of Non-Technical Summary Author of Chapters 1-5
Tom Dearing	CEnv status Full member of IEMA MSc BA (Hons)	Six years' experience in HIA. Lead author of HIA studies of multiple airports, highways schemes, urban regeneration, wind farms and electricity transmission projects.	Author of Chapter 15: Human Health and associated appendices
Andrew Buroni	Fellow of the Royal Society of Medicine Fellow of the Royal Society for Public Health PhD MSc BSc	Eighteen years' experience in HIA. Director and expert witness of HIAs for nuclear and conventional power stations, waste incineration, numerous airports, highways schemes, high-speed rail, wind farms, oil and gas, surface mines, electricity transmission and urban regeneration. Member of IEMA working group on health and EIA.	Author of Chapter 15: Human Health and associated appendices
Kate Duff Technical Director	Chartered Physicist with Institute of Physics BSc. (Hons) Applied Physics	Over twenty-five years of UK and international experience in risk management and technical safety.	Author of Chapter 17: Major Accidents and Disasters
Bev Coupe Technical Director	MSc. Transport Engineering and Operations Diploma in Planning BA (Hons) Planning Studies	Twenty-four years' experience in transport planning. Contributed to Transport Assessments, sustainable transport schemes and strategies, accessibility assessments, development frameworks and local plan inquires.	Author of Chapter 14: Traffic and Transportation and associated appendices
Glyn Price Associate Director	BA (Hons) Geography and Planning	Thirteen years' experience in transport planning gained in both local government and private industry. Specifically, over seven years' experience of preparing Transport Assessments and Transport Statements, in line with UK national policy.	Author of Chapter 14: Traffic and Transportation and associated appendices
Colin Carter Associate Director	MA Engineering BA (Hons) Engineering	Twenty years' experience providing policy, economic and financial advice across a range of industrial sectors.	Author of Chapter 13: Socio-economics and associated appendices
Martin Peirce Principal Consultant	MSc. Nonlinear Mathematics BSc. (Hons) Mathematics with Astronomy	Twenty-five years' experience in environmental modelling. Extensive experience in the calculation of emissions to air, and modelling the atmospheric dispersion of pollutants for comparison of local air quality against regulatory limit. Performed many assessments of air quality around major airports over the last fifteen years.	Author of Chapter 6: Air Quality and associated appendices
Mark Linsley Associate Director	CEnv status PhD Farmland Bird Ecology BSc. (Hons) Ecology	Over nineteen years' experience in consultancy, with a background in ecological and ornithological research starting in the early 1990s. Extensive experience of project managing a wide range of ecological and environmental projects, many from initial risk assessment	Author of Chapter 7: Biodiversity and associated appendices

		and appraisal through to the post-consent stage.	
Liz Buchanan Associate Director	MSc Water Management MSci Physics Postgraduate Certificate in Development Management APMP Examination in Project Management	Over 10 years' experience in water resources assessment, environmental impact assessment and strategic environmental assessment. Lead author or technical reviewer of EIAs for a variety of sites throughout UK, including windfarms, power stations, opencast coal mines, urban regeneration areas and industrial developments.	Author of Chapter 8: Freshwater Environment
Ian Gates Associate Director	Chartered status with Landscape Institute M. LD Landscape Architecture BA (Hons) Geography	Twenty-five years' experience in private consultancy. Amassed considerable experience in undertaking and managing landscape and visual impact assessments and has carried out over two hundred assessments, usually in the context of EIAs.	Author of Chapter 11: Landscape and Visual Impact
Steve Wright Principal Consultant	BA (Hons) Landscape Architecture OND General Art and Design	Twelve years' experience in the production of visualisations and other supporting analysis for environmental appraisal. Additional skills in the fields of landscape sensitivity and capacity assessment, with particular reference to the analysis and practical application of landscape character assessment.	Author of Chapter 11: Landscape and Visual Impact
Oliver Bewes Associate Director	BEng Acoustical Engineering Engineering Doctorate in Transport Infrastructure Engineering Chartered Engineer – Institute of Acoustics Member of the Institute of Acoustics	Twelve years of experience working in a multi-disciplinary engineering firm and more than fifteen years' experience working in the field of railway noise and vibration control. Author and reviewer of complex documents to support EIA and to discharge planning conditions on infrastructure schemes.	Author of Chapter 12: Noise and associated appendices
John Cookson Principal Consultant	Associate status with IEMA Associate status with Institute of Acoustics BSc. (Hons) Human Geography Diploma in Acoustics and Noise Control	Worked in the aviation sector since 2003 as a consultant to the aviation industry, as well as spending a number of years working for an airport. Experience across a number of environmental disciplines, including emission inventories and dispersion modelling, carbon footprinting and noise assessments.	Author of Chapter 12: Noise and associated appendices
Jackie Pitt Consultant	PhD Archaeology MSc Palaeolithic Archaeology	Ten years' experience in the commercial archaeology and historic environment sector, two of those in the public sector. Specialises in the delivery of archaeological monitoring, desk-based assessments, appraisals and EIA.	Author of Chapter 9: Historic Environment and associated appendices
John Mabbitt Principal Consultant	PhD Archaeology MA Field Archaeology BA (Hons) Ancient and Modern History	Twenty-three years' experience of professional historic environment practice and project management on a wide variety of projects. Particular expertise in EIA supported by extensive experience of archaeological fieldwork management, buildings recording and documentary research.	Author of Chapter 9: Historic Environment and associated appendices
Christopher Harris	Associate status with ICE PhD Civil Engineering	Specialises in climate change adaptation and the resilience of infrastructure systems.	Author of Chapter 16: Climate Change and associated appendices

Principal Consultant	Prince2 Practitioner Certificate in Project Management		
Barry Mitcheson Principal Consultant	Chartered Chemist with Royal Society of Chemistry MSc. Pollution and Environmental Control BA (Hons) Natural Sciences RSoBRA Controlled Waters – Permanent Gases RSoBRA Human Health – Vapour Intrusion	Over 17 years' experience in managing land quality assessment. Worked on all aspects of land quality assessment from desk studies, through planning and implementing preliminary and comprehensive site investigations and risk assessments to remedial options appraisal, management and verification of remediation works.	Author of Chapter 10: Land Quality and associated appendices
Mike Raven Principal Consultant	BSc. (Hons) Environmental Protection	Specialist skills in ornithology in addition to a wide range of other ecological competencies. Mike has particular expertise in the collection and interpretation of ornithological survey data relating to proposed development sites, for which he has prepared technical reports and ornithological chapters/text for inclusion in Environmental Statements.	Author of Appendix 7.1 No Significant Effects Report (HIA)
Tim Haines Technical Director	Fellow of Geological Society Chartered status with Geological Society PhD Geological Science BSc. (Hons) Geology	Over 30 years' world-wide experience. Wide experience across the public and private sectors including work on major civil engineering projects and the extractive industry. Broad range of technical and management skills covering private water supplies, groundwater control, EIAs, planning development and water quality and pollution.	Author of Appendix 8.1 Hydrological Impact Assessment
Ben Fretwell Associate Director	Fellow of Geological Society Chartered status with Geological Society PhD Hydrogeology MSc. Engineering Geology BSc. (Hons) Geology	Twenty years consultancy experience. Specialises in the investigation, conceptualisation, characterisation and management of contaminated groundwater since undertaking a PhD in contaminant hydrogeology.	Author of Appendix 8.2 Flood Risk Assessment

1. Introduction

1.1.1 This Environmental Statement (ES) has been prepared in support of an application by RiverOak Strategic Partners Ltd ('RiverOak') to re-open Manston Airport (the 'site'). The application seeks to authorise the re-development of Manston Airport as a freight airport (hereafter referred to as the 'Proposed Development') with the capacity to handle a minimum of 10,000 air traffic movements annually. It is envisaged that this will provide additional air freight capacity to the UK and also serve to relieve pressure from other heavily congested airports in the south-east.

1.1.2 The Proposed Development is a Nationally Significant Infrastructure Project (NSIP) under Part 3 of the *Planning Act 2008*[1] (hereafter referred to as "the 2008 Act") and therefore requires an application to be submitted for a Development Consent Order (DCO) under Section 14 of the 2008 Act. This is further explained in **Section 1.5** and in **Chapter 3: Description of the Proposed Development**.

1.1.3 The site of the Proposed Development, shown in **Figure 1.1**[i], is within the district of Thanet in Kent, located in the south-east of the United Kingdom (UK).

1.1.1 In producing this ES, consideration has been given to the consultation requirements of sections 42 and 47 of the 2008 Act and the requirements of the *Infrastructure Planning (Environmental Impact Assessment (EIA)) Regulations 2017*[2] (hereafter referred to as the '2017 EIA Regulations'), and relevant Planning Inspectorate (PINS) Advice Notes[3].

1.1 The Applicant

1.2.1 RiverOak are a UK registered company which has acquired all rights and interests, and assumed financial and operational responsibility, for the DCO in respect of Manston Airport and the anticipated re-opening and operation of the airport.

1.2 Airports and Airspace Management in the UK

1.3.1 The UK has a competitive privatised airport system with all of the major civilian airports owned and operated by private companies, corporations or individuals. There are a small number of regional airports which are in public ownership, but several of the main[ii] passenger and air cargo airports are privately owned.

1.3.2 The oversight and regulation of the airports and civil aviation sector in the UK is undertaken by the Civil Aviation Authority (CAA), a statutory corporation that is part of the Department for Transport (DfT) (refer to Box 1.1 and Aviation Regulation and the DCO Process [Document TR020002/APP/7.5][4]).

[i] This ES is supported by a number of figures provided in **Volume 4** of this ES. The reader is directed to these figures as they assist the understanding of the descriptions and assessments presented in the ES.
[ii] Classed as 'main' according to passenger numbers and air cargo volumes.

Box 1.1 CAA and European Aviation Safety Agency (EASA)
The CAA is the statutory corporation which oversees and regulates, either directly or indirectly, all aspects of civil aviation in the UK; it is a public coorporation of the DfT. 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 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 800m 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.

1.3.3 The three main London airports, by passenger numbers, Heathrow, Gatwick and Stansted, are subject to some direct controls and restrictions from the DfT on movement number and noise effects. In addition to the three main London airports, numerous regional airports exist across the UK, including in the south-east. These are primarily passenger airports. This is discussed further in **Chapter 2: The Need for the Proposed Development and the Alternatives Considered**.

1.3 Overview of the Proposals

1.4.1 There has been an operational airport at the site of the Proposed Development since 1916. Until 1998 it was operated by the Royal Air Force (RAF) as RAF Manston and for a period in the 1950s was also a base for the United States Air Force (USAF).

1.4.2 From 1998 it was operated as a private commercial airport, known as Kent International Airport. The airport offered 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 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**).

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

- Runways and taxiways suitable for the take-off and landing of a broad range of cargo aircraft;
- An area for cargo freight operations able to handle at least 10,000 movements per year and associated infrastructure, including:
  - A new Air Traffic Control (ATC) tower;
  - A fire station; and
  - A fuel farm.
- Facilities for other airport related developments, including:
  - A passenger terminal and associated facilities;
  - 19 Cargo stands;
  - 4 passenger stands;
  - 3 stands associated with the recycling facility;
  - 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 airport related organisations.

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

1.4 Legal Framework for the Environmental Statement

1.5.1 This ES presents the findings of the EIA in accordance with the 2008 Act[5], the requirement of the 2017 EIA Regulations[2] and relevant Planning Inspectorate (PINS) Advice Notes.

Defining a NSIP under The Planning Act 2008

1.5.2 The 2008 Act and related secondary legislation outlines the regime for applications granting development consent for NSIPs. It introduces a system for consenting major infrastructure, classed as large-scale developments (relating to energy, transport, water or waste) which require a type of consent known as development consent.

1.5.3 The Proposed Development is considered to be an NSIP in accordance with the 2008 Act[5], falling under section 14(1)(i) of the 2008 Act as '*airport-related development*.' Section 23 further defines *airport related development* and this Project fulfils sections 23(4) and 23(5)(b), namely that this is the alteration of an airport, the effect of which:

> "*is to increase by at least 10,000 per year the number of air transport movements of cargo aircraft for which the airport is capable of providing air cargo transport services*".

1.5.4 The Proposed Development falls into these sections 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.

1.5.5 A DCO application must be submitted to the Planning Inspectorate[iii] (PINS) and, where the development that is the subject of a DCO application is 'EIA Development', the application must be supported by an ES reporting on the findings of the EIA process; as required by the 2008 Act and the 2017 EIA Regulations.

EU Directive 2014/52/EU

1.5.6 The legal basis for EIA originally derived from European Community (EC) *Directive 85/337/EE*[6] (then further amended by *Directives 97/11/EC*[7] and *2003/35/EC*[8]), the amended directive being consolidated as *Directive 2011/92/EU*[9]. Subsequent to this, *Directive 2011/92/EU* has been substantially amended by *Directive 2014/52/EU*[10].

1.5.7 *Directive 2014/52/EU* applied in the UK as of 16 May 2017 and resulted in its transposition into UK Law as the *National Infrastructure Planning (Environmental Impact Assessment) Regulations 2017* ('the 2017 EIA Regulations'). The publication of the Regulations introduced transitional arrangements. Projects which were the subject of a (duly made) Scoping Opinion Request or for which an ES has been prepared and submitted to the determining authority, prior to 16 May 2017, are considered under the 2011 EIA Regulations. However, projects which are the subject of a Scoping Opinion Request after 16 May 2017 are considered under the 2017 EIA Regulations.

1.5.8 Due to the Scoping Report being submitted in June 2016 and the subsequent Scoping Opinion being received in August 2016, there is no formal statutory requirement for the ES to be conducted under the 2017 EIA Regulations. However, at the developer's discretion, the EIA documentation that accompanies the DCO application has been prepared to incorporate the requirements from the

[iii] PINS is responsible for examining the application and then making a recommendation to the Secretary of State for Transport as to whether or not development consent should be granted or refused.

2017 Regulations. This is to ensure a robust approach is undertaken to meet the new requirements.

The need for an EIA under the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

1.5.9 The 2017 EIA Regulations[2] stipulate that an EIA is required prior to the granting of development consent for certain types of development projects. For some NSIPs EIA is mandatory (defined under Schedule 1), whilst others only require EIA if they are likely to have significant effects on the environment by virtue of their nature, size or location (defined in Schedule 2).

1.5.10 The Proposed Development falls under a broad set of criteria outlined in both Schedule 1 and Schedule 2 of the 2017 EIA Regulations. The Proposed Development falls under paragraph 7(1) of Schedule 1 – '*Construction of lines for long-distance railway traffic and of airports with a basic runway length of 2,100 metres or more'* - since the runway length exceeds that of the stated threshold. The Proposed Development also falls under 10(e) Construction of Airfields and 13(1) of Schedule 2, which state the following:

> ***'10(e)** Construction of airfields; and*
>
> ***13(1)** Any change to or extension of development of a description listed in Schedule 1 to these Regulations (other than a change or extension falling within paragraph 21 of that Schedule) or in paragraphs 1 to 12 of this Schedule, where that development is already authorised, executed or in the process of being executed, and the change or extension may have significant adverse effects on the environment.'*

1.5.11 Therefore, RiverOak have undertaken an EIA because of the characteristics, location and potential impact of reopening Manston Airport.

1.5.12 This ES presents the likely significant environmental effects of the Proposed Development during construction and following completion (also referred to as the operational stage). The ES also identifies mitigation measures to prevent, reduce and, where possible, off-set any significant adverse effects on the environment and the residual effects remaining thereafter. The results of the assessment and recommended mitigation measures are outlined in each individual Technical Chapter (**Chapters 6 – 17**) of this ES.

1.5.13 The scope of the ES has been agreed with PINS through a submission of an EIA Scoping Report (**Appendix 1.1**) and receipt of a Scoping Opinion (**Appendix 1.2**). Further refinement of the scope has occurred throughout the assessment process including consideration of comments received after publication of the 2017 and 2018 Preliminary Environmental Information Reports (PEIR). This is discussed in each of the Technical Chapters (**Chapters 6-17**). These reports provided preliminary environmental information relating to the potential environmental effects associated with the Proposed Development. The 2018 PEIR also contained information relating to the scope for additional chapters required under the 2017 EIA Regulations.

1.5.14 Where considered necessary, additional consultations have been undertaken with the relevant consultees as part of the EIA process. Further details are included in the respective Technical Chapters within the ES (**Chapters 6-17**).

1.5 Structure of Environmental Statement

1.6.1 This ES has been prepared on behalf of RiverOak as part of the requirements of the application process for NSIPs that are EIA Development.

1.6.2 An overview of the methodology adopted for each technical discipline is provided in the respective Technical Chapter (**Chapters 6-17**). This ES contains the information specified in Schedule 4 of the 2017 EIA Regulations and comprises of 26 Volumes and a Non-Technical Summary (NTS) as described below.

Non-Technical Summary

1.6.3 This is a standalone non-technical document which serves as a summarised version of the ES. It is intended to be accessible by a range of audiences, providing them with a clear outline of the Proposed Development, the environmental impacts and subsequent mitigation strategies to avoid or lessen the potential impacts.

Volume 1, 2 and 3: Environmental Statement – Main Text

1.6.4 This describes and reports the outcomes of the EIA undertaken for the Proposed Development.

1.6.5 Schedule 4 of the 2017 EIA Regulations[2] stipulates that the following should be included within an ES:

> *"A description of the likely significant effects on the factors specified in regulation 5(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development..."*
>
> *" A description of the factors specified in regulation 5(2) likely to be significantly affected by the development: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape."*

1.6.6 This ES therefore includes an assessment of the likely environmental effects of the Proposed Development that are considered likely to be significant. This reflects the above requirement of the 2017 EIA Regulations[2] for an ES to assess in detail only those effects that are likely to be significant.

1.6.7 Additionally, GHG emissions are accounted for in **Chapter 16: Climate Change**, however, other potential transboundary effects are also covered in the appropriate Technical Chapters (**Chapter 6-17**) for the airspace change process.

1.6.8 The 2017 EIA Regulations do not define significance; the overall approach that has been taken to define significance, as well as further information about the approach to preparing the ES, is outlined in **Chapter 5: Approach to the Environmental Statement**.

1.6.9 **Volume 4**: Figures

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

Volume 5 – 26: Technical Appendices

1.6.11 **Volumes 5 - 26** contains the full text of a number of surveys and technical assessments undertaken as part of the EIA, as well as relevant survey and modelling data, such as the EIA Scoping report, Preliminary Ground Appraisal Reports, results of modelling for air quality and noise and ecological survey reports. lists the mandatory requirements that Schedule 4 stipulates compliance with, alongside their location within this ES.

1.6.12 The ES is divided into Chapters and supported by a series of figures (**Volume 4**) within the main statement and technical appendices as appropriate (**Volumes 5 - 26**). The ES Chapters are as follows:

- **Chapter 2** outlines the need for the Proposed Development and the reasonable alternatives that have been considered.
- **Chapter 3** describes the Proposed Development, including information on how it would be constructed and operated.

- **Chapter 4** provides an overview of the relevant planning policies to establish the development parameters within which the Proposed Development would be acceptable.
- **Chapter 5** summarises the approach that has been used to undertake the impact assessment.
- **Chapter 6** provides the assessment results of the Proposed Development effects on air quality.
- **Chapter 7** sets out the likely significant effects of the Proposed Development on biodiversity.
- **Chapter 8** sets out the effects of the Proposed Development on the freshwater environment.
- **Chapter 9** provides the results of an historic environment assessment on the Proposed Development.
- **Chapter 10** sets out the results of an assessment of the effects of the Proposed Development on land quality.
- **Chapter 11** sets out the landscape and vision assessment of the Proposed Development**.**
- **Chapter 12** provides the assessment of the likely significant noise impacts arising from the Proposed Development.
- **Chapter 13** sets out the socio-economics assessment of the Proposed Development.
- **Chapter 14** sets out the results of the traffic and transportation assessment of the Proposed Development.
- **Chapter 15** provides the relevant information associated with the assessment of impacts on Human Health.
- **Chapter 16** provides the relevant information associated with the assessment of the impact of the Proposed Development on Climate Change.
- **Chapter 17** provides the relevant information associated with the assessment of impacts resulting from the risks associated with Major Accidents and Natural Disasters.
- **Chapter 18** sets out the results of the cumulative effects assessment of the Proposed Development.

Table 1.1 Location within this ES of the information required by Schedule 4 of the 2017 EIA Regulations

Schedule 4, Part 1	Topic Chapters and Document References
Description of the development / physical characteristics of the whole development	**Chapter 3** – Description of the Proposed Development
Outline of the main alternatives	**Chapter 2** – The Need for the Proposed Development and the Alternatives Considered
Description of the aspects of the environment likely to be significantly affected and the likely significant effects	
Population	**Chapter 11** - Landscape and Visual; **Chapter 12** - Noise; **Chapter 6** - Air Quality; **Chapter 13** - Socio-economics; and **Chapter 14** - Traffic and Transport.
Fauna	**Chapter 7** - Biodiversity
Flora	**Chapter 7** - Biodiversity
Soil	**Chapter 10** - Land Quality

Schedule 4, Part 1	Topic Chapters and Document References
Water	**Chapter 8** - Freshwater Environment
Air	**Chapter 6** - Air Quality; and **Chapter 14** - Traffic and Transport
Climatic Factors	**Chapter 8** - Freshwater Environment
Material assets, including the architectural and archaeological heritage	**Chapter 9** - Historic Environment
Landscape	**Chapter 11** - Landscape and Visual
Risks to Human Health	**Chapter 15** - Human Health; and Health Impact Assessment (HIA) (**Appendix 8.1**)
Major Accidents and Disasters	**Chapter 17** - Major Accidents and Disasters
Waste	**Chapter 3** – Proposed Development description and Construction Environmental Management Plan (CEMP). Effects of Waste considered in ES specialist technical chapters.
Climate Change	**Chapter 16** - Climate Change
Monitoring	**Chapters 6 – 17** Specialist technical chapters and **Chapter 3 -** Description of the Proposed Development.
The inter-relationship between the above factors	**Chapters 6 – 17**, as appropriate.
Cumulative Effects	**Chapter 18** - Cumulative Effects
Description of the reasonable alternatives to include 'comparison of the likely environmental effects'	**Chapter 2** - The Needs for the Proposed Development and the Alternatives Considered
Description of the measures to prevent, reduce and where possible offset any significant adverse effects on the environment	**Chapters 6 – 17**, as appropriate.
A non-technical summary	NTS
An indication of the difficulties encountered in compiling the required information	**Chapters 6 - 17**, includes discussion of these, as relevant.
Applicant to ensure that the ES is prepared by competent experts and the application must be accompanied by a statement from the applicant outlining the relevant expertise or qualifications of such experts.	**Chapter 1** – Introduction includes a Table of Competent Experts at the front.
Requirement to ensure the Habitats Regulations Assessment (HRA) and EIA are coordinated	HRA based on the outputs from ES Chapters including Biodiversity, Noise, Air Quality, Surface Water, Land Quality and Hydrogeology.

Volume 4: Figures

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

Volume 5 – 26: Technical Appendices

1.6.14 **Volumes 5 - 26** contains the full text of a number of surveys and technical assessments undertaken as part of the EIA, as well as relevant survey and modelling data, such as the EIA Scoping report, Preliminary Ground Appraisal Reports, results of modelling for air quality and noise and ecological survey reports.

REFERENCES

[1] Planning Act 2008 S23(4)(a) -(b) and (5)(a)-(b) (2008) [online] Available at http://www.legislation.gov.uk/ukpga/2008/29/pdfs/ukpga_20080029_en.pdf [Accessed 29/01/2018]

[2] The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 [online] Available at http://www.legislation.gov.uk/uksi/2017/572/contents/made [Accessed 29/01/2018]

[3] Planning Inspectorate (various) National Infrastructure Planning Advice Notes [online] Available at https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/ [Accessed 29/01/2018]

[4] Osprey Consulting (2017) Aviation Regulation and the Development Consent Order Process

[5] Planning Act 2008 [online] Available at http://www.legislation.gov.uk/ukpga/2008/29/pdfs/ukpga_20080029_en.pdf [Accessed 29/01/2018]

[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

[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

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

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 £52bn or 3.4% to UK Gross Domestic Product (GDP)[1]. 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 £140bn, and an estimated 40%, by value, of the UK's trade with economies outside of the EU is carried by air[2].

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[3]. 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)[4].

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[5].

2.1.4 Should UK airports be unable to meet the increased demand for air freight and air freighters, some 2.1m tonnes of freight would be diverted elsewhere by 2050, mainly to Northern European airports[6].

2.1.5 London's six airports - Heathrow, Gatwick, Stansted, Luton, London City and Southend - facilitate approximately 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[7].

2.1.6 Further information on the UK aviation sectors, including a qualitative study of potential demand, has been undertaken by Azimuth Associates[8] (the Azimuth Report, document TR020002/APP/7.4), and is included as part of the consultation materials. The Azimuth Report identifies a number of issues, which the Proposed Development aims to address, 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 addition to helping meet air freight capacity requirements, the Proposed Development would bring significant economic benefit to the area. Since the closure of the Pfizer plant near Sandwich in 2012 and Manston Airport in 2014, east Kent has not been host to a significant high-tech employer. Re-opening Manston is predicted to bring 3,417 direct jobs and a total of 23,235 direct, indirect, induced and catalytic jobs to the local, regional and UK economy by the 20th year of operation. To ensure the demand for skilled workers can be met locally, RiverOak is also working with local educational institutions to establish complementary education and training programmes.

2.1.8 In promoting the 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, as well as contributing significantly to the local economy in the long-term.

2.2 Characteristics of an Air Freight Airport

2.2.1 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 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. Providing sufficient aviation capacity to meet future airfreight demand is, as stated in a study by Oxford Economics[9], a first step to encouraging future trade growth.

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 and the design of the Proposed Development.

2.2.4 The characteristics of an optimal air freight airport, based on the developing or enhancing of an existing airport site[8], would include:

- A 2500m+ (non-grass) runway capable of supporting CAT II/III runway operations;
- Upgrading existing airport infrastructure with the capacity to provide facilities for new airfreight operators, according to demand;
- Certified, or the ability to obtain an Aerodrome Certificate 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 provide warehousing and handling facilities to hold freight;
- Air freight operations not constrained by passenger and other operations;
- Airspace that is outside of the London Control Zone (also known as the Controlled Traffic Region (CTR)) to provide maximum flexibility and capacity for airport operations;
- Good surface access to the strategic road network with no bottlenecks to access in or around the airport and an additional advantage of 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 an additional advantage of a good connection to continental Europe.

2.3 Consideration of Alternatives for an Air Freight Airport

2.3.1 In accordance with the *Infrastructure Planning (Environmental Impact Assessment) Regulations 2017* set out within paragraph (2) of Schedule 4 the ES must provide:

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

2.3.2 In considering the reasonable alternatives, consideration has been given to the characteristics of an air freight airport as outlined in **Section 2.2** and the information on the current airport capacity and constraints within the UK aviation sector[8].

2.3.3 The following options have been considered:

- 'Do Nothing' alternative: where the Proposed Development is not progressed;
- Alternative locations for the Proposed Development; and
- Alternative design/layout in the context of the design evolution.

Do Nothing Alternative

2.3.1 All six London airports will reach capacity by 2030.

2.3.2 London and the south-east has a lack of airport capacity, with sustained losses in potential trade running at £2bn/year without additional runway capacity[10]. Without increased air freight handling capacity, the existing forecast demand will not be met and the UK aviation sector and wider UK economy will not be able to grow or capture new market share. The option to do nothing is therefore not viable.

2.3.3 Sites within the UK capable of providing the facilities to meet the predicted air freight demand are limited and heavily constrained. Many sites that could have provided air freight capacity have been lost through redevelopment. To do nothing may result in the site being lost to the airport sector particularly given that there are development pressures to change its use.

2.3.4 In terms of the site, the do-nothing option would result in a gradual deterioration of the existing infrastructure on the site. The implications of such decline are difficult to predict. However, there would be an inevitable 'return to nature' as vegetation takes hold and species move onto the abandoned site. This is likely to be offset by the continued decline of facilities and the likely socio-economic effects (misuse etc.) associated with an abandoned brownfield site in a semi-rural area.

Strategic Alternatives to Manston Airport

2.3.5 As outlined in paragraph 2.1.5, and in the Azimuth Report, 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, with only Stansted and Heathrow handling significant amounts. However, these six 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 constraints to the increase in air freight at these airports is provided below.

Stansted Airport

2.3.6 Cargo-only flights account for approximately 8% of ATMs at Stansted, and the airport is currently prevented from operating to its maximum capacity due to the conditions of its consent[11]. It seems likely that the airport's owners, Manchester Airport Group (MAG), will want to maximise the use of their infrastructure. This is in line with the Department for Transport's (DfT) desire to make full use of existing capacity. However, it is also highly likely to focus heavily on the passenger market[8].

Heathrow Airport

2.3.7 In 2016 Heathrow handled approximately 65% of the UK's air freight, but very few dedicated cargo aircraft used the airport[12]. More than 99% of air freight at Heathrow is carried as belly hold on passenger aircraft[13].

2.3.8 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 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.

2.3.9 In 2015, Heathrow Airport Limited announced their intention to overhaul their cargo facilities, with the key aim of reducing the current processing time to approximately 4 hours[14]. However, this is still considerably longer than Manston's previous and proposed processing times for freight[8]. Furthermore, as York Aviation figures indicate, there will be a shortfall of slots for dedicated freighters in the south-east in the region of 45,000 by 2050, even with the addition of a third runway at Heathrow[15].

2.3.10 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 Airport

2.3.11 Gatwick handles very few dedicated freighters - none in 2016 and one in 2017. Given its small focus on this sector and limited experience, which is a key element in the choice of a freight airport for operators[16], Gatwick is unlikely to be 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 annually from 2050[17]; it can therefore be concluded that even with additional runways at both Heathrow and Gatwick, a shortfall in capacity will remain.

Luton Airport

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

2.3.13 The current number of stands at Luton is unable to support significant growth[18]. The airport has outlined plans for expansion via the publication of 'Vision for London Luton Airport's (LTN) Sustainable Growth 2020-2050'[19], with the vision of making:

> *"the best use of the existing runway at LTN to provide the maximum benefit to the local and sub-regional economy; to deliver good levels of service; and to actively manage environmental impacts at the local and wider levels in line with our commitment to responsible and sustainable development."*

2.3.14 The focus of this growth is within the passenger market, increasing the airport capacity from 12 million to 18 million passengers per annum (mppa) by 2021, with potential for growth up to 36 – 38 mppa by the late 2030s.

2.3.15 Luton's business profile is similar to Stansted's in terms of the dominance of Low Cost Carriers; the airport is therefore focused on passenger traffic, also highlighted within its sustainable growth plan. Therefore, it would be improbable for the airport to provide a hub for dedicated freighters.

London City Airport

2.3.16 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 69 tonnes of freight in 2016[12]. London City has a short and constrained runway, at 1,900m, and is therefore unable to support a large freighter operation.

Southend Airport

2.3.17 Southend Airport is focused on the Low Cost Carrier passenger market, handling only 5 tonnes of freight in 2015[20] and none in 2016, which is the last time it is recorded as handling freight[12]. Although extended in 2012, Southend's runway is too short for large aircraft and therefore unlikely to be suitable for long or mid-range freighter aircraft.

Other South-East UK Airfields

2.3.18 Alternative options for increasing air freight capacity in the south-east have been identified. However, as shown in **Table 2.1** each are subject to fundamental constraints on their development and on their ability to meet the requirements outlined in **Section 2.2**.

Table 2.1 Other airfields in the south-east

Airfield	Main Constraints to airfield providing necessary freight capacity
Biggin Hill	Biggin Hill Airport has one operational paved runway, 1,808m in length, which is too short for large freight aircraft to operate on. Equally, the runway orientation (south-west to north-west positioning) and its proximity to Gatwick Airport causes numerous airspace issues. The airport's geographical positioning on top of a hilltop means that it is often subject to adverse weather conditions due to its elevation, which would likely interfere with airport operations. It is also relatively rurally located, with poor links along single carriageway roads to major motorways (e.g. M25, M26, M23 etc.). These routes are unlikely to be able to support HGV movements associated with incoming and outgoing freight. The airport also has restricted operating hours, with no night flights permitted.
Farnborough	The airport is located on former Ministry of Defence (MoD) land and has two operational paved runways of approximately 2,400m and 2,450m in length respectively. Airport operations are currently limited to business aviation, involving executive jets and other aeroplanes/helicopters operating as corporate aircraft or air taxis. Under current planning permission, only business aircraft are permitted to use the aerodrome. Schedule passenger, freight, tour services and recreational flying are not permitted[21]. Present freight movements are limited to 100kg per aircraft, making the site unsuitable for development as a freight airport. Furthermore, there are restrictions on the number of aircraft movements (50,000 per annum), with no night flights (restricted to 07:00-22:00 on weekdays and 08:00-20:00 on weekends)
Lydd	Lydd Airport is rurally located, with relatively poor surface transport connectivity. Despite development plans to extend its short runway by 300m, its proposed extended length would still mean that larger aircraft can only take off with a restricted payload, limiting the carrying capacity of freight aircraft. Future development plans also highlight that aircraft numbers will be capped and that flying hours would be limited to 07:00-23:00 (i.e. no night flights). The airport also has considerable approach issues, with the presence of a MoD firing range (Hythe Firing Range) and the proximity of the nuclear power plant, Dungeness Power Station (approximately 5km south-east of the existing airport). These raise safety concerns with large-scale freight operations.
Northolt	Northolt is a Royal Air Force (RAF) station, approximately 10km north of London Heathrow. Its proximity to Heathrow raises safety issues and expansion of the site would likely impact upon Heathrow's own airspace capacity. The airport currently has one operational paved runway, approximately 1,600m in length and 46m wide. The current structure of the runway would not be able to support large freight aircraft, since it is too short.
Rochester	The airport currently has two cross wind operational grass runways, with a length of 830m and width of 32m. The current structure of these runways presently would not be able to support large freight aircraft. Although there are proposals to construct a paved runway at the existing airport, again this will be too short (anticipated length of 830m) and limit usage to certain aircraft types and categories. The airport does not have the supporting infrastructure in place to facilitate large-scale freight operations; infrastructure on site includes three hangers, aviation offices, control tower, fuel installations, museums and flying schools. Additionally, the airport has no plans to increase aircraft movements and has restricted operating hours.
Shoreham	The airport currently has two operational grass runways and one paved runway and is almost exclusively used for helicopter flights and light aircraft. The paved runway is 1036m long, while the grass runways are 877m and 400m respectively. The current structure of these runways would not be able to support large freight aircraft. The airport is adjacent to the A27, the only east-west trunk road south of the M25; transport links to the north in proximity to the existing airport are poor, supported only by single carriageway A roads (e.g. A283 and A24. Current links to the A27 would need to be re-c). Further west is the A3(M) and M27, however access to these motorways would mean travelling through the heavily congested areas of Worthing and Chichester. Furthermore, existing access from the airport to the A27 would need to be configured in order to support HGV movements associated with the incoming and outgoing freight. It is highlighted that '*without investment in road infrastructure, the ability of the private and public sectors to develop and invest in the Shoreham*

Airport area is unlikely'.

Shoreham Airport is also highlighted in the Adur Local Plan[22] as a site of strategic development, with a vision of creating 15,000 sqm of new employment generating floorspace focused on non-aviation/aviation businesses, industry and storage. As such the airport is already safeguarded for other future development.

Airports Outside of the South-East

2.3.19 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 and/or willingness to focus primarily on air freight and air freighters and, with the exception of the Proposed Development, no airports in the south-east have either the existing airport infrastructure or the ability for the new infrastructure to support air freight to be relatively easily created.

2.3.20 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.

2.3.21 However, East Midlands serves a wide catchment area, with many of the businesses 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 and beyond. Therefore, total time taken to deliver from origin to final destination increases, particularly around the bottlenecks on the strategic road network.

Manston Airport - The Preferred Option

2.3.22 The requirements for an optimal air freight airport, as set out in **Section 2.2 above**, have been considered in relation to the Proposed Development at Manston Airport.

2.3.23 Manston Airport is located outside of the CTR 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.

2.3.24 Manston Airport has an existing 2,748m long paved runway, which, with only minor alterations and new navigational aids and equipment (see **Chapter 3: Description of the Proposed Development**, **Section 3.2**), would be able to obtain an Aerodrome Certificate from the EASA to allow it to handle the larger classes of aircraft that are used and operated by air freight carriers.

2.3.25 As is highlighted 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. In addition, it has sufficient space on the 'Northern Grass' area to accommodate the airport related businesses that can be seen occupying premises in and adjacent to the vast majority of UK and European airports together with the airports surveillance radar systems.

2.3.26 Whilst there are some constraints to the Proposed Development at Manston Airport, for example being located to the south-east of London with greater road journey times to the North and West of London and the centres along the M4 corridor than, for example, Heathrow, these are offset by the unique advantages of the proposals which include: an existing 2,748m 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. None of which are likely to be sustained by any of the other airports in the south of England.

2.3.27 Taking the above into consideration, Manston Airport is considered to be the most 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'*[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 master planning process has also given consideration to on-site alternatives for individual elements and components of the Proposed Development. This has been undertaken as part of the on-going project evolution (see **Section 5.5**) as part of the project design process.

2.4.2 Although constrained by the existing site layout including the position of the runway, taxiways and airport buildings, a number of alternative layouts, designs and configurations were considered for the air freight and cargo facilities. Nonetheless, one of the guiding principles throughout the evolution of the design has been to minimise disruption to existing hardstanding areas in order to ensure protection of the lord of the manor water source beneath the site. This principle further constrains the viable options for alternative site layouts, particularly in terms of airside components of development.

2.4.3 Alternatives considered therefore focussed on areas where key environmental gains could be made, in particular looking at potential locations for the fuel farm (paragraphs 2.4.11-2.4.13), flight configuration including runway preference and measures that may be required during the construction of the site such as the location of compounds and hours of working.

2.4.4 Additional measures 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 were considered and integrated into the design throughout the production of the ES.

2.4.5 Further information on how environmental impacts influenced the evolution of the Proposed Development design is provided in the sections below.

Site Access

2.4.6 Site access, including the access for Heavy Goods Vehicles (HGVs), passengers, staff and fuel deliveries, was considered as part of this process. When Manston Airport was previously operating the airfreight, facilities access was from Spitfire Way (B2190), with all other parts of the airport accessed from Manston Road (B2050). Neither 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.

2.4.7 Alternative access for vehicles associated with airfreight operations considered using the existing airfreight access, a new single airport access located along Manston Road (B2050), or a new dedicated air freight access. It was the latter 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.

2.4.8 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 Transport.**

Surface Water Infrastructure

2.4.9 The design of the surface water capture, treatment and drainage system has also been subject to 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. Any changes to airside infrastructure have been minimised in part to limit risks to aquifer.

2.4.10 More detail on these elements are presented within **Chapter 8: Freshwater Environment** of this ES, the Flood Risk Assessment (FRA) and illustrated on the drainage layout, all of which will be included within the suite of Development Consent Order (DCO) application documents.

Fuel Farm

2.4.11 The location and design of the new airport fuel farm has also been 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 (CAA);
- 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.

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

2.4.13 A technical note on the alternative fuel farm locations and design evolution has been prepared (**Appendix 2.1**).

Northern Grass Area

2.4.14 Given the constraints, the ‘Northern Grass’ area was given particular attention during the beginning of the design process, with a series of environmental design principles being developed early in the process that then led to the creation of a zonal masterplan reflecting appropriate land uses in areas of the site with greater sensitivity such as those closer to residential receptors.

2.4.15 Design principles centred around a number of areas considered critical to environmental protection including noise minimisation, transport and access, landscaping and visual impact and odour.

2.5 Consideration of Environmental Mitigation Options

2.5.1 Alternatives for the operating procedures of aircraft using the Proposed Development have been considered with a view to mitigating potential impacts, whilst also ensuring that the safety of aircraft taking off and landing is not compromised.

2.5.2 Osprey Consulting Services, a leading technical consultancy specialising in operational and engineering support to aviation projects, were commissioned to work with Amec Foster Wheeler to review the potential operational and safety risks associated with environmental mitigation measures that may be implemented at Manston Airport. Principally, the environmental effects being considered were those on noise and vibration, in particular the noise from aircraft on take-off, departure, overflight and taxiing/ground operations. However, other potential environmental effects, for example on air quality or traffic and transportation for the operational alternative were also given consideration.

2.5.3 The alternatives considered are based upon standard practices and procedures that could be implemented at Manston Airport, accounting for Best Available Technology (BAT) that is being implemented at other similar airports in the UK and Europe.

2.5.4 It should be noted that the final design and approval of Manston Airport's flight paths and other operating procedures will not be undertaken as part of the DCO. This will be authorised by the CAA via a proposal for an Airspace Change Process (ACP). Therefore, in considering the operational alternatives all CAA guidance, as well as that from other relevant airport and aviation bodies (e.g. International Civil Aviation Organisation (ICAO)), has been considered.

2.5.5 The Noise Mitigation Plan (2018)[24] [Document number TR020002/APP/2.4] discusses the key operational alternatives considered.

2.5.6 The operational alternatives considered by the report were:

- Inset thresholds (of 100m, 250m and 500m);
- Altering runway length (of 100m, 250m and 500m);
- Altering the approach profile of aircraft; and
- Runway preference.

Inset Thresholds

2.5.7 The runway threshold is the beginning of the portion of runway that is usable for landing. One proposed method of mitigating the impact of aircraft noise is to inset the runway threshold, thereby moving the approach profile of an aircraft closer to the airfield and the aircraft touchdown point further along the runway. This would mean that aircraft fly at higher altitudes as they pass over communities located near the airport; in principle, the increased distance between aircraft and local communities would therefore potentially reduce noise levels experienced on the ground.

2.5.8 Information provided within **Appendix 2.2** concludes that an inset threshold exceeding 500m would have a significant operational impact on Manston Airport, precluding the use of aircraft types that are universally used in the cargo fleet. In terms of the environmental benefit of such an approach, a 500m inset threshold only results in an 86ft difference in aircraft height, resulting in less than a 0.5dB reduction in noise at 500ft. Noise benefits of an inset threshold reduce significantly with distance. At 4,000m, the distance between Manston Airport's eastern threshold and the western extent of Ramsgate, any noise benefit would be reduced by 75%; even at 1,400m, the closest point between the western edge of Ramsgate and Manston's easterly threshold, the benefit is likely to have been reduced by 50%.

2.5.9 Evidence indicates that an inset threshold will reduce the noise impact on areas surrounding Manston Airport; however, calculations suggest that the benefits will be minimal and extremely localised. Inset distances required to create a significant noise reduction would put restrictions on the types of aircraft operating at the re-opened Airport, if the former runway dimensions were utilised.

2.5.10 On the grounds that the impact of even large inset thresholds is negligible on noise reduction, and their operational impact is so great, it is considered that this option is not a feasible noise mitigation measure.

Altering Runway Length

2.5.11 Extending a runway's length would cater for an inset threshold without reducing the landing distance available (LDA)[i]. The take-off distance available (TODA)[ii] is a less significant factor, since modern aircraft do not utilise full runway lengths.

[i] LDA – The length of the runway that is declared available and suitable for the ground run of an aeroplane landing.

2.5.12 The cost associated with extending a runway is far greater than costs for runway construction. In addition, there is the potential for further infrastructure construction costs, including adjusting ground based radio navigation aids, airport lighting and runway markings. A conservative estimate for purely the construction of a 500m runway extension would likely exceed £8m. This assumes that the land is available for development and other airport safeguarding criteria (other buildings in the vicinity of the airport) can be met. A westerly runway extension at Manston Airport would require the removal of approximately 30 properties at Smugglers Leap Park, a property on Mount Pleasant Road and the re-modelling of the A253, the B2190 and the Minster Roundabout. These would add further significant costs.

2.5.13 As described previously, an inset threshold and associated runway extension of this size would likely result in a very marginal noise reduction. Consequently, although it would allow aircraft to operate at higher maximum landing weight (MLW), even in wet conditions, the potential cost of extension would outweigh any benefits with respect to noise reduction.

2.5.14 The rationale for increasing runway length is that an inset threshold can be added whilst maintaining the LDA. Analysis has shown that the effect of an inset threshold is localised, unless the displacement is very large (i.e. 500m-1,000m). In addition to excessive cost, extending the runway at Manston by this length would be a massive engineering project, with associated planning permission, environmental constraints and potential public objection to contend with. All this would be to create an inset threshold that would only have limited highly localised benefits as previously described.

2.5.15 The runway at Manston Airport is one of the longest available in the UK. Extending it would inevitably lead to additional environmental impacts; it is not considered that the environmental and economic costs would justify the minimal noise benefit of a displaced threshold. Therefore, this option is not considered as a feasible noise mitigation measure.

Altering the Approach Profiles

2.5.16 Steeper approach profiles can be used to mitigate the noise effect of aircraft over noise sensitive areas. However, the associated impact on aircraft certification, pilot training, aircraft operator and airport infrastructure requirements, as well as the related cost to airport operational and regulatory changes, must also be considered.

2.5.17 Factors considered in how the alteration of approach profiles would affect environmental effects and therefore be a viable alternative for Manston Airport (as outlined in **Appendix 2.2**) included:

- Regulatory factors;
- Aircraft certification requirements;
- Pilot operational implications;
- Aircraft speed; and
- Tailwind tolerance.

2.5.18 The possibility of combining inset thresholds with steeper approach profiles was also considered. The assessment concluded that introducing a steeper approach to a foreshortened runway would not significantly reduce the noise profile or meet ICAO requirements of ensuring that runway length is '*safe and sufficient for all operational requirements'.*

2.5.19 In accordance with ICAO documentation, the steepest approach angle permissible is 3.5°. There are a number of issues associated with the introduction of steeper approach profiles, which include but are not limited to the following:

- Requirements for aircraft certification;

[ii] TODA – The length of the take-off run available plus the length of the clearway beyond the runway, where provided.

- Exclusion of operating of certain aircraft models;
- Steeper approach angles prevent the use of poor weather approaches such as CAT II/III operations;
- Potential for additional pilot training and subsequent increase in costs for airline operators; and
- Capital costs associated with updating ground equipment, safety studies and regulatory approvals.

2.5.20 Due to the negligible effect on noise reduction that a 3.5° approach would have, it is considered that this option is not a feasible noise mitigation measure.

Runway Preference

2.5.21 Generally, the runway-in-use is selected to most closely align to the prevailing surface wind direction, with other factors such as local adjacent air traffic patterns and the position of the sun taken into account.

2.5.22 **Figure 2.1** provides a simplified flow diagram of an airport using the conventional method of same runway for departures and arrivals. **Figure 2.2** shows the issues associated with departures and arrivals from opposite runways.

Figure 2.1 Diagram demonstrating same way runway operation

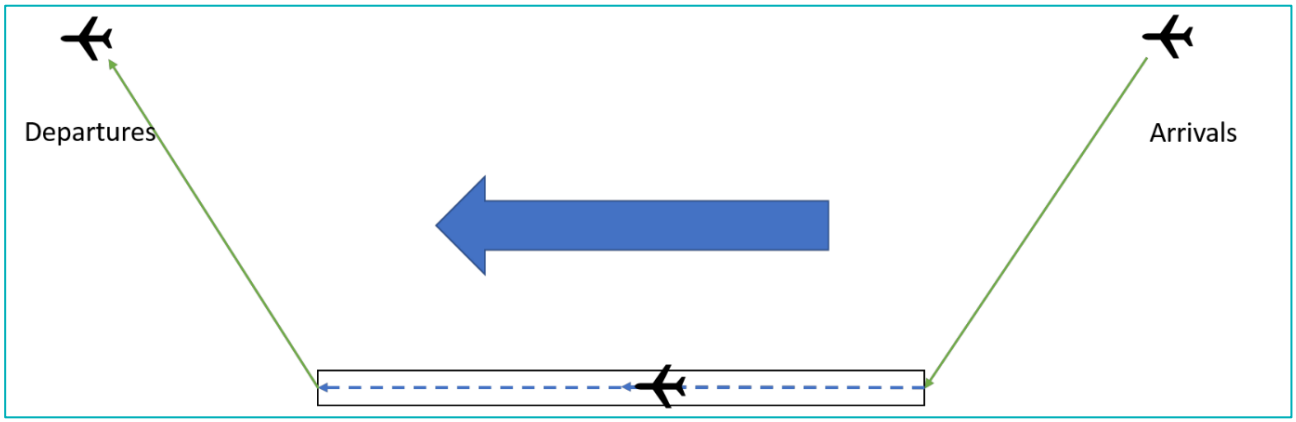
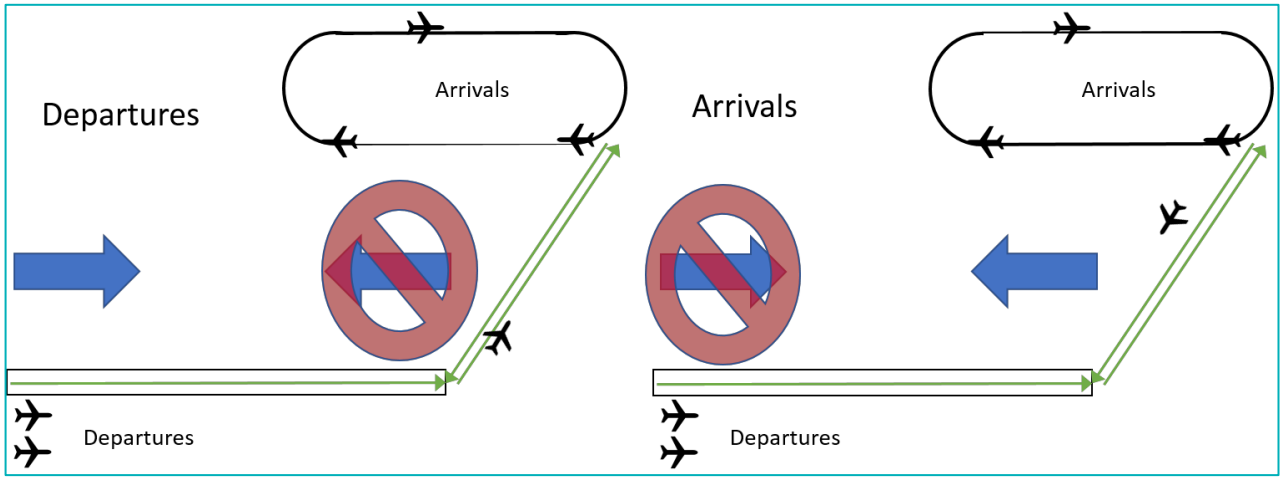


Figure 2.2 Diagram demonstrating opposite direction runway operations on the same runway.



2.5.23 Landing into a headwind is a preferred option for pilots; landing with a tailwind results in aircraft approaching the runway at higher speeds. This necessitates the requirement for a longer runway as the aircraft is travelling faster when landing.

2.5.24 Utilising a runway in deference to the ideal wind conditions has the risk of causing a higher rate of unsuccessful landings, increasing the number of aircraft forced to conduct a circuit to attempt a successful landing or executing a Missed Approach Procedure. Any of these events would undermine the noise reduction benefits associated with preferential runway selection.

2.5.25 Whilst prevailing wind conditions may preclude this option at times, utilising one runway for inbound aircraft and the opposite runway direction for outbound aircraft could reduce the impact of noise on the unused side of the airport. Consequently, it is considered that, having taken into account a range of factors including wind direction, this option may under certain circumstances be a feasible operational alternative.

REFERENCES

[1] Oxford Economics (2015), Economic Benefits from Air Transport in the UK [online] Available at http://www.oxfordeconomics.com/my-oxford/projects/281929 [Accessed 31/01/2018].

[2] Airports Commission (2015) Airports Commission: Final report [online] Available at https://www.gov.uk/government/publications/airports-commission-final-report [Accessed 31/01/2018].

[3] Eurocontrol (2013), Challenges of Growth 2013: Summary Report. European Commission: Brussels [online] Available at https://www.eurocontrol.int/sites/default/files/content/documents/official-documents/reports/201307-challenges-of-growth-summary-report.pdf [Accessed 31/01/2018].

[4] Boeing (2016) World Air Cargo Forecast 2016-2017 [online] Available at http://www.boeing.com/resources/boeingdotcom/commercial/about-our-market/cargo-market-detail-wacf/download-report/assets/pdfs/wacf.pdf [Accessed 31/01/2018].

[5] Boeing (2016) World Air Cargo Forecast 2016-2017 [online] Available at http://www.boeing.com/resources/boeingdotcom/commercial/about-our-market/cargo-market-detail-wacf/download-report/assets/pdfs/wacf.pdf [Accessed 31/01/2018].

[6] York Aviation (2015), Implications for the Air Freight Sector of Different Airport Capacity Options [online] Available at http://www.fta.co.uk/export/sites/fta/_galleries/downloads/air_freight/air-freight-implications-from-new-capacity.pdf [Accessed 31/01/2018].

[7] 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 [online] Available at http://londonfirst.co.uk/wp-content/uploads/2016/09/Importance-of-air-freight-to-UK-exports-PDF-FINAL.pdf [Accessed 31/01/2018]

[8] Azimuth Associates (2017) Manston Airport: A National and Regional Aviation Asset – Volumes I to IV [online] Available at http://rsp.co.uk/documents-page/ [Accessed 31/01/2018].

[9] Oxford Economics (2013), Impacts on the Air Freight Industry, Customers and Associated Business Sectors (p8) [online] Available at www.oxfordeconomics.com/publication/download/259165 [Accessed 31/01/2018]

[10] 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 Bristain Fly Campaign [online] Available at http://londonfirst.co.uk/wp-content/uploads/2016/09/Importance-of-air-freight-to-UK-exports-PDF-FINAL.pdf [Accessed 31/01/2018]

[11] Uttlesford District Council (2006) Stansted – Local Rule 4 [online] Available at https://www.acl-uk.org/wp-content/uploads/2017/07/STN-Local-Rule-4-1.pdf [Accessed 31/01/2018].

[12] Civil Aviation Authority (2017) Freight by Aircraft Configuration 2016 [online] Available at https://www.caa.co.uk/uploadedFiles/CAA/Content/Standard_Content/Data_and_analysis/Datasets/Airport_stats/Airport_data_2017_01/Table_15_Freight_by_Aircraft_Configuration.pdf. [Accessed 31/01/2018].

[13] Eurocontrol (2013), Challenges of Growth 2013: Summary Report. European Commission: Brussels [online] Available at https://www.eurocontrol.int/sites/default/files/content/documents/official-documents/reports/201307-challenges-of-growth-summary-report.pdf [Accessed 31/01/2018].

[14] Heathrow Media Centre (2015) Heathrow announces plan to double cargo volumes [online] Available at http://mediacentre.heathrow.com/pressrelease/details/81/Corporate-operational-24/5263 [Accessed 31/01/2018].

[15] York Aviation (2015), Implications for the Air Freight Sector of Different Airport Capacity Options (p19) [online]Available at http://www.fta.co.uk/export/sites/fta/_galleries/downloads/air_freight/air-freight-implications-from-new-capacity.pdf [Accessed 31/01/2018]

[16] 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.

[17] York Aviation (2015), Implications for the Air Freight Sector of Different Airport Capacity Options (p19) [online] Available at http://www.fta.co.uk/export/sites/fta/_galleries/downloads/air_freight/air-freight-implications-from-new-capacity.pdf [Accessed 31/01/2018].

[18] CAA (2014) Stansted Market Power Assessment; Annex 4. [online] Available at https://www.caa.co.uk/WorkArea/DownloadAsset.aspx?id=4294972551 [Accessed 31/01/2018].

[19] London Luton Airport Ltd (no date) London Luton Airport Vision for Sustainable Growth 2020-2050 [online] Available at https://www.llal.org.uk/Documents/vision2020-2050.pdf [Accessed 19/02/2018]

[20] Adur Council (2017) Adur Local Plan 2017 [online] Available at https://www.adur-worthing.gov.uk/media/media,147013,en.pdf [Accessed 19/02/2018]

[21] Rushmoor Borough Council (2015) Key Facts about Farnborough Airport [online] Available at http://www.rushmoor.gov.uk/CHttpHandler.ashx?id=14688&p=0 [Accessed 19/02/2018]

[22] Adur Council (2017) Adur Local Plan 2017 [online] Available at https://www.adur-worthing.gov.uk/media/media,147013,en.pdf [Accessed 19/02/2018]

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

[24] RiverOak Strategic Partners Limited (2018), Manston Airport Development Consent Order 2018 Consultation: Noise Mitigation Plan.

3. Description of the Proposed Development

3.1 Requirements under the EIA Guidelines

3.1.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 2017 EIA Regulations) require that an Environmental Statement (ES) provides a description of the location, design and size of a scheme to enable the likely significant environmental effects to be assessed and to enable the Planning inspectorate (PINS), the statutory consultees and the public to make a properly informed response.

3.1.2 Schedule 4 of the 2017 EIA Regulations requires amongst other things, the following issues to be addressed:

- a description of the location of the development;
- a description of the physical characteristics of the whole development including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases;
- a description of the main characteristics of the operational phase of the development; and
- an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste) produced during the construction and operation phases.

3.1.3 The description of development is also based on the requirements of PINS Advice Note 9 which provides guidance in the use of the Rochdale Envelope approach in the case of an application for a Nationally Significant Infrastructure Project (NSIP).

3.1.4 The Rochdale Envelope refers to the judgment of Justice Jeremy Sullivan in the case of the Kingsway Business Park Application in Rochdale[1] where it was acknowledged that a degree of flexibility is required in the determination of outline planning applications. In this regard Justice Sullivan noted:

> "*If a particular kind of project, such as an industrial estate development project (or perhaps an urban development project) is, by its very nature, not fixed at the outset, but is expected to evolve over a number of years depending on market demand, there is no reason why 'a description of the project' for the purposes of the directive should not recognise that reality".*

3.1.5 In the case of Manston Airport, whilst certain aspects of the Proposed Development, for example the length and width of the runway and taxiways can be 'fixed' for the purposes of the Development Consent Order (DCO) application, there will be other aspects, in particular the size and location of buildings that will be demand led and are therefore subject to the parameter planning approach allowed by the Rochdale judgment.

3.1.6 In summary, in the context of a DCO application for an NSIP, PINS Advice note 9 interprets the Rochdale judgment as follows:

- The application should acknowledge the need for details of a project to evolve over a number of years, within clearly defined parameters;
- The environmental assessment should take account of the need for such evolution, within those parameters, and should reflect the likely significant effects of such a flexible project in the ES; and
- Taken with those defined parameters of the project, the level of detail of the proposals must be such as to enable a proper assessment of the likely environmental effects, and necessary mitigation - if necessary - considering a range of possibilities.

3.1.7 It is with this guidance in mind that the Preferred Option for the Proposed Development has been developed. The assessments contained in the technical chapters (**Chapters 6 – 17**) of this ES have, in all cases, adopted a realistic worst case based on the parameters outlined below and shown on the illustrative masterplan at **Figure 3.1**.

3.2 Description of the Site and the Surrounding Area

The Application Site

3.2.1 The Proposed Development will be located 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 and redline site area is shown on **Figure 3.2.**

3.2.2 The area of outright permanent acquisition at the main site covers approximately 303.2ha (749 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 2,748m long, 61m 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 north-west boundaries of the site, as shown on **Figure 3.3**, 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 (ATC) 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.

3.2.3 A network of hard surfaced areas (i.e. taxiways, aprons, passenger car parking and roads) connect the buildings 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 which, during previous airport operation, 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.

3.2.4 The part of the site to the north of the B2050 (Manston Road), which bisects the centre of the site in an approximate east-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 south-western corner of the Northern Grass. A small number of other redundant buildings, such as the former RAF ATC tower, are also located on the Northern Grass.

3.2.5 In addition, the total area that would be the subject of the order and therefore falling within the Red Line Boundary includes the existing below ground pipeline between the site and Pegwell Bay. This means that the total area including the pipeline and its access points would be 311.7 hectares (770.2 acres).

Site History

3.2.6 Manston Airport provided a variety of airport-related services from 1916 until it ceased operation in May 2014. It operated as Royal Air Force (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 infrastructure, including the runway, taxiways, aprons, cargo facilities, and a passenger terminal still remain, 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

3.2.7 The site is located within National Landscape Character Area 113: North Kent Plain[2]. This encompasses a strip of land of approximately 90km in length bordering the Thames Estuary to the north and the Kent Downs to the south. The Site is also within the Thanet Landscape Character Area[3]. 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.

3.2.8 The surrounding area is less developed, comprising predominantly arable farmland interspersed with moderately sized villages and smaller clusters of residential properties. Those within 0.5km - 1km of the Proposed Development 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 Proposed Development;
- Properties on the north side of the B2190 (Spitfire Way);
- Properties on the northwest side of B2050 (Manston Road);
- Properties bordering Manston Court Road;
- Properties at the southern end of Manston High Street; and
- Those parts of Cliffsend adjacent to Canterbury Road West.

3.2.9 Arable farmland surrounding the Site also includes small pockets of Priority Habitat, namely deciduous woodland located to the north, west and south. There are 15 buildings that carry listed building status (13 Grade II and two Grade II*) and one scheduled monument within 1km of the Site. Those in closest proximity include:

- Granary (Manston Court Farmhouse), Grade II listed, 0.38km north-east of the Site boundary;
- Chapel House, Grade II listed, 0.5km south of the Site boundary;
- Way House, Grade II listed, 0.4km south of the Site boundary; and
- Enclosure and Ring Ditches ENE of Minster Laundy, designated as a scheduled monument and positioned 0.2km south of the Site boundary.

3.2.10 To the north-east and east of the Site is a transition from an agricultural to a more urban landscape, with the defined settlements of Margate and Ramsgate, and a series of linear settlements extending outwards from these, all geographically bounded by the English Channel.

3.3 Description of the Proposed Development

Summary Description

3.3.1 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 in excess of 10,000 air freight 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 3.4** and **Figure 3.1**, respectively.

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

3.3.3 A summary of the works to be undertaken as part of the Proposed Development are presented below:

- Upgrade of Runways 10/28 to allow CAT II/III operations (shown in **Figure 3.1**);
- Re-alignment of the parallel taxiway (Alpha) to provide EASA compliant clearances for runway operations;
- Construction of 19 EASA compliant Code E stands for air freight aircraft with markings capable of handling Code D and F aircraft in different configurations (shown in **Figure 3.1**);
- Installation of new high mast lighting for aprons and stands;
- Construction of 65,500m² of cargo facilities (shown in **Figure 3.5**);
- Construction of a new ATC tower (shown in **Indicative Visual 1**);
- Construction of a new airport fuel farm (**Appendix 2.1**);
- Construction of a new airport rescue and firefighting service (RFFS) station;
- Complete fit-out of airfield navigational aids (nav-aids) (shown in **Figure 3.1**);
- Construction of new aircraft maintenance/recycling hangars, including three tear-down stands (shown in **Figure 3.1**);
- Development of the Northern Grass area for airport related businesses (shown in **Figure 3.6**);
- Demolition of the redundant ‘old’ ATC Tower (shown in **Figure 3.3**);
- Safeguarding of existing facilities for museums on the site (shown in **Figure 3.1**);
- Highway improvement works; and
- Extension of passenger service facilities including an apron extension to accommodate an additional aircraft stand (total of four passenger stands) and increasing the current terminal size (shown in **Figure 3.1**).

3.3.4 The proposed zoning of different areas within the Site, and the proposed site layout are illustrated on **Figure 3.1**.

Manston Airport DCO Programme and Project Delivery

3.3.5 Based on the determination period, the DCO may be granted in Q3 2019 and this timescale has been assumed when developing the construction/operational programme for this assessment.

3.3.6 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 the Proposed Development over this 20-year period.

3.3.7 The main activity to be undertaken during Year 1 is construction work required to return the existing airport to full operational use. Subsequently, the full reopening of the airport would occur in Year 2, currently expected to be Q4 2020, which would also see the start of the air freight services. Passenger services are anticipated to commence in Year 4.

3.3.8 The three further phases of construction will be demand led and, as illustrated within **Table 3.1**, would be expected to follow in years 2-5, 5-12 and 12-18. During these three phases of construction, the airport would remain operational.

3.3.9 Construction phasing is depicted on **Figures 3.7 - 3.10.**

Table 3.1 Outline Project Programme

Component	Start Date	End Date	Airport Year of Operation
Granting of DCO	Q3 2019	N/A	Yr. 1
Construction Phase 1	Q3 2019	Q4 2020	Yrs. 1-2
Opening of the Airport	Q4 2020	Q4 2020	Yr. 2
First Full Year of Freight Operations	Q1 2021	Q4 2021	Yr. 3
Construction Phase 2	Q4 2020	2023	Yrs. 2-5
Start of Passenger Services	Q1 2022	N/A	Yr. 4
Construction Phase 3	2023	2030	Yrs. 5-12
Construction Phase 4	2030	2036	Yrs. 12-18

Airport Masterplan Components

Runway, Taxiway, Apron and Stands

3.3.10 It is proposed that the existing 2,748m, east-west aligned runway is retained. 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 would be required to improve the load bearing capacity for future aircraft operations in order to ensure compliance for CAT II/III operations[i] (for further information refer to **Appendix 3.1**). This is likely to require a minimum 150mm overlay of bituminous materials across the runway; further details of the construction methodology for the runway rehabilitation works are presented below (see Asphalt Pavement in **Section 3.3**).

[i] 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).

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

3.3.12 The total paved area each side of the runway extends 80m to the south and 150m to the north of the runway centreline. This paved area is not considered to provide an aviation benefit and could represent a risk to aircraft operations if loose material was dislodged and migrated onto the runway surface. It is imperative that loose material is not allowed to enter aircraft engines during take-off and landing operations. This type of material is called Foreign Object Debris (FOD) and mitigation measures to avoid FOD are at the forefront of all activities at an airport.

3.3.13 Although it would be possible to remove the excess paved areas, the EA have indicated that as little of the existing hardstanding as possible should be removed. As such, to mitigate FOD risk, it is proposed that remedial work will be undertaken to the surface. This could involve re-sealing joints, patch repairs or even a thin overlay to stabilise the surface. Details will be confirmed during the detailed design stage.

3.3.14 The existing parallel taxiway (Taxiway Alpha) is currently not compliant with EASA guidelines due to insufficient 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, will be required. It is proposed that the new taxiways will be constructed of either asphalt, concrete or a composite combination of these materials. Proposed works to Runway-Taxiway Alpha are shown on **Figure 3.11.**

3.3.15 A total of 19 Code E[ii] stands would be created to service the air freight operations, accompanied new taxiways to service the stands and connect them to the runway. The total area for the new taxiway and aircraft stands is anticipated to be approximately 574,000m^2.

3.3.16 The existing passenger apron, which can accommodate three passenger aircraft stands, will be retained. Rehabilitation or refurbishment may be required to ensure compliance with EASA guidelines. If required, this apron will be extended during Construction Phase 4 to provide an additional passenger aircraft stand.

3.3.17 The aircraft stands will be constructed using Pavement Quality Concrete (PQC). This is an industry standard form of construction due to its ability to withstand aircraft static loads and therefore provide the required durability. Positive drainage, where the drainage has been designed so that all surface water run off flows into the airport drainage network, will be provided on all stand areas. High mast lights would provide the required lighting for operational aircraft stands; it is expected these will vary in height from 15m to 25m.

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

3.3.19 The area north of the existing runway, where the new stands and taxiways will be constructed, currently has a gradient of more than 1.5%. In order to comply with the EASA guidance on airport design (document CS-ADR-DSN.D.265 & E.360[4]) the gradient for longitudinal slopes on taxiways should not exceed 1.5%, while on aircraft stands the slope should not exceed 1% in any direction.

3.3.20 Therefore, earthwork operations will be required to provide a suitable and compliant building platform for the taxiway, aprons and stands. The majority of this work would be completed during Construction Phase 1 in order to minimise disruption to live airport operations. It is estimated that approximately 300,000m^3 of material will be required. At this stage, a cut dispose-import solution is assumed by importing the required engineering fill material. Excavated material from the site will likely be disposed of off-site, with new engineering fill material imported for the construction. The re-use of site won material, (e.g. from the removal of existing taxiways and areas of hardstanding), will be considered, where deemed 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.

[ii] Alphabetic code for defining aircraft size based on wingspan from A (smallest) to F (largest).

3.3.21 Existing site contours and proposed contours are shown on **Figure 3.12** and **Figure 3.13**, respectively.

Air Traffic Control, Navigations Aids and Lighting

3.3.22 In order to gain a CAA aerodrome licence and comply with EASA guidance, new equipment and facilities are required; much of the equipment required to operate the airport is inadequate or has been removed.

3.3.23 The existing ATC building (north of the runway) will not allow controllers to safely and easily operate the new configuration of the re-opened airport, owing to the requirement for a new ATC facility.

3.3.24 Current proposals include a replacement facility north-west of the main airport site, adjacent to the airfreight cargo stands. Here, the controllers will have uninterrupted views of the runways, taxiways, both thresholds and cargo stands and Riveroak are comfortable that the site can easily accommodate a CAA compliant ATC building however it should be noted that alternative, offsite options are being considered. These would however form part of a separate application and would be developed in consultation with the CAA.

3.3.25 In the current proposals it is acknowledged that the passenger stands would be obscured by the cargo facility. In order to minimise the height of the proposed ATC building structure, the management of aircraft movements on the passenger apron will be via a network of CCTV cameras linked backed to the new ATC.

3.3.26 The proposed facility will have a diameter of approximately 6m with an overall footprint of approximately 500m^2, inclusive of the adjacent building annex. The tower will include an operational room with a viewing height of approximately 23m above ground level, with the roof of the tower at approximately 27m above ground level (maximum 74.0 metres (AOD). Options for construction of the tower could include a steel frame or slip form concrete.

3.3.27 An annex to the tower will provide space for the additional airfield operation equipment and departmental offices. This will be a two-storey structure steel frame construction with suitable cladding and profiled roof. Aesthetically the building will be in keeping with the adjacent structures and the ATC tower.

3.3.28 Indicative visuals of the ATC Tower are shown on **Indicative Visualisation 1**. The annex will be a two-storey structure and may include a profiled roof, the building will be formed from either brick or steel frames with suitable cladding. Aesthetically the building will be in keeping with the adjacent structures and the ATC tower. Options for construction of the tower could include steel frame or slip formed concrete. The final aesthetic will be key as this will be a prominent feature of the airfield and the final tower design will suit the design aesthetic of the site.

Indicative Visualisation 1 – Air Traffic Control Tower

3.3.29 The former approach lights within the airport boundary have been removed and will require replacement. Outside the airport boundary the approach lights remain and at this stage it is anticipated that these would not require replacing, accepting that additional approach lights would be required to meet the requirements for CAT II/III operations. Existing lights will be reused where possible.

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

Air Freight and Cargo Facilities

3.3.31 The main operational role of the re-opened airport is to facilitate airfreight movements. To meet the anticipated demand from the airfreight forecast, new cargo facilities will be required. The layout of the cargo area is shown on **Figure 3.5**.

3.3.32 The cargo facilities, which will be constructed on the new building platform to be created for the taxiways and stands, would be constructed in phases (as detailed in **Table 3.3**) to meet the demand and requirements of the airfreight forecast. The proposed contours for the cargo area are shown on **Figure 3.14**.

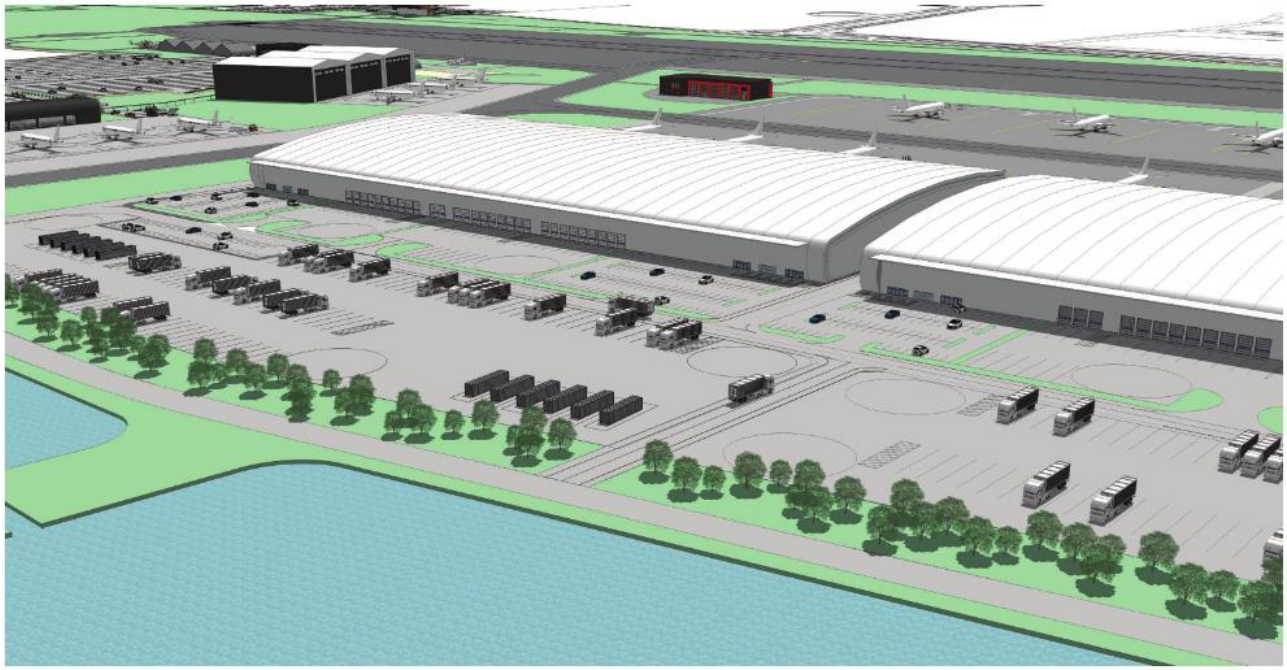
3.3.33 Each cargo facility will have associated Heavy Goods vehicle (HGV) parking, storage and car parking. The facilities will cover approximately 65,500m^2 in total, with approximate building heights of 20m above ground level (maximum 67.3 metres AOD) and will be used for the airside/landside management of cargo. The units will have a landside and airside frontage. A total storage and parking area of approximately 120,000m^2 will be provided. This will include a yard area for goods access with HGV dock levellers and includes space for parking of goods vehicles. Office space will be accommodated within this frontage with associated staff parking.

3.3.34 The airside elevation looks directly south onto an access road with adjacent aircraft stands. The airside frontage will have a mixture of industrial access doors and windows. This airside frontage is facing away from the nearest residential areas which will help to reduce the noise and visual impact.

3.3.35 The principles for the visual appearance of the development will be to achieve site-wide consistency with a contemporary and light industrial aesthetic. External wall finishes will be tailored to suit the end user requirements but a typical construction methodology would be for a steel portal framed building with pad foundations or 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, for example, office units or the division between facilities. 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. Conceptual visualisations of the cargo facility are included in the Design and Access Statement. Depending on the end user, the colour and style of the building may be revised to incorporate client colour schemes. **Indicative Visualisation 2** shows an indicative visualisation of the cargo buildings.

Indicative visualisation 2 - Cargo Buildings



3.3.36 Materials such as Kalzip, a standing seam 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.

3.3.37 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. These buildings would be demolished during Construction Phase 3 in order to accommodate the new cargo facilities that would be built during this phase.

Aircraft Maintenance Recycling Facilities

3.3.38 A new maintenance and recycling facility will be constructed to the east of the site. Conceptual visualisations are included in Section 08 of the Design and Access Statement. The facility will consist of hangar buildings and associated offices. Aircraft access will be via the existing taxiway and new apron areas in front of the hangars. Typically, the external aesthetic for a building of this size will use a mixture of greys to minimise the visual impact with feature lines to break up the external appearance. **Indicative Visualisation 3** provides an impression of the likely visual appearance of the recycling facility.

Indicative Visualisation 3 - Recycling facility

3.3.39 Aircraft recycling will take place within the enclosed hangar. The height of the hangars will typically be 20m above ground level to building eaves and 23m to peak (maximum height of 72.8m AOD).

3.3.40 The footprint of the buildings will be 10,215m^2 including the offices.

3.3.41 An office annex will be included on the landside frontage of the building with an associated car park. The offices will be two or three stories in total and maybe housed partially within the main body of the hangar. The primary use of this office space is to provide business and management areas.

3.3.42 The existing Maintenance Repair and Overhaul (MRO) hangar, which is located to the south of the terminal building, will be retained for use during the initial years of operation. A new MRO facility, with hangars would be constructed in Construction Phase 2; the old hangar would be demolished at this stage. The MRO and recycling facility would be further extended in each of Construction Phases 3 and 4 to provide an additional hangar and associated apron in each phase. The visual appearance of the building would be in keeping with the rest of the site

Passenger Terminal and Parking Facilities

3.3.43 Despite a focus on air freight, it is anticipated that there will be passenger services from Year 3 of the airport's operation.

3.3.44 The existing terminal building is in a poor state of repair. A new terminal building and its associated ancillary facilities will replace the existing terminal, which will be demolished in 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 future passenger forecast. The indicative design of the new terminal building is shown in **Indicative Visualisation 4**.

3.3.45 The initial terminal will provide airside/landside access and will be served by three refurbished Code C aircraft stands. A later expansion of the building and addition of a fourth passenger stand will accommodate the demands of the passenger forecast. Layout of the passenger area and passenger facilities are shown on **Figure 3.15**.

3.3.46 On the landside frontage, the existing surface car park will be extended. A new internal highway network, including a one-way system, will be constructed to provide taxi, bus and pickup facilities for passengers. Strategic placement of bollards and hard areas will be provided to create a 30m clear area in front of the terminal building to comply with security regulations.

3.3.47 The terminal building will be built to a height of approximately 15m above ground level (maximum of 59.6m AOD). The initial footprint will be 2,200m^2 with the potential to increase to 4,500m^2 to meet growth demands. The approximate dimensions of the initial footprint will be 75m x 30m.

3.3.48 Structurally, the building will comprise a steel frame with cladding and appropriate glazing. Architecturally the building will be consistent with the cargo buildings. In the conceptual visualisations included in the Design and Access Statement this has been achieved through adopting the curved roof profile shown in the conceptual visualisations for the cargo facilities. The terminal aesthetic will be in keeping with the overall site. A combination of hard landscaping and street furniture will be used to create a pedestrianised area and comply with security requirements.

Indicative Visualisation 4 - Passenger terminal

3.3.49 The existing terminal car park, which provides approximately 860 spaces, would be extended to provide parking for a total of 1,815 passenger spaces and 842 spaces for staff (see Appendix N of the TA). The carpark area would be divided up to include staff and long stay parking. The construction will comprise of asphalt, concrete and granular material. The layout will include a pedestrian walkway, trolley bays and pay on foot machines. Signed access will be provided from the car park to the terminal building. Land is available adjacent to the existing car park having been set aside as part of previous airport masterplan proposals. 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 the B2050 (Manston Road) would provide staff parking.

3.3.50 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 is detailed in the Transport Assessment. Car parking, public transport infrastructure and cycling facilities are shown on **Figure 3.15.**

Fuel Farm

3.3.51 The airport would require a new fuel farm 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 will need to be located airside (i.e. not on the Northern Grass area) for operational reasons; this will allow for the safe and efficient transport and delivery of fuel around the Site. At present, it is assumed that fuel would be delivered to the airport via road tanker, however the viability of alternatives, such as delivery via rail will be investigated as potential longer-term options.

3.3.52 The preferred location for the new fuel farm is in the south-east of the airport, on the site of the existing Jentex fuel facility. Currently, this is an independently operated fuel facility, although historically 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 associated infrastructure would be required to meet the needs of the Proposed Development, and to ensure that the facility is adequately designed and fit for purpose.

3.3.53 Prior to construction, decommissioning of existing tanks and infrastructure is required, alongside remediation of contaminated land, as deemed necessary. A number of site investigations have been undertaken at the Jentex site, for more information see **Chapter 10: Land Quality**, with a number of old tanks having already been decommissioned. These site investigations have not identified any significant contamination at the locations of the former tanks, but further site investigations will be undertaken to inform the detailed design of the fuel farm facility.

3.3.54 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.

3.3.55 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.

3.3.56 The site will be divided into a landside delivery area, a bunded area for airfield fuel tanks and an airside area for the filling of fuel bowsers and maintenance of the airfield fuel bowser fleet.

3.3.57 It is expected that a minimum of three 700,000l cylindrical fuel tanks will be required to meet the expected fuel farm requirements. An additional tank has been allowed for to accommodate lighter aircraft fuel used for general aviation aircraft.

3.3.58 The existing buildings will be retained and refurbished as part of the development, where possible. The total building quantum, not including the tank or tank bunds, will be approximately equal in height and floor area of the existing buildings.

3.3.59 For ease of access, the facility will have a separate access road from the local road network, 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.

3.3.60 The Environment Agency (EA) and Southern Water (SW) have been consulted on several occasions throughout the development and the principles surrounding the design of the fuel farm have been agreed. Further design information is provided within **Appendix 2.1** and both the EA and SW 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.

Site Access, Highway and Junction Improvements

3.3.61 Roads in the vicinity of the Proposed Development, including B2050 (Manston Road), B2190 (Spitfire Way) and the Manston Road/Spitfire Way junction, have been identified as requiring improvement; 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. Work will be undertaken in conjunction with KCC to provide improvements, which will require a signalised junction at the Manston Road/Spitfire Way junction, and other improvements to the local road network in the vicinity of the Site.

3.3.62 A new airport access for the cargo/aircraft maintenance facility is proposed on the B2190 (Spitfire Way) to the west of the existing access. This will be designed with sufficient capacity for the Proposed Development's operations: current proposals include a new roundabout to provide access to the airport. The detailed design of this and other highways/ junction improvements will be undertaken following consultation with KCC Highway Department and Highways England regarding the Transport Assessment.

3.3.63 A new network of internal roads for the air freight and cargo operations will also be constructed; inclusive of parking facilities for vehicles involved in air freight operations. This will facilitate 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 and at cargo building facilities.

3.3.64 A landscaping zone between new internal access roads and the local road network, and along the boundary with B2190 (Spitfire Way) and B2050 (Manston Road) will be provided. The landscaping scheme will be designed so that it is acceptable within the constraints of the aviation environment.

3.3.65 A Preliminary Construction Traffic Management Plan (PCTMP), Car Park Management Plan, Travel Plan, Airport Surface Access Strategy and Public Rights of Way Management Strategy (PRoWMS) have been developed as part of the TA; these will identify suitable embedded measures which should be incorporated into the design of the Proposed Development. The new elements to be considered as part of this are likely to include:

- Improvements to the core route along Spitfire Way and Manston Road from the A299 including road widening;
- Increased and enhanced facilities for taxis, buses and coaches for passengers and staff;
- Management of construction traffic vehicles;
- Diversions for any road closures required to construction highways infrastructure and accesses;
- Closure and diversion of local PRoW;
- Provision of a shuttle service to Ramsgate rail station;
- 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 Site;
- Amended public service bus stops, and public bus service frequency and route changes (to be agreed with the local authority and bus route operators); and
- Offsite junction improvements (to be delivered by Section 278 agreement or similar).

Outline Drainage Strategy

3.3.66 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 3.16**. The outline Drainage Strategy (DS) is discussed further below.

3.3.67 The Site is situated on an existing aquifer with a chalk subgrade a surface runoff for the site will ultimately discharge into Pegwell Bay, therefore drainage and surface water treatment has been a priority in development of the DS.

3.3.68 The outline DS for the site is to provide positive drainage following the site's natural contours, discharging into two adjacent attenuation ponds (see **Figure 3.1** for the layout of the site). Apart from providing attenuation, the ponds will also provide pollution control facilities. These ponds are located in the northern landside area at the natural site low point. Prior to discharging into the ponds, the water would flow through interceptors (existing and new). The first of these attenuation ponds would treat contaminated runoff through the use of mechanical aerators, before discharging into the second pond. Flow into the 'clean' pond would be limited; the spillway will have a storage capacity of greater than a 1 in 30-year flood event. From the second pond, the clean water will be conveyed towards the existing pumping station to be discharged from site.

3.3.69 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.

3.3.70 The location of the ponds is approximately 850m from the runway centreline and allows the ponds to be developed into a potential aesthetic attraction. An assessment will be undertaken during the detailed design stage to determine if further bird mitigation is required.

3.3.71 From the attenuation ponds, clean or treated water will 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 3.17**). 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.

3.3.72 A survey of the existing storm drainage pipe has been 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 site's discharge requirements.

3.3.73 Should the existing pumping system be unable to accommodate the proposed drainage volumes, two alternative options are available. The first is an upgrade to the existing pumping system, while 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 Development, if granted.

3.3.74 Ongoing consultation with the EA and SW is informing the drainage strategy and design. An application for a new environmental permit to discharge may be required from the EA, and if so would be applied for following the detailed design of the drainage strategy following DCO consent.

Outline Lighting Strategy

Airport Lighting

3.3.75 The scheme has been designed to achieve compliance with the International Commission on Illumination (CIE) Guide: CIE 150:2003 Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations for Environmental Zone E2:Rural Low district brightness - Village or relatively dark outer suburban locations.

3.3.76 The luminaires use high efficiently low energy light-emitting diode (LED) lamps and are designed to direct their light down. By carefully controlling cut off angles the luminaires minimise any upward light pollution to less than 2.5% of luminaire flux for the total installation. Lighting levels are minimised with higher lighting levels only being used where they are needed to comply with the minimum recommend lighting standards, such as for the airport aprons.

Business Park Lighting

3.3.77 The scheme has been designed to achieve compliance with the International Commission on Illumination (CIE) Guide: CIE 150:2003 Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations for Environmental Zone E2: Rural Low district brightness - Village or relatively dark outer suburban locations.

3.3.78 The luminaires use high efficiently low energy LED lamps and are designed to direct their light down. By carefully controlling cut off angles the luminaires minimise any upward light pollution to less than 2.5% of luminaire flux for the total installation. The lighting design will meet a boundary condition of a maximum of 1 Lux in order to avoid any obtrusive light into adjoining properties.

Airport Fire Safety

3.3.79 The Proposed Development 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

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

3.3.81 The proposed structure will comprise two distinct elements; an area for vehicle maintenance and storage plus welfare and offices for staff. The building footprint is expected to be approximately 1,550m^2 with a building height of approximately 10m above ground level (maximum roof height at 60.1m AOD). It will comprise a steel framed structure with concrete floor and wall cladding.

3.3.82 The aim of this facility is to provide on-shift accommodation for the airfield fire team which is adjacent to the equipment and vehicles. It also allows rapid access to the runway in order to meet the required emergency response times, plus access to the aircraft stands and buildings.

3.3.83 The structure will be capable of accommodating over 15 operatives at any one time with space for offices and personal storage for a total of 60 staff. Exact deployment requirements will be determined in accordance with operational requirements.

3.3.84 Building aesthetics will be in keeping with typical new airfield developments. Typically, the cladding would be a mixture of black or grey with red highlights in keeping with the fire tender equipment. Text in the form of painted letters or signage may form part of the building frontage. **Indicative Visualisation 5** shows an illustrative visualisation of the airside fire facility.

Indicative Visualisation 5 - Airside Fire Facilities

3.3.85 The garage has front and rear access doors to allow for ‘drive through’ parking. This avoids potentially dangerous reversing operations. The front elevation of the building is aligned perpendicular to the runway orientation to provide the required rapid response. Additional space has been allocated in the building for ancillary operational vehicles i.e. a bird scaring vehicle.

3.3.86 The two existing Emergency Water System (EWS) tanks, 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.

3.3.87 The regulatory training of airport firefighting personnel will be undertaken off site at approved facilities. This means that an on-site fire training ground incorporating an aircraft simulation rig, to simulate mock firefighting rescues, will not be required. An area for the routine training of personnel on non-fire simulations i.e. breathing apparatus, will be undertaken on the existing hard standing area at the north-eastern end of the runway.

Public Firefighting Team Requirements

3.3.88 As a standard, fire hydrants are required at 90m intervals around the perimeter of large buildings. Unobstructed access is required to this equipment 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 during the detailed design process.

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

3.3.90 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

3.3.91 As a minimum, a mains-fed sprinkler system will 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.

3.3.92 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.

Northern Grass

3.3.93 The Northern Grass area will accommodate infrastructure critical to the running of the airport including airport-related businesses which do not require an airside location. Additional areas are safeguarded for the continuing use of the existing Museums and the retention of the existing memorial garden.

3.3.94 The Northern Grass will comprise multiple business units of various sizes and layouts with a total floor space of 105,100m^2. Two new accesses would be provided from B2050 (Manston Road) to this 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.

3.3.95 A new radar will 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 or a new tower and radar installed at the same location. An area around the radar has been safeguarded to allow safe operation. The size of this area will be dependent on the type and specifications of the radar.

3.3.96 The development will comprise the following key elements:

- A Business Park consisting of B1 and B8 units accommodating airport-related businesses. These will be zoned in accordance with **Figure 3.31** (DCO submission drawing NK018417 RPS-MSE-XX-DR-2089). The sum of the new B1 and B8 building footprints within the Northern Grass area will not exceed 105,100m^2 with a 25/75 split of B1 and B8 development;
- Highways infrastructure to provide access to facilities within the business park area;

- Areas of planting, bunding or other screening to the outer areas of the site acting as visual and noise mitigation to adjacent residential receptors;
- The Manston airfield radar tower and associated infrastructure, including an area safeguarded for safe operations of the radar facility;
- Attenuation ponds and related drainage infrastructure; and
- An area safeguarded for continued operation of the RAF and Spitfire & Hurricane Museums, plus memorial ground.

3.3.97 The proposed zoning and key areas for the Northern Grass development is shown on **Figure 3.31** (drawing NK018417 RPS-MSE-XX-DR-C-2089).

3.3.98 A selection of B1 and B8 airport-related businesses will be located on the Northern Grass area within a new business park comprising Zones 1, 2 and 3 with a 'buffer zone' to provide visual screening. The exact footprint and orientation of each business unit will be tailored to meet end user requirements. A zonal development approach has been taken, giving maximum building heights and total building footprint both on the site and within each zone.

3.3.99 Typically, the buildings will be steel framed structures with panel cladding. Some buildings will include roller shutter doors. Small and medium sized office units may be developed as brick and block structures. Office annexes and individual office buildings will be sympathetically designed in either brick or a suitable aesthetic cladding. It is envisaged that roofs will be predominately flat or low pitch to mitigate visual impact.

3.3.100 The overall maximum footprint for new B1 and B8 units of development is broken down for each zone. It is intended that the negative impact of larger buildings can be offset with increased areas of landscaping and open space. The maximum footprint of buildings within each area will be as follows:

- Zone 1: <30,000m^2 of B1 building development;
- Zone 2: <60,000m^2 of B1/B8 building development; and
- Zone 3: <26,000m^2 of B8 building development.
- Total: <105,100m^2 of B1/B8 building development.

3.3.101 Maximum building heights above finished ground level have also been defined within each zone as follows:

- Zone 1: approximately 16m above ground level (maximum 64.5m AOD); and
- Zone 2 approximately 18m above ground level (maximum 66.5m AOD)
- Zone 3: approximately 18m above ground level (maximum 64.2m AOD).

3.3.102 A more detailed description of each zone is given below:

- Zone 1 – This is the building zone considered to be of highest sensitivity to residential receptors. Buildings in this area will be limited in height to 64.5m AOD (approximately 16m above finished ground level), which is comparable to a building height of approximately 2-3 storeys. Buildings will be limited to usage class B1.
- Zone 2 – This area is considered to be slightly less sensitive from the perspective of residential receptors. Buildings will be either B1 or B8 usage class and limited in height to 66.5m AOD (approximately 18m above finished ground level).
- Zone 3 – This area is considered to have the least sensitivity to local residential receptors. B8 development will be prioritised in this area with a maximum building height of 64.2m AOD (approximately 18m above finished ground level).
- Buffer Zone – This comprises a 45m strip along the east and northwest boundaries. No B1 or B8 buildings will be constructed within this strip and use will be limited to landscaping,

visual screening, retention of existing accesses and pavements. It is accepted that some services and infrastructure may be required in this area such as substations and hydrants. However, the impacts of these are considered negligible. Some existing pavement infrastructure will also be retained to provide access to the rear of housing on Manston Road.

- Internal Highways – The highways network will be a single carriageway asphalt surface estate road with a 30mph speed limit designed to accommodate both light vehicles and HGV traffic with street lighting to adoptable standards. Road drainage will be provided via a gully or kerb drain system discharging into the attenuation ponds. Two accesses have been provided onto the local highways network. Non-vehicular routes including footways, crossings and cycleways will be provided and constructed in accordance with KCC standard details and adopted into the highway network.
- Access – Two Accesses to the Northern Grass Area have been provided as follows:
    - Northern Grass Area Western Access with Manston Road
        - The Western access to the Northern Grass area will be from Manston Road. This is proposed to directly access the western elements of the Northern Grass area and will link through to the Southern Northern Grass area access via an internal road; and
        - The junction is proposed to a three arm ghost right turn priority junction with informal pedestrian crossing facilities.
    - Northern Grass Areas Southern Access with Manston Road
        - The Southern access to the Northern Grass area will be from the B2050 Manston Road which will directly access the southern elements of the Northern Grass area and a link though to the Western Northern Grass area access via an internal road;
        - The junction is proposed to be a new signalised junction linked with the adjacent access (passenger terminal access) to the east; and
        - The junction has been designed to incorporate pedestrian crossing facilities across the access arm and across Manston Road.

Other Developments

3.3.103 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.

3.3.104 The RAF Manston Museum and the Spitfire and Hurricane Memorial Museum will remain on site, with an area of land being safeguarded for these facilities. It is intended that these museums will be retained and continue to operate on the site. In support of this, a substantial area (30,000m^2) encompassing the existing building locations, has been safeguarded within the masterplan. Indicative proposals for a new Spitfire and Hurricane memorial building have been prepared, which include the creation of a café and seating area. Detailed proposals would involve consultation with the current operators to ensure that these meet the museum specific requirements.

3.3.105 The safeguarded area for the Spitfire and Hurricane Museum encompasses the Allied Air Forces Memorial Garden. The intention is that this is fully retained and protected as part of the site development.

3.3.106 The current business aviation terminal and hangar, south of the passenger terminal, would be refurbished for use for Fixed Base Operations (FBO). This will be incorporated into a new area for accommodating light aircraft, business jets and helicopter stands. These operations are located south of the aircraft maintenance and recycling facilities and towards the eastern end of the runway.

3.3.107 The proposed facility could include eight light aircraft hangars of approximately 800m^2, two helipads and the FBO building. The maximum height of construction within this area is approximately 15m (maximum 66.2m AOD) due to proximity of the runway and the requirements of the Obstacle Limitation Surface (OLS). Aircraft access will be provided via new taxiways links from the existing parallel taxiway.

3.3.108 There are several design options for construction of the hangars; these could be the traditional steel frame hangar building or 'fabric' type hangar on a steel frame. Conceptual visualisations are shown in Section 08 of the Design and Access Statement.

3.3.109 Access for passengers and public will be from the internal road network.

Utilities, Services and Use of Resources

3.3.110 In order to support the increased level of activity and development on the site additional services will be required. This will include additional internal electrical substations, communication networks, and foul and potable water connections. A utility strategy has been developed in order to determine the requirements of the airport for each phase of operation and construction. The detailed design including new and diverted services will be developed through discussions with statutory service providers and stakeholders.

3.3.111 An assessment of the further load requirements has been 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.

3.3.112 A new foul drainage network will be required for the new facilities as assessed within the utility strategy. Discussions with Southern Water on the requirements of the Proposed Development have taken place as part of the consultation process. Southern Water will be further consulted on the scheme following acceptance of the DCO.

3.3.113 The proposed requirement for potable water has also been assessed in the utility strategy in consultation with Southern Water.

3.3.114 The Proposed Development includes measures to manage, control and limit water and energy use, and waste production. The design of the Proposed Development will adopt best practice and procedures from the aviation and other related sectors.

3.3.115 Measures to address climate resilience are included as embedded mitigation within **Chapter 16: Climate Change**.

Waste

3.3.116 It is important that the identified best practice measures for the construction and operation of the Proposed Development are used to inform the implementation of a robust Construction Environmental Management Plan (CEMP) and Site Waste Management Plan (SWMP).

Construction Waste

3.3.117 Waste material will be generated at all stages of the construction process. Construction waste will arise from the following key aspects of the Proposed Development:

- Demolition of existing buildings and infrastructure (including the ATC Tower; air freight facility, fire station, maintenance hangar and passenger terminal);
- Excavation and earthworks for preparation of foundations; and
- Construction of new buildings (ATC Tower; expanded cargo facilities, larger fire station, additional maintenance hangars and a new passenger terminal); runway refurbishment; asphalt pavement (access, storage and parking); concrete pavement (taxiway and aprons); and airport related business development (in the Northern Grass area).

3.3.118 Indicative targets for the construction of the Proposed Development are to achieve an 87% diversion of waste from landfill, and 62% re-use of materials within the site. Operational waste targets are dependent on the exact nature of the airport activities and in the airport related business development on the Northern Grass site.

3.3.119 Further assessment of the detailed design of assets and their associated waste streams would also be required to input into the SWMP. The appointed contractor will submit a detailed SWMP to RiverOak Strategic Partners Limited (RiverOak) for the associated construction activities, in accordance with best practice waste management for the site.

3.3.120 The bulk of the imported material will be hardstone for asphalt and Pavement Quality Concrete, in addition to sands and gravels for use in the lower layers in the aircraft pavements and drainage.

3.3.121 A likely route for the delivery of the hardstone will be by road from the railhead at Sevington (near Ashford) or from Whitstable or Ridham. Sands and gravels could be acquired from the same source or from a new processing plant at Ramsgate. There are other opportunities via Dover and The Isle of Grain.

3.3.122 Approximate quantities of the main materials required for the construction of the Proposed Development during Construction Phase 1 are given in **Table 3.2** below.

Table 3.2 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

3.3.123 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. At this stage, there is insufficient information to determine the existing earthwork materials' suitability as an engineering fill material underneath the aircraft pavements.

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

3.3.125 Demolition arisings, where possible, will be recycled for use on site. This includes the material from the existing taxiways and apron stands that will be removed.

3.3.126 Wrapping and packing will be returned to the supplier.

3.3.127 It is recommended that good practice segregation of waste is followed during the construction phase of the development. Sufficient space should be allowed to allow segregation of demolition, construction and excavation wastes. However, the location will be dependent on constraints in the working area of the site. It is expected that the following principles would apply:

- Recyclables – Waste storage receptacles/areas should be clearly marked to promote source segregation and inhibit contamination. A waste stream colour coding system could be employed to aid the successful segregation of waste at source. This can take the form of different coloured signs or bins or skips indicating which waste stream can be accepted in each receptacle/area. The Institution of Civil Engineers (ICE) developed a generic colour coding scheme for the construction industry; it is suggested that this system could be used during construction of the development. Containers should be fit for purpose and of a suitable durable construction for use. Prior to leaving the site containers/vehicles shall be sheeted and secured to prevent emission of particulates and dust.
- Food waste – If a site construction compound will include a canteen where food is produced, prepared or sold then food waste may also be segregated. Bins would need to be provided for the recyclables mentioned above, plus food if sufficient quantities are produced.
- Residual waste – In the event that residual waste is to be landfilled testing should be carried out to ensure that demolition or excavation materials are given the correct Waste Acceptance Criteria (WAC) classification, and are disposed of correctly as inert non-hazardous waste. A full record must be maintained of all materials that are removed from the site.
- Hazardous waste – Any hazardous waste generated as part of demolition, excavation or construction activities needs to be segregated from other waste streams to prevent cross-contamination, and suitable containment is required to provide storage and onward transport, according to the type of hazard (e.g. bunded storage for liquids). Hazardous waste should be disposed of correctly using suitable registered waste carriers and facilities for hazardous waste. A full record must be maintained of all hazardous waste materials that are removed from the site.

Operational Waste

3.3.128 The operational aspects of the development and associated generation of waste are dependent on the final design and airport functions, particularly with regard to occupation of the airport related business development proposed for the Northern Grass area.

3.3.129 The Proposed Development has the potential to generate municipal solid waste type waste (i.e. card, paper, plastic, glass, metal and wood), and also some organic waste. There are established practices for reducing and managing these types of materials, with good opportunities for reuse and recycling.

3.3.130 Following the granting of the Order, RiverOak will develop a framework waste management plan for the site that all occupiers will be expected to adopt as a condition of their tenancy. In broad terms, the airport itself as well as any occupiers of the Northern Grass area will be expected to manage waste in line with the waste hierarchy below.

3.3.131 The objectives of the outline waste management options (in order of preference, in accordance with the waste hierarchy) are to:

- Minimise raw materials consumed and the volume of waste produced i.e. prevent creating waste;
- Re-use any waste produced, where practicable;
- Recycle waste, where reuse is not practicable;
- Recover waste, where feasible; and
- Dispose of any remaining waste streams in accordance with legislative requirements.

3.3.132 The provision of effective storage and segregation of waste materials at the site will be a key element to ensure waste is managed safely and efficiently to maximise the potential for reuse and recycling. With respect to the airport related business development, waste management may be organised by individual businesses.

Construction Phases

3.3.133 As outlined in **Table 3.3** 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. Construction Phases 2 - 4 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.

3.3.134 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**). The exact timing of Construction phases 2 - 4 will be dependent on the growth in demand and take-up of capacity, but they are anticipated to be within the periods outlined in **Table 3.2**.

3.3.135 **Table 3.3** 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 3.3 Project Construction Phases – Construction Figures by Phase

	Phase 1	Phase 2	Phase 3	Phase 4	Total
Aircraft Stands	8 (cargo),	6 (cargo) 3 (passenger) 1 (Recycling hangar)	2 (cargo) 1 (Recycling hangar)	3 (cargo), 1 (passenger) 1 (Recycling hangar)	19* (cargo), 3 (passenger) 3 (Recycling hangar)
Cargo Facilities	12,000m^2	16,500m^2	14,000m^2	23,000m^2	65,500m^2
Non aircraft pavement (new and rehabilitated)	758,000m^2	95,000m^2	59,000m^2	72,500m^2	984,500m^2
Aircraft Pavement (new and rehabilitated)	394,000m^2	103,000m^2	43,500m^2	34,000m^2	574,500m^2

*Number of cargo stands based on markings for Code E aircraft occupation. Stands will also include markings for Code D and F aircraft which will result in alternative configurations. See stand layout drawing for details.

3.3.136 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.

Construction Phase 1

3.3.137 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, taxiway construction and cargo facilities, to be completed.

3.3.138 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 platforms;
- Runway Rehabilitation (asphalt paving);
- Construction of new taxiways, aprons and cargo stands;
- Highway Improvements;
- Construction of new air freight and cargo facilities;
- Construction of new business units on the northern area of the site;
- Construction / Rehabilitation of the new Fuel Farm site;
- Construction, refurbishment and/or relocation of existing business aviation, flight school and training, and helicopter/heli-charter services;
- Construction/installation of new ATC, approach lights, airfield ground lighting, navigational aids and radar;
- Construction of new Rescue and Fire Fighting Service facility; and
- Landscaping along the boundary with B2190 (Spitfire Way) and B2050 (Manston Road).

3.3.139 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

3.3.140 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.

3.3.141 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.

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

3.3.143 The existing taxiways, aprons, stands and other areas of hardstanding that are not required for operation or required for protection of the underground aquifer would also be removed as part of these operations. Intrusive works on the site will be minimised and approval would be sought from the EA prior to any intrusive works being undertaken.

3.3.144 It is expected that that much of the existing hardstanding material that is removed can be broken up and recycled for use as the sub-base and base for the new taxiways, aprons and stands. Additional material could also be obtained from other on-site demolition materials. However, an

assessment of the engineering suitability of any materials would need to be carried out prior to re-use.

3.3.145 In areas where the existing ground levels are suitable the turf and topsoil will be stripped and stockpiled to allow excavation in preparation for airfield pavement foundation works. Once removed, the sub-soil would be excavated up to a depth of 500mm in the works area to allow for the construction of the sub-base and base. The depth of construction will be determined following the soils investigation during the detailed design stage and the process for removal will be agreed with the Environment Agency prior to commencement of site works.

3.3.146 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 re-use on the airport site. Contaminated soil identified during ground investigation prior to and during construction will be either treated on-site and reused, or removed and disposed of off-site by a suitably licensed waste disposal operator.

3.3.147 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.

3.3.148 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

3.3.149 The paving for the new taxiway, aprons and stands could be constructed using Pavement Quality Concrete (PQC). It is expected that a concrete batching plant would be set up in the site working area. The materials and equipment needed would be 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 above ground level.

3.3.150 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.

3.3.151 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 laying the PQC. Due to the large areas it is likely that this will be constructed using slip forming techniques. This is a machine lay method which does not require the installation of shutters to support the concrete during the curing period. However, there will be areas where slip form techniques are not suitable i.e. small and irregular areas. For these locations semi-mechanical techniques will be used which requires installation of shutters to permit the laying of the high strength concrete.

3.3.152 The high strength concrete layer would be approximately 300 - 400m mm thick. The installation will be completed in approximately 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

3.3.153 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 (2m x 7.5m).

3.3.154 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.

3.3.155 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.

3.3.156 Marshall asphalt may also be used as a suitable material for Taxiway or Apron construction as an alternative to PQC pavement.

Building Construction and Foundations

3.3.157 The construction of the new air freight and cargo facilities, ATC tower, firefighting facilities and passenger terminal would all be undertaken during Construction 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.

3.3.158 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, if necessary, CFA piled foundations will be used and therefore 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

3.3.159 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.

3.3.160 As detailed in **Table 3.3** 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.

3.3.161 In addition, during this phase the first new aircraft maintenance / recycling hangar will be constructed, and the existing MRO hangar and facilities demolished.

3.3.162 A new terminal building and refurbishment of passenger aircraft stands will occur in this phase opening passenger services at the airport.

3.3.163 The construction techniques for the concrete pavement and building construction during Construction Phase 2 would be the same as those during Construction Phase 1.

Construction Phase 3

3.3.164 As detailed in **Table 3.3**, 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 cargo buildings adjacent to Spitfire Way would be demolished. The internal access road would be constructed in its permanent alignment.

3.3.165 An additional aircraft maintenance hangar would also be provided alongside the MRO facility.

3.3.166 The construction techniques for the concrete pavement and building construction during Construction Phase 3 would be the same as those during Construction Phase 1.

Construction Phase 4

3.3.167 As detailed in **Table 3.3**, 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.

3.3.168 An additional aircraft passenger stand would be constructed next to the existing passenger apron. A further maintenance hangar could also be provided adjacent to the previously constructed MRO facilities.

3.3.169 The construction techniques for the concrete pavement and building construction during Construction Phase 4 would be the same as those during Construction Phase 1.

Construction Compound, Equipment and Hours of Operation

3.3.170 Compound areas will comprise offices, welfare facilities, vehicle parking and material storage areas, which will be located within the airport boundary. Proposed locations for Construction compounds have been shown on the Phasing drawings (**Figures 3.27 – 3.30**).

3.3.171 Batching plants are expected to be utilised during all construction phases. A batching plant incorporates vertical silos for the storage of cement and bitumen. The maximum height of these silos would be 20m.

3.3.172 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 Construction Environmental Management Plan (CEMP), and where possible noise reduction measures would be implemented to prevent noise and other nuisance.

3.3.173 The manpower on-site during Construction Phase 1 is anticipated to average 210, with a maximum of 630 forecast during the peak construction period.

3.3.174 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 3.4**.

Table 3.4 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
	Generator	5
	Pick-up trucks	10
	Small vans	10
	Road sweepers	2
	Skip trucks and skips	6

Construction Traffic Management and Logistics

3.3.175 A CTMP has been prepared and the implementation of which will reduce construction traffic, recommend designated HGV delivery routes to the strategic road network and limit hours of delivery, to minimise nuisance and disruption to local communities. The CTMP is included as Appendix L to the TA.

3.3.176 Access to the site for all construction vehicles during Construction Phase 1 will be from the new site access to be constructed on the B2190 (Spitfire Way) (as shown in **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).

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

3.3.178 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 408 movements/day with 15,228 movements required for the earthworks during Construction Phase 1.

3.3.179 The timings of deliveries to the Site would be managed to avoid arrivals and departures during peak morning and evening traffic periods.

3.3.180 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 PCTMP. Wide loads are likely to be required for the following equipment in particular:

- Concrete batcher, four wide loads required;
- Asphalt batcher, six wide loads required; and
- Piling rig, two wide loads required per rig.

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

3.3.182 A Staff Travel Plan has been prepared which sets out how construction workers travel to site, including the use of sustainable transport modes (Appendix L to the TA).

Construction Environmental Management Plan

3.3.183 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.

3.3.184 In order to manage and minimise environmental effects from construction, a CEMP has been produced (**Appendix 3.2**); this sets out the measures and their method of delivery. This provides an overview of the standard construction management measures that would be implemented as part of the Proposed Development, incorporating the embedded environmental measures that form part of the proposals.

3.3.185 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.

Intrusive Investigations

3.3.186 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.

3.3.187 All intrusive investigations will be agreed with the EA and other stakeholders as appropriate prior to the commencement of works.

3.3.188 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

3.3.189 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. Some operational activities will be 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 assessment, it has been assumed that the operation of the Proposed Development will commence in airport Year 2.

3.3.190 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[iii] and Northpoint Aviation[iv], and is presented in *Manston Airport: A National and Regional Aviation Asset Volume III*[5]. The information, as relevant to the operational phase of the development and the assessment for the ES, 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.

3.3.191 Azimuth on behalf of RiverOak has produced a report[5] for the Proposed Development which includes an air traffic forecast on a yearly basis, *Manston Airport: A National and Regional Aviation Asset Volume III.* The report and forecast have been produced through a combination of qualitative and quantitative assessments.

Flight Timings

3.3.192 The majority of flights will take off and land between the hours of 07.00 to 23.00.

3.3.193 There may be a requirement for night-time flights, and a realistic assumption has been made and included for the purposes of noise modelling. A range of commitments on future noise related activities at the airport have been provided in the form of a Noise Mitigation Plan (document TR020002/APP/2.4).

3.3.194 The main measures in the noise mitigation plan include a 'quota count', common at other UK airports, where aircraft are given an independently assessed score known according to how noisy they are, and then an annual quota is imposed. Thus, there is a control of the total amount of noise from aircraft rather than the total number of aircraft. In the case of Manston Airport, a quota count of 3028 is applied and in addition the noisiest aircraft (with quota count 8 or 16) are also banned from night flying altogether. The night time period quota figure has been arrived at based on a typical mix of aircraft operating within the noise levels that have been environmentally assessed.

Airspace Route and Operating Procedures

3.3.195 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[6]. Preliminary discussions on this and other related topics have been held between RiverOak, the project team and the CAA.

3.3.196 The Airspace Change Process provides permission for the detailed operating procedures and airspace required by the airport, 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

[iii] http://azimuthassociates.co.uk/
[iv] http://aviation.wpengine.com/

RiverOak and the respective Regulators will be minimised (for further contextual information refer to Box 1.1 in **Chapter 1: Introduction**).

3.3.197 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 is not sufficiently robust. Instead, it means that a set of expected flight routes and procedures have been prepared for the project, in order to perform an assessment upon the operational effects of the Proposed Development. 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.

Aircraft Taxi Routes, Hold Points and Engine Ground Running Locations

3.3.198 The detailed design of the aircraft taxi routes, hold points and engine ground running locations are 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 have been determined as part of the on-going design and are presented in the TA.

Airside Ground Support Equipment

3.3.199 The airport will require the following airside ground support equipment (GSE) (**Table 3.5**), as part of general airfield operations, the air freight and passenger operations. Figures provided are worst case, 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.

Table 3.5 Airside GSE

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
	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

3.3.261 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, publicly available information on the aircraft used by airline operators, and from the records from the previous operations at Manston Airport prior to its closure.

3.3.262 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 which is also used to classify airport infrastructure), and maximum landing weight (in metric tons), that are expected to operate at the Airport, and used in the forecasting, are presented in **Appendix 3.3**. The International Civil Aviation Organization (ICAO) aircraft approach speed category is shown in **Table 3.6**.

Table 3.6 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

VAT —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.

3.3.263 In order to mitigate the impact from the largest and noisiest types of aircraft, a restriction on certain types of aircraft using the airport, except in emergency or other exceptional circumstances, would be implemented. Further information is provided in the Noise Mitigation Plan (document TR020002/APP/2.4).

3.3.264 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, older aircraft will gradually be phased out of use and be replaced. Therefore, the forecasts include an allowance to replace older aircraft with available new types.

3.3.265 Most UK airports occasionally land air traffic which is unscheduled for example in emergencies or in special circumstances (e.g. exceptional weather conditions or medical flights during disaster relief etc). The frequency of such occurrences is unknown, however it is likely to be a very small

number of movements in any given year and therefore is not included in the indicative flight schedule used for modelling purposes.

Air Freight Forecast

3.3.266 The primary focus for the Proposed Development will be air freight operations, which are planned to resume in Year 2, Q4 2020.

3.3.267 The principal types of markets and goods that the airport is likely to service are:

- Global import and export for parcels and packages;
- African market, particularly for the import of flowers, fruit and vegetables;
- Chinese market, 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 market, particularly for export markets including fish and shellfish;
- Pakistani market, including the import of clothing and the export of consumer goods;
- Russian market, for gas and oil equipment and the export of luxury items;
- South American market, for the import of perishable fresh produce; and
- US market, for a range of import and exports.

3.3.268 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.

3.3.269 It has been forecast that a reopened airport could capture in the region of 300,000 – 350,000 tonnes of airfreight by 2040 and provide part of the solution to the problem of a shortfall in aviation capacity in the UK[5]. This would be from a combination of business returning to the airport, the capture 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.

3.3.270 The air freight forecast has been produced using the following assumptions/calculations (see **Appendix 3.1** for the Glossary):

- 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;
- 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; and
- Humanitarian and medevac – outbound only.

3.3.271 An annual summary of forecasted air freight is shown in **Table 3.7**. 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 3.7 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
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

3.3.272 In developing the air freight forecast, HGV movements at an assumed load of ten tonnes per HGV has been used for the initial period of the forecast. For later years, this is reduced to five 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 (i.e. arriving on one aircraft and departing on another).

3.3.273 The Proposed Development will focus on freight aircraft and the largest number of flights is likely to be during the winter season rather than the summer season. The majority of the cargo anticipated to be handled at Manston will have no particular seasonality associated. The exception to this is perishables (fresh fruit, vegetables and cut flowers) the volumes (and thus flight numbers) of which will be greater in winter than summer; this is due to the higher import demand during the period when the UK is non-productive in this sector. Therefore, for example, the assessment of aircraft noise for the Proposed Development is based on a 'typical busy day' during the busier winter season to ensure that a worst-case assessment is undertaken.

Passenger Forecast

3.3.274 It is anticipated that complementary 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.

3.3.275 A passenger forecast has been prepared as part of the business plan[5]. As outlined above, passenger flights are forecast to start in airport Year 3.

3.3.276 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.

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

Table 3.8 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	662,769
4	4,972	52	5,024	679,868
5	5,012	52	5,064	686,672
6	6,650	52	6,702	695,295
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	1,128,44
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
19	8,849	148	8,997	1,356,521
20	9,144	154	9,298	1,407,753

3.3.278 Based on market intelligence, research from other airports and historic information from previous operations at the airport the assumptions have been made for the mode of transport for passengers and their UK origins/destinations. Details of this are set out in the Transport Assessment (Section 6) and in Appendix L to the TA.

3.3.279 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 will aim to increase the percentage of travel by sustainable modes for the later years of the forecast.

3.3.280 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

3.3.281 In addition to the core business of air freight, and the complementary passenger services, Manston Airport will also serve as a base for a number of other airport and aviation related services. These are outlined in the following section. Services include:

- Fixed Base of Operations – the airport will provide a base for business aviation and executive travel, including for helicopter and heli-charter flights;
- Flight School – it is anticipated that the existing flight school and training facilities will be retained at the airport; and
- Maintenance, Repair and Overhaul – a number of businesses including AvMann Engineering, have been based at the airport working in MRO. The airport will continue to support and encourage these operations, and new MRO facilities will be constructed as part of Construction Phase 2.

Airport Hours of Operation and Staffing

3.3.282 It will be necessary for the airport to be staffed continuously. Airport operations staff will need to be available during both day and night periods and a permanent security presence in the airport control room is required. It is also anticipated that staff, including air traffic controllers, rescue staff and firefighting staff and security (as detailed in **Table 3.9**), will be rostered on a 12-hour shift programme, with a week of four days on/three days off followed by three days on and four days off.

3.3.283 However, airport operating times and ATMs will be dependent on the anticipated air traffic, and the rostering of the staff will 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.

3.3.284 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.

3.3.285 The airport administration staff, alongside staff based in the airport related business units on the Northern Grass area will work traditional working hours, typically 08.00 to 18.00.

3.3.286 The forecast of the number of jobs which will be generated by the reopening of Manston Airport is included within the business plan and forecast prepared for RiverOak[5]. There are four categories of economic impact/job creation:

- **Direct Economic Impact:** The employment, income and Gross Domestic Product (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 ATC, 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, Do-It-Yourself (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.

3.3.287 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 will 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*[7]):

- 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.

3.3.288 Using this formula, and the 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 3.9** below.

Table 3.9 Manston Airport Direct, Indirect/Induced and Catalytic Jobs Forecast[7]

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	1,542	0	2,398
3	108,553	662,768	1,551	2,791	6,203	10,545
4	167,092	679,868	2,085	3,753	8,341	14,179
5	173,741	686,672	2,150	3,870	8,601	14,621
6	181,436	965,295	2,446	4,438	9,862	16,766
7	192,908	975,591	2,576	4,638	10,306	17,520

8	200,673	975,591	2,645	4,762	10,581	17,988
9	203,245	975,591	2,668	4,803	10,673	18,143
10	212,351	975,591	2,749	4,948	10,996	18,693
11	222,377	1,011,587	2,812	5,062	11,249	19,124
12	234,508	1,049,022	2,890	5,202	11,561	19,653
13	244,690	1,087,954	2,947	5,305	11,789	20,042
14	256,989	1,128,444	3,018	5,432	12,072	20,522
15	270,579	1,170,553	3,094	5,570	12,378	21,042
16	283,904	1,214,347	3,164	5,695	12,656	21,515
17	296,594	1,259,892	3,224	5,802	12,894	21,920
18	312,344	1,307,259	3,301	5,942	13,205	22,448
19	324,838	1,356,521	3,349	6,029	13,397	22,775
20	340,758	1,407,753	3,417	6,151	13,668	23,235

3.3.289 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 direct airport jobs would include:

- Airlines;
- Ground handling;
- Airport and ATC;
- Retail and other in-terminal services;
- Airport security and passenger screening;
- Customs, immigration and government jobs;
- Ground transport;
- Food and beverage; and
- MRO.

3.3.290 Direct airport jobs will likely cover a broad range of positions, as forecast in **Table 3.10**.

Table 3.10 Manston Airport Direct Airport Jobs by Position[7]

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
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	157	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

3.3.291 The majority proportion of the direct airport employees will be those working in passenger and freight services. These roles include the ticket collections, passenger check-in, customer service and assistance, 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.

3.3.292 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

3.3.293 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 3.11**. 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). Relevant industry standards, guidance and best practice will be followed, and where appropriate consultation will be undertaken with relevant stakeholders and consultees.

Table 3.11 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 EASA	Kent Fire & Rescue Service, Kent County Constabulary, South East Coast Ambulance Service, Thanet District Council (TDC)	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, EA	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	EA, 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	EA, Natural England	Post DCO Consent
Long Grass Policy	Procedure for the management of all airport	CAA CAP 772	EA, Natural England	Post DCO Consent

	grass to deter most common hazardous birds found on an aerodrome			
Waste Management Plan	Plan		EA	Post DCO Consent
Discharge Monitoring Procedure	Ensure compliance with discharge permit	Environmental Permitting Guidance Groundwater Activities, Environment Agency December 2010	EA	For DCO Submission
Environmental Policy and Environmental Management Plan	An Environmental Management Plan governing the procedures taking place whilst the airport is operating.	To be developed in line with best practice		Post DCO consent
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, KCC Highways, TDC	For DCO Submission

Decommissioning Phase

3.3.294 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.

3.3.295 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 placement of a new overlay on existing paved surfaces. Consequently, for these works there is often no requirement for any decommissioning.

3.3.296 In addition, although the lifetime of the Proposed Development is currently forecast to be 20 years for business planning purposes, it is very likely to extend beyond this date and, as such, whilst other equipment, infrastructure and facilities will need to be replaced, the airport itself is assumed to operate in perpetuity

REFERENCES

[1] R v Rochdale Metropolitan Borough Council ex parte Milne [2001] Env L.R. 22

[2] Natural England (2012) NCS Profile: 113 North Kent Plain (NE357) [online] Available at: http://publications.naturalengland.org.uk/publication/2900242 [Accessed 26/01/2018]

[3] Thanet District Council (2012) Landscape Character Areas [online]. Available at: https://www.thanet.gov.uk/media/2327036/Landscape-Character-Areas-August-2012.pdf [Accessed 26/01/2018]

[4] EASA (2017) CS-ADS-DSN Issue 4 [online] Available at: https://www.easa.europa.eu/document-library/certification-specifications/cs-adr-dsn-issue-4 [Accessed 26/01/2018]

[5] Azimuth Associates (2017) Manston Airport: A National and Regional Aviation Asset: Volume III The Forecast [online] Available at: http://rsp.co.uk/documents/rsp-documents/azimuth-associates-manston-airport-a-national-and-regional-aviation-asset-volume-iii-the-forecast/ [Accessed 26/01/2018]

[6] Civil Aviation Authority (2016) Airspace Change Process Guidance Document [online] Available at: https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=395 [Accessed 26/01/2018]

[7] Azimuth Associated (2017) Manston Airport: A National and Regional Aviation Asset: Volume IV The Economic and Social Impacts of Airport Operations [online] Available at: http://rsp.co.uk/documents/rsp-documents/azimuth-associates-manston-airport-a-national-and-regional-aviation-asset-volume-iv-demand-in-the-south-east-of-the-uk/ [Accessed 26/01/2018]

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 to establish the policy context against which the proposals for the reopening of Manston Airport ("the Proposed Development") will need to be considered. Further detail is provided in **Appendix 4.1**. Further topic specific policies that have been considered are provided in the Technical Chapters (**Chapters 6 - 17**) within this Environmental Statement (ES).

4.2 National Planning Policy

The Planning Act 2008[1]

4.2.1 *The Planning Act 2008* ('the 2008 Act'), which received Royal Assent on 26 November 2008, provides a development consent system for nationally significant transport, energy, water, wastewater and waste infrastructure projects.

4.2.2 The 2008 Act is the primary legislation which established the legal framework for applying for, examining and determining applications for Nationally Significant Infrastructure Projects (NSIPs) taking into account the guidance in National Policy Statements (NPSs).

4.2.3 It also made provision for the creation of a new independent body, the Infrastructure Planning Commission (IPC), which had responsibility for examining NSIP applications for development consent and determining them where a relevant national policy statement is in place. The IPC has now been abolished and responsibility for examining NSIP applications has passed to the Planning Inspectorate.

National Planning Policy Framework – Draft Text for Consultation (March 2018)

4.2.4 The draft revised National Planning Policy Framework (NPPF) published in March 2018 incorporates policy proposals previously consulted on in the Housing White Paper and the Planning for the Right Homes in the Right Places Consultation (September 2017). The consultation closes on the 10 May 2018.

4.2.5 The NPPF continues to set out the Government's planning policies for England and how these are to be applied (paragraph 1) and continues to state that planning law requires applications to be determined in accordance with the Development Plan unless material considerations indicate otherwise (paragraph 2). Paragraph 2 further confirms that the NPPF is a material consideration in planning decisions.

4.2.6 Paragraph 4 specifically states that the NPPF does not contain specific policies for NSIPs and that these are determined in accordance with the decision-making framework set out in the 2008 Act and relevant national policy statements for major infrastructure, as well as any other matters that are relevant (which may include the NPPF). It also states that NPSs form part of the overall framework of national planning policy and are a material consideration in decisions on planning applications.

4.2.7 Paragraph 7 states that the purpose of the planning system is to contribute to the achievement of sustainable development. Paragraph 8 states that achieving sustainable development means that the planning system has three overarching objectives (economic, social and environmental) which are interdependent and which need to be pursued in mutually supportive ways so that opportunities can be taken to secure net gains across the different objectives. Paragraph 9 states that planning policies and decisions should play an active role in guiding development towards sustainable solutions but, in doing so, should take local circumstances into account to reflect the character, needs and opportunities of the area.

4.2.8 Paragraph 10 states that so that sustainable development is pursued in a positive way, at the heart of the NPPF is a presumption in favor of sustainable development. For decision-taking, paragraph 11 states that this means approving development proposals that accord with an up-to-date development plan without delay; or where there are no relevant development plan policies, or the policies which are most important for determining the application are out-of-date, granting permission unless:

- The application of policies in the NPPF that protect areas or assets of particular importance provides a clear reason for refusing the development proposed; or
- Any adverse impacts of doing so would significantly and demonstrably outweigh the benefits when assessed against the policies in this Framework taken as a whole.

4.2.9 Paragraph 12 reconfirms that the presumption in favour of development does not change the statutory status of the development plan as a starting point for decision making.

4.2.10 Paragraph 20 states that the strategic policies required for the area of each local planning authority should include those policies and strategic site allocations necessary to provide (amongst other things) infrastructure for transport.

4.2.11 The draft revised NPPF promotes effective cooperation and paragraph 28 especially endorses effective and on-going joint working between strategic plan making authorities and relevant bodies which it believes are integral to the production of a positively prepared and justified strategy. In particular, the draft revised NPPF states that joint working should help to determine where additional infrastructure is necessary.

4.2.12 The NPPF promotes building a strong, competitive economy and paragraph 82 states that planning policies and decisions should help create the conditions in which businesses can invest, expand and adapt. It continues by saying that significant weight should be placed on the need to support economic growth and productivity, taking into account both local business needs and wider opportunities for development. The approach taken should allow each area to build on its strengths, counter any weaknesses and address the challenges of the future. This is particularly important where Britain can be a global leader in driving innovation and in areas with high levels of productivity, which should be able to capitalise on their performance and potential.

4.2.13 Section 9 of the NPPF concerns promoting sustainable transport and paragraph 103 (b) states that transport issues should be considered so that opportunities from existing or proposed transport infrastructure and changing transport technology and usage are realised. Paragraph 105(c) states that planning policies should identify and protect, where there is robust evidence, sites and routes that could be critical in developing infrastructure to widen transport choice and realise opportunities for large scale development.

4.2.14 Paragraph 105(e) and 105(f) state that planning policies should:

> *"(e) provide for any large-scale facilities, and the infrastructure to support their operation and growth, taking into account any relevant national policy statements and whether such development is likely to be a nationally significant infrastructure project. For example, ports, airports, interchanges for rail freight, roadside services and public transport projects; and*
>
> *(f) recognise the importance of maintaining a national network of general aviation facilities – taking into account their economic value in serving business, leisure, training and emergency service needs, and the Government's General Aviation Strategy."*

4.2.15 Paragraph 124 reinforces the need for planning policies and decisions to support the creation of high quality buildings and places. Paragraph 127 states that applications that can demonstrate early proactive and effective engagement with the community should be looked on more favourably than those that cannot.

4.2.16 Further detail of those sections of the NPPF that are relevant to the Proposed Development are provided in **Appendix 4.1**. The revised NPPF is expected to be adopted in July 2018.

National Planning Practice Guidance (NPPG)[2]

4.2.17 On 6 March 2014, the Department for Communities and Local Government (DCLG) launched the NPPG, a web-based resource.

4.2.18 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 NPPF.

National Infrastructure Planning (Environmental Impact Assessment) 2017 Regulations[3]

4.2.19 As discussed in **Chapter 1: Introduction**, *Directive 2014/52/EU* resulted in its transposition in to UK Law as the *National Infrastructure Planning (Environmental Impact Assessment) Regulations 2017* ('the 2017 EIA Regulations'). The 2017 EIA Regulations came into force on 16 May 2017.

4.2.20 The aim of Environmental Impact Assessment ("EIA") is to protect the environment by ensuring that a local planning authority, when deciding whether to grant planning permission for a project which is likely to have significant effects on the environment, does so in the full knowledge of the likely significant effects and takes this into account in the decision-making process. The applicant is responsible for the preparation of the ES.

4.2.21 The ES must contain information specified in regulation 18(3) in addition to meeting the requirements of regulation 18(4). It must also include any additional information specified in Schedule 4 of the 2017 EIA Regulations which is relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected.

4.2.22 The location of the information required under the 2017 EIA Regulations is described in **Chapter 1: Introduction** of this ES and is not repeated here.

Aviation Strategy White Paper (expected 2018)

4.2.23 The Government has announced that the Department for Transport (DfT) is currently progressing work to develop a new strategy for UK aviation[4]. The Government undertook consultation in autumn 2017, which should lead to the publication of an Aviation Strategy White Paper by the end of 2018.

4.2.24 The Government published a consultation document to establish views on the approach the Government is proposing to take on a number of aviation issues identified to inform the Aviation Strategy. The consultation document is entitled 'Beyond the Horizon: The Future of Aviation in the UK'[5]. This consultation closed on 13 October 2017. The new strategy is proposed to focus on aviation covering the whole country and a long-term strategy; with the consultation process examining the effect on all of the UK's regions.

4.2.25 It is recognised within the consultation document that before a new runway is built, for the UK to grow its domestic and international capacity, there is a need for existing runways throughout the UK to be more intensively utilised. Of particular interest is paragraph 7.20, which states:

> *"The Government agrees with the Airports Commission's recommendation that there is a requirement for more intensive use of existing airport capacity and is minded to be supportive of all airports who wish to make best use of their existing runways including those in the South East."*

4.2.26 The Government received 372 responses to its consultation. In April 2018, it published a document entitled 'Beyond the Horizon: The Future of Aviation in the UK – Next steps towards an Aviation Strategy"[6] which sets out how the Government will take account of the responses to the call for evidence through the next phase of development of the Aviation Strategy. Paragraph 1.2 states that the new Aviation Strategy will take a fresh look at the aviation sector and its challenges and opportunities, as well as the role of Government. It will build on the UK's aviation success story in pursuit of the following aim:

"To achieve a safe, secure and sustainable aviation sector that meets the needs of consumers and of a global, outward-looking Britain."

4.2.27 The strategy will have the following six objectives (paragraph 1.4):

- Help the aviation industry work for its customers;
- Ensure a safe and secure way to travel;
- Build a global and connected Britain;
- Encourage competitive markets;
- Support growth while tackling environmental impacts; and
- Develop innovation, technology and skills.

4.2.28 Paragraph 8.1 of the document confirms the next steps for the aviation strategy. It states that a new simpler process will see a single green paper produced in Autumn 2018. There will now be an intense period of engagement and policy development that will inform the contents of the green paper that will ensure that the Government is able publish a comprehensive and fully informed Aviation Strategy in early 2019.

4.2.29 In June 2018, the Government reported on the feedback received from the Aviation Strategy call for evidence document, specifically on its proposal to support airports throughout the UK by making best use of their existing runways. The DfT reported that 60% of the relevant responses were in favour of the Government's proposal, 17% against and 23% supportive provided certain issues were addressed (paragraph 1.7)[7]. Paragraph 1.26 states the Government's expectation for airports wishing to increase either their passenger or air traffic movement caps to allow them to make best use of their existing runways to submit applications to the relevant planning authority. Paragraph 1.27 states that applications to increase caps by 10mppa or more or deemed nationally significant would be considered as NSIPs under the Planning Act 2008 and would be considered by the Secretary of State. The Government makes clear (paragraph 1.26) that as part of any planning application, airports will need to demonstrate how they will mitigate against local environmental issues, taking account of relevant national policies, including any new environmental policies emerging from the Aviation Strategy. Paragraph 1.29 therefore concludes that:

"Therefore the Government is supportive of airports beyond Heathrow making best use of their existing runways. However, we recognize that the development of airports can have negative as well as positive local impacts, including on noise levels. We therefore consider that any proposals should be judged by the relevant planning authority, taking careful account of all relevant considerations, particularly economic and environmental impacts and proposed mitigations."

Airports National Policy Statement (NPS): New Runway Capacity and Infrastructure at Airports in the South East of England – June 2018

4.2.30 On 25th June 2018, the House of Commons debated the proposed Airports National Policy Statement that had been laid before Parliament on 5th June 2018[8]. Following approval from the House, the Airports NPS was designated as a national policy statement under the provisions of Section 5 (1) of the Planning Act 2008 subject to any legal challenge.

4.2.31 The Draft Airports NPS was initially published for consultation on 2 February 2017, with a revised draft published in October 2017. This followed the outcome of the work by the Airports Commission which published its final report[9] in July 2015. The Government announced on 25 October 2016 that a north-west runway at Heathrow Airport was its preferred scheme to deliver additional airport capacity in the south-east of England[10].

4.2.32 In designating the Airports NPS, the Government has endorsed the need for a new runway at Heathrow Airport. The NPS provides the primary basis for decision making on development consent applications for a north-west Runway at Heathrow Airport and is also an important and relevant consideration in respect of applications for new runway capacity and other airport

infrastructure in London and the South East of England (paragraph 1.12). The Airports NPS sets out (paragraph 1.13):

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

4.2.33 Paragraph 1.14 confirms that the Airports NPS sets out planning policy in relation to applications for any airport nationally significant infrastructure project in the South East of England, and its policies will be important and relevant for the examination by the Examining Authority, and decisions by the Secretary of State, in relation to such applications.

4.2.34 Capacity at other airports is not specifically addressed in the Airports NPS; therefore, it will not form the basis for determination of this Development Consent Order ("DCO") application. However, the Airports NPS is still a relevant consideration for other applications for airports infrastructure in London and the south-east (paragraphs 1.14, and 1.38 and 1.41). The need to have regard of other matters which are both important and relevant to the determination of DCO applications is confirmed at Section 104(2)(d) of the 2008 Act.

4.2.35 The Airports NPS also does not affect wider aviation issues for which the 2013 Aviation Policy Framework[16] and subsequent policy statements apply (paragraph 1.38). The Government has also announced that the DfT is currently progressing work to develop a new strategy for UK Aviation (see paragraph 4.2.23 of this Chapter).

4.2.36 In paragraph 1.39, the Government confirms that it is supportive of airports beyond Heathrow making best use of their existing runways albeit that they recognise that the development of airports can have positive and negative impacts, including on noise levels. Consistent with paragraph 1.29 of "'Beyond the Horizon: The Future of Aviation in the UK – Making best use of existing runways"[7], the Government states that any proposals should be judged on their individual merits by the relevant planning authority, taking careful account of all relevant considerations, particularly economic and environmental impacts.

4.2.37 As indicated in paragraph 1.39, paragraph 1.42 states that airports wishing to make more intensive use of existing runways will still need to submit an application for planning permission or development consent to the relevant authority, which should be judged on the application's individual merits. However, in light of the findings of the Airports Commission on the need for more intensive use of existing infrastructure as described at paragraph 1.6 of the Airports NPS, the Government accepts that it may well be possible for existing airports to demonstrate sufficient need for their proposals, additional to (or different from) the need which is met by the provision of a north-west Runway at Heathrow. The Government's policy on this issue will continue to be considered in the context of developing a new Aviation Strategy.

4.2.38 The parts of the Airports NPS[8] which are particularly relevant to the Proposed Development include:

- The reaffirmation that international connectivity, underpinned by strong airports and airlines, is important to the success of the UK economy as it facilitates trade in goods and services, enables the movement of workers and tourists and drives business innovation and investment, being particularly important for many of the fastest growing sectors of the economy (Paragraph 2.1);
- International connectivity attracts businesses to cluster round airports and helps to improve the productivity of the wider UK economy. The UK's airports are the primary gateway for vital time-sensitive freight services (Paragraph 2.2);
- 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 (Paragraph 2.4);

- The UK will benefit economically from growth in employment and exports from future aviation growth (paragraph 2.5); and
- The importance of air freight services to the UK economy is also acknowledged within the Airports NPS (Paragraph 2.7).

4.2.39 Paragraph 2.9 of the Airports NPS states that the importance of aviation to the UK economy, and in particular the UK's hub status, has only increased following the country's decision to leave the European Union. As the UK develops its new trading relationships with the rest of the world, it will be essential that increased airport capacity is delivered, in particular to support development of long haul routes to and from the UK, especially to emerging and developing economies.

4.2.40 The benefits for freight delivered by the Heathrow north-west runway was one of four strategic considerations to which the Government afforded particular weight in selecting it as its preferred scheme[11].

Airports Commission Final Report (July 2015)[12]

4.2.41 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 and to make recommendations which will allow the UK to maintain its position as Europe's most important aviation hub.

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

4.2.43 Specifically, in relation to the Proposed Development, the Airports Commission throughout their considerations recognised that the air freight sector plays an important role in the UK economy, particularly to trade with emerging markets and other non-EU countries and to many airlines. The Airports Commission identified that the key sectors for air freight include perishables such as food and flowers and pharmaceutical products and medicines. These products need to be delivered in controlled environments within short shelf lives. Additionally, 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 is another key sector (Paragraphs 6.65 to 6.69).

Airports Commission Discussion Paper 06: Utilisation of the UK's Existing Airport Capacity (June 2014)[13]

4.2.44 The Airports Commission during its investigation looked at the potential to redistribute demand away from airports in London and the south-east. 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. This is especially so at a time when the major London airports are already operating very close to capacity.

Airports Commission Interim Report (December 2013)[14]

4.2.45 In relation to Manston Airport, the Airports Commission Interim Report within Appendix 2: *Assessment of Long-Term Options*[15] 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."*

4.2.46 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)[16]

4.2.47 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.

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

4.3 Regional Policy

4.3.1 This section sets out the regional policy that is relevant to the Proposed Development.

The London Plan, 2016 (Consolidated with Alterations since 2011)

4.3.2 The London Plan recognises that despite being located outside of Greater London, regional airports provide a key contribution to supporting both the economy and connectivity of London.

4.3.3 With regards to aviation, there is a specific policy in the London Plan (Policy 6.6). It states that adequate airport capacity serving a wide range of destinations is critical to the competitive position of London in a global economy. Airport capacity serving the capital and wider south-east of England must be sufficient to sustain London's competitive position.

Draft new London Plan (December 2017)

4.3.4 Policy SD2 (Collaboration in the Wider South East) looks for strategic understanding of the transport issues facing the wider south east. It outlines that the Mayor will work with wider south east partners to find solutions to shared strategic concerns including the wider needs for freight.

4.3.5 Policy T8 concerns Aviation and states that the Mayor supports the case for additional aviation capacity in the South East of England, provided it would meet London's passenger and freight needs, recognising that this is crucial to London's continuing prosperity and to maintaining its international competitiveness and world-city status.

4.3.6 Policy T8 further states that better use should be made of existing airport capacity, underpinned by upgraded passenger and freight facilities and improved surface access links, in particular rail.

4.3.7 Paragraph 10.8.4 states that the Mayor recognises the need for additional runway capacity in the south east of England, but this should not be at the expense of London's environment or the health of its residents.

4.3.8 In Paragraph 10.8.10, the Mayor recognises that air freight plays an important role in supporting industry in London and the UK, and the provision of both belly hold and dedicated freighter capacity should be an important consideration when plans for airport development in the south east of England are taken forward.

4.3.9 Further detail of those sections of the draft new London Plan that are relevant to the Proposed Development are provided in **Appendix 4.1.**

4.4 Local Planning Policy

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

- Thanet District Council (TDC);
- Dover District Council (DDC); and
- Canterbury City Council (CCC).

Thanet District Council

4.4.2 The Proposed Development is located entirely within the administrative authority of TDC.

4.4.3 The statutory Development Plan for TDC 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).

4.4.4 In addition, TDC 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 (2006) Saved Policies and Proposals Map[17]

4.4.5 An extract from the Local Plan Proposals Map showing the Proposed Development site is provided in **Figure 4.1**.

4.4.6 The key planning policy designations that affect the Proposed Development 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).

4.4.7 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

4.4.8 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)[18]

4.4.9 Within the Draft Local Plan Preferred Options version, Strategic Priority 1 looked to create additional employment and training opportunities, to strengthen and diversify the local economy and improve local earning power and employability.

4.4.10 TDC recognised that various options were available with regards to the future use of Manston Airport, as an operational airport and for aviation activities, as well as for other developments. It was acknowledged that these needed to be explored and assessed for the wider area of the airport and its environs through the Development Plan making process. TDC was therefore seeking to designate the area as an “opportunity area” for which TDC would prepare an Area Action Plan (AAP) Development Plan Document. The AAP for Manston Airport was going to set out the development framework for the development and regeneration of the area. A consideration of the

AAP was going to be the promotion, retention, development and expansion of the airport and aviation related operations and this needed to be supported by a feasibility study and a viable business plan.

4.4.11 The alternative option for the AAP was going to 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.

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

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

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

4.4.14 TDC has significantly amended site specific draft Policy SP05 (Manston Airport) following an airport viability study which they commissioned from Avia Solutions. This considered 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 15-20 years. It also considered previous reports and developments in national aviation. The September 2016 report 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.

4.4.15 Accounting for conclusions of the airport viability report and given the level of objectively assessed housing needs, TDC considered that the most appropriate use for the 320ha brownfield airport site was for a mixed-use settlement for at least 2,500 new dwellings and up to 85,000sqm of employment and leisure floorspace. Revised Policy SP05 seeks to create an attractive, sustainable, free-standing new settlement with a district centre featuring all the amenities needed for a town. The development would also deliver important links across Thanet, improve access to and from the site and provide open space and community facilities that the whole of Thanet can access.

4.4.16 Full details of key relevant revisions to the draft policies are provided in **Appendix 4.1.**

4.4.17 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) was revised to provide 2,500 residential dwellings at the Former Airport Site.

4.4.18 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) were proposed for widening; and junction improvements were proposed at Manston Road/Spitfire Way and at Manston Road/Manston Court Road. A new road was also proposed from Columbus Way (Manston Business Park) to Manston Road, Birchington.

4.4.19 The draft plan was taken to an extraordinary meeting on the 18 January 2018 of the Council for permission to proceed to the publication stage. This would have provided members of the public the opportunity to comment prior to submission to an independent Planning Inspector for examination. During this meeting councillors voted by 35 votes to 20 not to progress with Thanet's Local Plan and as such the plan was rejected.

4.4.20 Presently, TDC are continuing to work on the draft local plan. Any delays in the process of the development of the Local Plan may result in the intervention by the Ministry of Housing, Communities and Local Government (formerly the Department for Communities and Local Government), removing TDC's control from the process. At the time of writing, TDC were in the process of seeking Members' views on the next steps to be taken with the draft Plan with a view to moving the Plan forward towards publication for comment under Regulation 19 of the Town and

Country Planning Act (Local Planning) (England) Regulations 2012 with subsequent submission of the Plan for examination under Regulation 22.

Dover District Council

4.4.21 The statutory Development Plan for DDC comprises:

- Dover District Core Strategy[19] (adopted September 2010);
- Dover District Land Allocations Local Plan[20] (adopted January 2015);
- Dover District Proposals Map[21]; and
- Dover District Local Plan (Saved Policies)[22] (2002).

4.4.22 A review of DDC'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.

4.4.23 DDC are in the process of producing a new Local Plan. The new Local Plan will cover the period from 2014 to 2037 and will set out the key policies for the District. DDC has identified Manston Airport as a cross-boundary strategic priority for planning. DDC expects to publish the proposed Local Plan draft for public consultation in July 2019.

Canterbury City Council

4.4.24 The statutory Development Plan for CCC comprises:

- Canterbury District Local Plan (July 2017) and Proposals Map[23]; and
- Herne Bay Area Action Plan[24] (adopted April 2010).

4.4.25 A review of CCC Development Plan documents has not identified any planning policy of relevance to the re-opening of Manston Airport. However, the Local Plan does recognise that the NPPF encourages Local Authorities to plan proactively for the transport infrastructure necessary to support the growth of airports.

4.5 Other Relevant Plans and Strategies

4.5.1 The following plans and strategies which do not constitute planning policy are also deemed to be relevant, further details of which are given in the Planning Statement [document reference TR020002/APP/7.2]:

- A Vision for Kent 2012-2022 by the Kent Form (2012)[25];
- Thanet Destination Management Plan (2013)[26];
- Kent and Medway's Growth Plan (2013): 'Unlocking the Potential: Going for Growth'[27];
- South East Local Economic Partnership (SELEP) – Strategic Economic Plan (March 2014)[28];
- Kent County Council (KCC) - Facing the Aviation Challenge (August 2014)[29];
- KCC - Manston Airport under private ownership: The story to date and the future prospects (March 2015)[30];
- Kent and Medway Growth and Infrastructure Framework (September 2015)[31] and 2018 Update[32];
- TDC Corporate Plan 2016-2020 (2016)[33];
- Draft Thanet Transport Strategy (October 2017)[34];

- SELEP Strategic Economic Plan – Evidence Base (September 2017);
- East Kent Growth Framework – the East Kent Growth Plan – Final Draft Report (August 2017);
- Local Transport Plan for Kent 4 – Delivering Growth without Gridlock 2016-2031 (2017); and
- Thames Estuary 2050 Growth Commission – 2050 Vision (June 2018).

4.6 Other Consents Needed

4.6.1 As outlined in Section 1.1, the principal legislation under which permission is required is the 2008 Act.

4.6.2 The Proposed Development will also require other consents, licences and permits 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 (CAA), Natural England (NE), the Environment Agency (EA) and others as appropriate (refer to document TR020002/APP/7.6 for further information).

4.7 Habitats Regulations Assessment

4.7.1 EU *Directive 92/43/EEC* on the conservation of natural habitats and of wild fauna and flora (known as the *Habitats Directive (as amended*)) provides, *inter alia*, a framework for the protection of European (wildlife) sites. *The Habitats Directive* is transposed into the law of England and Wales by *The Conservation of Habitats and Species Regulations 2017, as amended (SI 2017 No. 1012)* [34,35] also known as the 'Habitat Regulations'.

4.7.2 When considering the merits of the application, the Secretary of State and PINS must consider potential effects on European (wildlife) sites. European sites are defined as Special Areas of Conservation (SACs), candidate SACs, Sites of Community Importance (SCI), Special Protection Areas (SPA) and European Marine Sites, which are marine areas designated as SACs and SPAs. UK policy extends the requirements pertaining to European sites to include Ramsar sites and potential SPAs, which would include proposed extensions or alterations to existing SPAs.

4.7.3 Ten European sites have been identified that are considered to be potentially affected by the Proposed Development, as follows:

- Thanet Coast and Sandwich Bay SPA;
- Thanet Coast and Sandwich Bay Ramsar;
- Thanet Coast SAC;
- Sandwich Bay SAC;
- Outer Thames Estuary Marine SPA;
- Margate & Long Sands SCI (Inshore Marine);
- Stodmarsh SPA;
- Stodmarsh SAC;
- Stodmarsh Ramsar; and
- Blean Complex SAC.

4.7.4 In addition to the assessment of potential effects on these ten European sites that will need to be addressed in the ES, there is a requirement under the Habitat Regulations to undertake a screening exercise. The aim of the screening exercise is to determine whether the European sites are likely to be significantly affected by the Proposed Development, either alone or in combination with other plans and projects. If the screening exercise concludes that significant effects are likely,

there will be a need for an Appropriate Assessment to be carried out. The screening and any Appropriate Assessment and subsequent assessment form part of what is known as the Habitat Regulations Assessment (HRA) process.

4.7.5 Screening and any subsequent Appropriate Assessment will be undertaken by PINS (the 'competent authority'), drawing upon information about the likely significant effects of the Proposed Development on the qualifying features of the European sites that will be provided to it by RiverOak Strategic Partners (RiverOak). In undertaking its assessment and to facilitate the HRA process, PINS is required to consult with NE and other interested parties as appropriate. A separate HRA screening report, in the form of a 'Non-Significant Effects' report has been provided in **Appendix 7.1**.

REFERENCES

[1] The Planning Act (2008) Available online at: http://www.legislation.gov.uk/ukpga/2008/29/pdfs/ukpga_20080029_en.pdf [Accessed 29/01/2018]

[2] Department for Communities and Local Government (2016) Planning Practice guidance. Available online at https://www.gov.uk/government/collections/planning-practice-guidance [Accessed 01/02/2018]

[3] The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 [online] Available at http://www.legislation.gov.uk/uksi/2017/572/contents/made [Accessed 29/01/2018]

[4] Written Statement to Parliament on Airport Capacity and Airspace Policy – 2nd February 2017

[5] The Department for Transport (July 2017) Beyond the horizon: The Future of Aviation in the UK. Available online at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/636625/aviation-strategy-call-for-evidence.pdf [Accessed 01/02/2018]

[6] The Department for Transport (April 2018) Beyond the horizon: The future of UK aviation. Next steps towards an Aviation Strategy. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/698247/next-steps-towards-an-aviation-strategy.pdf [Accessed 03/07/18]

[7] The Department for Transport (June 2018) Beyond the horizon: The future of UK aviation. Making best use of existing runways. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/714069/making-best-use-of-existing-runways.pdf [Accessed 03/07/18]

[8] The Department for Transport (June 2018) Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/714106/airports-nps-new-runway-capacity-and-infrastructure-at-airports-in-the-south-east-of-england-web-version.pdf [Accessed 03/07/18]

[9] Airports Commission (2015) Airports Commission: final report. Available online at: https://www.gov.uk/government/publications/airports-commission-final-report [Accessed 01/02/2018]

[10] Department for Transport (2016) Government decides on new runway at Heathrow. Available online at: https://www.gov.uk/government/news/government-decides-on-new-runway-at-heathrow [Accessed 01/02/2018]

[11] Department for Transport (February 2017) Consultation on Draft Airports National Policy Statement: new runway capacity and infrastructure at airports in the South-East of England.

[12] Airports Commission (2015) Airports Commission: Final Report. Available online at: https://www.gov.uk/government/publications/airports-commission-final-report [Accessed 01/02/2018]

[13] Airports Commission (2014) Discussion Paper 06: Utilisation of the UK's Existing Airport Capacity. Available online at: https://www.aef.org.uk/uploads/Airports-Commission-utilisation-existing-capacity.pdf [Accessed 01/02/2018]

[14] Airports Commission (2013) Airports Commission: Interim Report. Available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/271231/airports-commission-interim-report.pdf [Accessed 01/02/2018]

[15] Airports Commission (2013) Appendix 2: Assessment of Long-term Options: Interim Report. Available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/268620/airports-commission-interim-report-appendix-2.pdf [Accessed 01/02/2018]

[16] Department for Transport (2013) Aviation Policy Framework. Available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/153776/aviation-policy-framework.pdf [Accessed 01/02/2018]

[17] Thanet District Council (2006) Thanet Local plan 2006 Saved Policies. Available online at: https://www.thanet.gov.uk/your-services/planning-policy/thanets-current-planning-policy/thanet-local-plan-2006/ [Accessed 01/02/2018]

[18] Thanet District Council (2015) Draft Thanet Local Plan to 2013 Preferred Options Consultation. Available online at: https://www.thanet.gov.uk/your-services/planning-policy/thanets-new-local-plan/draft-thanet-local-plan-to-2031-preferred-options-consultation-january-2015/ [Accessed 01/02/2018]

[19] Dover District Council (2010) Dover District Local Development Framework Core Strategy. Available online at: https://www.dover.gov.uk/Planning/Planning-Policy-and-Regeneration/PDF/Adopted-Core-Strategy.pdf [Accessed 01/02/2018]

[20] Dover District Council (2015) Dover District Land Allocations Local Plan. Available online at: https://www.dover.gov.uk/Planning/Planning-Policy-and-Regeneration/PDF/Draft-Adopted-LALP-120115.pdf Accessed 01/02/2018]

[21] Dover District Council (2010) Dover District Proposals Map. Available online at: https://www.dover.gov.uk/Planning/Planning-Policy-and-Regeneration/Home.aspx [Accessed 01/02/2018]

[22] Dover District Council (2002) Dover District Local Plan Saved Policies. Available online at: https://www.dover.gov.uk/Planning/Planning-Policy-and-Regeneration/Adopted-Development-Plans/Saved-Policies.aspx [Accessed 01/02/2018]

[23] Canterbury City Council (2017) Canterbury District Local Plan. Available online at: https://www2.canterbury.gov.uk/media/1507001/Canterbury-District-Local-Plan-Adopted-July-2017.pdf [Accessed 01/02/2018]

[24] Canterbury City Council (2010) Hern Bay Area Action Plan. Available online at: https://www2.canterbury.gov.uk/media/512291/HerneBayAreaActionPlanlowres.pdf [Accessed 01/02/2018]

[25] Kent Forum, Vision for Kent 2012-2022. Available online at: https://www.kent.gov.uk/__data/assets/pdf_file/0003/5475/Vision-for-Kent-2012-2022.pdf [Accessed 19/03/2018]

[26] Thanet District Council (2013) Thanet Destination Management Plan. Available online at: https://www.thanet.gov.uk/publications/destination-management-plan/thanet-destination-management-plan/ [Accessed 19/03/2018]

[27] Kent and Medway Economic Partnership (2013) Unlocking the Potential; Going for Growth. Available online at: http://kmep.org.uk/documents/Unlocking_the_Potential_-_v.3.1_19.12.13.pdf [Accessed 01/02/2018]

[28] South East Local Enterprise Partnership (SELEP) Strategic Economic Plan Evidence Base. Available online at: http://www.southeastlep.com/images/uploads/resources/SouthEast_LEP_Strategic_Economic_Plan_Evidence_Base_FINAL.pdf [Accessed 19/03/2018]

[29] Kent County Council (2014) Facing the Aviation Challenge. Available at: https://www.kent.gov.uk/__data/assets/pdf_file/0016/15433/Facing-the-Aviation-Challenge.pdf [Accessed 19/03/2018]

[30] Kent County Council (March 2015) Manston Airport under private ownership: The story to date and the future prospects. Position Statement. Available online at: https://www.kent.gov.uk/__data/assets/pdf_file/0003/29541/Manston-Airport-position-statement.pdf [Accessed 01/02/2018]

[31] Kent County Council (2015) Kent and Medway Growth and Infrastructure Framework. Available online at: https://www.kent.gov.uk/__data/assets/pdf_file/0012/50124/Growth-and-Infrastructure-Framework-GIF.pdf [Accessed 01/02/2018]

[32] Kent County council (2018) Kent and Medway growth and infrastructure framework. Available online at: https://www.kent.gov.uk/__data/assets/pdf_file/0018/80145/GIF-Framework-full-document.pdf [Accessed 03/07/18]

[33] Thanet District Council Corporate Plan 2015 to 2019. Available online at: https://www.thanet.gov.uk/about-us/corporate-plan-2015-to-2019/ [Accessed 19/03/2018]

[34] Thanet District Council. Thanet District Transport Strategy 2015-2031 Draft Version 1 30/10/2017. Available at: https://democracy.thanet.gov.uk/documents/s58674/Annex%206%20-%20Draft%20Thanet%20Transport%20Strategy.pdf. [Accessed 19/03/2018]

[35] The Conservation of Habitats and Species Regulations 2017. Available online at: https://www.legislation.gov.uk/uksi/2017/1012/contents/made [Accessed 09/02/2018]

5. Approach to the Environmental Statement

5.1 Introduction

5.1.1 This Chapter describes the approach to the Environmental Statement (ES) for submission to the Planning Inspectorate (PINS).

5.1.2 As noted in **Chapter 1: Introduction** and **Chapter 4: Planning Policy Context**, following recent consultation with PINS, the applicant has elected to adopt the *National Infrastructure Planning (Environmental Impact Assessment) 2017 Regulations*[1] (hereafter referred to as the '2017 EIA Regulations') in preparing the ES for the Proposed Development.

5.2 Environmental Impact Assessment Process

5.2.1 The key characteristics of an EIA are that it is:

- **Systematic**, comprising a sequence of tasks defined both by regulation and by good practice, leading to the use of the information that is gathered to inform decision-making as to whether or not the Proposed Development should be allowed to proceed;
- **Analytical**, requiring the application of specialist skills from the environmental sciences;
- **Impartial**, its aim being to inform the decision-maker rather than to promote the project;
- **Consultative**, with provision being made for obtaining feedback from interested parties including local authorities and statutory agencies; and
- **Interactive**, whereby the proposals for the key stages of the development are progressively refined in response to environmental as well as technical considerations with a view to minimising the scheme's potential adverse environmental effects and maximising its environmental benefits.

5.2.2 The preparation of the ES is one of the key stages in the EIA process as it brings together information about any likely significant environmental effects. It is expected that PINS will use the information contained within the ES to inform its recommendation to the Secretary of State for Transport about whether the Proposed Development should be allowed to proceed.

5.2.3 The steps followed in the EIA process are summarised in **Box 5.1**. These are based on the 2017 EIA Regulations[1], government guidance[2] and good practice. They require inputs not only from the team that prepares the ES, but in this case, also from RiverOak Strategic Partners (RiverOak) and PINS. Following a short section on terminology, the remainder of this Chapter provides further information about the key steps in the process.

Box 5.1 Key Steps in the EIA Process

- Defining the project, including consideration of the need for the project and the main alternatives for meeting this need;
- Deciding on the likely significant environmental effects that need to be assessed and how the necessary assessments will be carried out;
- Using a Scoping Report[i] (if obtained) as a basis for consulting over the scope of the assessment that is reported in the ES and refining the scope in response to the comments that are received (with this refinement process continuing as the proposals for the Proposed Development and the understanding of its environmental effects evolve);
- Assembling further information about the baseline environmental conditions that relate to the likely significant environmental effects;
- Determining whether this baseline is relevant to the assessment or whether it is more appropriate to predict how the baseline will have changed by the time that the development is constructed or operated;
- Identifying measures to avoid, reduce or compensate for adverse effects, or to increase the environmental benefits of the scheme, and liaising with the project design team to incorporate these (where possible) into the proposals, ensuring that the development proposals as amended are environmentally assessed;
- Ongoing consultation with statutory consultees and other interested parties, as appropriate;
- Assessing the magnitude and other characteristics of the environmental effects being assessed;
- Assessing the sensitivity (and where relevant, value) of identified receptors to changes resulting from the development;
- Identifying additional measures to avoid, reduce or compensate for adverse effects, or to increase the environmental benefits of the scheme;
- Evaluating the significance of the predicted residual effects;
- Collating the findings in an ES and summarising the findings in a Non-Technical Summary (NTS);
- Submission of the ES to the relevant competent authority, in this instance PINS;
- Decision-making, which may involve inter alia ongoing negotiation and requests for further information;
- Informing stakeholders of the decision on whether or not the development is to be permitted; and
- Ongoing environmental monitoring, assessment and other work, as required, including screening for the need for a further ES to be prepared in relation to the development.

5.3 Environmental Impact Assessment Terminology

5.3.1 In some ESs, the terms ‘impacts’ and ‘effects’ are used interchangeably, whilst in others the terms are given different meanings. Some use ‘impact’ to mean the cause of an ‘effect’ whilst others use the converse meaning. This variety of definitions has led to a great deal of confusion over the terms, both among the authors and the readers of ESs.

5.3.2 The convention used in this ES is to use ‘impacts’ only within the context of the term EIA, which describes the process from scoping through to ES preparation to subsequent monitoring and other work. Otherwise, this report uses the word ‘effects’ when describing the environmental consequences of the Proposed Development. Such effects come about as a result of:

- Physical activities that would take place if the Proposed Development were to proceed (e.g. vehicle movements during construction operations); or
- Environmental changes that are predicted to occur as a result of these activities (e.g. loss of vegetation prior to the start of construction work or an increase in noise levels). In some cases, one change causes another change, which in turn results in an environmental effect.

5.3.3 The environmental effects that are predicted to result are the consequences of the environmental changes for specific environmental receptors (e.g. for bats from the loss of roosting sites or foraging areas, or for people from an increase in noise levels, etc.).

[i] Note: the scoping report prepared in 2016 has been taken into account in completing the assessments contained within the EIA. A revised scoping report has not been issued as it would simply duplicate the consultation being carried out here. As such, any additional comments relating to the additional and revised provisions of the 2017 EIA Regulations, will be taken into account as appropriate.

5.3.4 This ES is concerned with assessing the effects of the Proposed Development, rather than the activities or changes that cause them. However, this requires that the activities involved with the construction and operation of the Proposed Development are understood such that the likely resultant changes can be identified, often based on predictive assessment work. An example of how a physical activity and environmental change can lead to an environmental effect is given in **Box 5.2**.

Box 5.2	**Example of activities and environmental changes leading to an environmental effect**
For a development that involves activities at various locations, mobile plant might undertake a number of activities related to the excavation of materials, including soils, and delivery of materials to the working area. These activities would lead to an increase in background noise levels that it might be determined could have significant effects on people living nearby and on wildlife. It would therefore be necessary to assess the change in noise levels, drawing on data from plant manufacturers to determine the amount of noise each item of plant would generate when undertaking excavation and other activities and comparing this with the baseline conditions in the absence of the Proposed Development. For each receptor that could be significantly affected, an assessment would be made of the effects caused by the change in noise levels.	

5.4 The Stages of Assessment

Scoping

5.4.1 EIA scoping involves identifying:

- The people and environmental resources (collectively known as 'receptors') that could be significantly affected by the Proposed Development;
- What aspects of the Proposed Development those receptors might be affected by (e.g. loss of habitat affecting a particular species); and
- The work required to take forward the assessment of these potentially significant effects.

5.4.2 The approach taken in the 2016 scoping exercise accords with PINS Advice Note Seven[3]. However, the Scoping Report (**Appendix 1.1**) submitted by RiverOak in request of a Scoping Opinion (**Appendix 1.2**), for reasons already explained in **Chapter 1: Introduction**, no longer formally applies to these proposals. Since the Proposed Development has remained the same, the Scoping Opinion received is used to guide the scope of the detailed assessment.

5.4.3 The 2009 and 2017 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 approach was adopted for the 2016 Scoping Report (**Appendix 1.1**), the 2017 Preliminary Environmental Information Report (PEIR), the 2018 PEIR and for this ES.

5.4.4 Scoping was started at the outset of the work on the EIA, with the initial conclusions about potentially significant effects of the Proposed Development being set out in the EIA Scoping Report (**Appendix 1.1**). The preparation of this report was informed by the legislative and policy context relevant to the Proposed Development.

5.4.5 At the EIA scoping stage, the conclusions surrounding significance are usually based upon professional judgement. This is with reference to the Proposed Development description and drawing on, as appropriate, available information about the magnitude and other characteristics of the potential changes that are expected to be caused by the Proposed Development. The receptors' sensitivity to the changes, the effects of the changes on relevant receptors, and the value of receptors is analysed and considered. If the information that is available at the EIA Scoping Report stage does not enable a robust conclusion to be reached that a potential effect is not likely to be significant, the effect is then taken forward for further assessment.

5.4.6 The Scoping Report for the Proposed Development sets out what had been identified at that time to be the potentially significant environmental effects that needed to be considered in the ES (refer

to **Appendix 2.1** for further information on what was scoped in and out). It outlined the approach to undertaking the assessments of these effects. The report was issued to PINS to inform its Scoping Opinion under the 2009 EIA Regulations (see **Chapter 1: Introduction**). 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[4] and included as **Appendix 1.2**.

5.4.7 It should be noted that scoping did not cease upon receipt of the Scoping Opinion; the scope of the assessment has been progressively refined in response to comments from consultees, the environmental information resulting from survey or assessment work and the evolution of the Proposed Development. Consultation, through meetings, correspondence and discussions, with statutory and non-statutory consultees has taken place throughout the preparation of this ES and to inform the 2017 and 2018 public consultations.

5.4.8 For these reasons, although the ES is now based on the 2017 EIA Regulations, it is not necessary to request a new Scoping Opinion. Rather the scope of assessment for those new topics (namely **Chapter 15: Human Health**, **Chapter 16: Climate Change** and **Chapter 17: Major Accidents and Disasters**) that need to be considered as a result of this DCO application now being made under the 2017 EIA Regulations[1] is documented within this ES and was made available to both statutory and non-statutory consultees within the 2018 PEIR used for the 2018 public consultation.

Preliminary Environmental Information Report

5.4.9 In June 2017, RiverOak published for consultation a PEIR, prepared to align with the requirements of *The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009* (2009 EIA Regulations).

5.4.10 Subsequently a 2018 PEIR was prepared to align with the requirements of 2017 EIA Regulations which came into force with transitional provisions on 16 May 2017. The 2018 PEIR updates the preliminary environmental information provided previously, where appropriate, and provides the preliminary environment information for the additional requirements of the 2017 EIA Regulations. This information has been incorporated into this ES.

Consultation

5.4.11 The purpose of consultations (via meetings, telephone and correspondence) was to agree the assessment methodologies for technical studies and identify any sensitivities or concerns associated with the Proposed Development, which may need consideration in the design process and assessment as part of the EIA.

5.4.12 As stated previously, the scope of the detailed assessment has evolved since the Scoping Opinion was received. This is as a result of a number of things, particularly engagement with relevant parties such as:

- Relevant local authorities (planning, highways, flooding, ecology, environmental health, historic/conservation and landscape specialists) from:
  - Kent County Council (KCC);
  - Thanet District Council (TDC);
  - Canterbury District Council;
- Environment Agency (EA);
- Historic England;
- Highways England (HE);
- Kent Wildlife Trust (KWT);

- Natural England (NE); and
- Southern Water (SW).

5.4.13 A number of other bodies have responded in writing as part of both the non-statutory and statutory consultation, for example the Civil Aviation Authority (CAA) and Ministry of Defence (MoD). Further information on their comments will be provided in the Consultation Report that will accompany the DCO application. Where the comments are relevant to the EIA, this is identified in the applicable technical chapter (**Chapters 6 – 17**) of this ES.

5.4.14 Comments made by statutory consultees and other interested parties are discussed where deemed appropriate in the relevant technical chapters (**Chapters 6 – 17**) of the ES.

Baseline Data: Surveys

5.4.15 A considerable amount of environmental baseline data is available from a variety of sources (e.g. online, local authority databases, previous SHP application etc.); the nature of the sources varies between technical topics, but in each case the data reflects the most up to date information. This wealth of existing data has provided a good overview of the environmental baseline for the site and the surroundings.

5.4.16 Baseline data has been predominantly collated from desk-based searches, which in some cases is supplemented by survey data. RiverOak (and its predecessor RiverOak Investment Corporation) have made every effort to access the land for surveying, including the latter securing a section 53 consent in December 2016, and the former securing a voluntary licence to access the land. However, despite this, some restrictions upon access have prevented complete coverage of the site.

5.4.17 Although complete surveys have presently not been possible, sufficient information exists whereby the following has been applied. Where survey information is absent, a realistic worst-case approach has been adopted to what might be found had all the surveys been carried out, based on desktop surveys, analysis and site surveys undertaken. This is coupled with a commitment to carry out further surveys once access to land has been obtained, whether through voluntary agreement or compulsory access following the making of the application, or should the DCO be granted, access once ownership of the land has been obtained.

5.4.18 RiverOak continues to pursue access via on-going discussions, a further section 53 application and is also exploring the use of section 172 of the *Housing and Planning Act 2016*[5], which grants surveying rights to those intending to seek compulsory acquisition powers with a much-simplified procedure. This is to ensure that where necessary, further site surveys can be undertaken to confirm or disprove worst-case assumptions, in addition to informing detailed mitigation plans to be approved by the local planning authority under DCO requirements.

5.4.19 NE, HE and KCC's heritage team have been kept informed of this approach throughout and no objections have been raised.

5.4.20 As with projects where full surveying has been possible, final confirmatory checks of the ecological and archaeological environment will be carried out immediately prior to construction.

5.5 Project Design and EIA Scope Evolution

5.5.1 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 throughout the entirety of the EIA process. Some of these opportunities have become part of the Proposed Development for which consent is being sought.

5.5.2 The iterative process of design evolution, whereby design changes are made in response to environmental information has resulted in the amended Proposed Development being the subject

of further assessment work. This process often leads to further design changes and continues through to the finalised proposals upon which the DCO application will be based.

5.5.3 Thus, it is the case that minor changes to the design of the Proposed Development have been integrated as a result of the iterative design process and are presented in **Chapter 3: Description of the Proposed Development,** of this report. The information contained in **Chapter 3: Description of the Proposed Development** is that which has been assessed in each of the topic chapters and is considered to represent the likely case, with the worst-case scenario only being applied where is there a lack of certainty or survey data available.

5.5.4 Consideration of alternatives is part of the iterative process of EIA and a summary of the alternatives considered during the design of the Proposed Development has been included in **Chapter 2: The Need for the Proposed Development and the Alternatives Considered** of this ES.

5.6 Identification of Baseline Conditions

Current Baseline

5.6.1 A description of the aspects of the environment, which, at the scoping stage, were considered likely to be significantly affected by the Proposed Development is given in each of the technical chapters (**Chapters 6 – 17**). Desktop studies, consultation and field surveys have been used to identify the current conditions and environmental character of the area for each topic.

5.6.2 The nature of the sources of baseline data varies between topics, but in each case the data reflects the most up to date information for that topic that is available for inclusion in this ES.

5.6.3 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

5.6.1 Whilst the baseline environment provides a description of the current baseline conditions, due to the length of the construction and operational programmes (see **Chapter 3: Description of the Proposed Development**, **Section 3.3** 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 will be the same as at present (2018). This reflects changes resulting from human influences, such as new development or increased traffic which have the potential to modify the current environmental conditions. **Figure 4.1** shows allocations in the vicinity of Manston Airport considered in the Cumulative Effects Assessment (CEA).

5.6.2 The baseline information and data has been 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.

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

5.6.4 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 discussed in the relevant technical chapters of this ES.

5.6.5 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 (e.g. construction noise, visual intrusion of construction plant etc.) and operation (affected by, e.g. aircraft noise, visual intrusion of buildings etc.) of the Proposed Development.

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

5.7 Assessment Years

5.7.1 The anticipated construction and operational programme for the Proposed Development is provided in **Section 3.3** of **Chapter 3: Description of the Proposed Development**, of this ES. Construction works will be undertaken in four phases, with Phases 2 **–** 4 reflecting the expected growth in demand and take up of capacity. Phase 1 construction is expected to commence in Autumn 2019 and be completed by late 2020 (the opening year).

5.7.2 The adopted approach to assessment is that the 'opening year' will be used as the basis of assessment of operational effects at which time the Proposed Development would be fully commissioned and operational. The operational assessment will also consider Year 6 and Year 20.

5.7.3 However, in order to ensure that a worst-case scenario is considered there is some variation in the assessment year(s) between environmental topics. This 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.

5.8 Overview of Assessment Methodology

5.8.1 For each technical chapter, (e.g. landscape and visual or noise) 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 Chapters, use will be made of modelling or other methodologies.

5.8.2 Each technical chapter (**Chapters 6 – 17**) of the ES is structured as follows:

- Introduction – which includes the limitations or assumptions that have been made in preparation of the Chapter;
- Policy and Legislative Context – which provides a summary of the national and local planning policy information relevant to the particular topic;
- 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;
- Overall Baseline (where appropriate, further detail will be set out under **Section 8** on the assessment of potential effects);
- Environmental Measures incorporated into the Proposed Development – embedded measures in order to avoid, reduce or compensate for adverse effects of the proposals. The assessment is therefore completed for a mitigated scheme;
- Scope of the Assessment – this sets out the likely significant effects that have been given further consideration in the ES and those that have been scoped out as the effects are unlikely to be significant;

- 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 the 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;
- 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 Proposed Development) is also considered; and
- Conclusions of significance evaluation.

5.9 Inter-related and Cumulative Effects

5.9.1 The 2017 EIA Regulations[1] state that:

> *"the characteristics of the development must be considered with particular regard to… (b) cumulation with other existing development and/or approved development"[6].*

5.9.2 Additionally, inter-related effects and cumulative effects must be clearly distinguished, see **Box 5.3**. This approach is consistent with the advice contained within PINS Advice Note 9[7]**.**

Box 5.3 Inter-related Effects and Cumulative Effects – PINS Advice Note 9
Inter-related effects are defined as the inter-relationships between topics which occur where a number of separate effects, e.g. noise and air quality, affect a single receptor such as fauna. These will be assessed, where appropriate, within the technical 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) within the context of the site and any other reasonably foreseeable proposals in the vicinity, where there is the potential for combined environmental effects. Within the Manston Airport ES, cumulative effects will be assessed within **Chapter 18: Cumulative Effects**. The approach adopted for Cumulative Effects Assessment is that presented within PINS Advice Note 17: Cumulative Effects Assessment[8].

Inter-related Effects

5.9.3 There are two types of inter-related effects. These are:

- Combined effects: consideration as to whether any of the individual effects of the Proposed Development would combine to create a cumulative effect; and
- Interactive effects: consideration of interactive effects in relation to a specific receptor.

5.9.4 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 when noise from piling activities may occur at the same time as transport related noise and may act upon the same 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.

5.9.5 Interactive effects are assessed in relation to a specific receptor, but here the effect could be caused by the interactions of different types of effect 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 cumulative effects across topic areas are assessed, where the nature of the effect allows professional judgment to be applied.

5.9.6 National policy guidance requires that all relevant effects should be considered objectively. However, existing policy guidance presently fails to provide advice on how such an objective assessment should be carried out. In the absence of any guidance, the cumulative assessment of inter-related effects from the Proposed Development itself, seeks to draw upon the conclusions of the appropriate individual assessments of this ES and against each of the identified receptors, evaluate the extent to which the sum of any predicted effects may give rise to significant environmental effects.

Cumulative Effects

5.9.7 The EIA considered 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 committed developments to result in significant cumulative effects. It is important to recognise that the baseline assessments in the EIA include existing development. It is EIA best practice to consider the future baseline situation, which includes other committed developments that are likely to be constructed or have not yet commenced but have a valid planning permission. In addition, proposed developments which are the subject of a planning application (at the time of preparing the EIA), have also been considered.

5.9.8 The process for undertaking a CEA for an NSIP has been defined by the PINS, outlined within PINS Advice Note 17[8]. This 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.

5.9.9 Further details regarding the methodology undertaken for the CEA is provided in **Chapter 18: Cumulative Effects**.

5.10 Limitations and Assumptions

5.10.1 The key assumptions and limitations associated with conducting this EIA are outlined below. Assumptions specific to each technical discipline are identified in the appropriate technical chapters (**Chapters 6 – 17**).

5.10.2 Baseline conditions have been established from a variety of sources, including historical data, but due to the dynamic nature of certain aspects of the environment, conditions will change during the construction and operation of the Proposed Development.

5.10.3 The key assumptions are as follows:

- Information received from third parties is complete and up to date;
- The design, construction and completed stages of the Proposed Development will satisfy minimum environmental standards, consistent with contemporary legislation, practice and knowledge;
- The assessment of potential environmental effects during construction is based on the anticipated type of construction equipment and construction approach set out in **Chapter 3: Description of the Proposed Development**;
- Conditions will be imposed on the Planning Permission that would secure appropriate measures to control the construction methods for the site preparation, earthworks and construction phases; and

- Likely significant environmental effects have been assessed on the basis of the defined description of the Proposed Development, set out in **Chapter 3: Description of the Proposed Development**.

REFERENCES

[1] The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 [online] Available at http://www.legislation.gov.uk/uksi/2017/572/contents/made [Accessed 01/02/2018]

[2] Ministry of Housing, Communities & Local Government Guidance on the requirements of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 [online] Available at: https://www.gov.uk/guidance/environmental-impact-assessment [Accessed 09/02/2018]

[3] The Planning Inspectorate (2015) PINS Advice Note 7: Environmental Impact Assessment, screening and scoping (version 5) [online] Available at https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/03/Advice-note-7v4.pdf [Accessed 01/02/2018]

[4] The Planning Inspectorate (2016) Scoping Opinion: Proposed Manston Airport [online] Available at https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR020002/TR020002-000308-Scoping%20Opinion [Accessed 01/2/2018]

[5] The Housing and Planning Act 2016 [online] Available at http://www.legislation.gov.uk/ukpga/2016/22/contents/enacted [Accessed 01/02/2018]

[6] Schedule 3, Part 1 (2017) Environmental Impact Assessment Regulations [online] Available at http://www.legislation.gov.uk/uksi/2017/571/pdfs/uksi_20170571_en.pdf [Accessed 01/02/2018]

[7] The Planning Inspectorate (2012) PINS Advice Note 9: Rochdale Envelope (version 2) [online] Available at https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2013/05/Advice-note-9.-Rochdale-envelope-web.pdf [Accessed 01/02/2018]

[8] The Planning Inspectorate (2015) PINS Advice Note 17: Cumulative Effects Assessment [online] Available at https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf [Accessed 01/02/2018]

Contents

6. Air Quality

6.1 Introduction

6.1.1 This Chapter sets out an assessment of the effects of the proposals for the reopening of Manston Airport (the 'Proposed Development') on air quality. An appendix to this Chapter sets out the results of assessments of the effects of odour (refer to **Appendix 6.4**).

6.1.2 This Chapter should be read in conjunction with the description of the Proposed Development (**Chapter 3: Description of the Proposed Development**). Following a summary of the limitations of the Environmental Statement (ES), the Chapter outlines the relevant policy, legislation and guidance that has informed the assessment (**Section 6.2**), and the data gathering methodology that was adopted as part of the assessment (**Section 6.3**). This leads on to a description of the scope of the assessment (**Section 6.4**), the overall baseline conditions (**Section 6.5** and **Appendix 6.2**), the environmental measures incorporated into the Proposed Development (**Section 6.6**) and the assessment methodology (**Section 6.7** and **Appendix 6.3**). The Chapter concludes with the results of the assessment (**Sections 6.8 – 6.13**) and a summary of the significance of the Proposed Development's air quality impacts (**Section 6.14**).

6.1.3 The principal sources of air quality impacts are emissions to atmosphere from:

- 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 from the above sources and uses a dispersion model to calculate the resulting ground-level concentrations of air pollutants, averaged over both short and long-term periods. These concentrations are then evaluated for significance in relation to the Air Quality Standards (AQS) and assessment levels set in legislation and in Government and international guidance.

6.1.5 The assessment makes a number of worst-case assumptions to ensure that the predicted impacts are not underestimated. In fact, it is likely that the impacts are overestimated. The results should be interpreted acknowledging that they present a worst-case scenario.

Limitations of this ES

6.1.6 The nature of the modelling process means that it has not been possible to include the contribution from road traffic in contour plots, so when viewing the contour plots it should be taken into consideration that concentrations close to major roads will be greater than those shown. However, the road traffic concentration has been included in the assessment of specific receptors where there is relevant exposure (refer to **Sections 6.8 – 6.10**), so this does not affect the robustness of the assessment. For similar reasons, it has not been possible to include the contribution from road traffic in the ecological assessment of daily mean NO_x.

6.1.7 No other technical difficulties have been encountered whilst preparing this Chapter.

6.2 Policy, Legislation and Guidance

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 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.

6.2.2 Full details of all national and local planning policies relevant to the Proposed Development can be found in **Appendix 4.1**. The following section outlines legislation and policy relevant to this air quality assessment.

EU Legislation

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

6.2.3 *Directive 2008/50/EC* (the 'Directive')[1], 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 $PM_{2.5}$.

6.2.4 The Directive sets limits, or target levels, for selected pollutants that are to be achieved by specific dates and also details procedures that EU Member States should take in assessing ambient air quality. Regulated pollutants include sulphur dioxide (SO_2), nitrogen dioxide (NO_2), oxides of nitrogen (NO_x), particulate matter (PM_{10} and $PM_{2.5}$), lead (Pb), benzene (C_6H_6) and carbon monoxide (CO).

6.2.5 The limit and target levels relate to concentrations in ambient air. At Article 2(1), the Directive defines ambient air as:

> *"…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."*

6.2.6 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:

> *"Compliance with the limit values directed at the protection of human health shall not be assessed at the following locations*:
>
> *a) any locations situated within areas where members of the public do not have access and there is no fixed habitation;*
>
> *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*
>
> *c) on the carriageway of roads; and on the central reservation of roads except where there is normally pedestrian access to the central reservation."*

Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora

6.2.7 *Directive 92/43/EEC* (the 'Habitats Directive')[2], which originally came into force in 1994, provides for the designation and protection of 'European sites' of high nature value, the protection of 'European protected species', and the adaptation of planning and other controls for the protection of European Sites. It is transposed into English law as *the Conservation of Habitats and Species Regulations 2010* (the Habitats Regulations). Sites which are important for habitats or species (as listed in Annexes I and II of the Habitats Directive) are designated as Special Areas of Conservation (SACs).

6.2.8 The Habitats Regulations also regulate Special Protection Areas (SPAs) classified under *Directive 79/409/EEC* on the Conservation of Wild Birds (the Birds Directive). These sites, SACs and SPAs, form a network termed Natura 2000.

6.2.9 The Habitats Regulations also provide for the control of potentially damaging operations, whereby consent may only be granted once it has been shown through 'appropriate assessment' that the proposed operation will not adversely affect the integrity of the site. When considering potentially

damaging operations, the 'precautionary principle' must be applied; that is, consent cannot be given unless it is ascertained that there will be no adverse effect on the integrity of the site.

UK Legislation

The Environment Act 1995

6.2.10 Part IV of the *Environment Act 1995*[3] 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 Air Quality Objectives (AQOs).

6.2.11 To carry out an air quality review and assessment under the LAQM process, Government guidance formerly recommended a three-stage approach. This phased review process used 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. From the 2016 reporting year, Defra introduced a streamlined process with a single Annual Status Report, on the grounds that local authorities had built up sufficient understanding of local air quality issues that the more elaborate procedure is no longer required.

6.2.12 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 AQOs by the required dates.

6.2.13 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.

6.2.14 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, to reduce air pollution concentrations so that the required AQOs are met.

The Air Quality Standards Regulations 2010

6.2.15 The *Air Quality Standards Regulations 2010* (the 'Air Quality Standards Regulations')[4] came into force on 11 June 2010 and transpose *Directive 2008/50/EC* into UK legislation. The limit values in *Directive 2008/50/EC* are transposed into the Regulations with attainment dates in line with the Directive. The limit values in the *Air Quality Standards Regulations 2010* are generally referred to as Air Quality Standards (AQS).

6.2.16 AQSs are legally binding limits on 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.

6.2.17 Similarly, to *Directive 2008/50/EC*, the *Air Quality Standards Regulations 2010* define ambient air as:

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

6.2.18 *Directive 2008/50/EC* prescribes locations where compliance with the AQS (limit value) does not need to be assessed[5]:

> "*Compliance with the limit values directed at the protection of human health does not need to be assessed at the following locations:*
>
> *a) any location situated within areas where members of the public do not have access and there is no fixed habitation;*

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

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[6] provides a framework for improving air quality at a national and local level and supersedes the previous strategy published in 2000. It imposes a number of obligations on local authorities to manage air quality. It does not directly impose obligations on developers.

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 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:

"…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…"

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

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

"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 -

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

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

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

Other Guideline Values

6.2.24 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

6.2.25 The aim of the World Health Organisation (WHO)[7] 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 AQS.

Environmental Assessment Levels

6.2.26 The Environment Agency (EA) guidance note "Air emissions risk assessment for your environmental permit"[8] 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.

6.2.27 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 WHO[7], which states:

> *"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."*

6.2.28 In general, current conditions in the UK are such that elevated concentrations of O_3 or SO_2 are rare. As such, it is considered that 200 µg m^{-3} is the more appropriate assessment level for daily mean NO_x. This has been accepted by Natural England (NE)[i].

Guidance on Evaluation Criteria

IAQM/EPUK Guidance for Human Receptors

6.2.29 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)[9] 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 as "negligible", "slight", "moderate" or "substantial", taking 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.

6.2.30 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:

> *"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."*

6.2.31 These descriptors are only designed for annual mean concentrations. Descriptors for short-term (daily or hourly) concentrations are not available.

EA Guidance for Human Receptors

6.2.32 EA guidance[10] gives criteria for screening outsource contributions in the context of environmental permit applications. Although intended for use in evaluating permit applications, it is often used for planning applications where no better guidance is available (particularly for ecological receptors). 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.

6.2.33 This guidance also introduces the terms 'process contribution' (PC), meaning the concentration or deposition rate resulting from the installation activities only, excluding other sources, and 'predicted environmental contribution' (PEC), meaning the total modelled concentration, equal to the PC plus the background contribution. These terms are commonly used in air quality assessments, even where the term 'process' is not strictly accurate, and so are used in this assessment with 'process' referring to the Proposed Development.

6.2.34 For human receptors, there is no need for further assessment if the screening calculation finds that:

- Both the following are met:
  - The short-term PC[ii] is less than 10% of the short-term air quality assessment level (AQAL); and

[i] An assessment level of 200 µgm^{-3} was agreed with NE during a meeting on 5 September 2017.
[ii] Where the short-term PEC is calculated as the PC plus twice the long-term background concentration.

- The long-term PC is less than 1% of the long-term AQAL;

- Or both the following:
  - The short-term PEC is less than 20% of the short-term AQAL; and
  - The long-term PEC is less than 70% of the long-term AQAL.

EA and IAQM Guidance for Ecological Receptors

6.2.35 The EA guidance[10] also gives criteria for screening outsource contributions at designated nature conservation sites.

6.2.36 For SPAs, SACs, Ramsar sites and Sites of Special Scientific Interest (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.

6.2.37 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.

6.2.38 Following detailed dispersion modelling, no further action is required if:

- The proposed emissions comply with Best Available Technique (BAT) associated emission levels (AELs) or the equivalent requirements where there is no BAT AEL; and
- The resulting PECs will not exceed AQALs.

6.2.39 IAQM guidance[11] provides further suggestions on circumstances where there is definitely an insignificant effect on a site in relation to the Habitats Directive. This guidance endorses the EA criteria above, noting that:

> *"The EA, in consultation with the conservation agencies, is the only organisation with any statutory responsibility that has set out principles and guidance for the assessment of air quality impacts on nature conservation sites. As a consequence, its thinking has been applied to other developments where such assessments are required, involving sources that are not industrial and not regulated by the EA. There is nothing inherently wrong with such an approach, provided that the underlying principles are followed."*

6.2.40 The IAQM guidance goes on to emphasise that these criteria are for screening out effects from further assessment, not an indication that there is an adverse impact:

> *"As the only available source of guidance that is relevant to this topic, the EA's approach to assessment has been widely adopted. Unfortunately, this has also led to many instances where the criterion for determining when a new source has an inconsequential effect has been wrongly used as a threshold for the onset of damage to a habitat. It is quite clear from studying the EA's original guidance and its more recent statements that this is a false interpretation. Instead, in cases where an air quality impact is greater than 1% of a critical level or critical load, this should serve only as a trigger to consider the matter in greater detail with the involvement of a qualified ecologist, to consider the likelihood of an adverse effect on the integrity of the habitat. Furthermore, it should be recognised that the criterion was set as 1% and not 1.0%. It may be considered by some that it is prudent to explore the likelihood of an adverse effect when the impact is, say 1.2% of a critical load, but the reality is that this was never the original intention of*

the methodology. The calculation of impacts is always subject to some uncertainty, especially where deposition is concerned. It would be more in the spirit of the original proposal to use 1% as a criterion if impacts that were clearly above 1% were treated as being potentially significant, rather than impacts that are about 1% or slightly greater.

Regardless of these observations on the precision and accuracy of predicted impacts, it is the position of the IAQM that the use of a criterion of 1% of an assessment level in the context of habitats should be used only to screen out impacts that will have an insignificant effect. It should not be used as a threshold above which damage is implied and is therefore used to conclude that a significant effect is likely. It is instead an indication that there may be potential for a significant effect, but this requires evaluation by a qualified ecologist and with full consideration of the habitat's circumstances."

National Planning Policy Framework

6.2.41 The National Planning Policy Framework (NPPF)[12] 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.

6.2.42 Paragraph 124 of the NPPF states:

"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."

6.2.43 A draft revised NPPF[13] was issued for consultation in March 2018. Paragraph 179 of the Draft NPPF states:

"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

6.2.44 Further detail in relation to air quality is contained in the air quality section of the planning practice guidance website[14].

Airports National Policy Statement (NPS): New Runway Capacity and Infrastructure at Airports in the South East of England

6.2.45 The Airports NPS[15] was designated as a national policy statement under the provisions of Section 5 (1) of the Planning Act 2008 subject to any legal change in June 2018. Whilst this document is focused on the potential for expansion at Heathrow Airport, it is an important consideration for applications for new runway capacity and other airport infrastructure in London and the South East of England (paragraph 1.12).

6.2.46 The NPS states that the applicant should undertake an assessment of the project in the environmental statement. This should assess:

- *"Existing air quality levels for all relevant pollutants referred to in the Air Quality Standards Regulations 2010 and the National Emission Ceilings Regulations 2002 (as amended) or referred to in any successor regulations;*

- *Forecasts of levels for all relevant air quality pollutants at the time of opening, (a) assuming that the scheme is not built (the 'future baseline'), and (b) taking account of the impact of the scheme, including when at full capacity; and*
- *Any likely significant air quality effects of the scheme, their mitigation and any residual likely significant effects, distinguishing between those applicable to the construction and operation of the scheme including any interaction between construction and operational changes and taking account of the impact that the scheme is likely to cause on air quality arising from road and other surface access traffic."*

6.2.47 Mitigation measures put forward should be acceptable and may affect the project design, layout, construction and operation. The mitigation measures should also be subject to consultation with local communities and relevant stakeholders. This will ensure that the most effect measures are taken forward.

Thanet District Council's Local Plan

6.2.48 Thanet District Council's (TDC) 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. This declares the objective "*to maintain the overall environmental quality of the district".* In particular, "*proposals for new development that would result in the national air-quality objectives being exceeded will not be permitted."* Details of the relevant saved policies are given in **Appendix 4.1**.

Kent and Medway Air Quality Partnership

6.2.49 The Kent and Medway Air Quality Partnership has prepared Air Quality Planning Guidance[16] 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. It has no legal status but acts as a guidance note summarising requirements and best practice for managing air quality within the planning process.

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 6.1** 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 6.1**.

Table 6.1 Information used in the preparation of this ES Chapter

Source	Data
Air Pollution Information Service (APIS)[25]	Mapped background deposition rates. Critical level and critical load information for nitrogen and acidity.
Department for Environment, Farming and Rural Affairs (Defra)[20]	Mapped background air pollutant concentrations.
EA	Locations of sensitive ecological receptors.
MAGIC[27]	Locations of sensitive ecological receptors.
TDC	Air Quality monitoring data.

Survey Work

6.3.3 In view of the extensive monitoring data available from TDC (see **Section 6.5)**, it was not considered that any additional monitoring was required for determining baseline concentrations. This was stated in the Scoping Report (**Appendix 1.1**), the 2017 and 2018 Preliminary Environmental Information Reports (PEIRs), the Scoping Opinion (**Appendix 1.2**) and the consultation responses (Consultation Report, Document TR020002/APP/8a) did not raise any objection to this intention.

6.3.4 If the Proposed Development proceeds, the ZH3 Thanet Airport continuous monitor will be reinstated. This will serve to identify the actual effects of the development upon ambient air quality at that location.

Consultation

6.3.5 Since 2015 and throughout the undertaking of the survey and assessment work, RiverOak Strategic Partners (RiverOak) has engaged with consultees with an interest in potential air quality effects (see **Chapter 1: Introduction** for more information). A non-statutory consultation took place from June to September 2016. A Scoping Report (**Appendix 1.1**), including a chapter covering air quality, was produced and submitted to the Planning Inspectorate (PINS) who provided a Scoping Opinion (**Appendix 1.2**). A statutory consultation then took place from June to July 2017, consulting on the 2017 PEIR in accordance with the provisions of the 2009 EIA Regulations. The 2017 PEIR included results of a preliminary air quality assessment. A further PEIR was produced for the 2018 consultation (the 2018 PEIR) which took place in January 2018.

6.3.6 Organisations that were consulted include:

- PINS;
- TDC;
- Public Health England (PHE); and
- NE.

6.3.7 A summary of the consultee comments and responses provided is provided in **Table 6.2** along with a response to identify how the matter is dealt with in this report.

Table 6.2 Consultee Comments

Consultee	Comments and Considerations	How addressed in this ES
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 6.4.17 et seq.
PINS	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 and is why they have not been included in this assessment.
PINS	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.	An assessment of odour has been carried out in accordance with the IAQM Guidance and is provided as **Appendix 6.4**.
PINS	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 as part of the Construction Environmental Management Plan (CEMP).
PINS	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, were set out in the previous 2017 and 2018 PEIRs and are repeated in this ES. Specific consultation with TDC and NE has been undertaken in order to reach agreement on the final selection of the receptors considered in the assessment, which are set out in **Section 6.4**.

Consultee	Comments and Considerations	How addressed in this ES
PINS	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 fully operational by 2035. This should include on- and off-airport effects where relevant.	This assessment details the dispersion modelling carried out. As detailed in this ES (Appendix 6.3), AEDT was rejected after further consideration and an alternative modelling methodology was chosen which is considered more appropriate.
PINS	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 considers the potential for impacts upon biodiversity and protected ecological resources, in relation to 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[9] have been used.
PINS	The Applicant should set out in the ES any proposals for long term air quality monitoring of airport-related activities.	The previous airport operator funded TDC to operate a continuous monitor near the airport. RiverOak has agreed to reinstate this arrangement for the Proposed Development.
PINS	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)).	**Chapter 16: Climate Change** includes a quantitative assessment of changes in emissions of CO_2 arising from the Proposed Development, together with an evaluation in relation to the proposed cap on aviation emissions of 37.5 Mt by 2050.
TDC	Odour assessment - it is agreed that there is not an 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. A qualitative assessment of aircraft odour emissions given the history of odour complaints from the former airport use should also be provided in the ES.	This ES includes an assessment of odour in accordance with the IAQM Guidance[17] (**Appendix 6.4**).
TDC	There is no reference to CO_2 emissions and climate change which is now generally 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.	**Chapter 16: Climate Change** includes a quantitative assessment of changes in emissions of CO_2 arising from the Proposed Development, together with an evaluation in relation to the proposed cap on aviation emissions of 37.5 Mt by 2050.

Consultee	Comments and Considerations	How addressed in this ES
TDC	An emissions mitigation assessment must be provided in accordance with Thanet District Council Air Quality Technical Planning guidance 2016.	An assessment is included in this ES (**Section 6.13**).
TDC	The air quality assessment should also include flight training school operations, fire training (plume dispersal) and airside aircraft maintenance emissions.	Flight training school operations are included in this assessment (see **Appendix 6.3**). There will be no fire training activities that lead to air quality emissions. No airside aircraft maintenance activities have been identified that lead to significant air quality emissions.
TDC	The applicant should also consider installation of a permanent air quality monitoring station on approval.	The previous airport operator funded TDC to operate a continuous monitor near the airport. RiverOak has agreed to reinstate this arrangement for the Proposed Development.
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.	Noted.
Natural England	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.	This ES in **Chapter 14: Traffic and Transportation** includes an assessment of impacts from road traffic in accordance with generally accepted criteria.
PHE	We note that the airport ceased activity in 2014 and have assumed that the Department for Environment, Food and Rural Affairs (Defra) background concentration maps take this closure into account. For the avoidance of doubt PHE requests that the proposer liaises with Defra to confirm that this is the case and that the Defra model does present a representative background level.	It is believed that the Defra background concentration maps include a contribution from the previous airport operation. However, the small amount of double counting is considered acceptable as a conservative assumption.
PHE	The proposer intends to assess air quality from the operation of the airport using a combination of the Project for the Sustainable Development of Heathrow (PSDH) and the guidance issued by the International Civil Aviation Organization (ICAO) in 2011. In the absence of a specific UK methodology PHE accepts this as a reasonable approach. In the final EIA, we recommend that the proposer should clearly identify how the two sets of guidance were utilised and provide a suitable rationale.	This ES provides sufficient detail of the methodology to allow it to be evaluated against best practice. Significant deviations from PSDH or ICAO methodologies are identified.

Consultee	Comments and Considerations	How addressed in this ES
PHE	PHE is conscious that many substances have very low odour thresholds and that uncontrolled releases into the air may cause great public concern even if there is no demonstrable harm to public health. We recommend that the qualitative assessment should comprehensively identify all known potential sources of odour and include recommendations to minimise such odour emissions. The assessment should include both construction and operational phases.	The odour assessment (**Appendix 6.4**) identifies and assesses the main significant sources of odour.
PHE	The current EIA does not include an assessment of the impact of vehicle movements on local air quality either during the construction or operational phase of the development. Given the number of vehicle movements involved, PHE is not satisfied that the traffic related impacts on local air quality have been adequately assessed and we do not accept that the impacts are demonstrably de minimis. We understand that significant work remains to be done on the traffic surveys but recommend that the proposer works closely with the Local Authorities involved so that the traffic data can be used to model the air quality impacts in the local area, particularly given the existence of an air quality management area immediately adjacent to the proposed development.	As assessment of the impact of road traffic on air quality is included in this ES.
PHE	EIA indicates that the implementation of the project will result in significant adverse impacts on local sensitive receptors, notably on air quality, noise and odour. Strongly recommend that the applicant considers all opportunities to mitigate against any significant deterioration in environmental quality.	The air quality impacts of the Proposed Development are generally not significant. Mitigation measures are summarised within Section 6.6 and Table 6.26 in Appendix 6.4. Possible additional mitigation measures include use of Stage IV plant for construction, and controls on odour from the fuel farm.
Natural England	We would welcome a discussion with your consultants as to how the ecological receptor locations set out in Table 6.5 were chosen.	Discussions with NE have taken place, including a meeting between the author of **Chapter 7: Biodiversity** and NE on 5 September 2017.
Natural England	Dust deposition; We would advise that for designated nature conservation sites the zone within which ecological receptors sensitive to dust are assessed is extended from 50m to 200m.	The zone within which ecological receptors sensitive to dust are assessed has been extended from 50m to 200m.
Green Party	Doesn't accept that RSP's claim that there is "scientific uncertainty about the health effects of NO2."	This is a selective quotation. The sentence referred to says that there is more uncertainty about the health effects of NO_2 than there is about PM_{10} and $PM_{2.5}$, which is true, because the health effects of PM10 and PM2.5 are reasonably well understood. For example, COMEAP are currently struggling to reach agreement about what the best mortality coefficient for NO_2 is.

Consultee	Comments and Considerations	How addressed in this ES
Green Party	The claim that "NO_X is not believed to have impacts on human health" is at best deliberately misleading, at worst factually incorrect as NO_X is a generic term covering various nitrogen oxide air pollutants.	NO_x is the name used for the mix of nitrogen dioxide (NO_2) and nitric oxide (NO). Of these, NO_2 is believed to have health effects in humans, but NO is not. On the other hand, both NO_2 and NO are believed to have effects on plants. For these reasons, it is standard practice to treat NO_2 and NO_x as distinct (but related) pollutants, with regulations for the protection of human health written in terms of NO_2 and regulations for the protection of plants and ecosystems written in terms of NO_x. It was considered that the non-technical summary should not concern itself with an explanation of this distinction, but this is addressed in paragraphs 6.4.26, 6.7.11, and Tables 6.7 and 6.8, and within the assessment results and conclusions in Sections 6.8 – 6.11 and 6.14.
Green Party	Takes issue with PEIR statement that PM10 and PM2.5 "are within legal limits across most of the country" as RSP fails to make clear almost 80% of towns and cities in the UK are breaching safe levels of PM pollution.	We are unable to identify the source of the assertion that almost 80% of towns and cities in the UK are breaching safe levels of PM pollution. Defra's 2017 report "Air Pollution in the UK 2016" states: "All zones met the limit value for daily mean concentration of PM10 particulate matter, without the need for subtraction of the contribution from natural sources. All zones met the limit value for annual mean concentration of PM10 particulate matter, without the need for subtraction of the contribution from natural sources. All zones met the target value for annual mean concentration of PM2.5 particulate matter, the Stage 1 limit value, which came into force on 1st January 2015, and the Stage 2 limit value which must be met by 2020."
Stone Hill Park	Emissions from road traffic have not been robustly assessed, very little information to explain how traffic modelling has been taken into account. Need to give proper consideration to impacts as a result of airside sources and traffic impacts over the wider area. Spatial scope of the modelling not clear.	Road traffic has been modelled using a standard approach. Combined effects from on-airport sources and road traffic have been assessed where there is a non-negligible contribution from both. This is covered in the chapter.
Stone Hill Park	Latest emissions factors (v.8) not used.	Version 8 of the EFT was not issued until December 2017, after the modelling work was completed. The modelling work used EFT v7 uplifted by CURED, which gives good agreement with real-world emissions.
Stone Hill Park	Impacts on Pegwell Bay should not be ruled out of further assessment.	Environment Agency and IAQM guidance has been used to decide which impacts can be scoped out.
Natural England	Concern that no reference in relation to assessments of air quality on ecological receptors to comparisons between the peak previous airport use and current proposals.	No information on impacts of previous airport use is available. Our modelling suggests that any such air quality impacts would have been small and not possible to observe in practice.

Consultee	Comments and Considerations	How addressed in this ES
Natural England	Concern that choice of non-human receptors regarding air quality will not always pick up the most sensitive habitats. NE has not agreed the selection of non-human air quality receptors.	This was discussed in phone meeting with NE on 6 March 2018. After further explanation from Wood, NE seemed happy with modelling approach and conclusions. Receptors were chosen to identify the locations with the greatest concentrations of pollutants (i.e. the locations closest to the airport or roads). The assessment then assumed that the most sensitive features for each site applied across the whole site, including at the modelled receptors. This approach was taken as a first pass because the air quality team is not qualified to identify particular locations within the designated site where the most sensitive features are present. This approach is a worst case.
Natural England	Query whether applicant has considered possibility that there may be more sensitive habitats further within particular sites which may suffer more significant impact even though emission or deposition levels are reduced by this point.	Receptors were chosen to identify the locations with the greatest concentrations of pollutants (i.e. the locations closest to the airport or roads). The assessment then assumed that the most sensitive features for each site applied across the whole site, including at the modelled receptors. This approach was taken as a first pass because the air quality team is not qualified to identify particular locations within the designated site where the most sensitive features are present. This approach is a worst case.
Natural England	NE wish to discuss derivation of NOx target for protected conservation areas.	This is discussed in PEIR at Chapter 7 Biodiversity, paragraphs 6.2.26 – 6.2.28, and was agreed at meeting with NE 5 September 2017.

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 Proposed Development; and the potential effects on receptors that could be caused by the Proposed Development.

6.4.2 The scope of the assessment has been informed by: the Scoping Report; consultee responses to the Scoping Report; the results of this ES assessment; consultee responses to the 2017 PEIR and 2018 PEIR; the results of interim stages of the work; and the 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 7km × 4km Cartesian grid centred on the airport was modelled, with a receptor resolution of 100m, 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 contribution from site emissions, given that the emissions sources are spread over an area of several square kilometres in extent, and receptors of interest are more than 200m 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 present 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 Chapter. 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 Committed developments have been reviewed to determine where new locations of exposure may be created in future (e.g. new residential developments), and specific receptors for these have been chosen on the same basis as for existing locations of exposure.

6.4.7 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 **Appendix 6.1** and **Figures 6.1– 6.4**.

6.4.8 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*[4]. These Regulations are detailed in **Section 6.2** of this report and do not differentiate between whether the workplace location is under the control of the operator, or an off-site workplace location.

Ecological Receptors

6.4.9 The EA guidance note "Air emissions risk assessment for your environmental permit"[18] indicates that the impact of an installation should be evaluated at protected conservation areas that meet the following criteria:

- SPAs, SACs or Ramsar sites within 10km of the installation (or within 15km of coal or oil-fired power stations); and
- SSSIs or local nature sites (ancient woods, local wildlife sites and national and local nature reserves (National Nature Reserves (NNR) and Local Nature Reserves (LNR)) within 2km of the location.

6.4.10 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 EA. The receptors are detailed in **Appendix 6.1**, **Figure 6.5** and **Figure 6.6**.

6.4.11 Much of the north-east 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, **Appendix 6.1** 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;
  - 1000324 Stodmarsh; and
- NNR:
  - 1007228 Sandwich & Pegwell Bay.

Monitor Receptors

6.4.12 In order to allow modelled results to be compared against monitoring data, the monitoring locations have also been included as receptors, as detailed in **Appendix 6.1**, **Figure 6.7** and **Figure 6.8**.

Roadside Receptors

6.4.13 As detailed in **Appendix 6.3**, roads were modelled using a transect of receptors for each road link, extending to 200m from the road kerb in each direction. This approach makes it simple to determine the distance from the road at which a given concentration assessment level is exceeded and to identify properties within that distance.

Spatial and Temporal Scope

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

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

- The opening year (Year 2);
- Year 6 (being the year at which the airport is forecast to reach 10,000 cargo movements per year); and
- Year 20.

6.4.16 Construction activity is expected to be spread over the first 18 years of the Proposed Development, but is conservatively assumed to be condensed into Years 2 and 6 (with construction completed before Year 20). This approach ensures that the peak construction years are captured by the assessment.

Potentially Significant Effects

6.4.17 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

6.4.18 Of the potential air quality impacts on human health, the most likely to constrain the acceptability of the Proposed Development is annual mean NO_2. Given that the airport will operate at a steady level of activity 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 have been included in the assessment to provide confidence in this conclusion.

Rationale for Excluding other Pollutants from this Assessment

6.4.19 Other pollutants may also be emitted from airport and associated operations, including SO_2, carbon monoxide 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. 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[19] it states:

- *What are the pollutants of concern for all Panels?*
- *Key pollutants for assessment: NO_x, NO_2 and PM.*
- *Ozone: for role in atmospheric chemistry in dispersion models.*
- *Not required: benzene, 1,3-butadiene, carbon monoxide, lead, PAHs and sulphur dioxide.*
- *... 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.*
- *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).*

6.4.20 According to Defra's background concentration maps[20], 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 their peak, be less than 10% of emissions from Heathrow Airport (emissions of NO_x from aircraft main engines in the landing and take-off cycle in the April 2008–March 2009 period were 4075 t[21], compared with 238 t calculated for Manston in Year 20). 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.

6.4.21 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 TDC until 2014, which found concentrations consistently within legal limits. TDC[22] states:

> *"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."*

6.4.22 Moreover, Defra's guidance on local air quality management[23] 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:

> *"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."*

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

Potentially Significant Effects on Ecological Sites

6.4.24 Concentrations of NO_x in air are associated with adverse effects on plant growth, and are included in this assessment.

6.4.25 In addition, emissions of NO_x and SO_x 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 expected to be negligible, but the impact of nitrogen oxides on nitrifying and acid deposition are included in the assessment.

Inter-related Effects

6.4.26 Air quality, in addition to effects such as noise (**Chapter 12: Noise and Vibration**), visual (**Chapter 11: Landscape and Visual Impact Assessment)**, socio-economics (**Chapter 13: Socio-economics**) and traffic (**Chapter 14: Traffic and Transportation**), has the potential for inter-related effects that affect human receptors. This Chapter includes an assessment of air quality impacts against legal limits set for the protection of human health. Further consideration of air quality effects of the Proposed Development on human health is given in **Chapter 15: Health and Wellbeing** and an assessment of whether climate change will exacerbate air quality effects is provided in **Chapter 16: Climate Change**. The inter-related effect of multiple topics (noise, visual, traffic and transport, socio-economics, health and well-being in addition to air quality) acting in combination on the same human receptors (such as motor users, non-motor users, occupiers of properties and users of open space) is considered in **Chapter 18: Cumulative Effects**.

6.4.27 Air quality may also impact on ecological receptors. This Chapter includes an initial assessment of potential impacts on ecological receptors and **Chapter 7: Biodiversity** provides further assessment where impacts cannot immediately be scoped out as not significant. **Chapter 7: Biodiversity** also considers the inter-related effects of multiple topics, such as air quality, noise and water, on biodiversity receptors.

6.4.28 The traffic and transportation changes predicted as a result of the Proposed Development, which have been used to inform this air quality assessment, are described in **Chapter 14: Traffic and Transportation**.

6.4.29 This chapter includes an assessment of the impacts of releases of dust on human and ecological receptors, and describes mitigation measures. **Chapter 10: Land Quality** provides further information on sources of dust and the mitigation measures.

Cumulative Effects

6.4.30 The potential for cumulative effects is provided through an assessment at **Chapter 18: Cumulative Effects** and includes potential cumulative effects of the proposed development together with other identified major development proposals that were scoped in to the assessment. In summary, cumulative air quality effects as a result of other developments in the area are anticipated to result in no significant effects.

Pollutants Considered

6.4.31 As noted above, 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 $PM_{2.5}$).

6.4.32 A brief description of each pollutant is given in **Table 6.3**.

Table 6.3 Summary of the Pollutants Assessed

Pollutant	Description and Effect on Human Health and the Environment	Principal Sources
Oxides of nitrogen (NO_x)	NO_2 and nitric oxide (NO) are collectively referred to as 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 $PM_{2.5}$)	PM is the term used to describe all suspended solid matter. PM 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 WHO and the 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

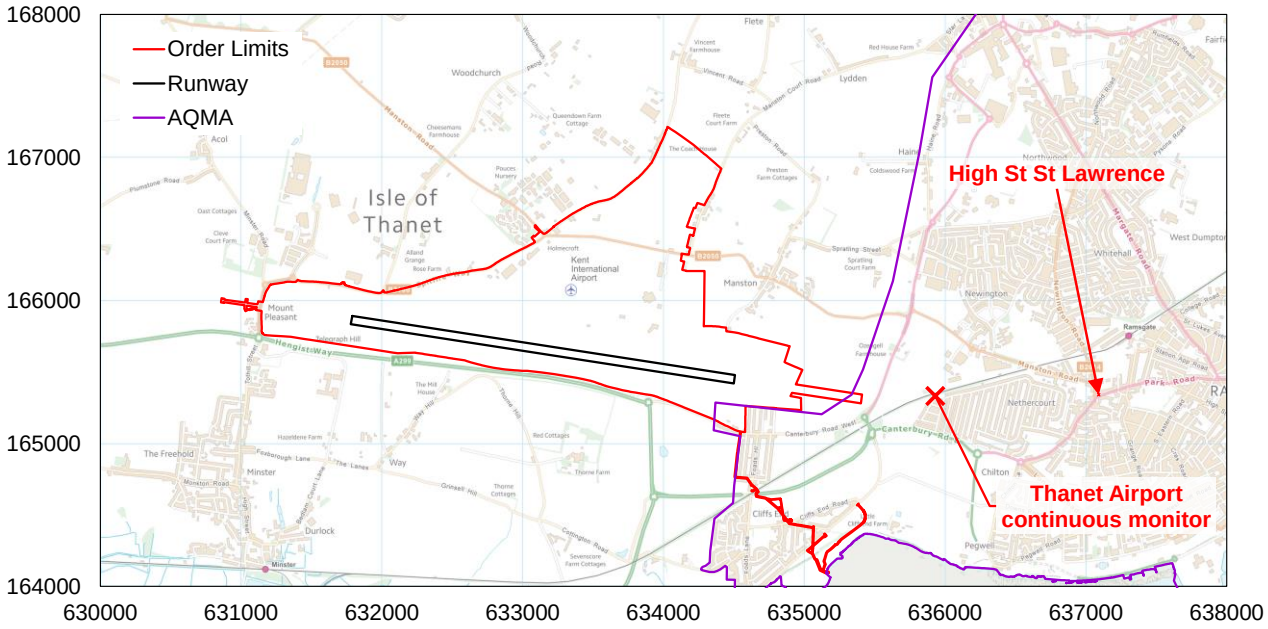
TDC Monitoring

6.5.1 Under Part IV of the *Environment Act 1995*, TDC is required to periodically review and assess air quality within its area of jurisdiction. This process of LAQM is an integral process for achieving national AQOs. TDC's 2014 progress report[22] summarised the air quality in the district thus:

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

6.5.2 The boundary of the AQMA abuts the boundary of the airport and at its nearest point is just 180m from the centre of the runway (see **Figure 6.1**, shown in full size in **Volume 5**. However, the nearest of the locations identified as having poor air quality (High Street St. Lawrence, A255) is a roadside location approximately 2km east of the eastern end of the airport.

Figure 6.1 The Vicinity of the Proposed Development, showing AQMA and continuous monitor



Contains Ordnance Survey data © Crown copyright and database right 2017.

6.5.3 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 1400m east of the eastern end of the runway, on the edge of the built-up area of the conurbation (see **Figure 6.1**). Triplicate NO_2 diffusion tubes were collocated at this site (and are still operated).

6.5.4 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.

6.5.5 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.

6.5.6 Details of the continuous monitors are given in **Appendix 6.2**.

6.5.7 Thanet also measures NO_2 at 24 passive monitoring (diffusion tube) locations (including eight triplicate sites). Two of these were first commissioned in 2015; the others have been in place since at least 2009. Details of the diffusion tubes are given in **Appendix 6.2**.

6.5.8 Measured annual mean NO_2 concentrations from Thanet's monitoring programme between 2007 and 2016 are detailed in **Appendix 6.2**. **Appendix 6.2** also shows the locations of the monitors labelled with the annual mean NO_2 concentration averaged over the available measurement years. This shows that concentrations above 20 µg m^{-3} are confined to roadside and urban centre locations. There is a modest decreasing trend at most monitors, averaging roughly 1µg m^{-3} per year, which is consistent with trends elsewhere in the UK.

6.5.9 For context, the legal limit for annual mean NO_2 concentrations is 40µg 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.

6.5.10 Measured annual mean NO_x concentrations from Thanet's monitoring programme between 2007 and 2016 are detailed in **Appendix 6.2**.

6.5.11 Measured annual mean PM_{10} concentrations from Thanet's monitoring programme between 2007 and 2016 are detailed in **Appendix 6.2**. These are both roadside sites. The monitoring shows that at the monitoring locations, concentrations are well below the legal limit of 40µg m^{-3}.

Defra's Background Mapped Concentrations

6.5.12 Defra maintains a nationwide model (the Pollution Climate Mapping (PCM) model) of existing and future background air quality concentrations at a 1km 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 1km 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.

6.5.13 The dataset was updated in 2016. Data are available for years from 2013 to 2030; modelled concentrations are generally decreasing over that time period. Since this update, Defra has issued its action plan[24] to ensure that air quality limits are met in the shortest time possible across the country. While some of the actions are targeted at hot spots, others will have a wider impact and will tend to reduce concentrations around Manston more quickly. The effects of the action plan are not accounted for in the Defra concentration dataset.

6.5.14 The dataset for the Thanet area includes a contribution from previous operations at Manston Airport. Defra provides a mechanism for subtracting out particular contributions, but for the present purposes the small amount of double-counting is considered to be acceptable.

6.5.15 Concentrations of NO_2, NO_x, PM_{10} and $PM_{2.5}$ from the Defra data for 2018 are given in **Appendix 6.2**. These are all well below the corresponding legal limits and typical of rural locations in England.

Comparison of Monitoring with Defra Data

6.5.16 Measured NO_2 concentrations at non-roadside monitors are compared with the Defra concentrations (both for 2016) for the corresponding grid square in **Table 6.4**. The measured concentrations are consistently significantly higher than the Defra concentrations, by 3 to 9µg m^{-3}. This is partly because the monitoring results for 2016 were unusually high, due to prevailing meteorological conditions, something which cannot be taken into account in the forecasting models. 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 6.4 Monitored Concentrations vs Defra Concentrations for NO_2 (µg m^{-3})

Name	Classification	Measured	Defra	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	16.7	9.4	7.3
TH27	Urban background	16.3	10.1	6.2
TH31	Urban background	14.7	9.5	5.2
TH32	Urban background	15.4	9.8	5.6
TH33	Urban background	16.5	10.3	6.2

*For 2013.
†For 2015.

6.5.17 Measured NO_x concentrations at non-roadside monitors are compared with the Defra concentrations for the corresponding grid square in **Table 6.5**. The measured concentrations are slightly higher than the Defra concentrations at ZH3 Thanet Airport, and considerably higher at ZH2 Margate Background.

Table 6.5 Monitored Concentrations vs Defra Concentrations for NO_x (µg m^{-3})

Name	Classification	Measured	Defra	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.
†For 2015.

APIS Background Mapped Deposition Rates

6.5.18 The Air Pollution Information System (APIS) website[25] provides information on background deposition of nitrogen and sulphur at sensitive ecological sites in the UK (see **Appendix 6.2)**. APIS is widely recognised as the primary source of this information and will be used for the air quality assessment.

Baseline Data Selection and Future Baseline

6.5.19 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 2016[iii], monitored concentrations at these locations are in the range 14.3 – 19.3µg m^{-3}, with an average of 16.2µg 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, 19.3µg m^{-3}, as a conservative estimate of the background concentration of annual mean NO_2 at all receptors, except as stated in the following paragraph.

6.5.20 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 35.3µg 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

[iii] Using 2013 values for ZH2 Thanet Margate Background, the last year of monitoring at that site.

concentration of 38.0µg 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.

6.5.21 For NO_x, the same approach is appropriate. It is therefore proposed to use 25.9µg 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.

6.5.22 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.

6.5.23 For determining background concentrations at near-road locations, a different approach is necessary. In order to be consistent with methodology for calculating concentrations (particularly NO_2 concentrations) near roads, the Defra maps will be used at these locations. Note that this methodology includes a model adjustment factor which corrects modelled concentrations to provide agreement with monitoring data, so the apparent underprediction of the Defra maps compared with monitoring is corrected for.

6.5.24 Background deposition rates of all pollutants will be taken from the APIS website[25], based on the most sensitive habitat feature at that designated site.

6.5.25 Note that these concentrations take into account existing sources of emissions, including those from Polar Helicopters operations at Manston Airport, and the Defence Fire Training and Development Centre (not part of Manston Airport).

6.5.26 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. For near-road locations, the projected Defra maps will be used for consistency across the roads methodology.

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

6.5.28 Committed developments have been reviewed to identify additional sources of emissions that are likely to arise in future. The main new developments of relevance are residential, which may generate additional road traffic. These have been included in the traffic model. No other developments have been identified which are likely to have a significant effect on air concentrations at receptors close to Manston Airport.

6.5.29 The background concentrations and deposition rates assumed in the modelling for this assessment are detailed in **Appendix 6.2** for each of the specific receptors.

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 6.7**. 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.

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 6.6**.

Table 6.6 Rationale for incorporation of Environmental Measure

Potential Receptor	Predicated Changes and Potential Effects	Incorporated Measure
Construction Phase		
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 Construction Environmental Management Plan (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		
Local Road Network	Congestion on the local road network.	Agree and enforce a strict routeing agreement for incoming and outgoing Heavy Goods Vehicles (HGVs), avoiding, where possible, peak traffic flow hours in order to reduce congestion and queueing.
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.
Human health and ecological receptors	Potential effects upon human health and ecological resources as a result of emissions from aircraft movements on the ground and during the land and take-off (LTO) cycle.	Planning of aircraft arrival and departure scheduling to avoid, where possible, over-long idling, taxiing and hold times. Airfield layout design to minimise times taxiing and holding. Use of Fixed Electrical Ground Power (FEGP) to minimise engine/Auxiliary Power Unit (APU) use. Bans on older, dirtier aircraft.
Human health and ecological receptors	Potential effects upon human health and ecological resources as a result of emissions from aircraft ground support equipment (GSE).	Largely electric GSE fleet. Diesel GSE largely bought new and meeting current emissions standards. Planning of aircraft arrival and departure scheduling to avoid, where possible, over-long operation of liquid fossil-fuelled GSE.

6.7 Assessment Methodology

Calculation of Concentrations and Deposition Rates

6.7.1 This section briefly describes the modelling methodology used to calculate concentrations and deposition rates and their impacts for the assessment. More details are given in **Appendix 6.3**.

6.7.2 Emissions from the following sources have been calculated:

- Aircraft on the ground, including landing roll, taxi-in, taxi-out, hold, take-off-roll, APU usage, brake wear, tyre wear and testing ground runs;
- Aircraft in the air up to 3,000ft (914m), including approach, initial climb and climb-out;
- GSE, including emergency diesel generators;
- Road traffic; and
- Construction activity, including construction-related road traffic.

6.7.3 Emissions are calculated using a bottom-up approach, based on multiplying activity levels by appropriate emission factors. Data on activity levels are provided by Viscount Aviation, supplemented by data from comparable airports. Emission factors are from standard published sources.

6.7.4 Emissions are assigned to spatial elements based on layout drawings provided by RPS and standard aviation operational practice (for example for runway assignments). The spatially-defined emissions are then entered into the dispersion modelling tool ADMS (or ADMS-Urban for road sources), which calculates concentrations of pollutants at receptors. Deposition rates at ecological receptors are calculated from concentrations in air using standard deposition velocities.

6.7.5 Road vehicle emissions are modelled slightly differently: because these are extensive sources, they are modelled using transects of receptors. This allows impacts from road traffic to be assessed further from the airport than otherwise. Concentrations at sensitive locations near roads at a distance from the airport are presented separately in **Section 6.11**.

6.7.6 The resulting concentrations and deposition rates are assessed against the established assessment criteria. Impacts are evaluated using criteria from the EA and from the IAQM and Environmental Protection UK (EPUK). The final evaluation of significance is based on professional judgement and expertise, in accordance with guidance from the IAQM.

6.7.7 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 worst-case year in terms of likely emissions from aircraft and vehicular movements.

6.7.8 Throughout the modelling process, care has been taken not to risk underpredicting impacts. In fact, a number of conservative assumptions have been made (see **Appendix 6.3** for a summary list of conservative assumptions) which mean that impacts are very likely to be overpredicted, that is to say this is very much a worst-case assessment. As will be seen, the modelled air quality impacts are generally low, so it has not been necessary to use less conservative modelling to demonstrate that the Proposed Development will have low significance for air quality.

Significance Evaluation Methodology

Air Quality Assessment Levels

6.7.9 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 authors refer to effectively the same assessment level under different names. This document follows IAQM/EPUK[9] 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).

6.7.10 **Table 6.7** and **Table 6.8** 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. The sources for these have been described in **Section 6.2**. The assessment levels for NO_2, PM_{10}, $PM_{2.5}$ and annual mean NO_x derive from the EU ambient air directive 2008/50/EC, as transposed into English law and included in the Air Quality Strategy. The assessment level for daily mean NO_x derives from EA guidance.

Table 6.7 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 6.8 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	200

6.7.11 The APIS website contains information on applicable critical loads for various habitats and species.

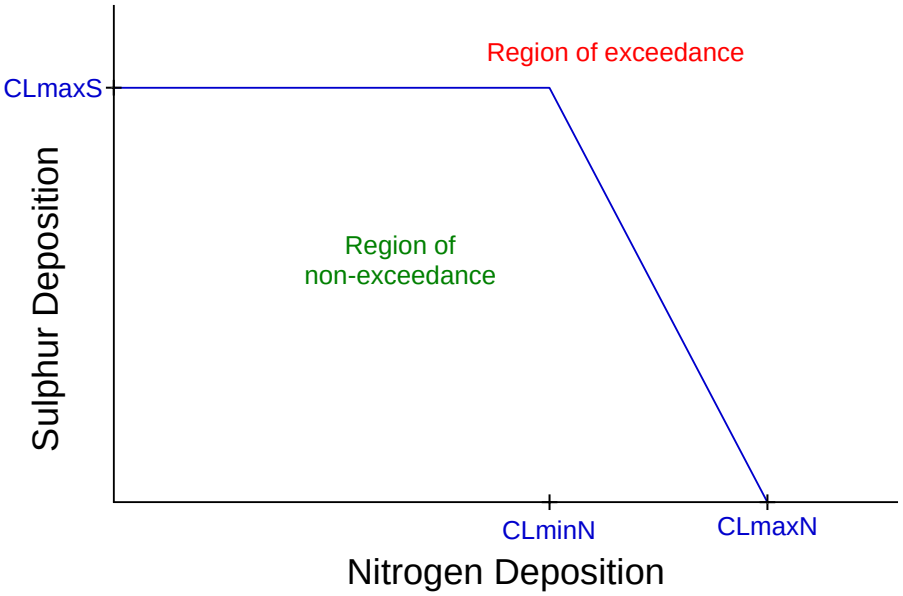
6.7.12 Eutrophication critical loads are given as a range and have units of kg N ha^{-1} y^{-1}. Generally, the lower end of the range should be used as a conservative assessment. The critical loads for acidification are more complicated, in that both the nitrogen and sulphur deposition fluxes must be 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.

6.7.13 These three quantities define the critical load function shown in **Figure 6.2**.

Figure 6.2 Specimen Critical Load Function for Acidity



6.7.14 Information held on the APIS website has been reviewed in order to identify the main habitat/species features and their site relevant critical loads. These are summarised in **Appendix 6.3**.

Significance Criteria

IAQM/EPUK Guidance

6.7.15 For assessing the significance of impacts at human receptors, this assessment will follow the IAQM/EPUK guidance described above (Paragraph 6.2.29 et seq), using the impact descriptors defined in **Table 6.9**.

Table 6.9 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

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})
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}).

6.7.16 For ecological receptors, this assessment will use the EA criteria for screening out impacts that do not require further assessment (Paragraph 6.2.35 et seq), taking into account the IAQM interpretation of the EA criteria (Paragraph 6.2.39 et seq). Where it is not possible for the impact at a receptor to be screened out in accordance with this guidance, the impacts are evaluated further in the **Chapter 7: Biodiversity** and relevant Appendices.

Public Exposure

6.7.17 Guidance from the UK Government and Devolved Administrations[23] 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 6.10** provides an indication of those locations that may or may not be relevant for each averaging period.

Table 6.10 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.

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
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 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.

6.8 Assessment of Effects: Year 2

6.8.1 This section sets out the results of the dispersion modelling for Year 2 and compares predicted ground level concentrations against the assessment criteria detailed in **Section 6.7**. The predicted concentrations resulting from the Proposed Development (known as the process contribution or PC) are presented, along with the total predicted environmental concentrations (PEC), which include the background contribution from sources unrelated to the Proposed Development. These concentrations are then compared with the relevant AQAL (standard, objective, target or guideline value).

6.8.2 Modelled concentrations include the contributions from operational activity on the airport such as aircraft (including at height beyond the airport boundary) and GSE, construction activity on and around the airfield, and road traffic (including construction-related road traffic).

6.8.3 For Year 2, it is assumed that Phase 1 construction activity lasts for the first three quarters of the year and operational activity takes place over the remaining quarter, with no overlap and activity levels pro-rated accordingly. This represents the current proposed timescales. Concentrations from construction are generally greater than from operation.

6.8.4 This section addresses impacts at receptors with a few kilometres of the airport. The contribution from airport-related roads further afield is assessed in **Section 6.11**.

6.8.5 As previously explained, concentrations have been calculated for five years of meteorology. For each receptor or grid point, the highest concentrations of the five meteorology years is chosen as the final results. All results reported in this Chapter are therefore for the most adverse weather conditions.

6.8.6 Results are given here for the key receptors for each assessment criterion. Full results are available in **Appendix 6.5**.

6.8.7 Please note that in the following tables, results are given to several decimal places. This is to enable comparison between receptors and between PC and PEC contributions. The number of decimal places should not be taken as providing any indication of the accuracy of the results.

Human Health Effects: NO_2

6.8.8 ***Summary**: No new or existing exceedances of the annual mean NO_2 objective or the hourly mean NO_2 objective are predicted. Impacts are **negligible** everywhere except at a small number of*

*properties close to the airport boundary, where impacts are at most **moderate**, and in St Lawrence where the background is very high due to existing road traffic and the impact of the Proposed Development is **slight**. It should be remembered that this assessment uses a number of worst-case assumptions, so impacts are actually likely to be lower (better) than modelled. As a possible mitigation measure, impacts can be reduced further by using new construction plant.*

6.8.9 Predicted concentrations of annual mean NO_2 are given in **Table 6.11**, 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; excluding roads contribution) in the vicinity of the Proposed Development are shown in **Figure 6.23** in **Appendix 6.6**.

Table 6.11 Maximum PCs and PECs for annual mean NO_2, Year 2, assuming Stage IIIB Construction Plant

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	% PC of AQAL	% PEC of AQAL	Impact
H08	40	4.66	32.25	11.7%	80.6%	Moderate
H09	40	5.11	35.72	12.8%	89.3%	Moderate
H10	40	6.01	33.30	15.0%	83.3%	Moderate
H11	40	6.18	31.72	15.5%	79.3%	Moderate
H12	40	5.07	27.79	12.7%	69.5%	Moderate
H13	40	3.50	24.23	8.7%	60.6%	Slight
H14	40	2.33	24.77	5.8%	61.9%	Slight
H15	40	8.08	30.47	20.2%	76.2%	Moderate
H16	40	2.40	24.65	6.0%	61.6%	Slight
H17	40	2.11	31.04	5.3%	77.6%	Slight
H23	40	2.69	21.99	6.7%	55.0%	Slight
A32	40	0.21	38.21	0.5%	95.5%	Slight
A33	40	0.22	38.22	0.5%	95.5%	Slight
A34	40	0.21	38.21	0.5%	95.5%	Slight
A35	40	0.21	38.21	0.5%	95.5%	Slight
A36	40	0.21	38.21	0.5%	95.5%	Slight
A37	40	0.21	38.21	0.5%	95.5%	Slight
A38	40	0.21	38.21	0.5%	95.5%	Slight
A39	40	0.21	38.21	0.5%	95.5%	Slight
A40	40	0.21	38.21	0.5%	95.5%	Slight
A41	40	0.21	38.21	0.5%	95.5%	Slight
A42	40	0.21	38.21	0.5%	95.5%	Slight
A43	40	0.21	38.21	0.5%	95.5%	Slight
M11	40	4.15	23.45	10.4%	58.6%	Moderate

6.8.10 In Year 2, the maximum annual mean NO_2 PEC at any relevant human receptor location near the Proposed Development is predicted as 36µg m^{-3} or 89% of the AQAL at the H09 Pouces Cottages receptor. The modelled contribution from the airport here is 5.1 µg m^{-3}, but this receptor has a significant contribution from non-airport road traffic on the B2190 Spitfire Way. The greatest PC at any of the modelled receptors is 8.1 µg m^{-3} at the H15 Manston Court Road receptor. Under the IAQM/EPUK criteria, the impact at these receptors, as well as other receptors along Spitfire Way, is classed as **moderate**.

6.8.11 The locations classed as having a **moderate** impact are those with a PC greater than 4 µg m^{-3} (see top right cell in **Table 6.9**). These are shown by the yellow contour in **Figure 6.23** in **Appendix 6.6**, which extends beyond the airport boundary to include properties along Manston Court Road and Spitfire Way.

6.8.12 The results above assume that construction plant only meets Stage IIIB emission standards. The contribution from construction activities is greater than that from operational activities. If construction plant is upgraded to moderately new equipment meeting Stage IV emission standards[iv], then the total concentration is reduced substantially and the impact drops to **negligible** at all relevant receptors except H09, where the impact is classified as **slight**. This is shown in **Figure 6.24** in **Appendix 6.6**.

6.8.13 At the St. Lawrence receptors, the PC is 0.21µg m^{-3} and the PEC is 38.2µg m^{-3} in Year 2; the impact at these receptors is classified as **slight**. Using Stage IV plant for construction reduces the impact to **negligible**. At the Birchington receptors, the PC is 0.11µg m^{-3} and the PEC is 35.4µg m^{-3}; the impact at these receptors is classified as **negligible**.

6.8.14 Even with Stage IIIB equipment, the modelled annual mean NO_2 concentrations are all below 40µg 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.

6.8.15 No existing or new exceedances are predicted, and the maximum concentrations are well below the AQALs. It should be remembered that this is a worst-case assessment incorporating several conservative assumptions.

Human Health Effects: PM_{10}

6.8.16 ***Summary****: No new or existing exceedances of the annual mean PM_{10} objective or the daily mean PM_{10} objective are predicted. Impacts are* ***negligible*** *everywhere.*

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 6.12**.

Table 6.12 Maximum PCs and PECs for annual mean PM_{10}, Year 2, Worst Receptors

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	% PC of AQAL	% PEC of AQAL	Impact
H01	40	0.01	18.74	0.0%	46.8%	Negligible
H02	40	0.01	18.46	0.0%	46.1%	Negligible
H03	40	0.01	18.46	0.0%	46.1%	Negligible
H04	40	0.01	18.46	0.0%	46.1%	Negligible

[iv] Equipment less than 6 years old in Year 2 will meet Stage IV.

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	% PC of AQAL	% PEC of AQAL	Impact
H32	40	0.01	18.22	0.0%	45.5%	Negligible
H09	40	0.14	17.43	0.3%	43.6%	Negligible
H11	40	0.13	15.51	0.3%	38.8%	Negligible
H15	40	0.15	16.25	0.4%	40.6%	Negligible
S01	40	0.15	14.82	0.4%	37.0%	Negligible
S02	40	0.13	14.79	0.3%	37.0%	Negligible

6.8.18 The maximum annual mean PM_{10} PEC at any relevant human receptor location is predicted as 19 µg m^{-3} or 47% of the AQAL at the H01 Garden Cottage receptor. The modelled contribution from the airport here is just 0.01 µg m^{-3}. The greatest PC is 0.15 µg m^{-3} at the H15 Manston Court Road receptor, where the total PEC is 16 µg m^{-3} or 41% of the AQAL.

6.8.19 No existing or new exceedances are predicted, and the maximum concentrations are well below the AQALs. Under the IAQM/EPUK criteria, the impact at all receptors is classified as **negligible**.

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} at any receptor. 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.

Human Health Effects: $PM_{2.5}$

6.8.21 ***Summary**: No new or existing exceedances of the annual mean $PM_{2.5}$ objective are predicted. Impacts are **negligible** everywhere.*

6.8.22 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 6.13**.

Table 6.13 Maximum PCs and PECs for annual mean $PM_{2.5}$, Year 2, Worst Receptors

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	% PC of AQAL	% PEC of AQAL	Impact
H01	25	0.01	12.89	0.0%	51.6%	Negligible
H02	25	0.01	12.73	0.0%	50.9%	Negligible
H03	25	0.01	12.73	0.0%	50.9%	Negligible
H04	25	0.01	12.73	0.0%	50.9%	Negligible
H32	25	0.01	12.37	0.0%	49.5%	Negligible
H08	25	0.10	11.79	0.4%	47.2%	Negligible
H09	25	0.11	12.03	0.4%	48.1%	Negligible
H10	25	0.11	11.11	0.5%	44.4%	Negligible
H11	25	0.12	10.99	0.5%	44.0%	Negligible
H15	25	0.15	11.37	0.6%	45.5%	Negligible

6.8.23 The maximum annual mean $PM_{2.5}$ PEC at any relevant human receptor location is predicted as 13µg m^{-3} or 52% of the AQAL at the H01 Garden Cottage receptor. The modelled contribution from the airport here is just 0.01µg m^{-3}. The greatest PC is 0.15µg m^{-3} at the H15 Manston Court Road receptor, where the total PEC is 11µg m^{-3} or 45% of the AQAL.

6.8.24 No existing or new exceedances are predicted, and the maximum concentrations are well below the AQALs. Under the IAQM/EPUK criteria, the impact at all receptors is classified as **negligible**.

Ecological effects: Annual mean NO_x Concentrations in Air

6.8.25 ***Summary**: Some exceedances of the annual mean NO_x objective are predicted where major roads pass close to designated ecological sites, mainly because of levels of emissions from existing road traffic. The additional contribution from the Proposed Development, including airport-related traffic, is small, less than 5% of the objective at any major ecological site. The impact at all local ecological sites is **insignificant**.*

6.8.26 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. Note that some receptors are in the top five for both PC and PEC.

6.8.27 Predicted concentrations of annual mean NO_x at these selected receptors are given in **Table 6.14**.

Table 6.14 Maximum PCs and PECs for annual mean NO_x, Year 2, Worst Receptors

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	% PC of AQAL	% PEC of AQAL	Site type
E08	30	1.04	42.49	3.5%	141.6%	Major
E09	30	1.35	48.78	4.5%	162.6%	Major
E17	30	0.41	44.48	1.4%	148.3%	Major
E24	30	0.36	41.88	1.2%	139.6%	Major
E32	30	0.06	44.50	0.2%	148.3%	Major
E11	30	0.46	37.96	1.5%	126.5%	Major
E22	30	0.55	26.45	1.8%	88.2%	Major
E54	30	0.19	38.26	0.6%	127.5%	Local
E62	30	0.74	43.04	2.5%	143.5%	Local
E64	30	1.62	41.48	5.4%	138.3%	Local
E65	30	1.01	43.53	3.4%	145.1%	Local
E81	30	8.90	34.80	29.7%	116.0%	Local
E82	30	8.75	34.65	29.2%	115.5%	Local
E83	30	2.39	28.29	8.0%	94.3%	Local
E84	30	1.85	27.75	6.2%	92.5%	Local

6.8.28 The maximum modelled annual mean NO_x PEC at any relevant major environmental receptor (Ramsar, SPA, SAC and SSSI) is predicted as 49µg m^{-3} or 163% of the AQAL at the E09 receptor,

largely because it abuts the A28 through Margate. The modelled contribution from the airport here is 1.3µg m^{-3}, which is the greatest PC at any of the modelled nationally- or internationally-designated ecological receptors, again because of the additional road traffic.

6.8.29 The maximum modelled annual mean NO_x PEC at any relevant local nature receptor (i.e. excluding Ramsar, SPA, SAC and SSSI sites) is predicted as 44µg m^{-3} or 145% of the AQAL at the E65 receptor, representing Priority Habitat near Pegwell Bay. The modelled contribution from the airport here is 1.0µg m^{-3}. The greatest PC at any of the modelled local nature receptors is 8.9µg m^{-3} at the E81 receptor, representing a wooded area in the Priority Habitat Inventory near Spitfire Way. Under Environment Agency guidance[26], the PC at all local nature sites is less than 100% of the AQAL so can be screened out from further assessment.

6.8.30 Generally, background concentrations of annual mean NO_x are comfortably below the limit of 30µg m^{-3}, and the additional contribution from the Proposed Development is sufficiently small that there is no risk of new exceedances. However, concentrations close to roads may approach or exceed the limit, with quite large exceedances close to major roads. In some such roadside locations, it is possible that the extra contribution from the Proposed Development may create a new exceedance close to the road, or extend the area of exceedance slightly.

6.8.31 Under EA guidance, where the PC is greater than 0.3µg m^{-3} at major ecological receptors, further assessment may be required. Further assessment in provided in **Chapter 7: Biodiversity**.

Ecological Effects: Nutrient Nitrogen Deposition

6.8.32 ***Summary****: While some exceedances of the critical loads for nitrogen are predicted, these are due to existing deposition rates and the additional contribution from the Proposed Development is* ***insignificant****.*

6.8.33 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. Note that some receptors are in the top five for both PC and PEC.

6.8.34 Modelled nutrient nitrogen deposition rates at these selected receptors are given in **Table 6.15**, along with the receptor-specific critical loads. 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.

Table 6.15 Critical Loads Assessment of Nitrogen Deposition, Year 2, 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
E30	8	0.01	15.69	0.1%	196.1%	Major
E43	5	0.00	14.28	0.1%	285.7%	Major
E44	5	0.00	14.28	0.1%	285.7%	Major
E48	5	0.00	14.28	0.1%	285.7%	Major
E49	5	0.00	14.28	0.1%	285.7%	Major
E20	8	0.02	10.80	0.3%	135.0%	Major
E21	8	0.04	10.82	0.5%	135.2%	Major
E22	8	0.06	10.84	0.7%	135.4%	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
E23	8	0.04	13.48	0.5%	168.5%	Major
E24	8	0.03	13.47	0.3%	168.3%	Major
E79	10	0.28	26.18	2.8%	261.8%	Local
E80	10	0.26	26.16	2.6%	261.6%	Local
E82	10	1.76	27.66	17.6%	276.6%	Local
E84	10	0.37	26.27	3.7%	262.7%	Local
E86	10	0.06	25.96	0.6%	259.6%	Local
E81	10	1.79	21.11	17.9%	211.1%	Local
E83	10	0.48	19.80	4.8%	198.0%	Local

6.8.35 At the major environmental sites, the additional process contribution is at most 0.7% of the critical load at the E22 receptor representing Pegwell Bay. The PEC here is 135% of the critical load. At all modelled receptors, the PC is less than 1% of the critical load. Under EA guidance, where the PC at a major site is less than 1% of the critical load, it can be considered **insignificant** and does not need to be assessed further.

6.8.36 At the local nature sites, the additional PC is at most 18% of the critical load, at the E81 receptor, which represents deciduous woodland in the Priority Habitat Inventory near Spitfire Way. This is less than 100% of the assessment level, so under EA guidance, it can be considered **insignificant** and does not need to be assessed further.

Ecological Effects: Acid Deposition

6.8.37 ***Summary**: While some exceedances of the critical loads for acidity are predicted, these are due to existing deposition rates and the additional contribution from the Proposed Development is **insignificant.***

6.8.38 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 (again as a percentage of the critical load function).

6.8.39 Modelled process contribution and background deposition rates are given in **Table 6.16**. A comparison with the critical load function is given in **Table 6.17**[v].

6.8.40 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.

6.8.41 At the major environmental sites, the additional process contribution is at most 0.3% of the critical load function at the E22 receptor representing Pegwell Bay. The PEC here is 88% of the critical load.

6.8.42 The major receptor with the greatest PEC is E35, representing the Thanet Coast Ramsar site, where the PEC is 261% of the critical load function, but the PC is just 0.1% of the critical load function.

[v] 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.

6.8.43 At the local nature sites, the additional PC is at most 1.2% of the critical load function, at the E81 receptor, which represents deciduous woodland in the Priority Habitat Inventory near Spitfire Way. The PEC here is modelled as 16% of the critical load function.

6.8.44 Under the EA criteria, the impacts at all modelled receptors, both major and local, can be considered **insignificant** and do not need to be assessed further.

Table 6.16 Acid Deposition rates, Year 2, 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
E35	0	0.0003	0.25	1.12	Major
E37	0	0.0002	0.25	1.12	Major
E44	0	0.0003	0.22	1.02	Major
E48	0	0.0003	0.22	1.02	Major
E49	0	0.0003	0.22	1.02	Major
E21	0	0.0027	0.21	0.77	Major
E22	0	0.0039	0.21	0.77	Major
E23	0	0.0028	0.20	0.96	Major
E38	0	0.0014	0.20	0.96	Major
E39	0	0.0014	0.20	0.96	Major
E65	0	0.0079	0.28	1.62	Local
E77	0	0.0054	0.24	1.64	Local
E86	0	0.0043	0.29	1.85	Local
E87	0	0.0040	0.24	1.64	Local
E88	0	0.0049	0.24	1.64	Local
E61	0	0.0086	0.24	1.33	Local
E72	0	0.0134	0.24	1.64	Local
E73	0	0.0144	0.24	1.64	Local
E81	0	0.1281	0.27	1.38	Local
E82	0	0.1259	0.29	1.85	Local

Table 6.17 Critical Loads Assessment of Acid Deposition, Year 2, Worst Receptors

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	0.1	260.5	260.5	Major
E37	No exceedance	0.84	0.84	0.0	260.5	260.5	Major

Receptor	Exceedance (keq ha^{-1} y^{-1})			Percent of critical load function			Site type
	PC	Background	PEC	PC	Background	PEC	
E44	No exceedance	0.70	0.70	0.0	228.8	228.8	Major
E48	No exceedance	0.70	0.70	0.1	228.8	228.8	Major
E49	No exceedance	0.70	0.70	0.1	228.8	228.8	Major
E21	No exceedance	No exceedance	No exceedance	0.2	87.3	87.5	Major
E22	No exceedance	No exceedance	No exceedance	0.3	87.3	87.6	Major
E23	No exceedance	0.04	0.04	0.2	103.3	103.5	Major
E38	No exceedance	0.63	0.64	0.3	220.5	220.8	Major
E39	No exceedance	0.63	0.64	0.3	220.5	220.8	Major
E65	No exceedance	0.04	0.05	0.4	102.2	102.6	Local
E77	No exceedance	0.06	0.07	0.3	103.3	103.6	Local
E86	No exceedance	0.33	0.33	0.2	118.2	118.5	Local
E87	No exceedance	0.07	0.07	0.2	103.9	104.1	Local
E88	No exceedance	0.07	0.07	0.3	103.9	104.1	Local
E61	No exceedance	No exceedance	No exceedance	0.5	86.3	86.7	Local
E72	No exceedance	No exceedance	No exceedance	0.7	97.9	98.6	Local
E73	No exceedance	No exceedance	No exceedance	0.8	97.9	98.7	Local
E81	No exceedance	No exceedance	No exceedance	1.2	15.0	16.2	Local
E82	No exceedance	No exceedance	No exceedance	1.1	19.5	20.7	Local

6.9 Assessment of Effects: Year 6

6.9.1 This section sets out the results of the dispersion modelling for Year 6 and compares predicted ground level concentrations against the assessment criteria detailed in **Section 6.7**. The predicted concentrations resulting from the Proposed Development (known as the process contribution or PC) are presented, along with the total predicted environmental concentrations (PEC), which include the background contribution from sources unrelated to the Proposed Development. These concentrations are then compared with the relevant AQAL (standard, objective, target or guideline value).

6.9.2 Modelled concentrations include the contributions from operational activity on the airport such as aircraft (including at height beyond the airport boundary) and GSE, construction activity on and around the airfield, and road traffic (including construction-related road traffic).

6.9.3 For Year 6, it is assumed that Phase 3 construction activity lasts for the full assessment year, with the airport operating at the same time, so contributions from both sources are added together. This is a conservative assumption since Phase 3 construction may in practice take place over several years.

6.9.4 As noted in the methodology description (**Appendix 6.3**), it is assumed that all Phase 3 construction plant is no more than 10 years old, and therefore meets Stage IV emission standards.

6.9.5 This section addresses impacts at receptors within a few kilometres of the Proposed Development. The contribution from airport-related roads further afield is assessed in **Section 6.11**.

6.9.6 As previously explained, concentrations have been calculated for five years of meteorology. For each receptor or grid point, the highest concentrations of the five meteorology years is chosen as the final results. All results reported in this Chapter are therefore for the most adverse weather conditions.

6.9.7 Results are given here for the key receptors for each assessment criterion. Full results are available in **Appendix 6.5**.

6.9.8 Please note that in the following tables, results are given to several decimal places. This is to enable comparison between receptors and between PC and PEC contributions. The number of decimal places should not be taken as providing any indication of the accuracy of the results.

Human Health Effects: NO_2

6.9.9 ***Summary**: No new or existing exceedances of the annual mean NO_2 objective or the hourly mean NO_2 objective are predicted. Impacts are **negligible** everywhere except at a small number of properties close to the airport boundary, where impacts are **moderate**, and in St Lawrence where the existing background concentration is very high due to existing road traffic and the impact of the Proposed Development is **slight**. It should be borne in mind that this assessment uses a number of worst-case assumptions, and therefore impacts are likely to be lower (better) than modelled.*

6.9.10 Predicted concentrations of annual mean NO_2 at receptors are given in **Table 6.18**, 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 (excluding road contribution) are shown in **Figure 6.25** in **Appendix 6.6**.

Table 6.18 Maximum PCs and PECs for annual mean NO_2, Year 6

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	% PC of AQAL	% PEC of AQAL	Impact
H08	40	2.58	28.58	6.5%	71.5%	Slight
H09	40	3.19	31.67	8.0%	79.2%	Moderate
H10	40	4.54	30.42	11.3%	76.0%	Moderate
H11	40	4.48	28.86	11.2%	72.2%	Moderate
H12	40	3.64	25.73	9.1%	64.3%	Slight
H13	40	2.93	23.40	7.3%	58.5%	Slight
H15	40	2.48	24.43	6.2%	61.1%	Slight
H21	40	2.50	21.80	6.3%	54.5%	Slight
H23	40	3.66	22.96	9.2%	57.4%	Slight
A14	40	2.69	21.99	6.7%	55.0%	Slight
A32	40	0.26	38.26	0.7%	95.7%	Slight
A33	40	0.26	38.26	0.7%	95.7%	Slight
A34	40	0.26	38.26	0.6%	95.6%	Slight
A35	40	0.26	38.26	0.6%	95.6%	Slight

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	% PC of AQAL	% PEC of AQAL	Impact
A36	40	0.26	38.26	0.6%	95.6%	Slight
A37	40	0.26	38.26	0.6%	95.6%	Slight
A38	40	0.25	38.25	0.6%	95.6%	Slight
A39	40	0.25	38.25	0.6%	95.6%	Slight
A40	40	0.26	38.26	0.6%	95.6%	Slight
A41	40	0.26	38.26	0.6%	95.6%	Slight
A42	40	0.26	38.26	0.6%	95.6%	Slight
A43	40	0.26	38.26	0.7%	95.7%	Slight
M11	40	3.41	22.71	8.5%	56.8%	Slight

6.9.11 In Year 6, the maximum annual mean NO_2 PEC at any relevant human receptor location near the airport is predicted as 32µg m^{-3} or 79% of the AQAL at the H09 Pouces Cottages receptor, including a large contribution of 9µg m^{-3} from non-airport roads. The modelled contribution from the airport here is 3.2 µgm^{-3}. The greatest PC at any of the modelled receptors is 4.5µg m^{-3} at the H10 Bell Davies Drive 1 receptor, where the PEC is 30µg m^{-3} or 76% of the AQAL. Under the IAQM/EPUK criteria, the impact at these receptors and one other receptor on Spitfire Way is classed as **moderate**.

6.9.12 The locations classed as having a **moderate** impact are those with a PC greater than 4µg m^{-3} (see top right cell in **Table 6.9**). These are shown by the yellow contour in **Figure 6.25** in **Appendix 6.6**, which is largely confined to within the airport boundary except for parts of Bell Davies Drive close to Spitfire Way. At all other locations, the impact is **slight** or **negligible**.

6.9.13 At the St. Lawrence receptors, the PC is up to 0.26µg m^{-3} and the PEC is 38.3µg m^{-3} in Year 6; the impact at these receptors is classified as **slight**. At the Birchington receptors, the PC is up to 0.16µg m^{-3} and the PEC is 35.5µg m^{-3}; the impact at these receptors is classified as **negligible**.

6.9.14 The modelled annual mean NO_2 concentrations are all below 40µg m^{-3} and well below 60µg 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.

6.9.15 No existing or new exceedances are predicted, and the maximum concentrations are well below the AQALs. It should be remembered that this is a worst-case assessment incorporating several conservative assumptions.

Human Health Effects: PM_{10}

6.9.16 ***Summary:*** *No new or existing exceedances of the annual mean PM_{10} objective or the daily mean PM_{10} objective are predicted. Impacts are **negligible** everywhere.*

6.9.17 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 6.19**.

Table 6.19 Maximum PCs and PECs for annual mean PM_{10}, Year 6, worst receptors

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	% PC of AQAL	% PEC of AQAL	Impact
H01	40	0.05	18.79	0.1%	47.0%	Negligible
H02	40	0.04	18.49	0.1%	46.2%	Negligible
H03	40	0.03	18.49	0.1%	46.2%	Negligible
H04	40	0.03	18.48	0.1%	46.2%	Negligible
H32	40	0.05	18.28	0.1%	45.7%	Negligible
H10	40	0.31	15.98	0.8%	40.0%	Negligible
H11	40	0.31	15.75	0.8%	39.4%	Negligible
H23	40	0.39	16.08	1.0%	40.2%	Negligible
H54	40	0.32	17.40	0.8%	43.5%	Negligible
S02	40	0.33	15.00	0.8%	37.5%	Negligible

6.9.18 The maximum annual mean PM_{10} PEC at any relevant human receptor location is predicted as 19µg m^{-3} or 47% of the AQAL at the H01 Garden Cottage receptor. The modelled contribution from the airport here is just 0.05µg m^{-3}. The greatest PC is 0.39µg m^{-3} at the H23 High Street 5 receptor, where the total PEC is 16µg m^{-3} or 40% of the AQAL.

6.9.19 No existing or new exceedances are predicted, and the maximum concentrations are well below the AQALs. Under the IAQM/EPUK criteria, the impact at all receptors is classified as **negligible**.

6.9.20 Using the Defra formula to estimate the number of days where the daily mean PM_{10} is greater than 50µg m^{-3}, no more than 2 days per year are greater than 50µg m^{-3} at any receptor. This compares with 35 days per year permitted to be greater than 50µg m^{-3}. There is therefore no likelihood of an exceedance of the daily mean PM_{10} AQAL.

Human Health Effects: $PM_{2.5}$

6.9.21 ***Summary:*** *No new or existing exceedances of the annual mean $PM_{2.5}$ objective are predicted. Impacts are* ***negligible*** *everywhere.*

6.9.22 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 6.20**.

Table 6.20 Maximum PCs and PECs for annual mean $PM_{2.5}$, Year 6, worst receptors

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	% PC of AQAL	% PEC of AQAL	Impact
H01	25	0.04	12.93	0.2%	51.7%	Negligible
H02	25	0.03	12.75	0.1%	51.0%	Negligible
H03	25	0.03	12.75	0.1%	51.0%	Negligible
H04	25	0.02	12.74	0.1%	51.0%	Negligible

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	% PC of AQAL	% PEC of AQAL	Impact
H32	25	0.04	12.39	0.1%	49.6%	Negligible
H10	25	0.27	11.30	1.1%	45.2%	Negligible
H11	25	0.27	11.16	1.1%	44.7%	Negligible
H23	25	0.30	11.26	1.2%	45.0%	Negligible
H54	25	0.23	11.94	0.9%	47.8%	Negligible
A14	25	0.22	11.17	0.9%	44.7%	Negligible

6.9.23 The maximum annual mean $PM_{2.5}$ PEC at any relevant human receptor location is predicted as 13µg m^{-3} or 52% of the AQAL at the H01 Garden Cottage receptor. The modelled contribution from the airport here is just 0.04 µg m^{-3}. The greatest PC is 0.30µg m^{-3} at the H23 High Street 5 receptor, where the total PEC is 11µg m^{-3} or 45% of the AQAL.

6.9.24 No existing or new exceedances are predicted, and the maximum concentrations are well below the AQALs. Under the IAQM/EPUK criteria, the impact at all receptors is classified as **negligible**.

Ecological Effects: Annual Mean NO_x Concentrations in Air

6.9.25 ***Summary**: Some exceedances of the annual mean NO_x objective are predicted where major roads pass close to designated ecological sites, mainly because of levels of emissions from existing road traffic. The additional contribution from the Proposed Development, including airport-related traffic, is small, less than 6% of the objective at any major ecological site. The impact at all local ecological sites is **insignificant**.*

6.9.26 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.

6.9.27 Predicted concentrations of annual mean NO_x at these selected receptors are given in **Table 6.21**.

Table 6.21 Maximum PCs and PECs for annual mean NO_x, Year 6, worst receptors

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	% PC of AQAL	% PEC of AQAL	Site type
E08	30	1.32	39.83	4.4%	132.8%	Major
E09	30	1.76	45.12	5.9%	150.4%	Major
E17	30	1.03	42.04	3.4%	140.1%	Major
E24	30	0.84	39.98	2.8%	133.3%	Major
E32	30	0.16	40.76	0.5%	135.9%	Major
E22	30	0.72	26.62	2.4%	88.7%	Major
E54	30	0.32	35.88	1.1%	119.6%	Local
E62	30	0.85	39.77	2.8%	132.6%	Local
E64	30	2.09	39.31	7.0%	131.0%	Local
E65	30	1.29	40.85	4.3%	136.2%	Local

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	% PC of AQAL	% PEC of AQAL	Site type
E81	30	6.13	32.03	20.4%	106.8%	Local

6.9.28 The maximum modelled annual mean NO_x PEC at any relevant major environmental receptor (Ramsar, SPA, SAC and SSSI) is predicted as 45µg m^{-3} or 150% of the AQAL at the E09 receptor, largely because it abuts the A28 through Margate. The modelled contribution from the airport here is 1.8µg m^{-3}, which is the greatest PC at any of the modelled nationally- or internationally-designated ecological receptors, again because of the additional road traffic.

6.9.29 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 41µg m^{-3} or 136% of the AQAL at the E65 receptor, representing Priority Habitat near Pegwell Bay. The modelled contribution from the Proposed Development here is 1.3µg m^{-3}. The greatest modelled PC at a local nature receptor is 6.1µg m^{-3} at the E81 receptor, representing deciduous woodland in the Priority Habitat Inventory near Spitfire Way, where the PEC is 32µg m^{-3} or 107% of the AQAL. Under EA guidance[26], the PC at all local nature sites is less than 100% of the AQAL so can be screened out from further assessment.

6.9.30 Generally, background concentrations of annual mean NO_x are comfortably below the limit of 30µg m^{-3}, and the additional contribution from the Proposed Development is sufficiently small that there is no risk of new exceedances. However, concentrations close to roads may approach or exceed the limit, with quite large exceedances close to major roads. In some such roadside locations, it is possible that the extra contribution from the Proposed Development may create a new exceedance close to the road, or extend the area of exceedance slightly.

6.9.31 Under EA guidance, where the PC is greater than 0.3µg m^{-3} at major ecological receptors, further assessment may be required. Further assessment in provided in **Chapter 7: Biodiversity**.

Ecological Effects: Nutrient Nitrogen Deposition

6.9.32 ***Summary:*** *While some exceedances of the critical loads for nitrogen are predicted, these are due to existing deposition rates and the additional contribution from the Proposed Development is* ***insignificant****.*

6.9.33 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.

6.9.34 Modelled nutrient nitrogen deposition rates at these selected receptors are given in **Table 6.22**, along with the receptor-specific critical loads. 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 Proposed Development; no account is taken of reductions in deposition rates in future years.

Table 6.22 Critical Loads Assessment of Nitrogen Deposition, Year 6, 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
E30	8	0.01	15.69	0.1%	196.1%	Major
E43	5	0.01	14.29	0.1%	285.7%	Major
E44	5	0.01	14.29	0.2%	285.8%	Major
E48	5	0.01	14.29	0.2%	285.8%	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
E49	5	0.01	14.29	0.2%	285.8%	Major
E20	8	0.03	10.81	0.4%	135.2%	Major
E21	8	0.05	10.83	0.6%	135.3%	Major
E22	8	0.07	10.85	0.9%	135.7%	Major
E23	8	0.06	13.50	0.8%	168.8%	Major
E24	8	0.05	13.49	0.6%	168.6%	Major
E79	10	0.41	26.31	4.1%	263.1%	Local
E80	10	0.38	26.28	3.8%	262.8%	Local
E82	10	1.13	27.03	11.3%	270.3%	Local
E84	10	0.37	26.27	3.7%	262.7%	Local
E86	10	0.09	25.99	0.9%	259.9%	Local
E78	10	0.47	18.95	4.7%	189.5%	Local
E81	10	1.24	20.56	12.4%	205.6%	Local
E83	10	0.46	19.78	4.6%	197.8%	Local

6.9.35 At the major environmental sites, the additional process contribution is at most 0.9% of the critical load at the E22 receptor representing Pegwell Bay. The PEC here is 136% of the critical load. At all modelled receptors, the PC is less than 1% of the critical load. Under EA guidance, where the PC at a major site is less than 1% of the critical load, it can be considered **insignificant** and does not need to be assessed further.

6.9.36 At the local nature sites, the additional PC is at most 12% of the critical load, at the E81 receptor, which represents deciduous woodland in the Priority Habitat Inventory near Spitfire Way. This is less than 100% of the assessment level, so under EA guidance, it can be considered **insignificant** and the local nature sites do not need to be assessed further.

Ecological Effects: Acid Deposition

6.9.37 ***Summary:*** *While some exceedances of the critical loads for acidity are predicted, these are due to existing deposition rates and the additional contribution from the Proposed Development is* ***insignificant****.*

6.9.38 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 (again as a percentage of the critical load function).

6.9.39 Modelled process contribution and background deposition rates are given in **Table 6.23**. A comparison with the critical load function is given in **Table 6.24**[vi].

[vi] 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.

6.9.40 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.

6.9.41 At the major environmental sites, the additional process contribution is at most 0.5% of the critical load function at the E22 receptor representing Pegwell Bay. The PEC here is 88% of the critical load.

6.9.42 The major receptor with the greatest PEC is E35, representing the Thanet Coast Ramsar site, where the PEC is 261% of the critical load function, but the PC is just 0.1% of the critical load function.

6.9.43 At the local nature sites, the additional PC is at most 1.0% of the critical load function, at the E73 receptor, which represents deciduous woodland in the Priority Habitat Inventory near Thorne Farm. The PEC here is modelled as 99% of the critical load function.

6.9.44 Under the EA criteria, the impacts at all modelled receptors, both major and local, can be considered **insignificant** and do not need to be assessed further.

Table 6.23 Acid Deposition rates, Year 6, 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
E35	0	0.0005	0.25	1.12	Major
E37	0	0.0004	0.25	1.12	Major
E44	0	0.0006	0.22	1.02	Major
E48	0	0.0006	0.22	1.02	Major
E49	0	0.0005	0.22	1.02	Major
E22	0	0.0052	0.21	0.77	Major
E23	0	0.0043	0.20	0.96	Major
E38	0	0.0023	0.20	0.96	Major
E39	0	0.0020	0.20	0.96	Major
E42	0	0.0017	0.20	0.96	Major
E65	0	0.0104	0.28	1.62	Local
E77	0	0.0100	0.24	1.64	Local
E86	0	0.0062	0.29	1.85	Local
E87	0	0.0065	0.24	1.64	Local
E88	0	0.0077	0.24	1.64	Local
E72	0	0.0176	0.24	1.64	Local
E73	0	0.0189	0.24	1.64	Local
E75	0	0.0125	0.24	1.64	Local
E81	0	0.0882	0.27	1.38	Local
E82	0	0.0807	0.29	1.85	Local

Table 6.24 Critical Loads assessment of Acid Deposition, Year 6, worst receptors

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	0.1	260.5	260.5	Major
E37	No exceedance	0.84	0.84	0.1	260.5	260.5	Major
E44	No exceedance	0.70	0.70	0.1	228.8	228.9	Major
E48	No exceedance	0.70	0.70	0.1	228.8	228.9	Major
E49	No exceedance	0.70	0.70	0.1	228.8	228.9	Major
E22	No exceedance	No exceedance	No exceedance	0.5	87.3	87.7	Major
E23	No exceedance	0.04	0.04	0.4	103.3	103.7	Major
E38	No exceedance	0.63	0.64	0.4	220.5	221.0	Major
E39	No exceedance	0.63	0.64	0.4	220.5	220.9	Major
E42	No exceedance	0.63	0.64	0.3	220.5	220.8	Major
E65	No exceedance	0.04	0.05	0.6	102.2	102.7	Local
E77	No exceedance	0.06	0.07	0.5	103.3	103.8	Local
E86	No exceedance	0.33	0.34	0.3	118.2	118.6	Local
E87	No exceedance	0.07	0.08	0.4	103.9	104.2	Local
E88	No exceedance	0.07	0.08	0.4	103.9	104.3	Local
E72	No exceedance	No exceedance	No exceedance	0.9	97.9	98.8	Local
E73	No exceedance	No exceedance	No exceedance	1.0	97.9	98.9	Local
E75	No exceedance	No exceedance	No exceedance	0.7	98.4	99.1	Local
E81	No exceedance	No exceedance	No exceedance	0.8	15.0	15.8	Local
E82	No exceedance	No exceedance	No exceedance	0.7	19.5	20.2	Local

6.10 Assessment of Effects: Year 20

6.10.1 This section sets out the results of the dispersion modelling for Year 20 and compares predicted ground level concentrations against the assessment criteria detailed in **Section 6.7**. The predicted concentrations resulting from the Proposed Development (known as the process contribution or PC) are presented, along with the total predicted environmental concentrations (PEC), which include the background contribution from sources unrelated to the Proposed Development. These concentrations are then compared with the relevant AQAL (standard, objective, target or guideline value).

6.10.2 Modelled concentrations include the contributions from operational activity on the airport such as aircraft (including at height beyond the airport boundary) and GSE, and road traffic.

6.10.3 Note that there will be no significant construction activity during Year 20.

6.10.4 This section addresses impacts at receptors with a few kilometres of the Proposed Development. The contribution from airport-related roads further afield is assessed in **Section 6.11**.

6.10.5 As previously explained, concentrations have been calculated for five years of meteorology. For each receptor or grid point, the highest concentrations of the five meteorology years is chosen as the final results. All results reported in this Chapter are therefore for the most adverse weather conditions.

6.10.6 Results are given here for the key receptors for each assessment criterion. Full results are available in **Appendix 6.5**.

6.10.7 Please note that in the following tables, results are given to several decimal places. This is to enable comparison between receptors and between PC and PEC contributions. The number of decimal places should not be taken as providing any indication of the accuracy of the results.

Human Health Effects: NO_2

6.10.8 ***Summary:*** *No new or existing exceedances of the annual mean NO_2 objective or the hourly mean NO_2 objective are predicted. Impacts are* ***negligible*** *everywhere except at a small number of properties very close to the airport boundary, where impacts are predicted to be* ***moderate and adverse****, and in St Lawrence where the assumed background is very high due to existing road traffic and the impact of the Proposed Development is* ***slight****. It should be borne in mind that this assessment uses a number of worst-case assumptions, and therefore impacts are actually likely to be lower (better) than modelled.*

6.10.9 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 where the impact is not negligible).

6.10.10 Predicted concentrations of annual mean NO_2 at receptors near the airport are given in **Table 6.25**, for those modelled receptors with an impact of **slight** or m**oderate**. At all other modelled receptors near the airport, the impact is **negligible**. Contours of NO_2 PC (calculated as 70% of the NO_x PC; excluding roads) in the vicinity of the Proposed Development are shown in **Figure 6.14**.

Table 6.25 Maximum PCs and PECs for annual mean NO_2, Year 20, receptors near the airport

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	% PC of AQAL	% PEC of AQAL	Impact
H08	40	3.11	28.95	7.8%	72.4%	Slight
H09	40	3.34	31.59	8.4%	79.0%	Moderate
H10	40	2.73	28.48	6.8%	71.2%	Slight
H11	40	2.79	27.07	7.0%	67.7%	Slight
H12	40	2.44	24.47	6.1%	61.2%	Slight
H13	40	2.21	22.65	5.5%	56.6%	Slight
H15	40	2.62	24.59	6.6%	61.5%	Slight
H17	40	2.75	29.85	6.9%	74.6%	Slight
H18	40	2.59	28.83	6.5%	72.1%	Slight
H19	40	2.51	23.41	6.3%	58.5%	Slight
H20	40	2.93	23.03	7.3%	57.6%	Slight
H21	40	3.32	22.62	8.3%	56.5%	Slight
H22	40	2.98	22.28	7.5%	55.7%	Slight

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	% PC of AQAL	% PEC of AQAL	Impact
H23	40	4.94	24.24	12.4%	60.6%	Moderate
H35	40	2.25	21.55	5.6%	53.9%	Slight
H36	40	2.44	21.74	6.1%	54.4%	Slight
H37	40	2.62	21.92	6.6%	54.8%	Slight
H38	40	2.90	22.20	7.2%	55.5%	Slight
H39	40	2.61	21.91	6.5%	54.8%	Slight
H40	40	2.40	21.70	6.0%	54.3%	Slight
H43	40	2.27	21.57	5.7%	53.9%	Slight
H44	40	2.42	21.72	6.0%	54.3%	Slight
H49	40	2.22	25.35	5.6%	63.4%	Slight
H54	40	2.31	26.62	5.8%	66.6%	Slight
H69	40	3.14	22.44	7.8%	56.1%	Slight
A14	40	3.87	23.17	9.7%	57.9%	Slight
M10	40	2.63	21.93	6.6%	54.8%	Slight
M11	40	2.28	21.58	5.7%	54.0%	Slight

6.10.11 The maximum modelled annual mean NO_2 PEC at any relevant human receptor location near the Proposed Development is 32µg m^{-3} or 79% of the AQAL at the H09 Pouces Cottages receptor. The modelled contribution from the Proposed Development here is 3.3µg m^{-3}, but this receptor has a significant contribution of 10µg m^{-3} from non-airport road traffic on the B2190 Spitfire Way. The impact here is classified as **moderate adverse**.

6.10.12 The greatest PC at any of the modelled receptors is 4.9µg m^{-3} at the H23 High Street 5 receptor, representing Bush Farm at the very southern end of Manston High Street. The PEC here is 24 µg m^{-3} or 61% of the AQAL. Under the IAQM/EPUK criteria, the impact at this receptor is classed as **moderate**. Receptors H09 and H23 are the only specifically modelled receptors classified as having a **moderate** impact.

6.10.13 The modelled annual mean NO_2 concentrations are all below 40µg m^{-3} and well below 60µg m^{-3}. Under the Defra TG(16) guidance[23], it is highly unlikely that there will be an exceedance of the 99.79 percentile hourly mean NO_2 AQAL.

6.10.14 No existing or new exceedances are predicted, and the maximum concentrations are well below the AQALs. It should be remembered that this is a worst-case assessment incorporating several conservative assumptions.

6.10.15 Considering receptors further away from the airport, the PC reduces but there are urban roadside locations where the background is higher. Concentrations have been modelled at groups of receptors in areas identified by TDC as being of particular concern, around the High Street St. Lawrence and The Square Birchington. Modelled concentrations at these receptors are given in **Table 6.26**, and contours covering the urban area of Thanet district are shown in **Figure 6.15**.

Table 6.26 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	0.20	35.50	0.5%	88.8%	Negligible
A23	40	0.20	35.50	0.5%	88.8%	Negligible
A24	40	0.20	35.50	0.5%	88.8%	Negligible
A25	40	0.21	35.51	0.5%	88.8%	Negligible
A26	40	0.21	35.51	0.5%	88.8%	Negligible
A27	40	0.21	35.51	0.5%	88.8%	Negligible
A28	40	0.21	35.51	0.5%	88.8%	Negligible
A29	40	0.21	35.51	0.5%	88.8%	Negligible
A30	40	0.21	35.51	0.5%	88.8%	Negligible
A31	40	0.20	35.50	0.5%	88.8%	Negligible
M03	40	0.21	19.51	0.5%	48.8%	Negligible
A32	40	0.33	38.33	0.8%	95.8%	Slight
A33	40	0.33	38.33	0.8%	95.8%	Slight
A34	40	0.33	38.33	0.8%	95.8%	Slight
A35	40	0.33	38.33	0.8%	95.8%	Slight
A36	40	0.33	38.33	0.8%	95.8%	Slight
A37	40	0.33	38.33	0.8%	95.8%	Slight
A38	40	0.32	38.32	0.8%	95.8%	Slight
A39	40	0.33	38.33	0.8%	95.8%	Slight
A40	40	0.33	38.33	0.8%	95.8%	Slight
A41	40	0.33	38.33	0.8%	95.8%	Slight
A42	40	0.33	38.33	0.8%	95.8%	Slight
A43	40	0.33	38.33	0.8%	95.8%	Slight

6.10.16 The maximum annual mean NO_2 PEC of these receptors is predicted as 38.3µg m^{-3} or 96% of the AQAL at the A32 St. Lawrence 1 receptor, representing St. Laurence-in-Thanet Church. The modelled contribution from the Proposed Development here is just 0.33µg 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**.

6.10.17 Impacts at the other modelled St. Lawrence receptors are also classed as **slight**. Impacts at the receptors on The Square Birchington, where the PCs are 0.21µg m^{-3} or below, are all classed as **negligible**.

6.10.18 It should be emphasised that the modelled PECs at St. Lawrence and Birchington 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 (2007–2016) 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 0.4µg m^{-3} per year at St. Lawrence), and given the active measures to further reduce emissions from road vehicles which are expected to take effect over the next twenty years. A reduction of just 1µg 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}

6.10.19 ***Summary:*** *No new or existing exceedances of the annual mean PM_{10} objective or the daily mean PM_{10} objective are predicted. Impacts are **negligible** everywhere.*

6.10.20 Predicted concentrations of annual mean PM_{10} at all the modelled receptors have an impact of **negligible** under the IAQM/EPUK criteria[9]. Concentrations for those receptors with the five greatest PCs and the five greatest PECs are given in **Table 6.27**.

6.10.21 Contours of PM_{10} PC (excluding the road contribution) in the vicinity of the Proposed Development are shown in **Figure 6.16**. The contour plot clearly shows that the principal sources of PM_{10} are tyre and brake wear.

Table 6.27 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	0.07	18.86	0.2%	47.1%	Negligible
H02	40	0.05	18.50	0.1%	46.3%	Negligible
H03	40	0.05	18.50	0.1%	46.2%	Negligible
H04	40	0.04	18.49	0.1%	46.2%	Negligible
H32	40	0.07	18.49	0.2%	46.2%	Negligible
H17	40	0.34	17.56	0.8%	43.9%	Negligible
H21	40	0.34	16.03	0.9%	40.1%	Negligible
H23	40	0.55	16.24	1.4%	40.6%	Negligible
H54	40	0.48	17.66	1.2%	44.1%	Negligible
A14	40	0.42	16.11	1.1%	40.3%	Negligible

6.10.22 The maximum annual mean PM_{10} PEC at any relevant human receptor location is predicted as 19µg m^{-3} or 47% of the AQAL at the H01 Garden Cottage receptor. The modelled contribution from the Proposed Development here is just 0.07µg m^{-3}. The greatest PC is 0.6µg m^{-3} at the H23 High Street 5 receptor, representing Bush Farm at the very southern end of Manston High Street, where the total PEC is 16µg m^{-3} or 41% of the AQAL.

6.10.23 Under the IAQM/EPUK criteria[9], the impact at all receptors is classified as **negligible**.

6.10.24 Using the Defra formula to estimate the number of days where the daily mean PM_{10} is greater than 50µg m^{-3}, no more than two days per year are greater than 50µg m^{-3} at any receptor. This compares with 35 days per year permitted to be greater than 50µg m^{-3}. There is therefore no likelihood of an exceedance of the daily mean PM_{10} AQAL.

6.10.25 No existing or new exceedances are predicted, and the maximum concentrations are well below the AQALs.

6.10.26 Contours covering the urban area of Thanet district are shown in **Figure 6.17**.

Human Health Effects: $PM_{2.5}$

6.10.27 ***Summary:*** *No new or existing exceedances of the annual mean $PM_{2.5}$ objective are predicted. Impacts are **negligible** everywhere.*

6.10.28 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 6.28**.

6.10.29 Contours of $PM_{2.5}$ PC (excluding road contribution) in the vicinity of the airport are shown in **Figure 6.18**. The contour plot clearly shows that the principal sources of $PM_{2.5}$ are tyre and brake wear.

Table 6.28 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	12.96	0.2%	51.9%	Negligible
H02	25	0.04	12.76	0.2%	51.0%	Negligible
H03	25	0.04	12.76	0.1%	51.0%	Negligible
H04	25	0.03	12.75	0.1%	51.0%	Negligible
H32	25	0.05	12.51	0.2%	50.0%	Negligible
H17	25	0.23	12.09	0.9%	48.4%	Negligible
H21	25	0.26	11.21	1.0%	44.8%	Negligible
H23	25	0.41	11.36	1.6%	45.4%	Negligible
H54	25	0.34	12.10	1.4%	48.4%	Negligible
A14	25	0.31	11.26	1.2%	45.0%	Negligible

6.10.30 The maximum annual mean $PM_{2.5}$ PEC at any relevant human receptor location is predicted as 13µg m^{-3} or 52% of the AQAL at the H01 Garden Cottage receptor. The modelled contribution from the Proposed Development here is just 0.05µg m^{-3}. The greatest PC is 0.41µg 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 11µg m^{-3} or 45% of the AQAL.

6.10.31 Under the IAQM/EPUK criteria[9], the impact at all receptors is classified as **negligible**. No existing or new exceedances are predicted, and the maximum concentrations are well below the AQALs.

6.10.32 Contours covering the urban area of Thanet district are shown in **Figure 6.19**.

Ecological effects: Annual Mean NO_x Concentrations in Air

6.10.33 ***Summary:*** *Some exceedances of the annual mean NO_x objective are predicted where major roads pass close to designated ecological sites, mainly because of levels of emissions from existing road traffic. The additional contribution from the Proposed Development, including airport-related traffic, is small, less than 7% of the objective at any major ecological site. The impact at local ecological sites is **insignificant**.*

6.10.34 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.

6.10.35 Predicted concentrations of annual mean NO_x at these selected receptors are given in **Table 6.29**. Contours of NO_x PC in the vicinity of the Proposed Development are shown in **Figure 6.20**, and over a wider area are shown in **Figure 6.21**.

Table 6.29 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
E09	30	2.02	45.15	6.7%	150.5%	Major
E17	30	1.42	42.26	4.7%	140.9%	Major
E18	30	0.79	39.92	2.6%	133.1%	Major
E24	30	1.15	40.28	3.8%	134.3%	Major
E32	30	0.22	40.36	0.7%	134.5%	Major
E08	30	1.51	39.85	5.0%	132.8%	Major
E22	30	0.93	26.83	3.1%	89.4%	Major
E54	30	0.41	35.78	1.4%	119.3%	Local
E62	30	1.05	39.72	3.5%	132.4%	Local
E64	30	2.55	39.62	8.5%	132.1%	Local
E65	30	1.56	41.00	5.2%	136.7%	Local
E70	30	2.08	31.96	6.9%	106.5%	Local
E78	30	3.37	29.27	11.2%	97.6%	Local
E79	30	2.82	28.72	9.4%	95.7%	Local
E80	30	2.58	28.48	8.6%	94.9%	Local
E81	30	3.61	29.51	12.0%	98.4%	Local
E82	30	3.48	29.38	11.6%	97.9%	Local

6.10.36 The maximum annual mean NO_x PEC at any relevant major environmental receptor (Ramsar, SPA, SAC and SSSI) is predicted as 45µg m^{-3} or 151% of the AQAL at the E09 receptor, largely because it abuts the A28 through Margate. The modelled contribution from the Proposed Development here is 2.0µgm^{-3}, which is the greatest PC at any of the modelled nationally- or internationally-designated ecological receptors, again because of the additional road traffic.

6.10.37 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 41µg m^{-3} or 137% of the AQAL at the E65 receptor, representing Priority Habitat near Pegwell Bay. The PC here is 1.6µg m^{-3}. The greatest modelled PC at a local nature receptor is 3.6µg m^{-3} at the E81 receptor, representing deciduous woodland in the Priority Habitat Inventory near Spitfire Way, where the PEC is 30µg m^{-3} or 98% of the AQAL. Under EA guidance[10] the PC at all local nature sites is less than 100% of the AQAL so can be screened out from further assessment.

6.10.38 Generally, background concentrations of annual mean NO_x are comfortably below the limit of 30µg m^{-3}, and the additional contribution from the Proposed Development is sufficiently small that there is no risk of new exceedances. However, close to roads concentrations may approach or exceed the limit, with quite large exceedances close to major roads. In some such roadside locations, it is possible that the extra contribution from the Proposed Development may create a new exceedance close to the road, or extend the area of exceedance slightly.

6.10.39 However, 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 – 2016) monitored concentrations. This is a very conservative assumption, given that the monitoring data over that period shows a steady reduction in concentrations (about 1.4µg m^{-3} per year at the ZH2 and ZH3 monitors), and in fact the assumed background concentration assumed here (25.9µg 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 and other sources which are expected to take effect over the next twenty years.

6.10.40 It should also be remembered that the modelling makes a number of worst-case assumptions about the emissions from the Proposed Development, so the PC is also likely to be overestimated.

6.10.41 Under EA guidance, where the PC is greater than 0.3µg m^{-3} at major ecological receptors, further assessment may be required. Further assessment is provided in **Chapter 7: Biodiversity**. **Figure 6.22** shows the 0.3µg m^{-3} (i.e. 1% of AQAL) contour overlaid on the major designated sites.

Ecological Effects: Maximum Daily Mean NO_x Concentrations in Air

6.10.42 ***Summary:*** *No new or existing exceedances of the daily mean NO_x objective are predicted. Impacts are therefore* ***insignificant****.*

6.10.43 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. For technical reasons, it is not possible to include the road contribution in the assessment of short-term criteria, because it is not possible to ensure that the hours of the year with the greatest airport contributions coincide with the hours of the year with the greatest road contributions.

6.10.44 Predicted concentrations of maximum daily mean NO_x at these selected receptors are given in **Table 6.30**.

Table 6.30 Maximum PCs and PECs for maximum daily 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	200	9.91	61.71	5.0%	30.9%	Major
E21	200	13.31	65.11	6.7%	32.6%	Major
E22	200	20.04	71.84	10.0%	35.9%	Major
E23	200	11.46	63.26	5.7%	31.6%	Major
E24	200	12.58	64.38	6.3%	32.2%	Major
E62	200	23.08	74.88	11.5%	37.4%	Local
E63	200	24.80	76.60	12.4%	38.3%	Local
E64	200	27.89	79.69	13.9%	39.8%	Local
E75	200	21.56	73.36	10.8%	36.7%	Local

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	% PC of AQAL	% PEC of AQAL	Site type
E76	200	21.11	72.91	10.6%	36.5%	Local

6.10.45 The maximum daily mean NO_x PEC at any relevant major environmental receptor (Ramsar, SPA, SAC and SSSI) is predicted as 72µg m^{-3} or 36% of the AQAL at the E22 receptor, representing Pegwell Bay. The modelled contribution from the Proposed Development here is 20µg m^{-3}, which is the greatest PC at any of the modelled nationally- or internationally-designated ecological receptors.

6.10.46 The maximum daily mean NO_x PEC at any relevant local nature receptor (i.e. excluding Ramsar, SPA, SAC and SSSI sites) is predicted as 80µg m^{-3} or 40% of the AQAL at the E64 receptor, representing deciduous woodland in the Priority Habitat Inventory near the Lord of the Manor. The modelled contribution from the airport here is 28µg m^{-3}, which is the greatest PC at any of the modelled local nature receptors.

6.10.47 No existing or new exceedances are predicted at any of the modelled receptors. Under EA guidance[10], the impacts at all modelled receptors, both major and local, can be screened out from further assessment.

Ecological Effects: Nutrient Nitrogen Deposition

6.10.48 ***Summary:*** *While some exceedances of the critical loads for nitrogen are predicted, these are due to existing deposition rates and the additional contribution from the Proposed Development is* ***insignificant.***

6.10.49 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.

6.10.50 Modelled nutrient nitrogen deposition rates at these selected receptors are given in **Table 6.31**, along with the receptor-specific critical loads. 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[25] and without any additional contribution from the Proposed Development; no account is taken of reductions in deposition rates in future years.

Table 6.31 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
E31	8	0.02	15.70	0.2%	196.2%	Major
E43	5	0.01	14.29	0.2%	285.8%	Major
E44	5	0.01	14.29	0.2%	285.8%	Major
E48	5	0.01	14.29	0.2%	285.8%	Major
E49	5	0.01	14.29	0.2%	285.8%	Major
E20	8	0.04	10.82	0.5%	135.3%	Major
E21	8	0.06	10.84	0.8%	135.5%	Major
E22	8	0.09	10.87	1.2%	135.9%	Major
E23	8	0.08	13.52	1.0%	169.0%	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
E24	8	0.06	13.50	0.8%	168.8%	Major
E79	10	0.57	26.47	5.7%	264.7%	Local
E80	10	0.52	26.42	5.2%	264.2%	Local
E82	10	0.70	26.60	7.0%	266.0%	Local
E84	10	0.37	26.27	3.7%	262.7%	Local
E86	10	0.12	26.02	1.2%	260.2%	Local
E78	10	0.68	19.16	6.8%	191.6%	Local
E81	10	0.73	20.05	7.3%	200.5%	Local

6.10.51 At the major environmental sites, the additional process contribution is at most 1.2% of the critical load at the E22 receptor representing Pegwell Bay. The PEC here is 136% of the critical load. At all other modelled receptors, the PC is less than 1% of the critical load. Under EA guidance, where the PC at a major site is less than 1% of the critical load, it can be considered **insignificant** and does not need to be assessed further. As the IAQM guidance points out, this is an approximate benchmark ("1% and not 1.0%") and does not mean that where the PC is over 1% there will necessarily be an adverse impact. It is therefore considered that these impacts do not need to be assessed further.

6.10.52 At the local nature sites, the additional PC is at most 7% of the critical load, at the E81 receptor, which represents deciduous woodland in the Priority Habitat Inventory near Spitfire Way. This is less than 100% of the assessment level, so under EA guidance, it can be considered **insignificant** and does not need to be assessed further.

Ecological effects: Acid Deposition

6.10.53 ***Summary:*** *While some exceedances of the critical loads for acidity are predicted, these are due to existing deposition rates and the additional contribution from the Proposed Development is* ***insignificant****.*

6.10.54 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 (again as a percentage of the critical load function).

6.10.55 Modelled process contribution and background deposition rates are given in **Table 6.32**. A comparison with the critical load function is given in **Table 6.33**[vii].

6.10.56 Background acid deposition rates at many of the modelled receptors are modelled to be at exceedance already, based on background deposition rates from APIS[25] and without any additional contribution from the Proposed Development; no account is taken of reductions in deposition rates in future years.

6.10.57 At the major environmental sites, the additional process contribution is at most 0.6% of the critical load function at the E22 receptor representing Pegwell Bay. The PEC here is 88% of the critical load.

[vii] 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.

6.10.58 The major receptor with the greatest PEC is E35, representing the Thanet Coast Ramsar site, where the PEC is 261% of the critical load function, but the PC is just 0.1% of the critical load function.

6.10.59 At the local nature sites, the additional PC is at most 1.2% of the critical load function, at the E73 receptor, which represents deciduous woodland in the Priority Habitat Inventory near Thorne Farm. The PEC here is modelled as 99% of the critical load function.

6.10.60 Under the EA criteria[26], the impacts at all modelled receptors, both major and local, can be considered **insignificant** and do not need to be assessed further.

Table 6.32 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
E35	0	0.0006	0.25	1.12	Major
E37	0	0.0005	0.25	1.12	Major
E44	0	0.0008	0.22	1.02	Major
E48	0	0.0009	0.22	1.02	Major
E49	0	0.0008	0.22	1.02	Major
E22	0	0.0067	0.21	0.77	Major
E23	0	0.0057	0.20	0.96	Major
E38	0	0.0030	0.20	0.96	Major
E39	0	0.0026	0.20	0.96	Major
E42	0	0.0021	0.20	0.96	Major
E65	0	0.0135	0.28	1.62	Local
E77	0	0.0138	0.24	1.64	Local
E86	0	0.0083	0.29	1.85	Local
E87	0	0.0088	0.24	1.64	Local
E88	0	0.0101	0.24	1.64	Local
E72	0	0.0223	0.24	1.64	Local
E73	0	0.0237	0.24	1.64	Local
E75	0	0.0171	0.24	1.64	Local
E76	0	0.0152	0.24	1.64	Local

Table 6.33 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	
E35	No exceedance	0.84	0.84	0.1	260.5	260.6	Major
E37	No exceedance	0.84	0.84	0.1	260.5	260.5	Major
E44	No exceedance	0.70	0.70	0.2	228.8	228.9	Major
E48	No exceedance	0.70	0.70	0.2	228.8	228.9	Major
E49	No exceedance	0.70	0.70	0.1	228.8	228.9	Major
E22	No exceedance	No exceedance	No exceedance	0.6	87.3	87.9	Major
E23	No exceedance	0.04	0.04	0.5	103.3	103.8	Major
E38	No exceedance	0.63	0.64	0.6	220.5	221.1	Major
E39	No exceedance	0.63	0.64	0.5	220.5	221.0	Major
E42	No exceedance	0.63	0.64	0.4	220.5	220.9	Major
E65	No exceedance	0.04	0.05	0.7	102.2	102.9	Local
E77	No exceedance	0.06	0.07	0.8	103.3	104.1	Local
E86	No exceedance	0.33	0.34	0.5	118.2	118.7	Local
E87	No exceedance	0.07	0.08	0.5	103.9	104.4	Local
E88	No exceedance	0.07	0.08	0.6	103.9	104.4	Local
E72	No exceedance	No exceedance	No exceedance	1.2	97.9	99.1	Local
E73	No exceedance	No exceedance	No exceedance	1.2	97.9	99.2	Local
E75	No exceedance	No exceedance	No exceedance	0.9	98.4	99.3	Local
E76	No exceedance	No exceedance	No exceedance	0.8	98.4	99.2	Local

6.11 Assessment of Effects from Roads away from the Airport: All Years

6.11.1 Previous sections have presented assessments of the impacts of the Proposed Development close to the airport site, including the impact of airport-related and non-airport road traffic. However, the extra traffic generated by the Proposed Development may travel some distance and so generate impacts at greater distances from the airport. These more distant impacts are assessed in this section.

6.11.2 Although operational traffic flows and non-airport traffic flows tend to increase over time, construction traffic occurs predominantly in early years, and early years also have generally higher vehicle emission factors. The net effect is that impacts from road traffic are broadly similar in each of the three assessment years. It is therefore simpler for this section to consider all assessment years together.

6.11.3 In this section, only the impacts from road traffic are assessed, with the contribution from aircraft and the airfield being ignored. As shown in previous sections (e.g. **Figure 6.15**), the aircraft/airfield contribution is negligible more than a few kilometres from the airport, so this is a useful approach to understand the road impacts.

6.11.4 This section compares the impacts of airport-related traffic against baseline (Without Proposed Development) traffic. The airport-related traffic includes both operational traffic (including freight deliveries, fuel deliveries, passengers and staff) and construction traffic.

Human Health Effects: NO_2

6.11.5 ***Summary:*** *The impacts of road traffic on the annual mean NO_2 objective and the hourly mean NO_2 objective are **negligible** everywhere except at a small number of properties very close to two roads, where a small number of properties experience **slight** impacts.*

6.11.6 The impact of the Proposed Development's road traffic on annual mean NO_2 concentrations is classified as **negligible** at all roadside locations and in all assessment years, except alongside the A299 Thanet Way and B2190 Spitfire Way road links.

6.11.7 In all three assessment years, non-negligible impacts are predicted close to the A299 Thanet Way, west of the roundabout junction with A28/Potten Street Road. Modelled impacts here are greatest in Year 2. Modelled concentrations on the transect for Year 2 are given in **Table 6.34**.

Table 6.34 Modelled annual mean NO_2 concentrations, Year 2, transect across A299 Thanet Way

Distance from kerb (m)	AQAL (µg m^{-3})	Without Proposed Development		With Proposed Development		Impact
		Road contribution (µg m^{-3})	Total concentration (µg m^{-3})	Road contribution (µg m^{-3})	Total concentration (µg m^{-3})	
20	40	14.76	21.47	15.22	21.94	Negligible
15	40	16.95	23.67	17.48	24.20	Negligible
12	40	18.59	25.30	19.16	25.87	Negligible
10	40	19.87	26.59	20.48	27.20	Negligible
8	40	21.33	28.05	21.98	28.70	Negligible
6	40	23.05	29.76	23.74	30.45	Negligible
6	40	30.87	37.59	31.77	38.48	Slight
8	40	28.91	35.62	29.76	36.47	Slight
10	40	27.20	33.91	28.01	34.72	Slight
12	40	25.67	32.38	26.44	33.15	Slight
15	40	23.69	30.41	24.41	31.12	Slight
20	40	20.96	27.67	21.60	28.31	Negligible

6.11.8 **Table 6.34** shows that impacts from the additional traffic are **negligible** except within 20m of the kerb. Concentrations are higher on the northern side of the road, as is to be expected from prevailing winds.

6.11.9 Properties within 20m of the kerb have been identified using the MAGIC website's aerial photography and measurement tools[27]. Approximately 23 properties were identified within 20m of the road, of which four are isolated properties (two at Frost Farm, 13m from the road, one at Hawthorn Corner 15m from the road, and one at Brookdene Farm 17m from the road). The remainder are where the road passes Herne Bay; the closest property is about 8m from the road, where the modelled PEC is 35.6µg m^{-3} without the Proposed Development and 36.5µg m^{-3} with

the Proposed Development, an increase of 0.9µg m^{-3}. This implies that approximately 23 properties would receive a **slight** impact from the traffic arising from the Proposed Development in Year 2. There are no moderate impacts at relevant receptors.

6.11.10 In Years 6 and 20, impacts are predicted as **negligible** more than 6m from the kerb, so the impacts in Years 6 and 20 are **negligible** at all locations of relevant exposure.

6.11.11 In all three assessment years, **slight** impacts are predicted on the B2190 Spitfire Way. This location is immediately next to the airfield and has a non-negligible aircraft contribution, so is discussed in more detail in **Sections 6.8 – 6.10**, where the combined effects of road traffic and aircraft are assessed.

Human Health Effects: PM_{10}

6.11.12 ***Summary:*** *The impacts of road traffic on the annual mean PM_{10} objective and the daily mean PM_{10} objective are **negligible** everywhere.*

6.11.13 The impact of the Proposed Development's road traffic on annual mean PM_{10} concentrations is classified as **negligible** at all roadside locations and in all assessment years.

6.11.14 The greatest increases compared to the Without Proposed Development are on the B2190 Spitfire Way. This location is immediately next to the airfield and the potential aircraft contribution should therefore be taken into account. This location is discussed in more detail in **Sections 6.8 – 6.10**, where the combined effects of road traffic and aircraft are assessed.

6.11.15 The greatest impacts are in Year 20. This is different from the situation with annual mean NO_2, partly due to the different road vehicle fleet mixes (particularly the fraction of heavy duty vehicles (HDVs)) in the two years, and partly due to changes in background concentrations which affect the chemistry of NO_2 formation. The increase in annual mean PM_{10} concentration is at most 0.5µg m^{-3} at 1m from the kerb. The modelled total concentration near this road is 18µg m^{-3} or 45% of the AQAL.

6.11.16 In Years 2 and 6, the greatest increases at 1m from the kerb on Spitfire Way are 0.2µg m^{-3} and 0.4µg m^{-3} respectively.

Human Health Effects: $PM_{2.5}$

6.11.17 ***Summary:*** *The impacts of road traffic on the annual mean $PM_{2.5}$ objective are **negligible** everywhere.*

6.11.18 The impact of the Proposed Development's road traffic on annual mean $PM_{2.5}$ concentrations is classified as **negligible** at all roadside locations and in all assessment years.

6.11.19 The greatest increases compared to the Without Proposed Development are on the B2190 Spitfire Way. This location is immediately next to the airfield and the potential aircraft contribution should therefore be taken into account. This location is discussed in more detail in **Sections 6.8–6.10**, where the combined effects of road traffic and aircraft are assessed.

6.11.20 The greatest impacts are in Year 20. This is different from the situation with annual mean NO_2, partly due to the different road vehicle fleet mixes (particularly the fraction of HDVs) in the two years and partly due to changes in background concentrations which affect the chemistry of NO_2 formation. The increase in annual mean $PM_{2.5}$ concentration is at most 0.3µg m^{-3} at 1m from the kerb. The modelled total concentration near this road is 12µg m^{-3} or 48% of the AQAL.

6.11.21 In Years 2 and 6, the greatest increases at 1m from the kerb on Spitfire Way are 0.12µg m^{-3} and 0.23µg m^{-3} respectively.

Ecological effects: Annual Mean NO_x Concentrations in Air

6.11.22 ***Summary:*** *Increases in concentrations of annual mean NO_x are expected alongside major roads, but these concentrations alongside major roads are already expected to exceed the objective Without the Proposed Development.*

6.11.23 The greatest increases in annual mean NO_x concentrations are in Year 2. This is different from the situation with annual mean NO_2, due to changes in background concentrations which affect the chemistry of NO_2 formation.

6.11.24 The greatest increases compared to the Without Proposed Development are on the B2190 Spitfire Way. This location is immediately next to the airfield and the potential aircraft contribution should therefore be taken into account, so this location is discussed in more detail in **Sections 6.8 – 6.10**, where the combined effects of road traffic and aircraft are assessed. There are no major designated ecological sites (SACs, SPAs, Ramsar or SSSIs) near this road. Modelled concentrations on the transect for Year 2 are given in **Table 6.35**.

Table 6.35 Modelled annual mean NO_x concentrations, Year 2, transect across B2190 Spitfire Way

Distance from kerb (m)	AQAL (µg m^{-3})	Without Proposed Development		With Proposed Development	
		Road contribution (µg m^{-3})	Total concentration (µg m^{-3})	Road contribution (µg m^{-3})	Total concentration (µg m^{-3})
20	30	13.74	23.06	15.57	24.89
15	30	16.43	25.75	18.65	27.97
12	30	18.68	28.00	21.22	30.54
10	30	20.57	29.89	23.38	32.70
8	30	22.86	32.18	26.00	35.32
6	30	25.81	35.13	29.37	38.69
5	30	27.60	36.92	31.41	40.73
4	30	29.68	39.01	33.80	43.12
3	30	32.09	41.41	36.54	45.86
2	30	35.06	44.39	39.94	49.27
1	30	38.92	48.25	44.35	53.68
1	30	32.01	41.33	36.42	45.75
2	30	28.53	37.86	32.46	41.78
3	30	25.92	35.24	29.47	38.79
4	30	23.84	33.16	27.10	36.42
5	30	22.06	31.38	25.07	34.39
6	30	20.56	29.88	23.35	32.67
8	30	18.11	27.43	20.55	29.87
10	30	16.23	25.55	18.41	27.73
12	30	14.70	24.02	16.66	25.98

Distance from kerb (m)	AQAL (µg m^{-3})	Without Proposed Development		With Proposed Development	
		Road contribution (µg m^{-3})	Total concentration (µg m^{-3})	Road contribution (µg m^{-3})	Total concentration (µg m^{-3})
15	30	12.90	22.22	14.60	23.92
20	30	10.77	20.09	12.16	21.48

6.11.25 The greatest total concentrations of annual mean NO_x are along the A299 Thanet Way, west of the roundabout junction with A28/Potten Street Road. The only major designated ecological site (SACs, SPAs, Ramsar or SSSIs) within 200m this road is The Swale SPA/Ramsar/SSSI, which at its closest point is 160m from the road; the total concentration at this closest point is at most 17µg m^{-3}. Modelled concentrations on the transect for Year 2 are given in **Table 6.36**.

Table 6.36 Modelled annual mean NO_x concentrations, Year 2, transect across A299 Thanet Way

Distance from kerb (m)	AQAL (µg m^{-3})	Without Proposed Development		With Proposed Development	
		Road contribution (µg m^{-3})	Total concentration (µg m^{-3})	Road contribution (µg m^{-3})	Total concentration (µg m^{-3})
20	30	28.40	36.35	29.36	37.31
15	30	32.95	40.91	34.06	42.02
12	30	36.41	44.37	37.64	45.59
10	30	39.17	47.13	40.49	48.45
8	30	42.36	50.31	43.78	51.74
6	30	46.15	54.10	47.70	55.65
5	30	48.32	56.28	49.95	57.90
4	30	50.84	58.80	52.55	60.51
3	30	53.62	61.58	55.42	63.38
2	30	56.87	64.83	58.78	66.74
1	30	60.90	68.86	62.94	70.90
1	30	81.69	89.65	84.46	92.41
2	30	77.08	85.04	79.70	87.65
3	30	73.33	81.29	75.82	83.77
4	30	70.04	78.00	72.42	80.37
5	30	67.00	74.95	69.27	77.22
6	30	64.33	72.28	66.51	74.46
8	30	59.62	67.58	61.65	69.60
10	30	55.61	63.57	57.50	65.46

Distance from kerb (m)	AQAL (µg m^{-3})	Without Proposed Development		With Proposed Development	
		Road contribution (µg m^{-3})	Total concentration (µg m^{-3})	Road contribution (µg m^{-3})	Total concentration (µg m^{-3})
12	30	52.08	60.03	53.84	61.80
15	30	47.59	55.54	49.20	57.16
20	30	41.53	49.48	42.94	50.89

Ecological Effects: Nutrient Nitrogen Deposition

6.11.26 ***Summary:*** *The impacts of road traffic on nutrient nitrogen deposition are* ***insignificant*** *everywhere.*

6.11.27 The greatest increases in nitrogen deposition rates are in Year 20.

6.11.28 The only roads that have an increase in traffic flows above screening thresholds and that pass within 200m of a designated ecological site are as follows:

- The A299 west of the airport passes 170m from the Swale Ramsar, SPA and SSSI;
- The A299 west of the airport passes 45m from the Foxes Bottom LNR and 170m from the Seasalter Levels LNR;
- The A256 south of the airport passes 60m from the Thanet Coast and Sandwich Bay Ramsar and SPA and the Sandwich Bay SAC;
- The A256 south of the airport passes adjacent to the Sandwich Bay to Hacklinge Marshes SSSI; and
- The A256 south of the airport passes 150m from the Sandwich and Pegwell Bay NNR.

6.11.29 In addition, several roads pass within 200m of various local wildlife sites and protected habitat sites.

6.11.30 The major ecological sites identified above all have a minimum critical load for nitrogen deposition of 8kg N ha^{-1} y^{-1}, except The Swale for which the minimum critical load is 15kg N ha^{-1} y^{-1}.

6.11.31 The A256 south of the airport passes adjacent to Sandwich Bay to Hacklinge Marshes SSSI. In Year 20, at 1m from the road, the additional nitrogen deposition from the Proposed Development is 0.12kg N ha^{-1} y^{-1} or 1.5% of the critical load, given a critical load of 8kg N ha^{-1} y^{-1}. The additional contribution drops to below 0.08kg N ha^{-1} y^{-1} or 1.0% of the critical load within 10m of the kerb. In Years 2 and 6, the increase is less than 1% of the critical load even at 1m from the kerb. The additional contribution is therefore considered **insignificant** in any of the assessment years, based on the EA criterion that a PC of less than 1% of the AQAL at a major ecological site may be considered insignificant.

6.11.32 At 60m from the A256, representative of the Ramsar, SPA and SAC, the additional contribution is just 0.03kg N ha^{-1} y^{-1} or 0.3% of the critical load in Year 20, and is lower in the other assessment years. The additional contribution from this road at the NNR is even smaller. The additional contribution is therefore considered **insignificant** in any of the assessment years.

6.11.33 The A299 west of the airport passes 170m from the Swale Ramsar, SPA and SSSI. In Year 20, at 170m from the road, the additional nitrogen deposition from the Proposed Development is 0.03 kgN ha^{-1} y^{-1} or 0.4% of the critical load, given a critical load of 8kg N ha^{-1} y^{-1}. In Years 2 and 6, the increase is even smaller. The additional contribution is therefore considered **insignificant** in any of the assessment years.

6.11.34 At 45m from the A299, representative of the Foxes Bottom LNR, the additional contribution is just 0.1kgN ha^{-1} y^{-1} or 1.3% of the critical load in Year 20, and is lower in the other assessment years. The additional contribution is therefore considered **insignificant** in any of the assessment years, based on the EA criterion that a PC of less than 100% of the AQAL at a local nature site may be considered insignificant.

6.11.35 Considering all the roads that may pass near a local nature site, the greatest additional nitrogen deposition (assuming a deposition factor appropriate to woodland) is 1kg N ha^{-1} y^{-1} at 1m from the kerb in Year 20, and lower in the other assessment years. This is less than 100% of any critical loads, so is therefore considered **insignificant** in any of the assessment years, based on the EA criterion that a PC of less than 100% of the AQAL at a local nature site may be considered insignificant.

Ecological Effects: Acid Deposition

6.11.36 ***Summary:*** *The impacts of road traffic on acid deposition are* ***insignificant*** *everywhere.*

6.11.37 The greatest increases in acid deposition rates are in Year 20.

6.11.38 The A256 south of the airport passes adjacent to Sandwich Bay to Hacklinge Marshes SSSI. In Year 20, at 1m from the road, the additional acid deposition from the Proposed Development is 1.6% of the critical load function for this site. The additional contribution drops to below 1.0% of the critical load function within 15m of the kerb. In Years 2 and 6, the increase is less than 1% of the critical load even at 1m from the kerb. The additional contribution is therefore considered **insignificant** in any of the assessment years, based on the EA's criterion that a PC of less than 1% of the AQAL at a major ecological site may be considered insignificant.

6.11.39 At 60m from the A256, representative of the Ramsar, SPA and SAC, the additional contribution is under 0.2% of the critical load function for this site in Year 20, and is lower in the other assessment years. The additional contribution from this road at the NNR is even smaller. The additional contribution is therefore considered **insignificant** in any of the assessment years.

6.11.40 The A299 west of the airport passes 170m from the Swale Ramsar, SPA and SSSI. In Year 20, at 170m from the road, the additional nitrogen deposition from the Proposed Development is less than 0.3% of the critical load function for this site. In Years 2 and 6, the increase is even smaller. The additional contribution is therefore considered **insignificant** in any of the assessment years.

6.11.41 No acidity critical load information is available for the Foxes Bottom LNR or other local nature sites.

6.12 Assessment of Air Quality Effects from Construction Dust and Decommissioning

Construction Phase Effects

6.12.1 An assessment of dust from the construction phase has been carried out using the risk-based approach recommended by the IAQM[28], supported by expert judgement. Emissions of dust from the operational phase are expected to be negligible; emissions of particulate matter from the operational phase are assessed in previous sections of this Chapter.

6.12.2 The IAQM approach divides construction sources of dust into:

- Demolition of existing buildings and structures;
- Earthworks, including soil-stripping, ground-levelling, excavation and landscaping;
- Construction of new buildings and structures; and
- Trackout, i.e., the transport of dust and dirt onto public roads, where it may be resuspended by vehicles using the roads.

6.12.3 These four sources are assessed separately, since for any project the relative impacts are likely to be different, and the mitigation measures are also different.

Potential Dust Emission Magnitude

6.12.4 The likely amount of dust produced by each of the four sources is rated as follows:

- Demolition: Large, particularly due to the works to remove and crush concrete and tarmac surfaces. A small number of buildings are also to be removed;
- Earthworks: Large, due to the site levelling to manage gradients on site;
- Construction: Large, due to construction of new buildings and new concrete and tarmac surfaces; and
- Trackout: Large, although the number of outgoing vehicle movements is uncertain.

Sensitivity of the Area

6.12.5 The principal human receptors likely to be affected by dust are the dwellings and the museums. These are classed as high sensitivity in the IAQM guidance. There are also some places of work, which are medium sensitivity, and places of low sensitivity including agricultural land and footpaths.

6.12.6 There are approximately 170 dwellings within 100m of the order limits or trackout zone, of which approximately 40 are at Smugglers Leap, approximately 66 at Cliffsend, approximately 32 along Spitfire Way/Manston Road and approximately 32 along Manston Court Road. In relation to the four source types, the number of high-sensitivity receptors is:

- Demolition: No properties have been identified within 100m of expected demolition activities. Note that the existing runway and taxiways are more than 100m from properties;
- Earthworks: It is likely that earthworks (including landscaping) will take place across much of the site, so it is assumed that all 170 properties are within 100m of earthworks activities;
- Construction: It is assumed that construction activities take place within 100m of Spitfire Way/Manston Road and Manston Court Road, but runway and taxiway works, as well as the new airfield buildings, are more than 100m from the site boundary. There are therefore estimated to be 64 high-sensitivity receptors; and
- Trackout: It is assumed that properties on Spitfire Way and Smugglers Leap are potentially affected by trackout, so there are estimated to be approximately 60 high-sensitivity receptors.

6.12.7 The background annual mean concentrations of PM_{10} are less than 24µg m^{-3}, so the sensitivity of the area to human health impacts is low under the IAQM guidance.

6.12.8 Turning to ecological receptors, although the IAQM guidance is that receptors should be considered up to a distance of 50m from the site or trackout zone, NE requested that this should be extended to 200m, and this was accepted for the present assessment. While there are sites with national and international designations in the general vicinity of the airport, they are all more than 200 m from the order limits and from the trackout zone. There are therefore no high sensitivity ecological receptors. The only designated ecological sites within 200m of the order limits or trackout zone are priority habitat deciduous woodland. This feature is not sensitive to dust, so does not qualify as a low sensitivity receptor.

6.12.9 For these reasons, the sensitivity of the area to ecological impacts is negligible under IAQM guidance, and ecological impacts from construction will not be assessed further.

6.12.10 Applying the IAQM sensitivity criteria, the sensitivity of the area can be summarised thus:

- Dust soiling — Demolition: Low;
- Dust soiling — Earthworks: High;

- Dust soiling — Construction: Medium;
- Dust soiling — Trackout: Medium;
- Human health: Negligible; and
- Ecological: Negligible.

Risk of Impacts with No Mitigation

6.12.11 Using the IAQM procedure to combine the results above, the risk of impacts with no mitigation applied is:

- Dust soiling — Demolition: Medium;
- Dust soiling — Earthworks: High;
- Dust soiling — Construction: Medium;
- Dust soiling — Trackout: Medium;
- Human health: Negligible; and
- Ecological: Negligible.

Mitigation

6.12.12 Given the medium and high risk of impacts determined above, a range of mitigation measures will be necessary to reduce the actual impact. The IAQM guidance suggests four mitigation measures that are desirable for these impact risks, and 47 that are highly recommended. They are not reproduced here. Details of proposed mitigation measures are included in the CEMP.

Significant Effects

6.12.13 In accordance with best practice for construction, the mitigation measures will be designed and implemented to ensure that the potential significant adverse effects will not occur, so the residual effect will be not significant.

6.12.14 As the IAQM Guidance states, even with rigorous dust management measures in place:

> *"it is not possible to guarantee that the dust mitigation measures will be effective all the time, and if, for example, dust emissions occur under adverse weather conditions, or there is an interruption to the water supply used for dust suppression, the local community may experience occasional, short-term dust annoyance. The likely scale of this would not normally be considered sufficient to change the conclusion that with mitigation the effects will be 'not significant'."*

Decommissioning Phase Effects

6.12.15 For the purposes of this assessment it is not envisaged that decommissioning of the airport would occur in the foreseeable future and in effect, the airport would operate in perpetuity.

6.12.16 Nonetheless, should it be necessary to decommission the airport, 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.

6.13 Monetisation of Air Quality Effects

6.13.1 The impacts of modelled concentrations of NO_2 and PM_{10} have been monetised using the approach recommended by WebTAG[29]. Various approaches to monetisation of air quality impacts

and improvements have been suggested, including in TDC Air Quality Technical Planning Guidance[30]. However, most recommendations are explicitly or implicitly addressed to schemes where the main air quality impact is due to increased road traffic. Such approaches use emissions from road traffic as a surrogate for air quality impact; these are usually called "damage cost" assessments.

6.13.2 Given that the Proposed Development will mainly have impacts from aircraft emissions, which have a very different source–receptor relationship from road traffic emissions, such approaches are not suitable. Given that detailed dispersion modelling of the emissions has already been carried out for the Manston Airport proposal, a more appropriate approach is an impact pathway approach (I-PA). In this, the total population exposure is calculated by multiplying the number of households exposed to a given pollution level, and then summing over all pollution levels. This gives a population exposure measured in household µg m^{-3}. This can then be multiplied by a cost factor to obtain an estimated cost of the air quality impact.

6.13.3 For this assessment, population exposure has been calculated by using a database which provides, for each postcode, the coordinates of the centre of the postcode and the number of households within that postcode. For each postcode, the concentrations of NO_2 and PM_{10} are determined from the gridded modelling results, and these are multiplied by the number of households within that postcode. The results are then summed over all postcodes in the study area to give the population exposure to the two pollutants. Results are given in **Table 6.37**.

Table 6.37 Population Exposure (household µg m^{-3})

Pollutant	Year 2	Year 6	Year 20
NO_2	4,586	11,161	16,528
PM_{10}	364	875	1,271

6.13.4 Cost factors are taken from WebTAG. For NO_2, final I-PA factors have not been published but are provided in a "Forthcoming changes" document from the Department for Transport[31]. Factors for the case where PM_{10} costs are calculated separately are used. The PM_{10} factors are from the TAG data book[32]. The factors are summarised in **Table 6.38**. A base year of 2010 is used throughout.

Table 6.38 Cost Factors (£ per (household µg m^{-3}))

Pollutant	Central	Low	High
NO_2 damage costs (with PM)	32.2	12.9	51.5
PM_{10}	92.72	48.59	105.36

6.13.5 Calculated costs for different cost factor estimates (central, low and high) are given in **Table 6.39**. The total cost uses the central estimate for the PM_{10} cost factor, but the low estimate for the NO_2 cost factor. This is based on recent advice from the Committee on the Medical Effects of Air Pollutants (COMEAP)[33] which suggests that the current best evidence leads to a coefficient of 1.0092 per 10µg m^{-3} annual average NO_2, when considering NO_2 in isolation from other pollutants. This is close to (but slightly lower than) the 1.01 coefficient used for the low estimate of damage costs in the WebTAG document.

Table 6.39 Calculated Costs (£)

Pollutant	Year 2			Year 6			Year 20		
	Low	Central	High	Low	Central	High	Low	Central	High
NO_2	59,154	147,655	236,157	143,972	359,373	574,774	213,214	532,208	851,203
PM_{10}	17,692	33,761	38,363	42,500	81,100	92,155	61,734	117,801	133,861
Total		92,915			225,072			331,015	

6.13.6 These cost estimates should be interpreted with caution. As well as the considerable uncertainty in the cost factors, the dispersion modelling was designed to provide a conservative estimate of impacts for evaluation against regulatory limits, and as such contains a number of sources of conservatism, as described in the methodology section. More realistic assumptions are likely to result in lower cost estimates.

6.13.7 Cost estimates have not been adjusted or discounted to other years.

6.14 Conclusions of Significance Evaluation

6.14.1 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 6.40**.

Table 6.40 Summary of Significance of Effects: Year 20

Impact Type	Significance Level	Rationale
Human health effects: Annual mean NO_2	Not significant	There are no new or existing predicted exceedances of the AQAL at receptors around the airport. The impact is classified as **moderate** under IAQM/EPUK criteria at some properties close to the airport and also fronting onto roads, but properties are all at least 10% below 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 no more than 0.3µg m^{-3}, which is classified as a **slight** impact under the IAQM/EPUK criteria[9]. However, this assumes that there is no reduction from current levels, whereas the current trend is for concentrations to fall by approximately 0.4µg m^{-3} per year, and a drop of just 1µg 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 40µg 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 50µg m^{-3} on no more than two days per year. The AQAL specifies that there should be no more than 35 days per year greater than 50µg m^{-3}, so it is not considered credible that there will be any exceedance of the daily mean PM_{10} AQAL.

Impact Type	Significance Level	Rationale
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	Not significant	Some Ramsar, SAC, SPA and SSSI receptors do not meet the EA criteria for not requiring further assessment, largely because of existing background concentrations. These sites will be considered further in **Chapter 7: Biodiversity**. All modelled local nature sites meet the EA criteria for not requiring further assessment.
Ecological effects: Nutrient nitrogen deposition	Not significant	Some Ramsar, SAC, SPA and SSSI receptors do not meet the EA criteria for not requiring further assessment, largely because of existing background deposition rates. These sites will be considered further in **Chapter 7: Biodiversity**. All modelled local nature sites meet the EA criteria for not requiring further assessment.
Ecological effects: Acid deposition	Not significant	All modelled receptors meet the EA criteria for not requiring further assessment.
Air quality effects: NO_x and particulates from construction activity on site	Not significant	Included in assessment above.
Air quality effects: NO_x and particulates from traffic and transport	Not significant	Included in assessment above.
Air quality effects: construction dust	Not significant	Assumes sufficient mitigation measures are included to reduce the risk to not significant levels.

Inter-related effects

6.14.2 Air quality effects during the construction and operation phase of the proposed development could lead to effects on human and biodiversity receptors. Effects on biodiversity have been considered in the air quality assessment, however the significance of some of the air quality impacts is determined in **Chapter 7: Biodiversity.** Effects on human health have been assessed as not significant, as all air quality impacts are within legal limits set for the protection of human health. Further consideration of effects on human health as a result of other environmental effects (such as noise, traffic and transport, visual and socio-economics together with air quality), is considered in **Chapter 15: Human Health**.

6.14.3 The inter-related effect of multiple topics (noise, visual, traffic and transport, socio-economics, health and well-being in addition to air quality) acting in combination on the same human receptors (such as motor users, non-motor users, occupiers of properties and users of open space) is considered in **Chapter 18: Cumulative Effects**.

6.14.4 **Chapter 10: Land Quality** provides information on sources of dust and the mitigation measures however this chapter includes an assessment of the impacts of releases of dust on human and ecological receptors, and describes mitigation measures.

6.14.5 No other inter-related effects are anticipated to arise on the potential receptors assessed within this Chapter.

REFERENCES

[1] 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. Available online at: http://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX:32008L0050 [Accessed 12/02/2018]

[2] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. Available online at: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31992L0043 [Accessed 12/02/2018]

[3] Environment Act 1995. Available online at: http://www.legislation.gov.uk/ukpga/1995/25/contents [Accessed 12/02/2018]

[4] The Air Quality Standards Regulations 2010. Statutory Instrument 2010 No. 1001. Available online at: http://www.legislation.gov.uk/uksi/2010/1001/pdfs/uksi_20101001_en.pdf [Accessed 12/02/2018]

[5] 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. Paragraph 2, Part 1 of Schedule 1.

[6] Defra et al (2007) The Air Quality Strategy for England, Scotland Wales and Northern Ireland. Available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69336/pb12654-air-quality-strategy-vol1-070712.pdf [Accessed 12/02/2018]

[7] World Health Organization (2000) Air Quality Guidelines for Europe, Second Edition. Available online at: http://www.euro.who.int/__data/assets/pdf_file/0005/74732/E71922.pdf [Accessed 12/02/2018]

[8] 'Air emissions risk assessment for your environmental permit'. Available online at: https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit [Accessed 02/02/2018], dated 2 August 2016.

[9] EPUK and IAQM (2017) Land-use Planning and Development Control: Planning for Air Quality, v1.2.

[10] Environment Agency (2016) Air emissions risk assessment for your environmental permit'. Available online at: https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit [Accessed 12/02/2018], dated 2 August 2016

[11] IAQM (2016) Use of a criterion for the determination of an insignificant effect of air quality impacts on sensitive habitats. January 2016.

[12] National Planning Policy Framework (2012). Available online at: https://www.gov.uk/government/publications/national-planning-policy-framework--2 [Accessed 12/02/2018]

[13] National Planning Policy Framework: Draft text for consultation (2018). Available online at: https://www.gov.uk/government/consultations/draft-revised-national-planning-policy-framework [Accessed 21/03/2018]

[14] Guidance: Air quality. 6 March 2014. Available online at: https://www.gov.uk/guidance/air-quality--3 [Accessed 12/02/2018]

[15] The Department for Transport (June 2018) Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/714106/airports-nps-new-runway-capacity-and-infrastructure-at-airports-in-the-south-east-of-england-web-version.pdf [Accessed: 11/07/2018]

[16] Kent & Medway Air Quality Partnership (2015) Air Quality Planning Guidance. December 2015.

[17] IAQM (2014) Guidance on the assessment of odour for planning.

[18] Environment Agency (2016) Air emissions risk assessment for your environmental permit. Available online at: https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit [Accessed 12/02/2018], dated 2 August 2016.

[19] Department for Transport. Project for the Sustainable Development of Heathrow - Report of the Air Quality Technical Panels. Undated. Available online at: http://webarchive.nationalarchives.gov.uk/20080306053058/http://www.dft.gov.uk/print_view/3b723f5b612c85bc79a526ca27c9d370 [Accessed 12/02/2018]

[20] Defra. Background mapping data for local authorities. Available online at: https://uk-air.defra.gov.uk/data/laqm-background-home. [Accessed 12/02/2018]

[21] Underwood et al. (2010) Heathrow Airport Emission Inventory 2008/9. AEAT/ENV/R/2906 Issue 1.

[22] Thanet District Council (2014) LAQM progress report. September 2014.

[23] Defra (2016) Local Air Quality Management Technical Guidance (TG16). April 2016.

[24] Defra. Air quality plan for nitrogen dioxide (NO2) in UK (2017). Available online at: https://www.gov.uk/government/publications/air-quality-plan-for-nitrogen-dioxide-no2-in-uk-2017. [Accessed 16/03/2018]

[25] Air Pollution Information System (APIS) website. Available online at: www.apis.ac.uk [Accessed 12/02/2018]

[26] Defra and the Environment Agency (2016) Air emissions risk assessment for your environmental permit. Available online at: https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit [Accessed 12/02/2018], dated 2 August 2016.

[27] Defra Magic website: Available online at: http://www.magic.gov.uk [Accessed 12/02/2018]

[28] IAQM (2016) Guidance on the assessment of dust from demolition and construction. Version 1.1, June 2016

[29] Department for Transport (2015) TAG Unit A3 Environmental Impact Appraisal. Available online at: https://www.gov.uk/government/publications/webtag-tag-unit-a3-environmental-impact-appraisal-december-2015 [Accessed 12/02/2018]

[30] Thanet District Council (2016) Air Quality Technical Planning Guidance. August 2016.

[31] Department for Transport (2017) Forthcoming Change to WebTAG: Revised NOx damage costs. March 2017.

[32] Department for Transport (2017) WebTAG Databook. Release v1.8.2, October 2017.

[33] COMEAP (2017) Annex A – Refined COMEAP recommendations letter. July 2017. In: Defra, UK Plan for tackling roadside nitrogen dioxide concentrations. Technical report. July 2017.

Contents

7. Biodiversity

7.1 Introduction

7.1.1 This Chapter sets out an assessment of the potentially significant effects of the Proposed Development on biodiversity[i], both within the site boundary and the surrounding area, where appropriate. A 'Report to Inform an Appropriate Assessment' (RIAA) (**Appendix 7.1**) details the results of the assessment on internationally designated nature conservation sites. This Chapter should be read in conjunction with the description of the Proposed Development (**Chapter 3: Description of the Proposed Development**).

7.1.2 The Chapter outlines:

- The relevant policy, legislation and guidance that has informed the assessment;
- The data gathering methodology adopted as part of the biodiversity assessment;
- A description of the overall baseline conditions;
- Environmental measures incorporated into the Proposed Development;
- The scope of the assessment;
- The assessment methodology;
- Assessment of effects on each biodiversity receptor; and
- A summary of the significance evaluation containing preliminary conclusions on the likely significance of environmental effects.

7.1.3 This Chapter focusses on the potentially significant effects of the construction and operation of the Proposed Development on notable and legally protected habitats and species. Potential effects on nature conservation interests both within and outside of the bounds of the Proposed Development have been considered and include:

- Temporary and permanent habitat loss;
- Habitat degradation / change (e.g. through changes in air quality); and
- Disturbance / displacement of flora and fauna.

7.1.4 In terms of the activities associated with the Proposed Development, potential effects may be associated with the:

- Construction of cargo facilities, hangers, aircraft stands, taxiways and associated infrastructure (e.g. fuel farm, road junctions etc.);
- Operation of aircraft and associated activities (e.g. aircraft loading, taxiing etc.) whilst within the bounds of the airport;
- Operation of aircraft approaching and leaving the airport (i.e. outside of the bounds of the airport); and
- Road traffic associated with the construction and operational phases of the Proposed Development.

7.1.5 This Chapter includes an assessment of the potential effects on nationally and locally designated sites and species of nature conservation interest. For internationally designated sites, this Chapter draws upon the RIAA (**Appendix 7.1**). The RIAA (**Appendix 7.1**) provides the necessary information for the competent authority (in this case the Secretary of State for Transport) to

[i] This is in accordance with section 5 (Environmental impact assessment process), para 2 (b) of the *Infrastructure Planning (EIA) Regulations 2017*.

undertake a Habitats Regulations Assessment (HRA) under the *Conservation of Habitats and Species Regulations 2017 (SI 2017 No. 1012) (the 'Habitats Regulations')*.

7.1.6 Both this Chapter and **Appendix 7.1** are supported by evidence gathered from desk studies, field surveys, and the assessments for **Chapter 6: Air Quality**, **Chapter 8: Freshwater Environment**, **Chapter 12: Noise and Vibration** and **Chapter 18: Cumulative Effects**.

7.2 Policy, Legislation and Guidance

7.2.1 A study of biodiversity related planning policy, legislation and guidance at the national, regional and local level has been undertaken for the Site and its locality to highlight any requirements which the Proposed Development needs to consider. A summary of the relevant national and local policies with regard to biodiversity is provided in **Table 7.1**, with full details of all national and local planning policies relevant to the Proposed Development presented in **Appendix 4.1, Chapter 4: Planning Policy Context.**

Table 7.1 National and Local Planning Policies relevant to Biodiversity

Policy	Summary
National Planning Policy Framework (NPPF) Draft for Consultation	Paragraph 168 – "*Planning policies and decisions should contribute to and enhance the natural and local environment by:* *d) minimising impacts and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures."*
	Paragraph 171 - *"Within areas defined as Heritage Coast (and that do not already fall within one of the designated areas mentioned in paragraph 170, planning policies and decisions should be consistent with the special character of the area and the importance of its conservation. Major development within a Heritage Coast is unlikely to be appropriate, unless it is compatible with its special character."*
	Paragraph 172 – "*To protect and enhance biodiversity and geodiversity, plans should:* *a) identify and map components of local wildlife-rich habitats, including the hierarchy of designated sites of importance for biodiversity; wildlife corridors and stepping stones that connect them; and areas identified by local partnerships for habitat restoration or creation; and* *b) promote the conservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity."*
	Paragraph 173 – "*When determining planning applications, local planning authorities should apply the following principles:* *a) if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;* *b) Development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;*

	c) Where development would involve the loss of individual aged or veteran trees that lie outside ancient woodland, it should be refused unless the need for, and benefits of, development in that location would clearly outweigh the loss; and *d) Development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to incorporate biodiversity improvements in and around developments should be encouraged, especially where this can secure measurable net gains for the environment."*
	Paragraph 174 – *"The following should be given the same protection as European sites:* *a) potential Special Protection Areas and possible Special Areas of Conservation;* *b) listed or proposed Ramsar sites50; and* *c) sites identified, or required, as compensatory measures for adverse effects on European sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites."*
	Paragraph 178 - "*Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health and living conditions, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:* *c) Limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."*
National Planning Policy Framework (NPPF)[1]	Paragraph 109 - "*The planning system should* contribute to and enhance the natural and local environment by: *minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures*".
	Paragraph 112 - "*Local planning authorities should set criteria based policies against which proposals for any development on or affecting protected wildlife or geodiversity sites or landscape areas will be judged. Distinctions should be made between the hierarchy of international, national and locally designated sites, so that protection is commensurate with their status and gives appropriate weight to their importance and the contribution that they make to wider ecological networks*".
	Paragraph 114 - "*Local planning authorities should:* ▶ *Set out a strategic approach in their Local Plans, planning positively for the creation, protection, enhancement and management of networks of biodiversity and green infrastructure; and* ▶ *Maintain the character of the undeveloped coast, protecting and enhancing its distinctive landscapes, particularly in areas defined as Heritage Coast, and improve public access to and enjoyment of the coast.*"
	Paragraph 117. "*To minimise impacts on biodiversity and geodiversity, planning policies should:* ▶ *Plan for biodiversity at a landscape-scale across local authority boundaries;* ▶ *Identify and map components of the local ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity, wildlife corridors and stepping stones that connect them and areas identified by local partnerships for habitat restoration or creation;*

- *Promote the preservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species populations, linked to national and local targets, and identify suitable indicators for monitoring biodiversity in the plan;*
- *Aim to prevent harm to geological conservation interests; and*
- *Where Nature Improvement Areas are identified in Local Plans, consider specifying the types of development that may be appropriate in these Areas.*"

Paragraph 118 - "*When determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by applying the following principles:*

- *if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;*
- *Proposed Development on land within or outside a Site of Special Scientific Interest likely to have an adverse effect on a Site of Special Scientific Interest (either individually or in combination with other developments) should not normally be permitted. Where an adverse effect on the site's notified special interest features is likely, an exception should only be made where the benefits of the development, at this site, clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest and any broader impacts on the national network of Sites of Special Scientific Interest;*
- *opportunities to incorporate biodiversity in and around developments should be encouraged;*
- *planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss; and*
- *the following wildlife sites should be given the same protection as European sites: – potential Special Protection Areas and possible Special Areas of Conservation; – listed or proposed Ramsar sites; and – sites identified, or required, as compensatory measures for adverse effects on European sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites.*"

Paragraph 125 - "*By encouraging good design, planning policies and decisions should limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*"

Paragraph 166 - "*Local Plans may require a variety of other environmental assessments, including under the Habitats Regulations where there is a likely significant effect on a European wildlife site (which may not necessarily be within the same local authority area), Strategic Flood Risk Assessment and assessments of the physical constraints on land use. Wherever possible, assessments should share the same evidence base and be conducted over similar timescales, but local authorities should take care to ensure that the purposes and statutory requirements of different assessment processes are respected.*"

Paragraph 192, in regard to the pre-application stage, states - "*The right information is crucial to good decision-taking, particularly where formal assessments are required (such as Environmental Impact Assessment, Habitats Regulations Assessment and Flood Risk Assessment). To avoid delay,*

	applicants should discuss what information is needed with the local planning authority and expert bodies as early as possible".
Thanet District Council Local Plan[2]	Saved Policy NC3: "*Development which would be damaging to…sites of Nature Conservation Interest…either in the long term or short term, will not be permitted.*"

Legislative Requirements

7.2.2 In preparing the biodiversity assessment, account has been taken of relevant legislation, namely:

- *The Conservation of Habitats and Species Regulations 2017*;
- *Natural Environment and Rural Communities Act 2006* (the NERC Act);
- *Countryside and Rights of Way Act 2000* (the CRoW Act);
- *Hedgerows Regulations 1997*;
- *Protection of Badgers Act 1992*;
- *Wildlife and Countryside Act 1981 (WCA) (as amended);* and
- *National Parks and Access to the Countryside Act 1949 (as amended).*

Relevant Guidance

7.2.3 Other guidance taken into account in the biodiversity assessment includes:

- Chartered Institute of Ecology and Environmental Management (CIEEM) (2016). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, (Ed 2.). CIEEM, Winchester;
- Collins, J (ed.) (2016). Bat Surveys for professional Ecologists: Good Practice Guidelines (Ed3) The Bat Conservation Trust, London;
- Shawyer, C. R. (2011). Barn Owl *Tyto alba* Survey Methodology and Techniques for use in Ecological Assessment: Developing Best Practice in Survey and Reporting. IEEM, Winchester;
- Froglife Advice Sheet 10 (1999). Reptile survey: an introduction to planning, conducting and interpreting surveys for snake and lizard conservation. Froglife. Halesworth;
- Gent, A.H. and Gibson, S.D., Eds. (1998). *Herpetofauna Workers' Manual*. Joint Nature Conservation Committee, Peterborough. Revised and reprinted 2003;
- English Nature (2001). Great crested newt mitigation guidelines (2001) English Nature, Peterborough;
- NE, EA and the Department for Environment, Food and Rural Affairs (DEFRA) guidance from: https://www.gov.uk/guidance/construction-near-protected-areas-and-wildlife#protected-species;
- Rodwell, J.S. (2006). *National Vegetation Classification: Users' Handbook*. Joint Nature Conservation Committee, Peterborough;
- Rodwell, J.S., (ed.) (1992) *British Plant Communities. Volume 3. Grassland and Montane Communities*. Cambridge University Press;
- Planning Inspectorate Advice Note Ten: Habitats Regulations Assessment relevant to nationally significant infrastructure projects (V7) (2016) The Planning Inspectorate. Bristol; and

- Civil Aviation Authority (CAA). (2014). Wildlife Hazard Management at Aerodromes. CAP 772.

7.3 Data Gathering Methodology

7.3.1 The baseline for an ecological impact assessment (EcIA) is usually informed by a Preliminary Ecological Appraisal (PEA) which comprises a desk study and an extended Phase I habitat survey. These together provide the context for determining what further (Phase 2) survey is required to provide sufficient information about potential receptors. Due to restrictions on site access, here the PEA was obtained by a desk study combined with a ground-truthing visit in February 2017 validating desk study data specific to the site. This section describes the approach adopted to inform this biodiversity assessment.

Desk Study

7.3.2 A data-gathering exercise was undertaken to obtain information relating to statutory and non-statutory biodiversity sites, priority habitats and species, and legally protected and controlled species (**Appendix 7.2**). In line with the CIEEM guidance[3], these are the sites, habitats and species that are of sufficient importance that effects upon them could be significant (**Boxes 7.1** and **7.2**).

Box 7. Designated biodiversity sites, priority habitats and species

Statutory biodiversity sites

Internationally important sites (collectively referred to in this report as European sites – whilst recognising that Ramsar sites are designated at a global level):

- Special Area of Conservation (SACs)[ii];
- Candidate SACs[iii];
- Sites of Community Importance (SCIs)[iv];
- Special Protection Areas (SPAs)[v];
- Listed or proposed Ramsar sites, potential SPAs, possible/proposed SACs[vi]; and
- Sites identified or required as compensatory measures for adverse effects on other European sites[vii].

Nationally important sites:

- Sites of Special Scientific Interest (SSSIs)[viii]; and
- National Nature Reserves (NNRs).

[ii] SACs are designated under Article 4(4) of Directive 92/43/EEC.
[iii] Candidate SACs are designated under Article 4.1 of Directive 92/43/EEC.
[iv] SCIs are sites that have been nominated or submitted by Member States and entered onto the list of sites compiled by the European Commission that form (along with SACs and SPAs) the Natura 2000 network. SCIs are subject to the provisions of Article 6(2) of Directive 92/43/EEC. SCIs are afforded full protection by law under the Conservation of Habitats and Species Regulations 2017 (regulation 8(1)(b)).
[v] SPAs are classified pursuant to the requirements of Directive2009/147/EC (Article 4). As European Sites they are provided with full protection by law under the Conservation of Habitats and Species Regulations 2010.
[vi] Government policy in England (see paragraph 118 of the NPPF) protects Ramsar sites, potential SPAs and possible SACs as if they were fully classified SPAs or a fully designated SACs.
[vii] Government policy in England (see paragraph 118 of the NPPF) is that any such compensatory land or water must itself be protected as if it were a fully classified SPA or a fully designated SAC.
[viii] Some SSSIs also wholly or partially fall within a European Site boundary.

Locally important sites:

Local Nature Reserves (LNR): Statutory sites that are of importance for recreation and education as well as biodiversity. Their level of importance is defined by their other statutory or any non-statutory designations (e.g. if an LNR is also an SSSI but is not a European site, it will be of national importance). If an LNR has no other statutory or non-statutory designation it should be treated as being of borough/district-level importance for biodiversity (although it may be of greater socio-economic value).

Non-statutory nature conservation sites

Sites of county importance: Non-statutory nature conservation sites in Kent are called Local Wildlife Sites (LWS).

Priority habitats and species

In this Chapter (and following the CIEEM guidance[4]), the geographic level at which a species/habitat has been identified as a priority for biodiversity conservation is referred to as its level of 'species/habitat importance'. For example, habitats and species of principal importance for the conservation of biological diversity in England are identified as of national species/habitat importance reflecting the fact that the importance of these species/habitats has been defined at a national level. The level of importance pertains to the species/habitat as a whole rather than to individual areas of habitat or species populations, which cannot be objectively valued (other than for waterfowl, for which thresholds have been defined for national/international 'population' importance).

- International importance: populations of species or areas of habitat for which European sites are designated;
- International importance: populations of birds meeting the threshold for European importance (1% of the relevant international population)[ix];
- National importance: Priority habitats and species of principal importance (HPI and SPI[x]) for the conservation of biological diversity in England. These are listed on**:**

  http://www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/prioritylist.aspx

- National importance: Species listed as being of conservation concern in the relevant UK Red Data Book (RDB) or the Birds of Conservation Concern (BoCC) Red List[5];
- National importance: Nationally Rare and Nationally Scarce species, which are species recorded from, respectively, 1-15 and 16-100 hectads (10x10km squares of the national grid);
- National importance: Populations of birds comprising at least 1% of the relevant British breeding/wintering population (where data are available); and
- Borough/district importance: Habitats and species listed in the Borough/District Biodiversity Action Plan (BAP).

[ix] The JNCC prepared guidelines to assist in the selection of SPAs (The Birds Directive: Selection guidelines for Special Protection Areas). Stage 1 of the two-stage process identifies those areas used regularly by 1% or more of the Great Britain (or in Northern Ireland, the all-Ireland) population of a species listed in Annex I of the Birds Directive in any season. The JNCC undertakes reviews of the SPA network and populations of its qualification species at roughly decadal intervals with the last (third) review published in 2016.
[x] Habitats and Species of Principle Importance (HPI and SPI).

Box 7.2 Legally protected and controlled species

Legal protection

Many species of animal and plant receive some degree of legal protection. For the purposes of this document, legal protection refers to:

- Species included in Schedules 1, 5 and 8 of the *Wildlife and Countryside Act 1981* (as amended), excluding:
  - Species that are only protected in relation to their sale (see Section 9(5) and 13(2) of the *WCA 1981*), given that the Proposed Development does not include any proposals relating to the sale of species; and
  - Species that are listed in Schedule 1 of the *WCA 1981* that are likely to breed on or near the site (given that this schedule is only applicable whilst birds are breeding).
- Species included in Schedules 2 and 5 of the *Habitats Regulations 2017*;
- Badgers, which are protected under the *Protection of Badgers Act 1992*; and
- Hedgerows, some of which are protected under *The Hedgerows Regulations 1997*.

Legal control

Schedule 9 of the *WCA 1981* lists species of animal that it is an offence to release or allow to escape into the wild and species of plant that it is an offence to plant or otherwise cause to grow in the wild.

7.3.3 Given the potential for the Proposed Development to affect biodiversity resources[xi] located off- as well as on-site, data were obtained for:

- Statutory designated sites (national and international) on or within a 15km radius of the site;
- Non-statutory designated sites of nature conservation interest located on, or within 2km of the site;
- Ancient woodland and other Habitats of Principal Importance (HPI) on, or within 2km of the site (where not already covered by statutory and non-statutory sites);
- Records of legally protected and otherwise notable species made on, or within 5km of the site, including records of bats and bat roosts from the Kent Bat Group;
- Granted European Protected Species Mitigation Licences (EPSML) within 5km of the site;
- Water bodies (potential great crested newt breeding habitat) within 500m[6] of the site, not separated from the Site by barriers (e.g. major roads, rivers, etc.) to great crested newt movement; and
- Records of bird species on or within 5km of the site.

7.3.4 In order to establish the baseline situation, biodiversity data were obtained from the sources listed in **Table 7.2** to identify existing data about the site and the surrounding area.

[xi] It was considered that effects were unlikely on such sites, habitats and roosts beyond these distances and that they were sufficient to identify important or valued ecological receptors (see **Section 7.6**).

Table 7.2 Information sources and data sought

Source	Data
The Government's Multi-Agency Geographic Information for the Countryside (MAGIC) website[7]	Statutory biodiversity sites; priority habitats; granted European Protected Species (EPS) mitigation licence applications (to 03.07.2017); SSSI Impact Risk Zones (IRZs)[xii].
The Kent and Medway Biological Records Centre (KMBRC)	Non-statutory (local) wildlife sites; ancient woodland and priority habitats, records of legally protected and priority species
Kent Ornithological Society (KOS)/Kent County Bird Recorder	Bird records were extracted from the KOS online database, for all species within 5km of the Site (http://birdgroups.co.uk/kos/default.asp, accessed in August 2016). Pegwell Bay bird reports.
British Trust for Ornithology (BTO)	Wetland Bird Survey (WeBS) survey data: core count data for 1995/96-2014/15 inclusive, and low tide data for 2002/03 and 2008/09 (the most recent winters for which data was available) were purchased from the BTO, for their Pegwell Bay count sector. In addition, further core count and low tide data for Pegwell Bay was from obtained from the BTO website (www.bto.org).
Sandwich Bay Bird Observatory (SBBO)	A map showing the main locations for wintering golden plover in the Sandwich Bay area, derived from ongoing SBBO studies into the species.
Civil Aviation Authority (CAA)	Historical data (2007-2017) on birdstrike at Kent International Airport.
Google Earth	Review of satellite imagery for identification of biodiversity interest features e.g. water bodies, connectivity features.
National Biodiversity Network (NBN)[8]	Records of legally protected and priority species.
UK Biodiversity Action Plan (UKBAP)[9]	UK Priority BAP species/habitats.
Kent Biodiversity Action Plan (KBAP) [10]	KBAP species and habitats.
NE[11]	Section 41 NERC Act 2006 species (SPI) and habitats (HPI) of principal importance; updated 14/05/2014. NE Studies commissioned studies into the numbers and distribution of golden plover in the Sandwich Bay and Thanet area, the results of which are reported in Griffiths (2004[12]) and Henderson & Sutherland (2017[13]).
Ecological Appraisals provided for development projects at or in close proximity to the Proposed Development site – namely Stone Hill Park (OL/TH/0550); Land East of Haine Road (OL/TH/14/0050); Land south of Great West Autos (F/TH/12/0722); Land east of Worlds Wonder (F/TH/14/0645) and Land North of Thorne Farm (F/TH/13/0596).	Ecology survey data e.g. Phase 1 habitat surveys, protected species surveys. Nesting birds and potential foraging and roost habitat for bats, and habitat for the four widespread reptiles were reported in publicly available documents associated with these developments. No evidence of other protected or notable species was reported.

[xii] The Impact Risk Zones (IRZs) are a GIS tool developed by NE to make a rapid initial assessment of the potential risks posed by development proposals to: SSSIs, SACs, SPAs and Ramsar sites. They define zones around each site which reflect the particular sensitivities of the features for which it is notified and indicate the types of development proposal which could potentially have adverse impacts.

7.3.5 Existing baseline data for this site were comprehensive, particularly as a result of the Stone Hill Park (SHP) planning application which covered predominantly the same area as the current DCO application and included an extended Phase 1 habitat survey.

7.3.6 Information from the SHP application has not informed our conclusion of significance in any assessment but merely been used to help guide our own survey work. Information obtained from the SHP proposal is listed in **Table 7.3**.

Table 7.3 Completed baseline surveys from the SHP Proposal

Survey Requirement	Survey Specification	Survey Area	Survey Date
Habitats	An extended Phase 1 habitat survey of the site was completed in accordance with good practice guidance.	Study area	June 2015
Bats (roost: building inspections)	External and internal (where possible) inspections were undertaken at each of the buildings on the site to determine potential to support roosting bats. Evidence indicating current or historic use of the buildings by bats was also searched for in accordance with good practice.	Site	June and October 2015
Bats: hibernation roost	A total of 28 nights of automated detector data were gathered in each of two buildings; inspections for hibernating bats by a NE licensed bat ecologist on each visit were also undertaken.	Site	January to March 2016
Great crested newt (GCN)	Four water bodies, one within the site boundary and three within 500m of the Proposed Development were assessed for their suitability to support GCN. Potentially suitable water bodies were subsequently surveyed to determine presence or likely absence of GCN, along with eDNA[xiii] sampling; in accordance with good practice guidance.	Site and within 500 m	April 2016
Birds: wintering birds	Four visits i.e. one visit each month. Methods included the use of a combination of vantage point and walked survey; the location of all birds seen and heard was mapped. Surveys were completed with regard to methods outlined within current good practice guidance.	Site	November 2015 to February 2016 inclusive

7.3.7 Therefore, while access restrictions meant that it was not possible to undertake an extended Phase 1 habitat survey within the site, existing information and the subsequent 'ground-truthing' exercise permitted a preliminary ecological assessment. The ground-truthing exercise involved a walk-over survey to verify whether existing data remained accurate, with the approach agreed with NE[xiv] in advance of the ground-truthing visit.

7.3.8 The scientific names of all species cited in the text are included in **Appendix 7.12**.

Survey Work

7.3.9 To support the DCO application for the Proposed Development, the following baseline survey programme was undertaken in 2017 at the site:

- Ground-truthing walk-over (February 2017) verifying available desk study data;
- Off-site non-breeding (over-wintering) bird surveys were undertaken due to the proximity of the Thanet Coast and Sandwich Bay SPA and Ramsar site and the Sandwich Bay to Hacklinge Marshes SSSI, which are important or designated for their wader and waterfowl interest. This covered farmland up to 2km from the Proposed Development boundary, which was considered to include an area within which qualification or interest features

[xiii] Environmental DNA.
[xiv] Baseline Data Collection Methodology and PEIR Meeting between Amec Foster Wheeler and Natural England on 03/11/2016.

(species) of the statutory designated sites i.e. golden plover might be affected by the Proposed Development. In other words, this farmland might act as 'functional' habitat for the designated sites bird species. Surveys were carried out once per month from September to March. Distribution counts of waterfowl in Pegwell Bay were also undertaken to determine the current population size, and distribution and usage by each waterbird species in and of the Bay. These were undertaken over one day per month, from October to March, over a six-hour diurnal period capturing a partial tidal cycle within each visit. When possible, survey dates coincided with daytime high tides;

- GCN: waterbodies on Site and within 500m of the Site boundary were assessed using the Habitat Suitability Index[14] (HSI) and screened for their suitability for breeding GCN;
- Bats: activity and roost surveys following current good practice detailed in the Bat Conservation Trust's guidelines[15] for sites with moderate habitat quality for bats:
  - Activity surveys to help identify any foraging and commuting areas, involving manual transects and the deployment of static recorders. Four bat activity transects were surveyed once per month (from dusk) between August and October 2017 inclusive. Bat activity was also recorded through the use of static monitoring devices, deployed for five nights at two locations per manual transect monthly between August and October inclusive; and
  - Buildings/structures on Site were inspected externally and internally to look for any evidence of bats and identify any roost potential, with the methodology reported in Babec (2017) [16] (**Appendix 7.6**). A ground–based assessment of trees on site was also undertaken in late November 2017, after leaf fall to permit better visibility. Trees with potential roost features (PRFs) were categorised according to their level (low, moderate or high) of potential to support roosting bats, the category then determining any subsequent level of survey. The methodology adopted for this assessment is reported in a Technical Note as (**Appendix 7.11**)[17].
- Reptiles: presence / likely absence surveys using 1,000 felts and 500 tins were undertaken over the site grassland throughout September 2017 (detailed within the reptile presence / absence survey report, November 2017 (Babec Ltd) in **Appendix 7.6**). Survey methodology was based upon current good practice guidance of Froglife[18];
- Barn owl: built structures and trees were inspected for barn owl nesting/roost sites in autumn 2017. The method adopted followed current good practice and is described in **Appendix 7.6**, but in summary comprised looking for potential access points, roosting features and nesting features as well as searching for barn owls and secondary evidence of barn owls, such as droppings, pellets, feathers and nest debris;
- Terrestrial invertebrates on site: an invertebrate scoping survey on site was undertaken in August 2017 with the methodology adopted reported in a Technical Note[19], (**Appendix 7.7**) upon which a survey programme was designed (see next section). In summary, the scoping survey methodology included walking through the grassland and visiting enclosed and marginal features of potential interest as invertebrate habitats with invertebrates sampled by sweep-netting and any conspicuous species identifiable without capture, such as butterflies and bumblebees, were also noted; and
- Badger: presence / absence surveys for badgers involving looking for any sign of badgers within the site and up to 30m from it was undertaken in autumn 2017.

7.3.10 A summary of the desk study information and surveys undertaken that have informed the preparation of this Chapter is provided in **Table 7.4**. The detailed methodologies for the desk study and the surveys completed to date are described in the respective baseline technical reports. These accompany this Chapter and are detailed within **Appendices 7.2** and **7.6** to **7.11**.

Table 7.4 Baseline surveys

Survey requirement	Survey specification	Survey area	Survey programme
Habitats	Ground-truthing of desk study data collected including Stone Hill Park Extended Phase 1 habitat survey (June 2015).	Site and surrounding land (to 50m)	February 2017
	Extended phase 1 habitat survey of Order Limits extension: Outfall corridor, and land north of Spitfire Way	Site and surrounding land (to 30m)	September 2017 October 2017
	Extended phase 1 habitat survey of Land parcel 1362 (potential compensation site)	Site and surrounding land (to 30m)	October 2017
Legally controlled species	Presence/absence survey	Site and surrounding land (to 50m)	September-December 2017
Great crested newt (GCN)	Assessment of water bodies' suitability for GCN	All water bodies on surrounding land (up to 500m)	April 2017
	Presence/absence survey	Not required. GCN scoped out from assessment	N/a
Reptiles	Presence/absence survey	Accessible areas of suitable habitat within the site	September 2017
Bats (roost)	External/internal building inspections	54 buildings within the site	September/October 2017
Bats (activity)	Static automated bat activity survey	Site only	August – October 2017
Birds (wintering)	Functional habitat surveys: golden plover	Land up to 2km from the site boundary	September 2016 – March 2017
	Pegwell Bay distribution counts	Pegwell Bay south to the River Stour	October 2016 - March 2017
Invertebrates	Site assessment	Site	August 2017
Badger	Presence / absence survey	Site and surrounding land (to 30m); land parcel 1362	September – October 2017

7.3.11 The extent of desk study and survey data informed a good assessment of the biodiversity of the Site. This has permitted development of a 'worst case scenario' approach for the assessment of effects on biodiversity where information is not complete, and this has been reflected in the proposed levels of mitigation to be provided.

Further Surveys

7.3.12 As is often the case, it was not possible to complete pre-application surveys[xv], but further surveys will be undertaken to confirm the 'worst case scenario' assessment and to refine the detailed biodiversity mitigation schemes that will be submitted for approval. These further surveys include:

- Bats:
  - Activity surveys (static and manual) to be completed between April and July, employing the same effort as in 2017. A dusk and pre-dawn survey will be undertaken on one of the survey occasions; and
  - Roost surveys: emergence/re-entry surveys will be undertaken for those buildings/structures identified with low, medium or high roost suitability in 2017. Closer inspection and survey will be conducted for those trees with potential roost features of moderate or high potential (see **Appendix 7.11**). Hibernation surveys will be conducted from December through to March inclusive.
- Breeding birds: territory mapping surveys within the site and, where public access permits, a 100m buffer around it. These will be based upon the British Trust for Ornithology (BTO's) Common Bird Census (CBC) methodology and will comprise six visits to the entire Site over the period March/April to June inclusive[20]. Surveys employing the same methodology will also be undertaken at land parcel 1362. Survey for barn owl will follow Shawyer (2011)[21];
- Reptiles: It was not possible to survey small areas (c. 4ha) of the site in 2017 due to access restrictions and it is planned that these will be surveyed in April/May[xvi]. If presence / likely absence survey in these unsurveyed areas reveal reptiles, a population size class survey (following Froglife guidelines[22]) will be undertaken;
- Terrestrial invertebrates: a survey programme of the site has been designed based upon the 2017 scoping survey and will target those species/assemblages that the site is most likely to support over the main period of invertebrate activity ((April to September inclusive (albeit focussing on the key activity period, May-July));
- Botanical Interest: National Vegetation Classification[23] (NVC) survey methodology will be employed to identify grassland communities of botanical interest within the site;
- Badger: Survey for badger will be undertaken of land off-site (e.g. land parcel 1362, **Appendix 7.10**), identified for provision of biodiversity compensation; and
- Legally controlled species: survey in January/February for the invasive plant, winter heliotrope through systematic search, particularly in the northern part of the site with records nearby.

Consultation

7.3.13 RiverOak Strategic Partners Limited (hereafter referred to as 'RiverOak') has been engaging with consultees with an interest in potential biodiversity issues since 2015. A Scoping Report (**Appendix 1.1**), including a chapter covering biodiversity, was produced and submitted to the Planning

[xv] It was not possible to accomplish the full suite of planned survey as explained in the 2017 and 2018 PEIRs due to access restrictions to the Site between late February and late August 2017 and from mid-December 2017 to mid-March 2018 (at least). Permission to access the Site in 2017 was obtained through a 'Notice of Entry'. This document provides the information required to be notified to the landowner pursuant to paragraph 7 of Annex 3 of the authorisation for access to land at Manston Airport granted by the Secretary of State (SoS) for Communities and Local Government under section 53 of the Planning Act 2008 on 16 December 2016 ("Section 53 Authorisation"). In addition to landowner challenges to the Notice of Entry request further delay was created by the 08/06/2017 General Election, which prevented the SoS from attending to the request over the General Election period. Access to the Proposed Development Site was attempted on 12/03/2018 under a section 172(1) of the Housing and Planning Act 2016 authorisation however entry was refused.

[xvi] The currently un-surveyed reptile survey areas are shown in Figure 2 of the reptile presence / absence survey report, November 2017 (**Appendix 7.6**).

Inspectorate (PINS) who provided a Scoping Opinion (**Appendix 1.2**) which although no longer formally associated with this application is still relevant (see **Chapter 4: Planning Policy Context**). Consultee responses on the Scoping Report with regard to Biodiversity are provided in the 2017 Biodiversity PEIR chapter and consultee responses were also received on both the 2017 and 2018 PEIR[xvii].

7.3.14 In addition to the statutory and non-statutory public consultations associated with the provision of the Scoping Opinion, in response to statutory consultations in 2017 and 2018 and engagement on the development of the masterplan, the following organisations were directly consulted:

- PINS;
- Natural England (NE);
- Environment Agency (EA);
- Kent County Council (KCC);
- Thanet District Council (TDC);
- The Royal Society for the Protection of Birds (RSPB);
- The Kent Wildlife Trust (KWT); and
- Kent Downs Area of Outstanding Natural Beauty Unit.

7.3.15 More specifically, meetings have been held with NE[xviii] and the KWT[xix]. KWT latterly indicated that, although they would still like to be consulted, they might not participate in further meetings due to resource constraints. RSPB confirmed (via email[xx]) that they do not wish to meet or participate in the Evidence Plan process for the Proposed Development other than responding (or not) to the public consultation materials and/or application documents as these are released. HRA information, and an opportunity to engage in the HRA process, has been provided to KCC and TDC. Consultation with NE continued until submission of the ES in regard to ongoing assessment and the HRA process.

7.4 Overall Biodiversity Baseline

Current Baseline

7.4.1 Information from the desk study and ground-truthing survey in February 2017 indicate that the site of the Proposed Development comprises a combination of hardstanding and buildings, large expanses of grassland and some limited areas of scrub and/or domestic landscaping. The desk study revealed that there is the potential for, or records of species which are legally protected or a priority for nature conservation, to be present on or adjacent to the site, namely: reptiles within suitable terrestrial habitats and badgers within the wider landscape. Furthermore, bats are likely to roost in suitable buildings and trees (potentially on site), and forage within the vicinity. An outline baseline is provided here, with a more detailed baseline provided for those receptors taken through to impact assessment.

Habitats

7.4.2 The 316ha site comprises a number of habitats, with open grassland the most extensive habitat (c.190 ha) and hardstanding (former runways, taxi-ing areas etc.) also extensive (c.105ha). Arable land extends over 17ha. Remaining habitats include buildings, bare ground, species-poor hedgerow, ephemeral short-perennial/ tall ruderal mosaics, standing water (two water bodies), scattered broad-leaved trees and scrub.

[xvii] The 2017 and 2018 PEIR can be accessed at: http://rsp.co.uk/statutory-consultation/
[xviii] Meetings with NE took place on 26/04/16; 09/11/16; 05/09/17 and 06/03/18.
[xix] The contact at KWT was Vanessa Evans.
[xx] Dated 09/11/2016, from Dora Querido, Conservation Officer, South-east Regional Office.

7.4.3 The grassland areas are predominantly semi-improved, with generally species-poor swards (species-poor semi-improved grassland) present through the majority of the site; particularly to the north and south of the runway, around the buildings in the central and northern areas and the larger field north of Manston Road. The Desk study revealed that the more diverse grassland (semi-improved neutral grassland) swards are also present, located principally to the western and eastern ends of the main runway as well as around buildings and hard-standing in the south-east part of the site, north of Manston Road.

7.4.4 Management of the grassland apparently continues as it did when the airport was active with regular mowing and removal of cuttings. These activities prevent a surface layer thatch build-up, and likely largely prevent flowering and seeding. Twice yearly fertilisation is also thought to occur allowing for an annual cut for silage.

7.4.5 Overall the grassland is dominated by coarse grasses indicative of largely neutral (mesotrophic) conditions. However, species preferring calcareous conditions were also recorded across much of the site, indicating the influence of underlying chalk soil conditions/geology in the area.

7.4.6 Nine HPI have been identified within 2km of the site, none of which occur within the Site. These habitats consist of wood pasture and parkland; deciduous woodland; lowland fens; reedbeds; coastal and floodplain grazing marsh; coastal saltmarsh; mudflats; and maritime cliffs and slopes. Numerous isolated and scattered parcels of woodland occur within 2km of the site, and other coastal and wetland HPI occur to the south and south-east of the site around Pegwell Bay.

7.4.7 Legally controlled plant species are absent from the site.

Bats

7.4.8 The site provides generally low quality foraging and commuting habitat for bats. The ground-truthing exercise in February 2017 identified that the site has large areas of semi-improved neutral grassland and extensive areas of hard-standing, which includes a runway, aircraft taxiing areas and buildings (see **Figure 7.3**). The site is exposed and the grassland is managed by cutting, providing low quality foraging habitat for bats. Bat activity on the site would likely be concentrated along the margins, such as the western and eastern boundaries of B2050 (Manston Road) and the hedgerows to the extreme north of the site and to the west of the runway.

7.4.9 The SHP desk study reported two bat roost records within a 1km grid square which potentially fall within the site boundary. These records are for a common pipistrelle roost (1km grid square overlaps the west of the site boundary) and an unidentified bat species (1km grid square over laps the east of the site boundary). Further information relating to the sizes of the roosts or roost type was not available. The next closest roost is located 2.4km to the south-west of the site. This was a maternity soprano pipistrelle roost that had a peak count of 668 pipistrelles, including juveniles on the wing when counted in July. Typically, this roost is reported to support between 250 and 350 fully grown (adult) bats[24].

7.4.10 Within 5km of the site there were 125 bat records since 2000, of at least six species: common pipistrelle; Nathusius' pipistrelle; soprano pipistrelle; brown long-eared; Natterer's and serotine. Additionally, some records are only allocated to genus level (e.g. *Pipistrellus* sp.) and there were six records of *Chiroptera* sp.

7.4.11 Building inspections in autumn 2017 revealed evidence of bats within four buildings (B8, B16, B17 and B41, **Appendix 7.6**) within the site. The results of the inspection indicate the presence of a hibernation roost within building B8, day / transitional roosts within buildings B16 and B41 and a night roost within building B17. No bats or evidence of bats were recorded in buildings B33 or B54, which were previously confirmed as bat roosts in 2015/16. A further 32 buildings were assessed as having the potential to support roosting bats (two buildings with high potential, six with moderate potential and 24 with low potential) as they incorporate potential roosting features.

7.4.12 A ground–based assessment of trees on site to check for potential bat roost features was undertaken in late November 2017 with the findings reported in a Technical Note as **Appendix**

7.11[25]. In total, 35 trees were identified as supporting PRFs with 17 trees classified as of low or negligible potential, which require no further inspection/survey with regard to bats.

Breeding Birds

7.4.13 The site is likely to support breeding bird assemblages associated with farmland and urban habitats including some listed as SPI, BoCC red-list and Schedule 1 of the WCA, such as skylark, house sparrow, grey partridge and barn owl. Over-wintering species may include wading birds and wildfowl.

7.4.14 Both skylark and grey partridge have been recorded on site during surveys in August 2017 and although these visits were outside the breeding season, it is considered that the site is used for breeding by both species. The grassland on site provides both suitable skylark nesting habitat and foraging habitat for chick provisioning. However, the suitability of the habitat for nesting could be impaired by the current management regime. It is possible that grassland mowing might destroy some nests, although, as they are ground nesters, this is likely to be through destruction from the wheels of passing machinery rather than the pass of mower blades which appear to be set high enough above the ground to prevent nest destruction.

7.4.15 The site provides some suitable nesting habitat for nesting grey partridge and also good foraging habitat for chicks and young birds. Breeding grey partridge might also nest in thick vegetation along hedges (favoured nesting habitat[26]) in surrounding arable land with broods subsequently moving onto the site to feed in the grassland, which provides a richer invertebrate chick food resource than surrounding arable.

7.4.16 The regular and frequent informal public access/dog walking to the existing grassland area north of Manston Road (extending to about 40ha), along with the continued mowing regime, reduce the quality of this area to breeding ground nesting species such as skylark and grey partridge.

7.4.17 Building inspections in autumn 2017 (see **Appendix 7.6**) found no evidence of nesting barn owls although two buildings (B11 and B52, **Figure 7.4** and **Figure 7.5**) were assessed as having the potential to support these as they contained suitable nesting features. Checks of all trees on site in November 2017 did not reveal any potential barn owl nesting features.

7.4.18 Considering the findings of the building inspections and the quality of the habitats on and around the site, it is considered unlikely that barn owls currently use the site and even if a worst case assessment were adopted, given the available habitats no more than a single pair of barn owl could nest on site.

7.4.19 It is considered that the design of the buildings on site provide very few nesting opportunities for other bird species of conservation concern, such as house sparrow and starling breeding would be in low numbers. A similar pattern may be seen with notable bird species, such as dunnock, that may nest in hedgerows and small trees. It is considered that the lack of such suitable nesting habitat on site would result in small numbers of such species breeding on site.

Great Crested Newts

7.4.20 The 2017 desk study identified one record of GCN since 2000, which was from Monkton Chalk Pit Nature Reserve in 2011, 2.9km to the west of the site. GCN presence was found not to feature in the ecology studies of other nearby recent developments[27]. In addition, no mitigation licences for this species appear on the MAGIC[28] database within at least 10km of the Proposed Development.

7.4.21 Two water bodies were identified within the site: a balancing pond and an emergency water supply tank. The balancing pond is a concrete structure with vertical walls covered with a wire frame; fish are visible and there is limited vegetation overhanging the concrete banks. The water supply tank is an above ground metal tank. During the ground-truthing site visit in 2017, it was considered that neither feature provides suitable breeding habitat for GCN. The desk study (**Appendix 7.2**) revealed no records for the site or within 2km, although it identified three ponds within a radius of 500m from the site, which might be suitable for GCN. Survey, including eDNA testing, for the SHP

proposal confirmed that, although suitable terrestrial habitat occurs on site and within 500m of the site, GCN was absent. Therefore, it was concluded that this species is absent from the site.

7.4.22 The desk study and survey revealed a total of ten water bodies: two within the site and eight within 500m of the site (detailed within **Appendix 7.2** and **Figure 7.2**). A summary of each water body is provided in **Table 7.5**.

Table 7.5 Water body assessment

Water body number	On/Off Site	Access (Y/N) [xxi]	Screened in/out
1	On	Y	Screened out: unsuitable habitat: fish present, vertical concrete walls.
2	On	Y	Screened out: unsuitable as above ground tank with no access for amphibians.
3	Off	Y	Screened out: unsuitable habitat (agricultural reservoir).
4	Off	N	Unable to screen in/out as no access and no data.
5	Off	N	No access but screened out: separated from Site by the A299.
6	Off	Y	Screened out: not present.
7	Off	N	Not applicable: no access.
8	Off	Y	Screened out: artificial garden pond with heavy use by ducks.
9	Off	Y, restricted view	Screened out: no standing water.
10	Off	Y	Screened out: unsuitable habitat (agricultural reservoir).

7.4.23 As a result of the findings of the desk study and water body assessments, it was concluded that GCN are likely to be absent from the site and suitable aquatic habitat within 500m of it. GCN were scoped out from further assessment.

Reptiles

7.4.24 No reptiles were recorded during the autumn 2017 presence/absence survey of the majority of the site. A single adult common lizard however, was recorded basking along the western site boundary (adjacent to Minster Road) during felt/tin placement on 23 August 2017. Considering the negative results of the presence/absence surveys, this single record suggests it was a transient reptile; though if it was resident, Froglife guidance[29] indicates that at best, a low population of common lizard might be present along the southern-most section of the western site boundary.

7.4.25 Small areas (c. 4ha) of the site were not included in the 2017 presence/absence survey, including the 'brownfield' land (the former car park) at the eastern end of the site. These unsurveyed areas are shown in Figure 2 in **Appendix 7.6**). In addition, presence/absence surveys are required (see **Appendix 7.10**) at the land north of Spitfire Way (c.0.3ha), a recent addition to the Proposed Development and suitable reptile habitat is present in this area. These as yet unsurveyed areas, although considerably smaller than the remaining parts of the site, support a greater complexity of habitat types which are more suitable reptile habitat than the large expanse of mown grassland that covers the majority of the rest of the site. Features such as daytime refuge/hibernation sites along with basking sites and good habitats for invertebrate prey are present and have the potential to contain high densities of one or more of the widespread reptile species (e.g. common lizard and slow worm).

[xxi] Permission to access the offsite waterbodies was sought but was not obtained for 4, 5 and 7.

Badger

7.4.26 Walkover surveys of the site did not reveal any evidence of badger. In February and August 2017, mammal burrows (which had potential to be setts) along the northern boundary of the site indicated by the desk study were found to have collapsed with no sign of recent mammal activity. In addition, that part of the site, south of the B2050 (Manston Road), is surrounded by a security fence; no damage to this that would allow badgers onto the runway section of the site was noted.

7.4.27 An extended Phase 1 habitat survey of the 0.25ha area of the site off Spitfire Way[xxii] in October 2017 revealed no evidence of badger (see **Appendix 7.9**). An extended Phase 1 habitat survey of land parcel 1362 did reveal some evidence of badger use, with a potential sett located adjacent but outside of the boundary of the land parcel/field (see **Appendix 7.10**). The evidence of badger in land parcel 1362 comprised a mammal run, and latrine. The potential sett was located on adjacent land. Land parcel 1362 is an arable field i.e. it is cultivated annually.

7.4.28 Badgers are common and widespread in Kent and England. It is considered that the low level of badger activity recorded on and adjacent the site (one potential sett recorded, confidential location) is likely to be slightly atypical of the area. This may be due to the perimeter security fence around much of the site and the surrounding busy roads, which would likely deter/prevent badgers from accessing the site. In addition, the generally flat, level terrain with little cover does not present optimal sett building habitat.

Terrestrial Invertebrates

7.4.29 The invertebrate scoping survey in August 2017 indicated that the managed grassland, which comprises most of the habitat on the site, is uniform in structure; has limited topographical variation; limited areas of bare ground; and, is semi-improved in character. Therefore, though invertebrates will be present, the expectation is that this assemblage will not be exceptional. Species diversity and interest are considered likely to be higher in other comparatively small areas of open habitats where there is:

- Varied structure, including bare and sparsely vegetated ground, unmanaged tall herbs and complex mosaics;
- Varied substrates;
- Locally varied topography; and
- Varied floristic composition, including good populations of a number of important food plants that are not present, or rare, in the managed grassland.

Designated Sites

7.4.30 The desk study has indicated the presence of the following statutory sites within a potential Zone of Influence (ZoI) (see **Box 7.4** for definition). The designated sites are shown on **Figure 7.1** with summary detail in **Table 7.6**.

Table 7.6 Desk Study: Statutory Sites (in order of distance from Order Limits/ Red Line Boundary)

Site	Status	Description	Approximate Distance from Site
Thanet Coast and Sandwich Bay	Ramsar	The site is of value to breeding and wintering birds, as well as supporting outstanding communities of terrestrial and marine plant species and a significant number of rare invertebrate species. The site supports a total of at least 15 Red Data Book invertebrate species associated with wetlands.	0m South-east

[xxii] This small area was included as part of the Proposed Development subsequent to the original establishment of the red line boundary.

Thanet Coast and Sandwich Bay	SPA	The site supports populations of European importance for turnstone (*Arenaria interpres)* (non-breeding); European golden plover (*Pluvialis apricaria*) (non-breeding) and little tern (*Sternula albifrons*) (breeding).	0m South-east
Sandwich Bay	SAC	Selected as an SAC due to the presence of several Annex I habitats. These being; embryonic shifting dunes, shifting dunes along the shoreline with European marram grass (*Ammophila arenaria)* - 'white dunes', fixed coastal dunes with herbaceous vegetation and dunes with *Salix repens* ssp. *argentea*.	0m South-east
Sandwich and Pegwell Bay	NNR	The Reserve has a complex mosaic of habitats including inter-tidal mudflats, saltmarsh, shingle beach, sand dunes, ancient dune pastures, chalk cliffs, wave cut platform and coastal scrubland. It supports the only ancient dune pasture in Kent. The reserve is of international importance for its wader and wildfowl populations. 615ha of the NNR is managed as a Kent Wildlife Trust Reserve.	0m South-west
Sandwich Bay to Hacklinge Marshes	SSSI	The most important sand dune system and sandy coastal grassland in South East England. There are also a wide range of other habitats such as mudflats, saltmarsh, chalk cliffs, freshwater grazing marsh, scrub and woodland are found here. This site comprises grazing marsh habitats within Minster Marshes and often supports large wintering populations of waders, some of which regularly reach levels of National importance. Associated with the site are outstanding assemblages of both terrestrial and marine plants and invertebrates.	0m South-east
Thanet Coast	SAC (including Inshore Marine)	The longest continuous stretch of coastal chalk in the UK that supports Annex 1 Habitats: Reefs and submerged or partially submerged sea caves	~150m North-east
Prince's Beachlands	LNR	A narrow coastal site located between two sections of Sandwich and Pegwell Bay NNR and within the Sandwich Bay to Hacklinge Marshes SSSI. A complex mosaic of habitats of international importance for its bird populations.	~2,500m South-east
Outer Thames Estuary	SPA (Marine)	The site is classified for the protection of the largest aggregation of wintering red-throated diver (*Gavia stellata*) in the UK, an estimated population of 6,466 individuals, which is 38% of the wintering population of Great Britain. The site extends to 379, 823.81 ha	~3,400m North and North-west
Thanet Coast	SSSI	The Thanet Coast is particularly noted for its bird populations, supporting both internationally and nationally important numbers of wintering birds, and outstanding assemblages of both terrestrial and marine plant species are present within its various constituent habitats, including communities of marine algae that are of limited occurrence elsewhere in the British Isles. Invertebrates are also of interest and there are recent records of three nationally rare and one nationally scarce species.	~4,300m East
Margate and Long Sands	SCI[xxiii] (Inshore Marine)	Margate and Long Sands starts to the north of the Thanet coast of Kent and proceeds in a north-easterly direction to the outer reaches of the Thames Estuary. It contains a number of Annex I Sandbanks slightly covered by seawater at all times, the largest of which is Long Sands itself.	~4,840m North

[xxiii] Margate and Long Sands was formally submitted by the government to the European Commission as a candidate Special Area of Conservation on 20 August 2010. Margate and Long Sands cSAC was adopted by the European Commission as a Site of Community Importance (SCI) in 2011. The UK Government then has 6 years from adoption to designate it as a SAC.

Stodmarsh	SPA	The site qualifies as an SPA as it holds internationally important numbers of several species with over winter: bittern and hen harrier, and during the breeding season gadwall. It also supports internationally important numbers over winter of shoveler and gadwall, and also qualifies due to an internationally important diverse assemblage of over wintering birds, including white-fronted goose, wigeon, mallard, pochard, tufted duck, water rail, lapwing and snipe.	~7,700m South-west
Stodmarsh	SAC	A sizeable population of the rare Desmoulin's whorl snail (*Vertigo moulinsiana*) lives beside ditches within pastures on the floodplain of the River Stour where reed sweet-grass (*Glyceria maxima*), large sedges and common reed (*Phragmites australis*) dominate the vegetation.	~7,700m South-west
Stodmarsh	NNR	Supports internationally important habitats including reedbeds, fens, ditches, wet grassland and open water which provide an ideal habitat for breeding and wintering birds, invertebrates and rare plants. Water voles are present on the reserve.	~7,700m South-west
Stodmarsh	SSSI	This wetland site contains a wide range of habitats including open water, extensive reedbeds, scrub and alder (*Alnus glutinosa*) carr which together support a rich flora and fauna diversity. The vegetation is a good example of southern eutrophic flood plain and a number of rare plants are found here. The site is also of interest due to its diverse breeding bird community and several scarce moths.	~7,700m South-west
Stodmarsh	Ramsar	The site supports six British Red Data Book wetland invertebrates, two nationally rare and five nationally scarce plant species. The flora of the site includes the rare sharp leaved pondweed, as well as vulnerable whorled water-milfoil (*Myriophyllum verticillatum*), rootless duckweed (*Wolffia arrhiza*) and *Carex divisa*. Otter is also recorded here.	~8,450m South-west
Preston Marshes	SSSI	The last remaining area of fen vegetation within the Little Stour Valley, supporting a number of notable plant species and breeding and wintering bird assemblages including lapwing, redshank, reed buntings and reed and sedge warblers. Wintering species include lapwing, snipe and various wildfowl such as teal and wigeon.	~8,900m South-west
Bishopstone Cliffs	LNR	A clifftop grassland important for insects, with some rare species, and birds, such as sand martin (nesting in the cliffs), skylark, meadow pipit and corn bunting. The LNR is part of Reculver Country Park.	~9,220m North-west
Blean Complex	SAC	A complex of broad leaved deciduous woodland designated for the Annex I habitat "Sub-Atlantic and medio-European oak or oak-hornbeam forests of the *Carpinion betuli"*.	~11,500m West
Blean Woods	NNR	Largest ancient woodland in southern Britain. Hornbeam, hazel, beech, oak, birch and sweet chestnut grow on the reserve, whilst brambles, bracken and bluebells dominate the woodland floor.	~11,500m West
East Blean Woods	SSSI	East Blean Woods is one of the best remaining examples of primary deciduous woodland in the Blean Woods complex. The wood comprises mixed coppice with oak standards.	~11,500m West

7.4.31 There are three non-statutory sites of nature conservation value within 2km of the site boundary:

- Pegwell Bay Infilled Dry Valley Local Wildlife Site (LWS, ref. TH02), located 1km south-east of the Proposed Development;
- Roadside Nature Reserve (RNR, ref. TH04), 1.5km north of the site; and
- Woods and Grassland, Minster Marshes LWS (ref. TH12). The LWS is located approximately 1.6km to the south of the site.

Future Baseline

7.4.32 It is anticipated that the current management of the site will continue as it is and up to the point of the Proposed Development. The future baseline of the site is therefore unlikely to be materially different to that which exists now. It is therefore appropriate to use the current baseline for the purpose of the assessment.

7.4.33 In the absence of the Proposed Development, or any other development, further dereliction is likely to occur and small parts of the site where management is limited/ non-existent will become more dominated by scrub.

7.4.34 In respect of ornithology, the future baseline may alter due to the effects of climatic change on bird productivity, survival rates, breeding and wintering ranges. Recent collaborative work by Durham University, the BTO and RSPB predict substantial changes in species ranges during the coming decades with an average shift north of 4km per year and contraction of range and species richness (Huntley *et al*., 2007[30]). For example, there is increasing evidence that the overwintering distributions of many coastal waders in the UK have shifted in recent decades in response to warming. In the last decade, this has resulted in declines in usage of east coast sites in favour of The Netherlands, although during recent cold winters, this trend has been partially reversed (Pearce-Higgins and Holt, 2013[31]).

7.4.35 There are likely to be similar climate change impacts on all other biodiversity. For example, analysis of distribution data for a range of vertebrate (e.g. amphibians, freshwater fish and mammals) and invertebrate groups (e.g. damselflies, spiders and millipedes) has shown a range extension northward and uphill in Britain over approximately 25 years, in response to the changing climate. For example, out of a total of 329 species with range limits in Britain analysed across 16 taxa, 275 species shifted northwards at their range margin and 52 shifted south. The same analysis showed that 227 species shifted to higher altitude and 102 species shifted to lower altitude. The average northwards shift across all species was 31-60km, with a mean increase in altitude of 25m (Hickling *et al*. 2006[32]).

7.4.36 However, in the short to medium term, it is anticipated that the baseline will remain similar, albeit the diversity and abundance of individual species with the floral and faunal assemblage may vary.

7.5 Environmental Measures Incorporated into the Proposed Development

7.5.1 The influence of environmental mitigation on the assessment of significance is discussed in **Section 7.6**. However, the broad approach adopted is that where achievable and agreed, environmental measures have been incorporated into the Proposed Development and the effect of this is taken into account during the assessment, since they are considered part of the design. In some cases, a potential effect may require no further consideration following incorporation of appropriate environmental measures.

7.5.2 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 biodiversity effects is provided in **Table 7.7**. A Mitigation and Habitat Creation Plan (MHCP, **Appendix 7.13**) details the off-site habitat creation proposed as part of the mitigation and compensation package. The MHCP details the conversion of Field/Land Parcel 1362 into a Biodiversity Area (BA) that will comprise a range of high quality habitats of benefit to valued ecological receptors.

Table 7.7 Rationale for incorporation of environmental measures

Potential receptor	Predicted changes and potential effects	Incorporated measure
Designated sites	Pollution/eutrophication from Site discharges	See Table 8.13 in **Chapter 8: Freshwater Environment** for measures applied during the construction process to prevent pollution incidents (from concrete batching/cement products) and uncontrolled sediment, and spillages of oils and other chemicals from entering the freshwater environment. An Outline DS has been developed (see **Chapter 3: Description of the Proposed Development**). The drainage system will be designed to capture, treat and discharge water in a controlled manner. No water will be allowed to infiltrate to ground from any site hardstanding, and water will either be re-used or set to the site treatment facilities (attenuation ponds). Discharge from these ponds will be via a permitted discharge to Pegwell Bay. Discharge of treated water to Pegwell Bay, rather than to ground, with appropriate monitoring of water quality to ensure quality standard is maintained. A maximum discharge rate of 150 l/s[xxiv] has been assumed in designing the on-Site attenuation ponds, however at the detailed design stage the site drainage network design will need to include consideration of the impact of the rate of discharge at the designated features on Pegwell Bay. Further consultation on this point with Natural England and the Environment Agency[xxv] is also expected to occur. The proposed pumping rate represents a maximum worst case scenario and lower rates could be achieved by using a variable rate pump or further attenuating water on site. If further attenuation is required this could be achieved by increasing the surface area of the ponds, by providing limited infiltration of clean run off (e.g. roof drainage), by providing addition attenuation tanks elsewhere on site, by providing additional storage capacity with the drainage network by oversizing pipes, by utilising any spare capacity in the Southern Water drainage network or by using clean run-off water elsewhere on site. The work to refine and improve attenuation and therefore reduce peak discharge rates is expected to be investigated during the detailed design stage of the project which will come after the order is made (see **Chapter 8: Freshwater Environment**).
Habitats	Habitat loss	Compensation through off-Site habitat creation at the c. 36ha land parcel 1362 (**Appendix 7.10**). Habitats will be managed specifically for the biodiversity value to be higher quality than that occurring on-Site.
Potential effects on birds due to damage or destruction of active nests	Legal non-compliance	Any removal of vegetation or buildings with the potential to support nesting birds will, wherever possible, be undertaken outside the bird nesting season (March to August inclusive) to ensure compliance with the WCA 1981 (as amended). If any clearance work has to be undertaken during the main breeding season, it will only be undertaken after a qualified ecologist has confirmed that the feature does not support any nesting birds. In view of this, no potential adverse effects are anticipated.
Bats	Disturbance to/loss of foraging, commuting habitat for bats Potential disturbance to roosts, mortality/injury to individuals; habitat loss	A method statement and tool-box talk will be prepared that would include details of pre-construction verification surveys for bats, describing the approach that would be followed to avoid contravening the *WCA1981* (as amended) (WCA) and The *Habitats*

[xxiv] Though initial consultation on site discharge rates mentioned a maximum rate of 30 l/s, as the masterplan has matured this has been determined to be too low for the hardstanding extent (see **Chapter 8: Freshwater**) and would result in deep excavations. Therefore, for the purposes of this application a maximum discharge rate of 150 l/s has been assumed.

[xxv] The regulation of the Pegwell Bay Discharge has been discussed by the EA and NE. The EA have indicated that a discharge of surface water runoff to sea does not usually require a Water Discharge Activities permit (see EA meeting 06/03/2017, Table 8.6, **Chapter 8: Freshwater**). However, it has been acknowledged in discussions that the designation features around Pegwell Bay do require protection and in this case a permit may be appropriate. The exact regulatory arrangement (and any associated monitoring) for the quality of site discharges will be discussed with the EA and NE prior to the commencement of works. The focus of these discussions will be the protection of the designated site at Pegwell Bay to ensure protection of sensitive features.

		Regulations. Where required, this would involve obtaining an EPS mitigation licence through NE with respect to development. The method statement will also describe habitat enhancements to be implemented as part of the Proposed Development. Due to the nature of the development much of the Site will be unsuitable for bats once operational with extensive Site and building lighting. Consequently, compensation for foraging/habitat/roost loss and any enhancements (including the installation of a bat barn, bat bunker and bat boxes) are provided off-Site within land parcel 1362 (see **Appendix 7.13**).
Breeding birds	Disturbance to/loss of foraging habitat/breeding sites/shelter	Off-Site habitat provision in the c.35.7ha land parcel 1362 for ground nesting farmland birds e.g. skylark and grey partridge (see **Appendix 7.10**). Although the extent of off-Site habitat provision is smaller than the area that will be lost, the habitat provided will be of higher quality. Created habitats, improving the quality of that lost on Site, will have particular species-specific habitat creation measures and management for farmland birds (see **Appendix 7.13**).
Reptiles	Kill/injure reptiles	Method statement and tool box talks will be prepared to avoid contravening the WCA. Removal of suitable habitat would be designed to avoid the risk of injury to reptiles, through measures such as timing ground works to avoid the reptile hibernation period and the gradual removal of habitat. Any reptile populations in the remaining unsurveyed areas (c.4ha) will be captured and translocated to suitable habitats (e.g. with hibernacula, compost heaps, log/brash piles and basking areas) on Site (south of the existing southern perimeter fence) and off-Site (the BA- see **Appendix 7.13**).
Terrestrial invertebrates	Disturbance to/loss of foraging habitat/breeding sites	Compensation through habitat treatments on Site (e.g. maintenance of a stressed vegetation community along runway edges by permitting short vegetation to grow on shallow substrate upon runway surface), and habitat creation on-Site south of the current southern perimeter fence and within the BA (see **Appendix 7.13**). Created habitat will be specifically designed with diverse features to encourage invertebrates (e.g. including features typical of open mosaic habitat.
Barn owl	Disturbance to nesting birds	Wherever possible, construction within 200m of barn owl nest sites will be timed to avoid breeding season (that is March – December inclusive). If this is not possible, nest boxes would be capped outside the breeding season prior to construction and new alternative nest sites will be installed off-Site at least 1km from busy roads to prevent collision risk with vehicles.
Badger	Legal non-compliance: damage/disturbance to setts/habitats and individuals	To ensure compliance with legislation a method statement and tool-box talk[xxvi] would be prepared that would include details of pre-construction surveys to check on the presence of badgers and the approach that would be followed to avoid contravening the *Protection of Badgers Act 1992*. Good practice guidelines would be followed during the works (see **Appendix 7.13**). This includes making all contractors aware of the potential presence of badgers, and not leaving trenches uncovered overnight (or leaving an escape plank if excavations cannot be covered). Any obvious mammal trails will be kept clear of obstruction.
All	Damage to species through disturbance from noise	Noise control measures have been assessed in **Chapter 12: Noise and Vibration**. During the construction phase these will include maintaining buffer distances to sensitive receptors, use of best technology, dampers on vibrating or noise emitting equipment, timing of works. Operational phase measures are set out in the noise mitigation plan (see section 12.7, **Chapter 12: Noise and Vibration**).

[xxvi] A 'toolbox talk' is a short presentation to the workforce on an aspect of a particular topic.

All	Damage to habitats and/or species through smothering/inhalation from dust	As part of the Construction Environmental Management Plan (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 (see **Chapter 6: Air Quality**). Measures will include locating stockpiles away from site boundary/receptors, covering or damping down stockpiles, stockpile maintenance/management, and removal of materials from site.
All	Damage to habitats and/or species caused by changes to air quality arising 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.
All	Damage to habitats and/or species through pollution (terrestrial and aquatic) during construction and operation.	Construction practices will comply with the Environment Agency's Pollution Prevention Guidelines with a view to preventing the pollution of ground and surface water. Pollution prevention control measures for water quality issues (including the management of noise and dust) are detailed in a method statement (as part of the CEMP) and implemented during the construction phase to avoid damage to habitats/species. **Chapter 8: Freshwater Environment** details further measures.
All	Damage to habitats and / or species from air quality changes through excessive vehicle emissions during operation.	During operation, agreed delivery and dispatch schedules for HGV will be enforced to avoid, where possible, congestion on the local road network and excessive emissions to atmosphere. A "no unnecessary idling" policy for all vehicles on the development site is to be implemented and enforced.
All	Damage to habitats and / or species as a result of emissions from aircraft movements on the ground and during the Landing and Take Off cycle.	Planning of aircraft arrival and departure scheduling to avoid, where possible, over-long idling, taxiing and hold times. Airfield layout design to minimise times taxiing and holding. Use of Fixed Electrical Ground Power to minimise engine/Auxiliary Power Unit use. Bans on older, dirtier aircraft.
All	Damage to habitats and / or species as a result of emissions from aircraft ground support equipment (GSE).	Operations will involve use of a largely electric GSE fleet. Any diesel GSE will largely be purchased new and meeting current emissions standards. Aircraft arrival and departure scheduling planned to avoid, where possible, over-long operation of liquid fossil-fuelled GSE.

7.6 Scope of the Assessment

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

7.6.2 The scope of assessment has been informed by: the scoping study; consultee responses to the Scoping Report and the 2017 and 2018 PEIRs; the results of the baseline survey work detailed in **Section 7.4**; and the Proposed Development design.

Approach to Identifying Receptors

7.6.3 The identification of receptors is based on relevant guidance and the professional judgement of a qualified technical specialist who has undertaken a desk study and a preliminary ecological assessment[xxvii] for the Site location.

7.6.4 In some cases, even without quantified information, it is reasonable to assume that some potential receptors will not experience significant effects. This is sometimes the result of mitigation measures that have been incorporated into the Proposed Development, which might reasonably be expected to be effective (see **Section 7.5**).

7.6.5 The following considerations have been taken into account in identifying potential receptors:

- The importance or value of the receptor at a local, regional and national level;
- The extent to which valued ecological receptors will be affected by changes that are expected to result from the Proposed Development;
- The sensitivity of the valued ecological receptors to the changes that are likely to occur;
- The likely magnitude, duration and other characteristics of the effects; and
- Relevant best practice and guidance where specialist methodologies have been developed as detailed below.

Potential Receptors

7.6.6 This section details the potential receptors that have been identified based on desk study, survey, professional judgement and on the consultation response received from PINS.

7.6.7 A key consideration in assessing the effects of any development/proposed works on flora and fauna is to define the habitats and species that need to be included in the assessment. In identifying these receptors, it is important to recognise that a development can affect flora and fauna both within the site (e.g. through the land-take required) as well as beyond the site (e.g. through noise generation, changes in air quality). The approach that has been taken in preparing this Chapter is to identify important biodiversity resources (the sites, habitats and species of sufficient importance that effects upon them could be significant), as well as considering legally protected species.

7.6.8 Assessment of the effects of the Proposed Development on biodiversity was undertaken with reference to CIEEM's Guidelines for Ecological Impact Assessment in the United Kingdom[33]. The assessment has focused on legally protected and otherwise important biodiversity resources (see **Boxes 7.1** and **7.2**).

7.6.9 The starting point for the assessment was to undertake an exercise, using the baseline data that were collected through the desk study and knowledge of the local area, to subdivide the recorded biodiversity receptors (i.e. designated sites, together with species populations and habitats) into:

- Those that could be significantly affected by the Proposed Development or for which the development could result in the contravention of relevant legislation, and that therefore required more detailed assessment; and
- Those that were assessed as not being likely either to be significantly affected or whose presence was not likely to result in any relevant legislation being contravened, and that did not therefore require further assessment (i.e. that were 'scoped out' of the assessment).

7.6.10 For sites/habitats/species that meet the criteria in **Box 7.1** and / or **7.2**, the next stage of the scoping assessment is to determine whether the identified receptors are likely to be of sufficient 'biodiversity conservation value' that an effect upon them could be significant in Environmental Impact Assessment (EIA) terms. In this context:

- Biodiversity conservation value relates to the quality and/or size of sites or habitats, or the size of species populations (see Box 7.3); and

[xxvii] Based on a ground truthing verification (see 'Survey work' section).

- Potential significance means that the effect could be of sufficient concern, or for positive effects, of such substantial benefit that it could influence the decision about whether or not development consent or a specified other consent should be granted.

Box 7.3 Value and importance for biodiversity conservation

The distinction between importance and value can be illustrated by common species such as the house sparrow. This species is important at a national level because it is a priority species (Section 41, *NERC Act 2006*). However, a small population that could be affected by a development would often be assessed as being of insufficient value for an effect (whether adverse or beneficial) to be of potential significance, due to the small size of the population. On this basis it would not need to be assessed further (i.e. it would be 'scoped out' of the assessment).

7.6.11 Receptors that are of sufficient value that an effect upon them would have the potential to be significant, together with all relevant legally protected species, are taken through to the assessment. This involves identifying, for each receptor:

- Any environmental changes that are likely to be caused by the Proposed Development which have the potential to lead to a significant effect and/or to contravene relevant legislation;
- For these environmental changes, determining the area within which each change could cause a likely significant effect or could contravene relevant legislation (i.e. an 'ecological zone of influence' - see **Box 7.4**);
- Comparing the area where the receptor occurs with the ecological zone of influence; and
- If the receptor occurs or is likely to occur within the zone of influence, concluding that either the receptor could be subject to a significant effect and/or the relevant legislation could be contravened, in which case the effects upon the receptor are scoped in, or no significant effect is likely to occur and it is scoped out.

Box 7.4 Defining ecological zones of influence

The ecological zone of influence that is the most straightforward to define is the area affected by land-take and direct land-cover changes associated with the development. This zone is the same for all affected receptors. By contrast, for each environmental change that can extend beyond the area affected by land-take and land-cover change (e.g. changes in noise associated with development activities within the land-take area), the zone of influence may vary between receptors, dependent upon the receptors' sensitivity to the change and the precise nature of the change.

For example, dormouse might be unaffected by noise associated with a development unless the noise is generated very close to where the dormouse nests, while another mammalian species might be disturbed at much greater distances; other species (e.g. of invertebrate) may be unaffected by changes in noise. A further complication is that the response of a receptor to a change associated with one development may differ to the response of the same receptor to a similar change on another development. This can occur as a result of the wide range of variables that influences the precise nature of any change (e.g. for noise this can include: differing baseline noise conditions; specific magnitude, timing or other characteristics of the noise; and the effects of screening and topography).

In view of these complexities, the definition of the zones of influence that extend beyond the land-take area will be based upon professional judgement, informed by discussions with the technical specialists who are working on other chapters of the ES. These specialists will provide information about the environmental changes that they assess within their ES chapters. This information will be combined with available ecological information about receptors' sensitivities to different environmental changes in order to define the extent of each ecological zone of influence.

7.6.12 The key issues relating to biodiversity receptors and the Proposed Development are as follows:

- The effects of temporary and permanent habitat loss from land take by access and construction areas;
- The effects of pollution (air quality effects associated with changes in air quality and nitrogen deposition leading to enrichment/acidification of habitats, pollution from surface water run-off etc.);
- Disturbance (from noise, visual and light, drainage) to surrounding habitats and associated species; and
- The effects of collision with aeroplanes, which is of particular relevance in areas known to support raptors or large concentrations of waterfowl.

7.6.13 Initially, a 15km radius was used as the search area and potential ZoI for the Proposed Development (to ensure incorporation of potential flight paths), with the intention of extending or reducing the ZoI as more information and baseline data became available. For example, the air quality assessment informed the original ZoI with regards to the potential distance over which deposition of nitrogen and other emissions may typically be detected. Over 15km, the emissions due to aircraft moving to or from the airport are likely to be deposited in a dispersed manner due to their ejection at altitude, hence the initial 15km radius. Justification for defining ZoI is provided in Table 7C.1 in **Appendix 7.3**.

7.6.14 **Table 7.8** summarises information about the receptors that have been identified through the scoping process as having the potential to be significantly affected by the Proposed Development and/or for which legislation could be contravened (see Table 7A.1 and Table 7B.1 in **Appendix 7.3**). The table also identifies the potential effects that need to be assessed. The report to inform the appropriate assessment (**Appendix 7.1**) details the assessment of those receptors (European sites) covered by the Habitats Regulations and those sites (such as Ramsar sites), which according to national policy (NPPF), are given the same consideration as European sites.

Table 7.8 Potential receptors

Potential Biodiversity Receptor	Valued and / or legally protected?	Relevant criteria (from Box 7.1) and legislation (from Box 7.2)	Potentially significant effects/legal contravention and causal changes
Thanet Coast and Sandwich Bay Ramsar	Biodiversity conservation value Legal status	Habitats Regulations	There is a potential for direct effects to the foraging habitat of over-wintering birds from the discharge (through pollution and/or scour) of treated water to Pegwell Bay. There is potential for effects to foraging habitat and potential disturbance / displacement effects to over-wintering birds as a result of aircraft movements.
Thanet Coast and Sandwich Bay SPA	Biodiversity conservation value Legal status	Habitats Regulations	There is a potential for direct effects to the foraging habitat of over-wintering birds from the discharge (through pollution and/or scour) of treated water to Pegwell Bay. There is potential for effects to foraging habitat and potential disturbance / displacement effects to over-wintering/breeding little tern birds as a result of aircraft movements.
Thanet Coast SAC	Biodiversity conservation value Legal status	Habitats Regulations	There is potential for direct effects resulting from a deterioration in air quality, increased deposition and from the discharge of treated water.
Sandwich and Pegwell Bay NNR	Biodiversity conservation value Legal status	*National Parks and Access to the Countryside Act 1949* and *the WCA 1981*(as amended)	There is potential for direct effects resulting from a deterioration in air quality, increased deposition and from the discharge (through pollution and/or scour) of treated water.

Potential Biodiversity Receptor	Valued and / or legally protected?	Relevant criteria (from Box 7.1) and legislation (from Box 7.2)	Potentially significant effects/legal contravention and causal changes
Sandwich Bay to Hacklinge Marshes SSSI	Biodiversity conservation value Legal status	*WCA 1981* (as amended)	There is a potential for direct effects to the foraging habitat of over-wintering birds from the discharge (through pollution and/or scour) of treated water to Pegwell Bay. There is potential for effects to foraging habitat and potential disturbance / displacement effects to over-wintering birds/breeding little tern as a result of aircraft movements.
Thanet Coast SSSI	Biodiversity conservation value Legal status	*WCA 1981* (as amended)	There is potential for direct effects resulting from a deterioration in air quality and increased nutrient nitrogen deposition.
Margate and Long Sands SCI (Inshore marine)	Biodiversity conservation value Legal status	Habitats Regulations	There is potential for direct effects resulting from a deterioration in air quality and increased nutrient nitrogen deposition.
Stodmarsh SAC	Biodiversity conservation value Legal status	Habitats Regulations	There is potential for direct effects resulting from a deterioration in air quality and increased nutrient nitrogen deposition.
Stodmarsh NNR	Biodiversity conservation value Legal status	*National Parks and Access to the Countryside Act 1949* and *the WCA 1981*(as amended)	There is potential for direct effects resulting from a deterioration in air quality and increased nutrient nitrogen deposition.
Stodmarsh SSSI	Biodiversity conservation value Legal status	*WCA 1981* (as amended)	There is potential for direct effects resulting from a deterioration in air quality and increased nutrient nitrogen deposition.
Stodmarsh Ramsar	Biodiversity conservation value Legal status	Habitats Regulations	There is potential for effects to foraging habitat and potential disturbance/displacement effects to over-wintering birds due to the noise/ aircraft visibility resulting from aircraft movements.
Stodmarsh SPA	Biodiversity conservation value Legal status	Habitats Regulations	There is potential for effects to foraging habitat and potential disturbance/displacement effects to over-wintering birds due to the noise/ aircraft visibility resulting from aircraft movements.
Preston Marshes SSSI	Biodiversity conservation value Legal status	*WCA 1981* (as amended)	There is potential for direct effects resulting from a deterioration in air quality and increased nutrient nitrogen deposition.
Breeding birds	Biodiversity conservation value Legal status	*WCA 1981* (as amended)	Land take/land cover change (habitat removal); management changes resulting in reduction in habitat. Potential effects on birds due to damage or destruction of active nests.
Bats	Biodiversity conservation value Legal status	Habitats Regulations NERC Act 2006 section 41 Species of Principal Importance (7 species) Kent BAP Priority species (Noctule, soprano pipistrelle and brown long-eared bat species)) *WCA 1981* (as amended)	Removal of/ damage to and/ or disturbance of roosts. Disturbance of commuting and foraging bats from light spill. Disturbance from noise / barrier effects to commuting routes from new development.

Potential Biodiversity Receptor	Valued and / or legally protected?	Relevant criteria (from Box 7.1) and legislation (from Box 7.2)	Potentially significant effects/legal contravention and causal changes
Badgers	Legal status (scoped out of assessment except for measures to ensure compliance with legislation)	*Protection of Badgers Act 1992*	Creation of deep excavations during construction/habitat enhancement/ creation in land parcel 1362 in which badgers could be trapped, causing death or injury. Increase in noise or vibration during the construction phase resulting in disturbance of sheltering badgers.
Reptiles	Legal status	NERC Act 2006 section 41 Species of Principal Importance *WCA 1981* (as amended) Kent BAP Priority species	Land take/land cover change (habitat removal) resulting in death or injury of reptiles.
Invertebrate assemblage	Biodiversity conservation value	NERC Act 2006 section 41 Species of Principal Importance	Land take/land cover change (habitat removal); management changes resulting in reduction in habitat.
Lowland grassland	Biodiversity conservation value	NERC Act 2006 section 41 Habitats of Principal Importance	Land take/land cover change, management changes resulting in loss /reduction in extent of receptor. There is potential for direct effects resulting from a deterioration in air quality and increased nutrient nitrogen deposition.
Woodland, including lowland, mixed deciduous and wet woodland, and traditional orchards	Biodiversity conservation value	NERC Act 2006 section 41 Habitats of Principal Importance	There is potential for direct effects resulting from a deterioration in air quality and increased nutrient nitrogen deposition.
Coastal and floodplain grazing marsh	Biodiversity conservation value	NERC Act 2006 section 41 Habitats of Principal Importance	There is potential for direct effects resulting from a deterioration in air quality and increased nutrient nitrogen deposition.
Reedbeds	Biodiversity conservation value	NERC Act 2006 section 41 Habitats of Principal Importance	There is potential for direct effects resulting from a deterioration in air quality and increased nutrient nitrogen deposition.

Climate Change

7.6.15 Greenhouse gas (GHG) emissions contribute to climate change, which could affect the designated features of European sites considered in this Chapter. For example: climate change may lead to crop management changes resulting in the loss of foraging habitat for golden plover[xxviii]. Climate change may also lead to changes in the distribution of wintering birds (e.g. wintering waders and wildfowl) due to other areas within the UK and abroad becoming more suitable for the species, leading to decline in the SPA/ Ramsar populations. Climate change has the potential to affect the prey of species e.g. breeding little terns[xxix] feed on sandeels, with the distribution of this fish species changed as a result of increased sea temperatures.

7.6.1 The climate change assessment (**Chapter 16: Climate Change**) concludes that whilst the Proposed Development has an impact upon global climate change, the effect is not significant assuming appropriate mitigations are taken.

7.6.2 Climate change has been incorporated in the design of habitats to reduce the risk of impact on breeding birds. This is described in **Section 7.13**. There are also other relevant design elements that reduce the impact of climate change on biodiversity, such as the allowance for climate change in drainage systems.

[xxviii] A notification/qualification species for the Thanet Coast and Sandwich bay SSSI/Sandwich Bay to Hacklinge Marshes SSSI.
[xxix] Also, a feature of the coastal designated nature conservation sites (see Table 7.6).

7.6.3 A high-level assessment of how climate change may affect species/species groups has been conducted and is presented in **Chapter 16: Climate Change**. Whilst climate change may impact receptors, the combined impact of the Proposed Development and climate change is inconclusive and therefore found to be not significant. As a result, no further mitigation as part of the Proposed Development is required, including monitoring beyond that required (as part of the favourable condition monitoring[xxx]) for SSSIs, which, if underpinning a European site, also provides a basis for their condition assessments.

Spatial and Temporal Scope

7.6.4 The spatial extent of the assessment of each potential significant effect reflects:

- The area occupied by the receptor that is being assessed; and
- The zone of influence associated with the environmental changes that are likely to affect the receptor (detailed in **Box 7.4**).

7.6.5 Thus, if part of a designated biodiversity site is located within the ecological zone of influence relating to a particular environmental change, an assessment is made of the effects on the Site as a whole. A similar approach has been taken for areas of notable habitat. For species that occur within an ecological zone of influence that relates to a change that could significantly affect the species, an assessment has been carried out on the total area that is used by the affected individuals or population of the species (e.g. for foraging or as breeding territories).

7.6.6 Effects on biodiversity (designated sites sensitive to air quality effects) associated with emissions (see **Table 7.8**) from road traffic as a result of the construction and operation of the development (e.g. HGV movements during construction, cargo deliveries to and from the airport) are assessed. Assessments occur where such sites fall within 200m of a road meeting one or more of the criteria included in the Highways Agency's Advice Note HA 207/07[xxxi] and the Environmental Protection UK/Institute of Air Quality Management (EPUK/IAQM)[34].

7.6.7 The study of associated noise (**Chapter 12: Noise and Vibration**) and air quality (**Chapter 6: Air Quality**) related effects during the construction and operational phases, upon which the biodiversity assessment is based, has been informed by the outcome of modelling based upon the location of the aircraft flight paths and are based upon worst-case (Year 2, 6 and 20) assessments.

Potentially Significant Effects

7.6.8 Based on the assessment methodology set out in **Section 7.7**, **Table 7.8** above summarises information about the receptors that have been identified (through the scoping process) as having the potential to be significantly affected by the Proposed Development (due to their biodiversity conservation value and/or for which legislation could be contravened). The table also identifies the potential effects that need to be assessed. The identified receptors are taken forward in **Section 7.8** for further, post-scoping assessment.

7.6.9 The environmental changes that are likely to be caused by the Proposed Development where a valued receptor is considered sensitive to these and which therefore have the potential to cause significant effects and/or contravention of wildlife legislation, have been identified as:

- Land-take/ land cover change/ construction;
- Increased light, noise and vibration;
- Increased vehicle movements;
- Pollution (contamination/eutrophication), and
- Air quality changes, including dust deposition and emissions.

[xxx] The condition of the SSSI land in England is assessed regularly by Natural England. There are six reportable condition categories: favourable; unfavourable recovering; unfavourable no change; unfavourable declining; part destroyed and destroyed.
[xxxi] Contained within Volume 11, Section 3 of the Design Manual for Roads and Bridges (DMRB) guidance.

Inter-related effects

7.6.10 There are two types of inter-related effect. These are:

- Combined effects: when individual effects of the proposed development combine to create a cumulative effect; and
- Interactive effects: consideration of interactions between different effects in relation to a specific receptor.

7.6.11 Combined effects normally 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 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. This is considered directly within the assessments included in this chapter and, as such, is not reported separately.

7.6.12 Interactive effects are assessed in relation to a specific receptor where the effect could be caused by the interactions of different types of effect from project activities even if individually these are insignificant (e.g. the interaction of noise disturbance and air quality changes on golden plover). Changes in relation to the following topics, as a result of the Proposed Development, have been considered and inter-related effects on biodiversity receptors are assessed within this chapter:

- **Chapter 6: Air Quality**;
- **Chapter 8: Freshwater Environment**; and
- **Chapter 12: Noise and Vibration**.

7.6.13 Where appropriate, interactive cumulative effects across topic areas are assessed, where the nature of the effect allows professional judgment to be applied. Interactive inter-related effects are located at the end of each assessment section.

7.6.14 The assessment of whether effects on biodiversity receptors has the potential to be exacerbated by climate change, is presented in **Chapter 16: Climate Change.**

7.6.15 There is potential for major accidents and disasters to affect biodiversity receptors. The receptors, baseline and assessments in this biodiversity chapter have been used to inform the assessment in **Chapter 17: Major Accident and Disasters**.

Cumulative effects

7.6.16 The biodiversity assessment considers the potential effects of the Proposed Development in combination with other schemes. Other plans and major developments need to be considered in assessing cumulative effects and include those under construction; permitted but not yet implemented; submitted but not yet determined; projects on the planning inspectorate's programme of projects; and those identified in development plans and other plans which are reasonably likely to come forward**.**

7.6.17 Details of the approach taken in assessing cumulative effects is provided in **ES Chapter 5: Approach to the Environmental Statement** and in **Chapter 18: Cumulative Impacts**. The outcome of this process, is a short-list of other developments and plans to include within the cumulative assessment.

7.6.18 The short list of other developments and plans that has identified for cumulative effects with the Proposed Development could potentially occur is presented in **Table 18.2** in **Chapter 18**. The reasons for inclusion and exclusion of 'other developments', are included in **Appendix 18.1, Chapter 18**. The location of the short list of 'other developments' is included in **Figure 18.1**.

7.6.19 Of these, 13 developments and nine plans are wholly or primarily associated with new residential property, with the remaining developments including an offshore wind farm, overhead electricity transmission, road improvement and other non-residential developments.

7.6.20 Developments and plans involving the construction of new residential housing have the potential to result in additional disturbance to features (e.g. species of wading birds) of European and international Importance and nationally designated nature conservation sites. This is due to

increased human visitor pressure to areas that these species utilise for foraging and roosting e.g. coastal habitats and farmland.

7.6.21 There is also the potential for onshore works (such as cable-laying) for the proposed offshore wind farm extension to disturb waders (such as turnstone and golden plover) foraging and roosting on Pegwell Bay. It is expected that this would be strictly controlled under any consent granted to the wind farm however, at this time the precise conditions are unknown.

7.6.22 Construction and operation of the developments and plans also have the potential to effect features of designated nature conservation sites due to increased nitrogen deposition from vehicles, pollution from surface water runoff from the sites, and increased disturbance due to the visual presence of operatives and noise from vehicles and machinery.

7.7 Assessment Methodology

7.7.1 Information for the assessment derives from the results of the desk study, baseline surveys, traffic, air quality and noise modelling, supplemented by published information (e.g. on potential biodiversity receptors' status, distribution, sensitivity to environmental changes and ecology) and professional knowledge of ecological processes and functions.

7.7.2 For each scoped-in receptor, effects have been assessed against the predicted future baseline conditions for that receptor (assumed to be the current baseline as noted in **Section 7.4**) during construction and operation. This future baseline has been defined using information as defined in 7.4.32 about the likely future use and management of the site in the absence of development, known population trends (for species) and any other proposed developments (consented or otherwise) that may act cumulatively with the scheme to affect biodiversity receptors. Modelling of air quality and noise effects has been based upon a worst-case scenario.

7.7.3 Throughout the assessment process, findings about potential for significant effects were used to inform the definition of requirements for additional baseline data collection and the identification of environmental measures to be incorporated into the Proposed Development design (in order to avoid or reduce adverse effects or to deliver enhancements). Measures to comply with relevant policies and legislation have also been included. The results of the assessment reflect the final design (i.e. incorporating the environmental measures).

7.7.4 For each receptor, the assessment deals with the effects of construction, and the effects of the operational airport. As more information has become available about the Proposed Development and about the populations of important and legally protected species, the scope of the assessment has been refined to focus on those receptors that have the potential to be significantly affected. Each scoped-in receptor has then been subject to further assessment of how it was likely to be affected by the Proposed Development, allowing for environmental changes that could affect the receptor during construction and operation.

7.7.5 A worst-case scenario has been used for the assessment, based upon the extensive existing baseline and expert opinion, to ensure that the predicted impacts are not underestimated i.e. there will not be worse effects than the worst-case scenario assessed. The environmental mitigation measures have been identified based on the worst-case scenario to ensure that any effects upon valued receptors are not significant.

7.7.6 The results from additional surveys will confirm whether the worst-case scenario is present or, whether the effects are actually less severe. If the effects are less severe than the worst-case mitigation, compensation and habitat provision (which has been designed based on worst-case assessment) can be refined and targeted at the actual effects.

Negative Effects

7.7.7 A negative effect is considered to be significant if the favourable conservation status of a receptor is compromised by the Proposed Development. Conservation status is defined by the CIEEM[35] as being:

- For habitats - the sum of the influences acting on the habitat and its typical species, that may affect its long-term distribution, structure and functions as well as the long-term survival of its typical species within a given geographical area; and
- For species - the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within a given geographical area.

7.7.8 A similar procedure has been used for designated sites that are affected by the development, except that the focus is on the effects on the integrity of each site, defined by the CIEEM guidelines as:

"*… the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified*."

The assessment of effects on integrity draws upon the assessment of effects on the conservation status of the features for which the site has been designated.

7.7.9 The decision as to whether the favourable conservation status has been compromised is made using informed judgement based on the findings of the assessment of how the resource would be affected.

Positive Effects

7.7.10 A positive effect is assessed as being significant if development activities are predicted to cause:

- An improvement in the condition of a habitat/species population from unfavourable to unfavourable recovering or favourable (noting that condition data are only available for SSSIs but that professional judgement has been used to apply the same principle to habitats/species elsewhere); or
- Partial or total restoration of a site's favourable condition.

7.7.11 If a species population, habitat or site is already in favourable condition, it is still possible for there to be a significant positive effect. There is, however, no simple formula for determining when such effects are significant and decisions about significance therefore have to be made on a case by case basis using professional judgement.

7.8 Assessment of effects on Thanet Coast & Sandwich Bay SPA/Ramsar, Sandwich Bay to Hacklinge Marshes (SBHM) SSSI and Thanet Coast SSSI through noise, vibration and visual disturbance

Baseline Conditions

Current Baseline

7.8.1 Thanet Coast and Sandwich Bay SPA/Ramsar and the SBHM SSSI are located at the north-eastern tip of Kent in southern England, approximately 925m south-east of the former airport. However, with the extension of the Order Limits (the site red line boundary) to include the outfall corridor to its discharge point at Pegwell Bay, this element of the Proposed Development lies adjacent to the SPA/Ramsar site. The designated sites are coastal, consisting of a long stretch of rocky shore, adjoining areas of estuary, sand dune, maritime grassland, saltmarsh and grazing marsh. The international designations hold important numbers of the following species:

- European golden plover[xxxii] (non-breeding);
- Ruddy turnstone[xxxiii] (non-breeding); and

[xxxii] Hereafter referred to as 'golden plover'.
[xxxiii] Hereafter referred to as 'turnstone'.

- Little tern (breeding).

7.8.2 The wetland habitats support 15 British Red Data Book invertebrates, as well as a large number of nationally scarce species (Ramsar Criterion 2 - supports 15 British Red Data Book wetland invertebrates and Ramsar Criterion 6 - species/populations occurring at levels of international importance).

7.8.3 Golden plover, grey plover, sanderling and ringed plover are also included as a notification features of aggregations of non-breeding birds for SBHM SSSI.

7.8.4 Grey Plover, ringed plover, sanderling and turnstone are also included as notification features of aggregations of non-breeding birds for Thanet Coast SSSI, with little tern notified for breeding.

Golden Plover (Non-breeding)

7.8.5 Golden Plover is a qualifying feature of the Thanet Coast & Sandwich Bay SPA as the SPA regularly supports 0.2% of the population of Great Britain, over the five-year peak mean 1991/92-1995/96 (Article 4.1 qualification)[36]. For the purposes of understanding European and National context and in order to determine significance, with respect to effects on the SPA population[37], **Table 7.9** presents a breakdown of population sizes and selection/significance thresholds[xxxiv].

Table 7.9 Golden plover populations and selection thresholds

Golden Plover		Population sizes (individuals)	1% Selection/ Significance thresholds
International population		930,000	9,300
GB population		400,000	4,000
Thanet Coast & Sandwich Bay SPA	1985/86-1989/90, an average peak count	1,980	N/A
	1998/99 to 2002/03 five-year mean peak Pegwell Bay 'roost' count	6,332	N/A
	An average of 1.6% of the GB population (5-year peak mean 1998/9-2002/3)	4,190	N/A
	2010/11 to 2014/15 five-year mean peak Pegwell Bay 'roost' count	**3,285**	**33**

7.8.6 The five-year mean peak count of golden plover of 3,285 birds for 2010/11-2014/15 (obtained from WeBS core count data for the Pegwell and Sandwich Bays WeBS count sector) has been used as the basis for this assessment. The numbers of golden plover over-wintering in the area has varied greatly over the period since the SPA was designated and therefore, this figure represents the most up-to-date value for the likely population size of golden plover for the SPA.

[xxxiv] There is no fundamental biological reason to take 1% of a population as the threshold level for establishing the level of importance of a site. Nevertheless, this percentage is widely considered to be of value in developing measures that give an appropriate level of protection to populations, and has gained acceptance on this basis throughout the world. The criterion was, for example, adopted by parties involved in the Ramsar Convention 1971. Thereafter, the 1% level of national species totals has been taken as the basis of assessment in various countries, including Britain (Stroud, Mudge & Pienkowski, 1990. Protecting internationally important bird sites. Nature Conservancy Council, Peterborough).

7.8.7 The Thanet Coast & Sandwich Bay SPA was originally designated in part for the internationally important non-breeding population of golden plover that it supports. Nationally important numbers of non-breeding golden plover are also notified features of the SBHM SSSI and Thanet Coast SSSI. However, as part of the third Joint Nature Conservation Committee (JNCC) SPA review[38], golden plover was removed as a designated species from the SPA (likely due to declining numbers), although this change is currently unratified. The UK population was estimated to be 420,000 birds in winter of which 400,000 are in Britain[39].

7.8.8 Golden plover winter on coastal and inland habitats around Sandwich Bay and Pegwell Bay. Their main feeding habitat is on arable fields and grazing marsh located inland of the dunes of Sandwich Bay (to the south of the Proposed Development) and roosting on intertidal areas of Pegwell Bay. The birds using the farmland adjacent to the Proposed Development are considered part of the SPA population and thus, this habitat is considered to be a functionally linked to the SPA.

7.8.9 A peak count of 530 golden plover was recorded during the Functional Habitat Survey in 2016/17 (**Appendix 7.5**) in a field adjacent to the southwest of the main part of the Proposed Development (see Figure 4.3 in **Appendix 7.1**). However, this peak count was exceptional during the survey, with the next largest flock being of 33 birds and the remaining records involving just one to six individuals.

7.8.10 During the Pegwell Bay Distribution Survey (**Appendix 7.5**), golden plover were primarily recorded in November and December 2016 and in February 2017, when 500-850 birds were counted. No foraging birds were observed, with all records relating to flocks of golden plover resting (roosting or loafing) on intertidal habitat close to the high-water mark along the northern and western fringes of Pegwell Bay during low, mid and the high tide periods (see Figure 4.4 in **Appendix 7.1**).

7.8.11 No golden plover were recorded within the site during bird surveys undertaken for the proposed Stone Hill Park development in winter 2015/16 (WSP PB, 2016[xxxv]), or during the Functional Habitat Surveys in 2016/17 (**Appendix 7.5**).

7.8.12 Henderson & Sutherland (2017[40]), Griffiths (2004[41]) and data provided by the Sandwich Bay Bird Observatory (SBBO) and KOS show that golden plover occur on both intertidal and inland areas around Pegwell Bay in winter[xxxvi]. A range of roost sites have been identified, including Pegwell Bay, but also inland on farmland.

7.8.13 Henderson & Sutherland (2017) divided their survey area into a number of Recording Areas, with the only records of golden plover within 2km of the Proposed Development being those in their Recording Area 15 to the east of the Proposed Development (see Figure 4.5 in **Appendix 7.1**). In that area (despite parts in the east being unsuitable for foraging due to the presence of tall brassica crops[xxxvii]), fields of ploughed and fallow land close to Pegwell Bay were used for feeding and roosting in the first half of the winter, as follows:

- A flock of 402 golden plover was roosting and foraging in a field adjacent to the south-east of the Proposed Development on 13 November 2016;
- Followed by 53 roosting in a different field (1.3km west of the Proposed Development) on 27 November 2016; and
- On 31 December 2016 there were 43 golden plover roosting in the same field as the 13 November 2016 record.

7.8.14 No golden plover were recorded in Recording Area 15 in January and February 2017 (a March survey was not undertaken in this Recording Area). These golden plover also used Pegwell Bay.

[xxxv] For the SHP ES, once monthly walkover surveys were undertaken within the site from November 2015 to February 2016 inclusive.
[xxxvi] Surveys for golden plover and lapwing were undertaken across the wide area from the north coast of Thanet to Sandwich Bay, twice-monthly from November 2016 to March 2017 inclusive. The work was broadly a repeat of the surveys carried out in winter 2002/03 (Griffiths, 2004).
[xxxvii] A common brassica crop is oilseed rape.

7.8.15 Henderson & Sutherland (2017) identified a number of other localities frequently used by golden plover. The highest numbers of roosting and foraging golden plover were to the south of the Proposed Development, approximately 3.5km from the Proposed Development on arable farmland in the Ash Levels Recording Area 7 where a peak count of 1,030 birds was recorded in January 2017.

7.8.16 The mudflats at Pegwell Bay formed a roost site, used intermittently at low tide, with a peak count of 1,000 golden plover there in February 2017. Disturbance caused by bait-diggers and other sources was identified as a continued problem in this area and the likely reason for its intermittent use by golden plover.

7.8.17 Unit 3 (intertidal muds and sand/littoral sediment) of the SBHM SSSI, the main location for the roosting golden plover, is in an 'Unfavourable – Recovering' condition[xxxviii]. The bird disturbance study undertaken at Pegwell Bay in winter 2010/11 (Swandale & Waite, 2012[42]) provides strong evidence indicating that recreational and commercial activities (including dog walking, walking without dogs, bait digging and kite surfing) are having a detrimental impact on bird populations in Pegwell Bay. The report states that: "*The most disturbing activity, particularly in the north section of the bay, is dog walkers with dogs off leads. This is being addressed through a dog management strategy which aims to provide alternative open space for dogs off leads. The voluntary agreement over kite surfing also needs to be reviewed given disturbance levels associated with this recreational activity. Continued monitoring is required particularly with regard housing development within Dover and Thanet Districts. Mitigation measures are being sought with regard these development plans including monitoring and possible wardening if monitoring indicates increased disturbance activity*." This is noted in the last condition assessment undertaken by NE.

7.8.18 Other areas of farmland used by roosting and/or foraging golden plover included:

- Sandwich Marshes (Recording Area 4), with up to 610 birds roosting by the flood-relief pools for the River Stour (4-5km south of the Proposed Development;
- Goshall Valley (Recording Area 8, 4-7km south, peak 810 birds); and
- Worth Marshes (Recording Area 1, 8-9km south, peak count 242 birds).

7.8.19 Results from the surveys in 2002/03 (Griffiths, 2004) and 2016/17 (Henderson & Sutherland, 2017) show similar patterns of golden plover distribution across the Thanet and Sandwich Bay areas and indicate that numbers have declined during the intervening years, from a high tide peak count of 4,962 birds (in January 2003) to only 1,536 (in late January 2017).

7.8.20 BTO Wetland Bird Survey (WeBS) core count data[xxxix] for Pegwell Bay also shows a general decline in the peak counts of golden plover in Pegwell Bay over the period 2000/01 to 2014/15. A summary of the WeBS data is provided in **Table 7.10** (the figures in parenthesis include additional data obtained for Pegwell Bay outside the standardised WeBS core count dates[43].

Table 7.10 Peak monthly counts of golden plover in Pegwell Bay, from winters 2000/01-2014/15

Winter	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Peak count	Month
2000/01	196	414	41	950	3,160	4,000	1,070	1,404	4,000	Feb
2001/02	0	840	2,680	6,000	7,000	2,000	3,750	3,711	7,000	Jan
2002/03	0	1,350	2,450	190	5,800	4,710	150	2,441	5,800 (7,229)	Jan

[xxxviii] Condition last assessed in December 2012.
[xxxix] There are two types of WeBS count: Core Counts undertaken at high tide, involving around 2,800 sites, and Low Tide Counts involving a relatively much smaller number of counts of feeding birds at low tide.

Winter	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Peak count	Month
2003/04	62	1,410	6,240	5,500	8,000	1,125	14	3,193	8,000	Jan
2004/05	95	0	3,830	5,200	5,330	4,500	920	3,312	5,330	Jan
2005/06	79	2,070	550	7,000	1,900	2,500	595	2,099	7,000	Dec
2006/07	11	663	3,730	945	2,900	4,170	80	1,785	4,170	Feb
2007/08	25	1,500	4,500	5,500	5,000	4,200	0	3,454	5,500	Dec
2008/09	0	0	2,000	3,500	3,230	3,150	5	2,377	3,500	Dec
2009/10	0	700	1,200	60	753	1,100	410	703	1,200 (3,150)	Nov
2010/11	132	160	3,400	51	2,000	0	0	1,148	3,400 (4,000)	Nov
2011/12	1	1,100	1,350	3,000	3,500	0	0	2,237	3,500 (3,640)	Jan
2012/13	1	180	2,000	2,820	4,330	2,820	285	2,072	4,330	Jan
2013/14	16	530	820	1,050	1,093	0	0	701	1,093 (2,000)	Jan
2014/15	1	0	1,147	2,456	0	760	0	1,454	2,456	Dec

Turnstone (non-breeding)

7.8.21 The Thanet Coast and Sandwich Bay SPA and Ramsar site are designated for their internationally important non-breeding numbers of turnstone. The SPA qualifying population of turnstone (of 940 individuals, 5-year peak mean counts from 1991/2-1995/6) represent 1.4% of the Western Palearctic population.

7.8.22 The two constituent SSSIs for the SPA are: the Thanet Coast SSSI and the Sandwich Bay to Hacklinge Marshes SSSI. The Thanet Coast SSSI is partly notified for its nationally important non-breeding population of turnstone. Turnstone is not a notified feature of the Sandwich Bay to Hacklinge Marshes SSSI though the intertidal habitats in Units 1 and 4 of the SSSI are known to be used by roosting turnstone. Both units are described by Natural England as being in a 'Favourable' condition, with Unit 1 containing undisturbed littoral habitat (rocky beach) in good condition.

7.8.23 Turnstone occur almost exclusively in coastal habitats, foraging and resting on rocky shorelines and beaches, as well as foraging along the tidelines on sandy beaches and on mudflats. The Proposed Development and surrounding farmland provide no opportunities for foraging or resting turnstone and therefore the species is unlikely to occur in these areas on a regular basis.

7.8.24 The Thanet Coast Turnstone Monitoring Report (Hodgson, 2016[44]) concluded from six surveys undertaken between 2001 -2010 that the population of turnstone within the SPA varied from 1,087 to 1,335 birds, with a mean of 1,227. A coordinated count in 2013 showed a marked decline, with 620 turnstone counted. Further coordinated counts in winter 2013/14 (two counts) and latterly in 2016 (single count) confirmed this decline, with 583, 664 and 537 birds recorded respectively.

7.8.25 It was suggested in Hodgson (2016) that prior to high tide, the turnstones from the Thanet Coast and Sandwich Bay SPA flew to join a roost, 2.5km west of Whitstable Harbour on the north Kent

coast, within the Swale SPA and some 18km north-west of the Proposed Development. This suggestion was based on results from coastal survey plots. It would therefore appear that the birds, as would be expected for this species, are following the coastline around Thanet and not undertaking any overland movements.

7.8.26 WeBS Core Count Survey results indicate that turnstone concentrations within the Thanet Coast and Sandwich Bay SPA occur mainly across the northern extremities of the SPA, heading west toward Whitstable, with Pegwell Bay supporting only a small proportion of the numbers mentioned here. **Table 7.11** shows the peak counts of turnstone each winter, obtained from the WeBS core count data, including additional counts obtained outside the standardised WeBS visit dates. Data for the Thanet Coast WeBS count sectors is very incomplete for the two most recent seasons for which data is available (2013/14 and 2014/15) and has therefore not been included[45].

Table 7.11 Peak counts of turnstone from 2008/09 – 2012/13 for Pegwell Bay and the Thanet Coast

	2008/09	2009/10	2010/11	2011/12	2012/13
Pegwell Bay	130	927	90	65	70
Thanet Coast	722	624	529	396	360

NB: Pegwell Bay includes the WeBS count sector 22412 (which also includes Sandwich Bay). Thanet Coast includes data for WeBS count sectors: 22417, 22418, 22420, 22431 and 22432[46].

7.8.27 During the Pegwell Bay Distribution Survey (**Appendix 7.5**), relatively low numbers of turnstone were recorded, with flocks of roosting and foraging birds primarily seen on intertidal habitat along the northern and north-western fringe of Pegwell Bay, near the high-water mark. The largest count of foraging turnstone was of 54 individuals on the northern fringe of Pegwell Bay on 13 October 2016 and of roosting birds, 28 on the western fringe on 14 March 2017. Figure 4.7 in **Appendix 7.1** shows the location of the peak counts of turnstone recorded in each 500m grid square.

Little tern (breeding)

7.8.28 Little tern is a qualification feature of the Thanet Coast & Sandwich Bay SPA. It qualifies under Article 4.1 of the Birds Directive, as during the breeding season the area regularly supports 0.3% (5-year mean, 1992-1996) of the breeding population of Great Britain. Following the third JNCC review (Stroud *et al*. 2016) of the SPA designated species, it was suggested little tern be removed, due to recent absence from the SPA, although this change is as yet unratified.

7.8.29 Little tern almost exclusively occurs in coastal habitats, nesting and foraging along shorelines and beaches. The Proposed Development and surrounding farmland provides no opportunities for foraging, resting or nesting little tern and therefore the species is unlikely to occur in this area.

7.8.30 Little tern no longer breeds within the Thanet Coast & Sandwich Bay SPA. The species has also ceased to breed on a regular basis in Kent, with no records of nesting mentioned in the latest Kent bird report, in 2014 (Privett [ed], 2016[47]). Little tern previously bred at a number of locations along the Kent coast, including on the Swale Estuary and on Shellness (on the Isle of Sheppey), Dungeness (on the south coast), near Plumpudding Island on the North Thanet coast and on Shell Ness in Sandwich Bay (Taylor *et al*., 1984[48]). During high tide, little terns from the colony at Shell Ness, in Sandwich Bay (at its closest 2.5km south of the airport runway) were known to forage in the shallow coastal waters of Pegwell/ Sandwich Bay and in the lower part of the River Stour.

7.8.31 Given the absence of this qualifying interest species from the SPA/SSSI, no significant effects are anticipated although consideration is given to the potential of the Proposed Development preventing recolonisation of the designated sites.

Other wader species (non-*breeding*)

7.8.32 The SBHM SSSI and Thanet Coast SSSI are notified (as well as for golden plover) for their nationally important non-breeding numbers of grey plover, ringed plover and sanderling. **Table**

7.12 shows the peak winter counts[xl] in Pegwell Bay for the notified feature species of these SSSIs, together with those for turnstone (an SPA qualification species). As with turnstone and little tern, grey plover, ringed plover and sanderling primarily inhabit coastal habitats and the site and surrounding farmland provide no foraging or resting opportunities for these species, and therefore they are unlikely to occur in this area.

Table 7.12 Peak winter counts of Thanet Coast/SBHM SSSI species at Pegwell Bay

Species	2010/11	2011/12	2012/13	2013/14	2014/15
Sanderling	93	120	101	120	106
Ringed plover	27	17	52	17	79
Grey plover	387	370	175	481	230

7.8.33 The SSSI is also notified for its breeding bird assemblage associated with lowland open waters and their margins, though none of the species that potentially form this assemblage are likely to utilise the site or adjacent farmland due to the lack of suitable wetland habitat.

Baseline Noise Levels

7.8.34 To characterise the baseline noise environment/ levels in the wider area around the Proposed Development (which is dominated by noise from road traffic), measurements and observations were undertaken at 14 locations during both daytime and night-time periods (as described in Table 12.2 in **Chapter 12**: **Noise and Vibration** and shown in **Figure 12.1** in **Chapter 12: Noise and Vibration)**. An ambient noise level has also been identified to represent each location observed, based on the following:

- Site observation;
- Short-term measurements; and
- Sound propagation modelling of the major sources of sound, namely road traffic movements for locations where the short-term noise level is uncertain and *Directive 2002/49/EC*[49] Round 2 noise mapping data where road traffic modelling is not possible or rail is the dominant noise source.

7.8.35 The baseline noise levels measured from Observation Point 13 (OBS13) located on the northern fringe of Pegwell Bay (the most relevant measurement point in terms of the SPA), showed daytime noise levels of 40-45 dB $L_{Aeq,5min}$[xli] and night time noise levels of 40 dB $L_{Aeq,5min}$ primarily due to road traffic. The ambient day and night noise level for OBS13 is 42 dB $L_{Aeq, 16hr}$ (see **Table 12.2** in Appendix 12 in **Chapter 12: Noise and Vibration**).

Future Baseline

7.8.36 In the absence of development, it is assumed that the site will remain principally as grassland and hard standing and the immediate vicinity will remain primarily as arable farmland. As a result, the management of this area would be unlikely to change in the foreseeable future and therefore the baseline with respect to nearby designated sites would not be altered significantly.

[xl] The figures provided are obtained from WeBS (Wetland Bird Survey) core counts for Pegwell Bay. The winter period is defined as September-March inclusive, covering the months when the species concerned are most likely to be present.
[xli] LAeq indicates average exposure noise level over a measured period, in this case 5 minutes (BS 7445-1:2003 Description and measurement of environmental noise – Part 1: Guide to quantities and procedures' BS7445-1:2003). BS 7445 provides guidance for describing and measuring noise from all sources. The standard recommends equivalent continuous A-weighted sound pressure level (LAeq) as the most appropriate basic noise indicator.

Predicted Effects and their Significance – Golden Plover non-breeding

7.8.37 Distribution data from the locality of the site indicate that golden plover utilising farmland to the south, north and west are likely to be connected with the Pegwell Bay (and its designated nature conservation sites) wintering population (i.e. they disperse from Pegwell Bay at high tide to forage on farmland in the wider area). As a result of the likely movements of birds between high-tide foraging areas around the site and Pegwell Bay at low tide, and their use of the surrounding farmland for foraging and roosting, there is potential for adverse effects on the golden plover population, due to:

- Auditory, visual, and vibration stimuli caused by vehicles, machinery and their operatives during construction and operation of the Proposed Development;
- Auditory disturbance caused by any onsite pyrotechnical bird scaring methods during operation of the Proposed Development;
- Auditory and visual disturbance caused by over-flying aircraft, and aircraft departing from and arriving at the airport; and
- The potential barrier effect of the airport to the movements of birds between foraging and roost sites.

7.8.38 The presence of the airport and operational aircraft could also create a barrier effect, causing any golden plover that regularly fly over the site to alter their normal flight paths to move around the site. Disturbance could also lead to the loss of foraging areas on farmland, and roost sites on farmland and intertidal habitat, resulting in the birds having to expend greater amounts of energy to find food and shelter, all of which could result in additional mortality and a decline in the population.

Construction Phase Effects

Construction Displacement - Habitat Loss

7.8.39 Noise, vibration and physical activity within the site from earthworks, fixed and mobile plant and the visual presence of operatives during the construction phase has the potential for foraging and resting golden plover to be displaced from any suitable farmland within 750m[50] of the site. Increased noise and vibration may also occur due to an increase in construction road traffic. As construction noise, vibration and activity within the site is currently lacking and also likely to be unpredictable, it has a greater potential to cause disturbance than an increase in road traffic noise and vibration. This is because birds in the vicinity of the airport are likely to be habituated to current road traffic noise and vibration and its more predictable pattern.

7.8.40 The work by Griffiths (2004)[51] identified no concentrations of golden plover within 750m of the site; the data for this work having been collected whilst Manston Airport was still operational.

7.8.41 Survey of farmland habitat around the site in 2016/17 has shown limited use by foraging and roosting golden plover of these areas within 750m of the site (**Appendix 7.2**). Between September 2016 and February 2017 inclusive, few golden plover were recorded, with generally five or less birds noted within 1km of the site. An exception to this occurred during the November 2016 survey when a flock of 530 golden plover was recorded in an arable field immediately to the south of the site at its eastern end (see the non-breeding bird survey report, **Appendix 7.5**). Soon after this record, the field was cultivated and no further records were obtained from that location. This flock was also recorded during the surveys reported in Henderson & Sutherland 2017 (see **Appendix 7.2**).

7.8.42 The desk study and winter bird surveys indicate that golden plover do not make regular use of farmland within 750m of the site, although birds may use it opportunistically, depending upon suitability of crop type. Golden plover rarely remain faithful to a single site throughout the winter but tend to use a number of sites dependant on food availability and weather conditions (Percival, 2007). The site is located adjacent to an extensive area of arable farmland (to the west, north and south) and therefore any birds displaced by the Proposed Development are likely to find alternative foraging sites within their usual foraging ranges. This is supported by the desk study and survey results in that birds were generally recorded at any one location during only part of

the non-breeding season period, suggesting that they were foraging widely, moving to alternative feeding sites in response to changing crop structure, food availability and weather conditions.

7.8.43 Golden plover are very much dependent upon the presence of suitable foraging areas during autumn and winter. Mason & MacDonald (1999)[52], in their study of wintering populations of golden plover in north-east Essex, found that the species showed a strong association for winter cereals. Much of the foraging activity of golden plover was recorded in fields of cereal less than 100mm in height, with golden plover rarely recorded on other crop or habitat types such as cereal stubble and oilseed rape. Kirby (1997)[53] identified many other factors that might influence the changing use of a site by golden plover. One of the main food sources is earthworms, which occur in much higher densities in the early stages of an arable crop rotation, with very few present in fields that have been under continuous arable cultivation for three or more years (Kirby, 1997). Large open fields are most favoured (Kirby 1997, Mason & MacDonald 1999) and during prolonged periods of hard weather, when the ground has been frozen for at least three days, lapwing and golden plover move from arable fields to grassland, where invertebrate prey remains more accessible. Where grassland is not present, the birds often leave the area for warmer climes such as in France and the Iberian Peninsula (Kirby, 1997).

7.8.44 It should also be noted that these studies focus on the use of habitats during the day and that golden plover are known to use different habitats to forage in during the night (Gillings *et al*., 2005). A study of plovers on Thanet during 2016 (M. Sutherland, unpublished data) involving eight paired visits by day and night, provided little evidence one way or the other as to whether the nocturnal distribution differed substantially from the diurnal. It was thought that, while locally, birds may be more dispersed at night, it is unlikely that the broad distribution patterns across the various survey areas would be substantially different from that recorded by day (Henderson & Sutherland, 2017[54]).

7.8.45 To conclude, the presence of golden plover on farmland adjacent to the Site is likely to be strongly influenced by crop management, in particular, the rotation and relative proportions of oilseed rape and winter cereal, the latter providing the bare ground habitat favoured for foraging birds in autumn and early winter. Results from the desk study and surveys indicate that the area within 750m of the Site which is the area identified within which any disturbance and displacement would occur, does not form an important part of the foraging grounds for the SPA population of golden plover.

7.8.46 Given that the functional habitat surveys and other desk study data (e.g. Henderson & Sutherland, 2017) indicate that farmland within 750m of the Site is not used on a regular basis by important numbers of golden plover (with a count of 530 birds in a single month) and with the availability of extensive alternative inland feeding habitat within the vicinity, the effects of displacement on the SPA golden plover population are considered not significant. The main roost site for the species (on Pegwell Bay) is located more than 1km from the Site, and thus is predicted not to be affected by construction works for the Proposed Development.

Other SSSI notification species

7.8.47 Other notification species are confined to the coastal habitats of the designated sites. These are too distant from the airport and the road network to be affected by noise and physical activity during the construction phase and it is considered that there will be no significant effects upon these species.

Operational Phase Effects

Operational Displacement - Habitat Loss due to Bird Scaring Activities

7.8.48 Once the Proposed Development is operational, there is potential for foraging and roosting golden plover to be displaced from arable land, grazing marshes and intertidal habitats (used for roosting) due to disturbance caused by methods employed at the airport to reduce/ prevent collision risk by deterring hazardous birds from using the aerodrome and adjacent land. These bird scaring activities may deter golden plovers from using otherwise suitable habitat up to a distance of 1km from the main part of the site[xlii].

[xlii] That is excluding the outfall corridor.

7.8.49 Trials undertaken to inform the now consented London Ashford (Lydd) Airport expansion concluded that bird scaring activities at the airport might have some disturbance effects up to 0.6-1km away, but that there was no indication that there would be any impacts on the populations[55]. The recommended methods for bird scaring at London Ashford (Lydd) included the use of audio and pyrotechnics, together with virtually continuous patrolling of the airport site.

7.8.50 Results from the desk study and surveys also indicate that golden plover do not utilise farmland or intertidal habitats within 1km of the site on a regular basis. In view of this, the effects of displacement to golden plover by bird scaring activities are considered negligible.

7.8.51 To conclude, there would be no significant effect on golden plovers as a result of bird scaring activities.

Operational Displacement - Habitat Loss due to Aircraft Flights

7.8.52 Once the Proposed Development is operational, there is potential for foraging and roosting golden plover to be displaced from arable land, grazing marshes and intertidal habitats (used for roosting) below or near to the flight paths of planes. The altitude, lateral distance and noise of the aircraft are all factors involved in potential disturbance, although separating the effect of aircraft noise from that of visual disturbance is difficult.

7.8.53 There is limited documented evidence on the visual and auditory disturbance effects of aircraft on birds and much of this comes from studies that have focussed on geese, ducks, swans and seabirds. Those studies involving waders (such as golden plover) have looked at the effects of microlights and jets. Also, these studies have mainly been based upon effects associated with aircraft altitude rather than lateral distance.

7.8.54 A literature review was undertaken by Amec Foster Wheeler collating information on bird disturbance by aircraft (**Appendix 7.4**). Results from this literature review and other studies indicate that beyond distances of 500m in altitude and 1km ground-level, lateral distance, golden plover are unlikely to be disturbed by the visual presence of flying aircraft.

7.8.55 A figure of locations overflown by aircraft below 500m is shown in Figure 4.6 in **Appendix 7.1**, based upon the worst-case scenario assessed in **Chapter 12: Noise and Vibration**.

7.8.56 The roosting areas for golden plover in Pegwell Bay are located outside the area where aircraft are predicted to fly over at altitudes of less than 500m (see Figure 4.4 and Figure 4.6 in **Appendix 7.1**) and are at their closest, 1.5km from the proposed routes for aircraft flights to the east of the airfield (beyond the 1km, lateral disturbance distance). Desk study and survey data also indicate that use of the farmland by golden plover in these areas is also low (see Figure 4.3 in **Appendix 7.1**).

7.8.57 Results from the literature review (**Appendix 7.4**) indicate that noise levels in excess of 80 dB[xliii] L_{Amax}[xliv] (peak noise levels) have been recorded as causing the more severe disturbance incidents in a number of studies, primarily in duck species. However, golden plover has been identified as a species of moderate sensitivity to noise disturbance, being tolerant of peak noise levels of up to 72 dB L_{Amax} (Cutts *et al.*, 2013[56]). Therefore, a more precautionary peak noise level of 70 dB L_{Amax} has been used for the purposes of this assessment, below which, noise from aircraft flights is very unlikely to elicit a more severe disturbance response (such as taking flight), and thus any effects of noise levels below 72 dB L_{Amax} would be negligible.

7.8.58 In addition to the relatively high levels of noise generated from nearby road traffic in the area (as indicated by the baseline noise measurements in **Chapter 6: Air Quality**), golden plover using farmland adjacent to the Proposed Development will also experience regular disturbance from agricultural activities including the high noise levels generated from gas guns/cannons[xlv] (used to

[xliii] The ratio between the quietest audible sound and the loudest tolerable sound is a million to one in terms of the change in sound pressure. Due to this wide range, a scale based on logarithms is used in noise level measurement. The scale used is the decibel (dB) scale which extends from 0 to 140 dB corresponding to the intensity of the sound pressure level.

[xliv] LAmax is maximum recorded noise level during the measurement period.

[xlv] These are portable devices that are located at the edge of fields to disturb birds from feeding and damaging crops, in particular, rape seed oil. They are setup to typically emit, 3-4 short, loud bursts of noise (bangs) at intervals of c.15 seconds.

scare wood pigeons from fields of oilseed rape, which is widely cultivated in the area) and from organised game shoots, and shooting for pest control purposes.

7.8.59 During operation of the Proposed Development, the average daytime noise levels across Pegwell Bay (during the period when peak numbers of aircraft flights will occur), are predicted to be between 50-63 dB L_{Aeq16}, (see **Figure 12.6** in **Chapter 12: Noise and Vibration**), and at night, generally less than 40 dB $L_{Aeq, 8hr}$ (see **Figure 12.7** in **Chapter 12: Noise and Vibration**).

7.8.60 In terms of disturbance to birds, the peak noise levels are likely to elicit more of a 'measurable' behavioural response by birds rather than the average noise levels over a period of time (e.g. over the course of a day).

7.8.61 The area of land (at ground level) where noise levels in excess of 80 dB L_{Amax} are predicted (during peak periods of operation of the Proposed Development) during the day (07:00 to 23:00) and night (23:00 to 07:00) are shown in **Appendix 7.1**, Figure 4.1a and Figure 4.1b respectively and where noise levels are in excess of 70 dB L_{Amax} shown on Figure 4.2a and Figure 4.2b, respectively. The different coloured shaded areas denote the mean number of events per day (due to aircraft movements), where peak noise levels of 80 and 70 dB L_{Amax} will be exceeded (respectively), taking into account the proposed flight paths, and combination of different aircraft types / models that to be in operation in Year 20 when the number of flights will have reached their peak (worst case scenario). For example, in Figure 4.2a, any birds foraging on land within the outermost shaded area (in light pink) are predicted to experience an average of 10-19 single noise events per day (due to aircraft flights) that exceed 70 dB L_{AMAX} during Year 20.

7.8.62 Results from the desk study (**Appendix 7.2**) and the Functional Habitat and Pegwell Bay Distribution surveys (**Appendix 7.5**) indicate infrequent use by golden plover of areas of farmland within the area where 70 dB L_{Amax} is exceeded (see Figure 4.3 and Figure 4.5 in **Appendix 7.1**). In addition, the desk study and survey data also indicate that the main area of Pegwell Bay used by roosting golden plover is not located within the area where noise levels in excess of 70 dB L_{Amax} are predicted (see Figures 4.2a, 4.2b and 4.4 in **Appendix 7.1**).

7.8.63 As stated previously, there is limited research and studies on the auditory disturbance effects of aircraft on birds in the UK and therefore, it is important that any case studies into effects on birds at currently operation airports in the UK are also considered in this assessment.

7.8.64 There are a number of operational airports in the UK that are located adjacent or close to SPAs designated for their congregations of non-breeding waterfowl and waders, including internationally important numbers of waders utilising mudflats for foraging. These include the civil airports at Belfast, Liverpool, Southampton, Bournemouth, Lydd (London Ashford Airport) and Blackpool (amongst others) and military aviation activities/ operations.

7.8.65 Table 1.2 in **Appendix 7.2** presents a summary of results of a review of case studies related to the effects of aircraft flights from military and civil airports in the UK on nearby SPAs. This study was undertaken to inform the now consented expansion of London Ashford Airport, south of Lydd in Kent (Parsons Brinckerhoff, 2007). The case studies highlighted, show that despite the visual and noise disturbance from civil and military aircraft flights over the SPAs, there have been no recorded adverse effects on their qualifying populations of waders and wildfowl, including non-breeding populations of golden plover on the Ribble Estuary, Wash, North Norfolk Coast, Dungeness to Pett Levels and Lough Foyle SPAs.

7.8.66 In addition, there is no evidence to indicate that the numbers of golden plover have increased since airport operations ceased at Manston Airport in May 2014 (see Table 4.3 in **Appendix 7.1**) and conversely, numbers appear to have declined.

7.8.67 To conclude, evidence from the literature review and case studies indicates that golden plover using Pegwell Bay for roosting and the farmland surrounding the Proposed Development for foraging will very likely habituate to the visual presence and noise from regular aircraft flights from the Proposed Development. Existing levels of noise in these areas are relatively high, primarily due to road traffic but also agricultural activities. The predicted peak noise levels (due to aircraft flights) that would be experienced by golden plover using Pegwell Bay and the surrounding farmland are unlikely to result in high levels of disturbance to these birds. Any golden plover displaced from farmland surrounding the Proposed Development would be able to locate other more extensive areas of suitable foraging habitat to the south and west. In view of this, the

effects of disturbance and displacement of golden plover are predicted to be negligible and are considered not significant.

Operational - Displacement (Barrier Effects)

7.8.68 Unlike little tern and the qualifying/notification wader species of the Thanet Coast and Sandwich Bay SPA, Ramsar Site and SSSI, golden plover frequently move to inland farmland areas to forage. Movements to and from inland areas and the coast result in the Proposed Development forming a barrier to the movement of golden plover between these sites. If the birds have to undertake flights of greater distance due to the presence of the Proposed Development, this could result in increased energy expenditure and lost foraging time, leading to increased mortality. Therefore, it is important to know the distribution of golden plover surrounding the airport and their likely flight paths between roosting and foraging areas.

7.8.69 Results from the desk study (see **Appendix 7.2,** in particular, the data from Henderson & Sutherland 2017) and baseline surveys (**Appendix 7.5**) indicate that much of the golden plover population roosts at Pegwell Bay, and forages on farmland to the south and south-west (more than 3km to the south of the site). The likely flights of golden plover between their main roost site and foraging areas is thus unlikely to take them across the site, or the vicinity of flight paths of low flying aircraft. In addition, CAA data (see **Appendix 7.2**) for part of the previous operational period for Manston Airport (2007-13[xlvi]) revealed only one record of golden plover collision with aircraft, indicating that the airport did not form part of the regular flight paths for this species.

7.8.70 The Proposed Development is not predicted to result in a significant barrier effect. This conclusion is supported by the lack of any regular use of the site and adjacent farmland by golden plover as shown by the desk study and survey data. In addition, the lack of CAA records of golden plover collision, indicates that the levels of flight activity by this species over the Site and adjacent areas are predicted to be low.

Inter-related effects

7.8.71 As set out above, noise, vibration and visual disturbance impacts on this receptor have been assessed as not having the potential for significant effects, even when considered in-combination. As such they are scoped out of the inter-related effects assessment.

7.8.72 Further effects (e.g. reduced quality of foraging habitat through changes in air quality and water quality) have been assessed as being of a sufficiently low magnitude (as detailed in this Chapter) so that their potential interactive effects are not considered to be significant when acting together. Therefore, with no alteration to the favourable conservation status of golden plover within the SBHM SSSI, effects are assessed as not significant and there are no adverse effects on the integrity of the SPA in respect of this species.

Predicted Effects and their Significance - Turnstone non-breeding

Operational Phase

Operational Displacement - Habitat Loss due to Aircraft Flights

7.8.73 There is the potential for foraging and roosting turnstone in Pegwell Bay to be adversely affected by auditory and visual disturbance caused by over-flying aircraft, and aircraft departing from and arriving at the airport.

7.8.74 Results from the desk study (**Appendix 7.2**) and the Pegwell Bay Distribution Survey (**Appendix 7.5**) indicate that turnstone do not utilise intertidal habitats for foraging and roosting within the area where 70 dB $_{LAmax}$ is exceeded (see Figures 4.2a and 4.2b), or where aircraft fly over at altitudes of less than 500m (see Figures 4.6 and 4.7 in **Appendix 7.1**). In addition, the main foraging and roosting areas for turnstone in Pegwell Bay are located more than 1km from the airport runway. There is no historical evidence to suggest that turnstone were displaced from

[xlvi] The airport closed in 2014.

areas of Pegwell Bay close to the flight paths during the period when Manston airport was operational; conversely, numbers of turnstone have declined since operation ceased (Hodgson, 2016).

7.8.75 There is some evidence to indicate that turnstone will readily habituate to disturbance (Cutts *et al*., 2009[57]) and that this species does not flush (fly away) until approached at very close distance (Borgmann 2010[58], Smith & Visser 1993[59], Holloway 1997[60]). Borgmann (2010) recorded an average distance at which wintering turnstone were flushed due to walkers of only 12m (the equal lowest value of all the species studied). Smit & Visser (1993) in their studies on the effects of human-related disturbance on waders and wildfowl in the Wadden Sea found that turnstone were flushed due to human presence at an average distance of 47m (compared to 211m for curlew), the lowest value of the nine species studied. Results from disturbance studies on waders in Findhorn Bay (Scotland) also found that turnstone reacted to human disturbance (such as the presence of dog-walkers) at much shorter distances (in this case at an average of 14m) than most other wader species (Holloway, 1997).

7.8.76 It is acknowledged that there is very little information within the literature review (**Appendix 7.4**) related specifically to the visual and auditory effects of aircraft flights on turnstone. In view of this, the assessment has drawn on information from case studies and from studies relating to the effects of human disturbance (for example, from dog walkers) on this species.

7.8.77 The review of case studies presented in Table 1.2 in **Appendix 7.4** shows that there have been no recorded adverse effects on the non-breeding populations of turnstone on the Wash, North Norfolk Coast or Belfast Lough SPAs, despite the close proximity of civil airports, and/or regular over-flight by military aircraft. In addition, in the water bird disturbance mitigation toolkit in (Cutts *et al*., 2013), turnstone is described as a species with a low sensitivity to disturbance that is extremely tolerant to disturbance and that habituates rapidly. This study also cites, amongst others, turnstone not reacting to noise levels in excess of 90 dB L_{AMAX} due to piling during construction works, indicating a tolerance to high noise levels.

7.8.78 There is also evidence to indicate that turnstone will readily habituate to other types of disturbance, in particular to the presence of humans (Cutts *et al*., 2009) and that this species does not flush (fly away) until approached at very close distance (Borgmann 2010, Smith & Visser 1993, Holloway 1997). Borgmann (2009) recorded an average distance at which wintering turnstone were flushed due to walkers of only 12m (the equal lowest value of all the species studied). Smit & Visser (1993) in their studies on the effects of human-related disturbance on waders and wildfowl in the Wadden Sea found that turnstone were flushed due to human presence at an average distance of 47m (compared to 211m for curlew), the lowest value of the nine species studied. Results from disturbance studies on waders in Findhorn Bay (Scotland) also found that turnstone reacted to human disturbance (such as the presence of dog-walkers) at much shorter distances (in this case an average of 14m) than most other wader species (Holloway, 1997).

7.8.79 To conclude, there is no evidence to suggest that turnstone will be disturbed by noise or the presence of aircraft in flight from the site. Therefore, displacement effects on this species are considered not significant.

Inter-related Effects

7.8.80 As set out above, noise, vibration and visual disturbance impacts on this receptor have been assessed as not having the potential for significant effects, even when considered in-combination. As such they are scoped out of the inter-related effects assessment.

7.8.81 Further effects (e.g. reduced quality of foraging habitat through changes in air quality and water quality) have been assessed as being of a sufficiently low magnitude (as detailed in this Chapter) so that their potential interactive effects are not considered to be significant when acting together. Therefore, with no alteration to the favourable conservation status of turnstone within the SBHM SSSI, effects are assessed as not significant and there are no adverse effects on the integrity of the SPA in respect of this species.

Predicted Effects and their Significance – Little tern: breeding

Operational Phase

Operational Disturbance - Breeding Failure due to the Noise from Aircraft Flights

7.8.82 Although little tern no longer breeds around Pegwell Bay assessment is made in order to determine whether the Proposed Development could prevent little tern from re-establishing itself as a breeding species on the coast. Once the Proposed Development is operational, there is potential for any nesting little terns to be displaced from coastal habitats (used for nesting and foraging) below or near to the flight paths of planes. The altitude, lateral distance and noise of the aircraft are all factors involved in potential disturbance, although separating the effect of aircraft noise from that of visual disturbance is difficult.

7.8.83 Most of the documented evidence on the visual and auditory disturbance effects of aircraft on birds comes from studies that have focussed on geese, ducks, swans and seabirds. Also, these studies have mainly been based upon effects associated with aircraft altitude rather than lateral distance.

7.8.84 A literature review was undertaken by Amec Foster Wheeler on bird disturbance by aircraft (**Appendix 7.4**). Results from this literature review and other studies indicate that beyond distances of 500m in altitude and 1km ground-level, lateral distance, little tern is unlikely to be disturbed by the visual presence of flying aircraft.

7.8.85 An indicative figure of locations overflown by aircraft below 500m is shown in Figure 6.6 in **Appendix 7.1**. It should be noted that no aircraft are currently operating from the Site and therefore the figure is based on indicative vertical climb profiles, operating procedures and flight paths. The actual procedures and flight paths will be consulted on after the DCO through the CAA's Airspace Change Process (ACP) and the ACP will provide opportunities for engagement with local communities and other stakeholders. The ACP will likely follow the process outlined in the draft ACP guidance CAP1520 (CAA, 2017).

7.8.86 Results from the literature review (**Appendix 7.4**) show that noise levels in excess of 80 dB[xlvii] L_{Amax}[xlviii] (peak noise levels) have been recorded as causing the more severe disturbance incidents in a number of studies, primarily in duck species. There is also evidence from the literature review to indicate that breeding terns are relatively tolerant of aircraft flights. The information provided for the application to expand London Ashford Airport, highlighted no evidence to indicate that the colony of Sandwich and common terns breeding on Burrowes Pits, close to the operational airport had been adversely affected by high noise levels from over-flying aircraft, of 90-95 dB LAmax (London Ashford Airport, 2012). The review of case studies presented in Table 1.2 in **Appendix 7.4**, shows that there has been no recorded adverse effects on the breeding populations of little tern on the Wash, North Norfolk Coast or Firth of Tay and Eden SPAs, despite the close proximity of airports, and regular over-flight by military aircraft.

7.8.87 The area of land (at ground level) where noise levels in excess of 80 dB L_{Amax} are predicted (during peak periods of operation of the Proposed Development) during the day (07:00 to 23:00) and night (23:00 to 07:00) are shown in **Appendix 7.1,** Figures 4.1a and 4.1b respectively, and where noise levels are in excess of 70 dB L_{Amax} shown on Figures 4.2a and 4.2b (**Appendix 7.1**) respectively The different coloured shaded areas denote the mean number of events per day (due to aircraft movements), where peak noise levels of 80 and 70 dB L_{Amax} will be exceeded (respectively), taking into account the proposed flight paths, and combination of different aircraft types/ models that are planned to be in operation in Year 20 when the number of flights will have reached their anticipated peak (worst case scenario). For example, in Figure 4.2a (**Appendix 7.1**), any birds foraging on land within the outermost shaded area (in light pink) are predicted to

[xlvii] The ratio between the quietest audible sound and the loudest tolerable sound is a million to one in terms of the change in sound pressure. Due to this wide range, a scale based on logarithms is used in noise level measurement. The scale used is the decibel (dB) scale which extends from 0 to 140 dB corresponding to the intensity of the sound pressure level.

[xlviii] LAmax is maximum recorded noise level during the measurement period.

experience an average of 10-19 single noise events per day (due to aircraft flights) that exceed 70 dB L_{AMAX} during Year 20.

7.8.88 Little tern is a coastal species and does not use farmland and as such available nesting areas do not occur within the area where 80 dB L_{Amax} is exceeded (see **Appendix 7.1**). Areas available for nesting for little tern, the closest of which is on Shell Ness on the southern edge of Pegwell Bay are located outside the area where aircraft are predicted to fly over at altitudes of less than 500m (see Figures 6.4 and 6.6 in **Appendix 7.1**) and are at their closest, 2.5km from the airport runway (beyond the 1km ground-level, lateral disturbance distance). In view of this, the effects of displacement to little tern by noise and visual presence from aircraft are considered not significant.

Inter-related Effects

7.8.89 As set out above, noise, vibration and visual disturbance impacts on this receptor have been assessed as not having the potential for significant effects, even when considered in-combination. As such they are scoped out of the inter-related effects assessment.

7.8.90 Further effects (e.g. reduced quality of foraging habitat through changes in air quality and water quality) have been assessed as being of a sufficiently low magnitude (as detailed in this Chapter) so that their potential interactive effects are not considered to be significant when acting together. Therefore, with no alteration to the favourable conservation status of little tern within the SBHM SSSI, effects are assessed as not significant and there are no adverse effects on the integrity of the SPA in respect of this species.

7.9 Assessment of effects to Thanet Coast and Sandwich Bay SPA/Ramsar; SBMH SSSI; Sandwich and Pegwell Bay NNR through water discharge

Baseline Conditions

Current Baseline

7.9.1 The Proposed Development is on relatively high ground, mainly at an elevation between 45-50 mAOD (metres above ordnance datum). The southern portion is located at an elevation of approximately 50mAOD, along the length of the existing runway, but rises to approximately 55mAOD in the westernmost corner of the site. North of the runway the site level declines to approximately 40mAOD in the west, at the Spitfire Way Junction (crossroads of the Manston Road (B2050) and Spitfire Way (B2190) carriageways), forming the start of the headwater valley for the Brooksend Stream, while remaining at 45-50 mAOD in the northernmost part of the site. The Site red line boundary (RLB) also encompasses the line of the buried pipeline to Pegwell Bay, which extends from the southern portion of the site at about 50 mAOD to the outfall point in Pegwell Bay.

7.9.2 The average annual rainfall recorded at Manston between 1981 and 2010 was 592.5mm[61].

7.9.3 There are no river watercourses on or adjacent to the Proposed Development, partly due to the high permeability of the underlying Chalk. A series of water channels and streams that form part of the Minster Marshes are located more than 1 km to the south of the main site. The buried pipeline lies in closer proximity to the north-western extent of this system, but aerial photography indicates that it does not cross any surface water features. Minster Marshes drain south into the River Stour, 3km south of the Proposed Development, which flows east into Sandwich and Pegwell Bays. Currently runoff from the Proposed Development infiltrates locally and, due to the highly permeable nature of the underlying geology, is unlikely to reach these surface water systems via overland flow routes.

Future Baseline

7.9.4 During the lifetime of the development it is considered that the baseline will evolve in the following manner:

- Construction Phase 1 and start of operation: The baseline will remain unchanged;
- Construction Phases 2, 3 and 4 and ongoing operation: During this period the Water Framework Directive targets (see **Appendix 8.3**) for surface and groundwater bodies will be attained and there may be some measurable change in climate; and
- Full operation phase: climate change will cause further variation from baseline climatic patterns.

Predicted Effects and their Significance

Construction Phase Effects

Treated Water Discharge into Pegwell Bay and Associated Designated Nature Conservation Sites – Change in Habitat Quality

7.9.5 There is a potential for direct effects to the foraging habitat of over-wintering birds from the discharge of treated water to Pegwell Bay. There is also potential for the discharge to adversely affect the qualifying/notification habitats of the Thanet Coast SAC and SBHM SSSI through scour at the point of discharge.

7.9.6 In addition to the ornithological features of the SPA/Ramsar, the SSSI is notified for its aggregations of non-breeding birds for grey plover, ringed plover and sanderling, all of which occur in winter at nationally important numbers. Additional notification features include the vascular plant assemblage, as well several dune community types, a number of strandline/intertidal vegetation communities, including:

- *Honkenya peploides* - *Cakile maritima* strandline community;
- *Suaeda maritima* saltmarsh;
- *Elytrigia atherica* saltmarsh;
- *Suaeda vera* - *Limonium binervosum* saltmarsh;
- *Suaeda maritima* saltmarsh
- *Juncus maritimus* saltmarsh;
- *Festuca rubra* saltmarsh *and Puccinellia maritima* sub-community;
- *Atriplex portulacoides* saltmarsh;
- Common reed *Phragmites australis* swamp and reed-beds;
- *Carex arenaria* - Cornicularia aculeata dune community;
- *Carex arenaria* - *Festuca ovina* - *Agrostis capillaris* dune grassland;
- *Salix repens* - *Campylium stellatum* dune-slack community;
- *Elymus farctus* ssp. Boreali-atlanticus foredune community;
- *Ammophila arenaria* mobile dune community;
- *Ammophila arenaria* - *Festuca rubra* semi-fixed dune community;
- *Festuca rubra* - *Galium verum* fixed dune grassland;

- *Ammophila arenaria - arrhenatherum elatius* dune grassland; and
- Populations of Schedule 8 plants - *Himantoglossum hircinum*, Lizard Orchid and *Orobanche caryophyllacea* Bedstraw Broomrape.

7.9.7 The Pegwell Bay section of the SAC/NNR/SSSI is largely intertidal although with four Annex 1[62] dune habitats comprising the primary reason for selection of the European site (detailed within **Table 7.13**):

Table 7.13 Annex 1 habitats of Thanet Coast SAC

Annex 1 habitat	Description/comment
Embryonic shifting dunes	The Embryonic shifting dunes at Sandwich Bay are representative of this habitat type in south-east England. The seaward edge of the north of this site displays a good sequence of embryonic shifting dune communities and there is a clear zonation within the dune habitat, with strandline species on the seaward edge and sand-binding grasses inland. Lyme-grass *Leymus arenarius* is extremely sparse and sand couch *Elytrigia juncea* is the dominant sand-binding species.
Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)	Shifting dunes along the shoreline with *Ammophila arenaria* occurs along the seaward edge of the northern half of this extensive dune system. It is representative of shifting dune vegetation in south-east England, a region where the habitat type is very restricted in its distribution. Although the area of this habitat type is small by comparison with other listed sites, the shifting dune vegetation contains a good range of characteristic foredune species including sea bindweed *Calystegia soldanella*, sea spurge *Euphorbia paralias* and sea-holly *Eryngium maritimum*.
Fixed coastal dunes with herbaceous vegetation (grey dunes)	Priority feature. Sandwich Bay is a largely inactive dune system with a particularly extensive representation of fixed dune grassland, the only large area of this habitat in the extreme south-east of England. The vegetation is extremely species-rich and the site has been selected because it includes a number of rare and scarce species, such as fragrant evening-primrose *Oenothera stricta*, bedstraw broomrape *Orobanche caryophyllacea* and sand catchfly *Silene conica*, as well as the UK's largest population of lizard orchid *Himantoglossum hircinum*.
Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*)	The small area of dunes with *Salix repens* ssp. *argentea* found at Sandwich Bay is of interest as it is the only example found in the dry south-east of England and is representative of this habitat type in a near-continental climate.

7.9.8 In addition to the Annex 1 habitat (detailed within **Table 7.13**), humid dune slacks are present as a qualifying feature, but not a primary reason for selection of the site as a SAC.

7.9.9 Discharge into Pegwell Bay is not likely to affect these dune and other terrestrial habitats.

7.9.10 This assessment of effects takes into account the environmental measures in Table 7.7 (and also Section 8.5 and Table 8.6 in **Chapter 8: Freshwater Environment)** i.e. it is an assessment of residual (post-mitigation) effects.

7.9.11 The existing drainage arrangements at the site divert rainfall to a sea outfall at Pegwell Bay. This outfall is of sufficient size to accept peak flows without surcharging.

7.9.12 Construction phase site discharge in Construction Phase 1 is contained on site and discharged to the site sewer network, following treatment by siltbusters or similar, or taken off-site. Additional measures, which are detailed in the Construction Environmental Management Plan (CEMP) and put in place to protect the groundwater environment during the construction phase, will also ensure that no potential pollutants reach Pegwell Bay (see **Section 8.5**).

7.9.13 In construction Phases 2 – 4, the Site drainage network will be in place and discharges will be to Pegwell Bay. All discharges will only take place once silt and any other potential pollutants (e.g. hydrocarbons) have been removed from Site discharge. The discharge is therefore of clean water.

7.9.14 Paragraphs 7.9.19-7.9.22 present the detailed design strategy for the site drainage network to ensure that measures are put in place to protect the qualification/notification features of Pegwell

Bay's designated sites. These measures will be confirmed with the EA and NE prior to the commencement of works.

7.9.15 The drainage strategy is based upon a 150l/s pump capacity. The outfall structure, with a series of four incomplete barriers that reduce the flow rate of the discharge to Pegwell Bay, is a robust structure designed with scour protection to prevent scour to intertidal habitat.

7.9.16 Following the incorporation of the environmental measures it is concluded that all effects on Pegwell Bay will be negligible. Therefore, it is concluded that there will be no significant effects on Pegwell Bay or any associated designated sites during the construction phase.

Operational Phase Effects

7.9.17 The operational phase has the potential to have a significant effect on water quality at Pegwell Bay, which in turn could, in this instance, it is not anticipated that the construction phase of the Proposed Development will have a significant effect on the designated sites habitats and species. This would be through the following mechanisms:

- The generation of sediment laden run-off entering the Site's drainage system in an uncontrolled manner; and
- Pollution from the spillages of concrete, oils, fuels or other chemicals entering the Site's drainage system or reaching Pegwell Bay through groundwater inflows.

7.9.18 Environmental measures incorporated into the Proposed Development (see **Table 7.7** and **Section 7.5**) will be included in the CEMP.

7.9.19 As described in **Section 3.4**, **Chapter 3: Description of the Proposed Development** the Outline Drainage Strategy for the Site (Appendix A in **Appendix 8.2** of **Chapter 8: Freshwater Environment**) provides for positive drainage following the site's natural contours, discharging into two adjacent attenuation ponds, one for 'dirty' water and one for 'clean' water. Prior to discharging into the ponds, the water will flow through interceptors (existing and new). The 'dirty' pond will treat de-icer contaminated runoff through the use of aerators, before discharging into the second pond. Flow into the 'clean' pond will be limited; the spillway will have a storage capacity of greater than a 1 in 30-year flood event. From the second pond, the clean water will be transported through the existing pumping system to be discharged from site. Discharge will only take place from the clean water pond once silt and any other potential pollutants (e.g. hydrocarbons, de-icer) have been removed from site discharge.

7.9.20 A maximum discharge rate of 150 l/s has been assumed in designing the on-site attenuation ponds which been sized to attenuate site run off for the 1% Annual Exceedance Probability (AEP) storm plus a 40% climate change allowance. At the detailed design stage, the site drainage network design will include consideration of the impact of the peak rate of discharge on the qualification/notification features of Pegwell Bay's designated sites in the construction phase. Further consultation on this point with NE and the EA is also expected to occur at the detailed design stage to ensure that appropriate scour protection is in place. The proposed pumping rate represents a maximum worst case scenario and lower rates could be achieved by using a variable rate pump or further attenuating water on site. If further attenuation is required this could be achieved by increasing the surface area of the ponds, by providing limited infiltration of clean run off (e.g. roof drainage), by providing addition attenuation tanks elsewhere on site, by providing additional storage capacity with the drainage network by oversizing pipes, by utilising any spare capacity in the Southern Water drainage network or by using clean run-off water elsewhere on site. The work to refine and improve attenuation and therefore reduce peak discharge rates is expected to be investigated during the detailed design stage of the project which will come after the order is made.

7.9.21 The Fuel Farm site will have its own separate drainage system which will connect to the drainage outfall pipe at Pegwell Bay (see Appendix G of Appendix A in **Appendix 8.2**). This drainage system will be fitted with an oil separator and an anti-pollution non-return control valve to ensure

that no hydrocarbons enter the drainage outfall to Pegwell Bay and any pollution incident does not leave the Fuel Drainage system.

7.9.22 The regulation of site discharges has been discussed with the EA (see **Table 8.6** and **Table 8.14** of **Chapter 8: Freshwater Environment**) and NE. The EA have indicated that they do not normally permit surface water drainage discharges to sea, however, it is acknowledged that the sensitivity of the features at Pegwell Bay does require appropriate mitigation. It is possible that a permitting approach could be used which combined the use of a Water Discharge Activity Permit to regulate discharges from the 'dirty' to 'clean pond, combined with the anti-pollution non-return valve on the Fuel Farm drainage system and appropriate monitoring of the clean pond outflow. The regulation of the quality of all discharges to Pegwell Bay will be discussed with the EA and NE prior to the commencement of works.

7.9.23 The appropriate design of the site drainage system, the regulation of the site discharge through an environmental permit and the design of the outfall discharge mean that all effects on Pegwell Bay from the site discharge are concluded to be negligible in the operation phase. Therefore, it is envisaged that there will be no significant effects on Pegwell Bay and associated designated sites during the operation of the site.

Inter-related Effects

7.9.24 Effects on these receptors not assessed above have been scoped out of any potential for significant effects. Effects scoped in (e.g. habitat loss through disturbance/displacement and from changes in air quality) have been assessed as being of a sufficiently low magnitude (as detailed in this Section) so that their potential interactive effects are not considered to be significant. Therefore, with no alteration to the favourable conservation status of the receptors, effects are assessed as not significant on the nationally designated sites and their features, and there are no adverse effects on the integrity of the SPA, Ramsar, SAC or other designated sites.

7.10 Assessment of Effects to Designated Sites/Priority Habitats/Plant and Invertebrate Species through Air Quality Effects

Baseline Conditions

Current Baseline

7.10.1 The Sandwich Bay SAC is designated for the presence of five Annex I habitats. The land coverage for each habitat within the SAC at its designation (in ha) has been obtained from the Natura 2000 data form (http://jncc.defra.gov.uk/ProtectedSites/SACselection/n2kforms/UK0013077.pdf), as follows:

- Embryonic shifting dunes (5.68ha);
- White dunes, shifting dunes along the shoreline (9.09ha);
- Grey dunes, fixed coastal dunes with herbaceous vegetation (223.93ha);
- Dunes with *Salix repens ssp. Argentea* (11.37ha); and
- Dune slacks (7.96ha).

7.10.2 The precise locations of each of the five Annex I habitat types within the SAC is not known, though the description for the SAC indicates the presence of the embryonic and white dunes to be primarily along the seaward side within the northern half of the Order Limits. However, the overall extent of the 'sand dune' Habitat of Principal Importance' (covering approximately 368ha) has been obtained from www.magic.defra.gov.uk and is shown on Figure 4.8 in **Appendix 7.1**.

7.10.3 The SBHM SSSI, is the constituent SSSI of the SAC and covers the entirety of the SAC, plus areas of adjacent and nearby land. The SSSI is notified for a total of 31 separate features, which include,

in addition to its ornithological interest, both its invertebrate and vascular plant assemblages and a range of vegetation types, as follows:

- SD11 - *Carex arenaria - Cornicularia aculeata* dune community;
- SD12 - *Carex arenaria - Festuca ovina - Agrostis capillaris* dune grassland;
- SD14 - *Salix repens - Campylium stellatum* dune-slack community;
- SD2 - *Honkenya peploides - Cakile maritima* strandline community;
- SD4 - *Elymus farctus ssp. Boreali-atlanticus* foredune community;
- SD6 - *Ammophila arenaria* mobile dune community;
- SD7 - *Ammophila arenaria - Festuca rubra* semi-fixed dune community;
- SD8 - *Festuca rubra - Galium verum* fixed dune grassland; and
- SD9 - *Ammophila arenaria - arrhenatherum elatius* dune grassland.

7.10.4 Together with a further seven vegetation communities associated with wetland, intertidal and coastal habitats:

- S4 - Phragmites australis swamp and reed-beds;
- SM14 - *Atriplex portulacoides* saltmarsh;
- SM16a - *Festuca rubra saltmarsh Puccinellia maritima* sub-community;
- SM18 - *Juncus maritimus* saltmarsh;
- SM21 - *Suaeda vera - Limonium binervosum* saltmarsh;
- SM24 - *Elytrigia atherica* saltmarsh;
- SM9 - *Suaeda maritima* saltmarsh; and
- Populations of Schedule 8 plants - *Himantoglossum hircinum*, Lizard Orchid and *Orobanche caryophyllacea* Bedstraw Broomrape.

7.10.5 The SBHM SSSI covers an area of 1,790ha, of which: 94% is in a 'Favourable' (50%) or 'Unfavourable - recovering' (46%) condition. The SSSI is divided into 62 units of which at least 12 Units (numbered 13-15, 17-19, 21-23, and 25-27 inclusive) contain sand dune habitat: ten in a 'Favourable' Condition, and two in an 'Unfavourable – Recovering' Condition (Units 18 and 22).

Current Baseline – Air Quality

7.10.6 The overall air quality baseline is detailed in **Chapter 6: Air Quality** with a summary provided here.

7.10.7 Thanet's measured annual mean nitrogen dioxide (NO_2) monitoring programme between 2007 and 2016 showed that concentrations above 20 µg m^{-3} are confined to roadside and urban centre locations. 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.

7.10.8 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.

7.10.9 Measured annual mean NO_x concentrations from Thanet's monitoring programme between 2007 and 2016 and monitor locations are detailed in **Appendix 6.2** of **Chapter 6: Air Quality**.

7.10.10 Measured annual mean PM_{10} concentrations from Thanet's monitoring programme between 2007 and 2016 are detailed in **Appendix 6.2** of **Chapter 6: Air Quality**. These are both roadside sites.

The monitoring shows that at the monitoring locations, concentrations are well below the legal limit of 40 µg m^{-3}.

7.10.11 The Department for Environment, Food and Rural Affairs (Defra) 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 datasets include annual average concentration estimates for NO_x[xlix], NO_2, PM_{10} and $PM_{2.5}$[l], as well as other pollutants. The datasets were updated in 2016.

7.10.12 Measured NO_2 concentrations at non-roadside monitors are compared with the Defra concentrations (both for 2016) for the corresponding grid square (see **Table 6.4** of **Chapter 6: Air Quality,** which shows the concentrations). The measured concentrations are consistently significantly higher than the Defra concentrations, by 3 to 9 µg m^{-3}. This is partly because the monitoring results for 2016 were unusually high, due to prevailing meteorological conditions, something which cannot be taken into account in the forecasting models. The magnitude of this difference is broadly consistent with comparisons in other parts of the country for similar air quality assessments, although the Margate urban background monitor (ZH2) shows an unusually large discrepancy.

APIS Background Mapped Deposition Rates

7.10.13 The Air Pollution Information System (APIS) website[63] 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.

Future Baseline

7.10.14 There is a slight trend in the air quality monitoring data for concentrations to reduce over the years. This trend will be ignored for conservatism[li]. The future baseline will therefore be assumed to be the same as the current baseline. For near-road locations, the projected Defra maps (2013 to 2013) will be used for consistency across the roads methodology.

7.10.15 No information is available on future nitrogen deposition[lii] rates, so these too will be assumed to be the same as the current baseline.

7.10.16 Committed developments have been reviewed to identify additional sources of emissions that are likely to arise in future. The main new developments of relevance are residential, which may generate additional road traffic. These additional traffic movements have been included in the traffic model. No other developments have been identified which are likely to have a significant effect on air concentrations at receptors close to the Proposed Development.

Predicted Effects and their Significance

7.10.17 There is potential for direct effects resulting from a deterioration in air quality. Plant and equipment used during construction, as well as road traffic generated during the construction phase, will produce emissions. During operation, emissions will result from aircraft and airside plant and equipment; and road traffic generated during the operation phase.

[xlix] Nitrogen oxides were taken to be nitrogen dioxide (NO_2) + nitrogen/nitric oxide (NO). NO and NO_2 are collectively known as NOx.
[l] PM_{10} is particulate matter 10 micrometres or less in diameter, $PM_{2.5}$ is particulate matter 2.5 micrometres or less in diameter. $PM_{2.5}$ is generally described as fine particles.
[li] It is often easier to make a conservative assumption than justify a more realistic one. Predicting background concentrations out to 2030 is uncertain and unlikely to appreciably change the conclusions. There is no info to project deposition rates.
[lii] NOx emissions may also, following chemical conversion in the air, form nitrogen dioxide, which is then deposited.

7.10.18 The pollutant of concern associated with emissions that might affect sensitive habitats is nitrogen oxide[liii] (NO_x). Road and air traffic emissions may increase the ambient NO_x concentrations in the air to which vegetation is exposed. The air quality standard measurement used for NO_x concentrations in air is the annual mean and the daily mean.

7.10.19 In addition to NO_x concentrations in air, NO_x emissions may also, following chemical conversion in the air, form nitrogen dioxide, which is then deposited. This nitrogen deposition may affect plant communities (with the consequent potential to alter habitats) by causing:

- Nutrient enrichment of soils; and
- Acidification of soils.

7.10.20 The strongest effect of NO_x emissions is through their contribution to nitrogen deposition (either through nutrient enrichment or acidification) rather than through the NO_x concentrations in air. Furthermore, there is substantial evidence to suggest that the effects of ambient nitrogen are much more likely to be negative in the presence of equivalent concentrations of sulphur dioxide (SO_2), with the ratio of SO_2 to NO_2 having decreased greatly in the UK over the past 30 years[64]. Ozone (O_3) has a similar effect to SO_2. Ozone has also decreased and in 2016 for the UK "*all zones and agglomerations met the target values for health and for protection of vegetation*"[65]. There is also a long-term objective for the protection of vegetation from O_3. In 2016 the south-east of England was below this long-term objective for the protection of vegetation[66]. In terms of potential impacts upon ecological receptors this means that any elevated levels of NOx concentrations in air are unlikely to have negative impacts when levels of SO_2 and O_3 are also low.

7.10.21 The EA and Institute of Air Quality Management (IAQM) has specific guidance for ecological receptors.

7.10.22 The EA[67] guidance gives criteria for screening outsource contributions at designated nature conservation sites. For SSSIs, SPAs, SACs and Ramsar sites there is no need for further assessment if the screening calculation finds that:

- Both the following are met:
  - The short-term PC[liv] is less than 10% of the short-term AQAL[lv]; **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.

7.10.23 The EA guidance states that 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.

7.10.24 It further indicates that, following detailed dispersion modelling, no further action is required if:

- The proposed emissions comply with Best Available Technique (BAT) associated emission levels (AELs) or the equivalent requirements where there is no BAT AEL; and
- The resulting PECs won't exceed AQALs.

[liii] Assessment of sulphur oxides (SO_2) has been scoped out as such emissions are expected to be negligible (see **Chapter 6: Air Quality**, section 6.4, and Table 6.8).
[liv] The predicted concentrations resulting from the process (i.e. the process contribution (PC)) are used along with background concentrations and the percentage contribution that the predicted environmental concentrations (PEC) would make towards the relevant standard, objective or guideline value (see **Chapter 6: Air Quality**).
[lv] 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/Environmental Protection UK (see glossary and abbreviations, Table 6.1, **Chapter 6: Air Quality**).

7.10.25 The critical level for all vegetation types from the effects of NOx has been set to 30 µg/m^3 [68].

7.10.26 The full scope of the air quality assessment, the air quality baseline, assessment methodology and assessments (covering both ecological and human receptors) are detailed in **Chapter 6: Air Quality**. The criteria for the spatial identification of ecological receptors is set out in **Section 6.4** of **Chapter 6: Air Quality**, with the receptors detailed in Table 6.6, and their location shown in **Figure 6.5** (those near the Proposed Development) and **Figure 6.6** (those further away from the site).

7.10.27 Following the air quality assessment in **Chapter 6: Air Quality,** the assessment here has been based upon three operational years, two of which also cover the construction phase, as follows:

- Year 2, representing the first year of aircraft operation;
- Year 6 (the point at which the airport exceeds 10,000 movements per year); and
- Year 20, representing the worst-case year in terms of likely emissions from aircraft and vehicular movements.

7.10.28 Construction activity will be spread over the first 18 years of the Proposed Development, but is conservatively assumed to be condensed into Years 2 and 6 (with construction completed before Year 20). This approach has ensured that the assessment has captured the peak construction years as well as the worst-case operational year[lvi].

7.10.29 Throughout the air quality modelling process, care has been taken not to risk under-predicting impacts. In fact, a number of conservative assumptions have been made (see **Appendix 6.3** of **Chapter 6: Air Quality**) for a summary list of conservative assumptions) which mean that impacts are very likely to be over-predicted, that is to say the air quality assessment is very much a worst-case assessment.

7.10.30 The ecological receptors included within the air quality assessment are those within the statutory designated sites for which the air quality modelling showed the greatest concentrations/deposition rates, rather than locations within/close to the most sensitive qualifying habitats (e.g. sand dunes). These concentrations/deposition rates were then assessed against the APIS data for the most sensitive habitats that formed the qualifying interest of the sites.

7.10.31 The air quality assessment shows that effects are predicted to be not significant on all 'local' designations (e.g. County Wildlife Sites/priority habitats) and consequently there is only need to consider those 'major' sites (e.g. SSSIs) where the air quality assessment revealed a need for further assessment (see **Section 6.8**, **6.9**, **6.10** and **Appendix 6** of **Chapter 6: Air Quality**).

7.10.32 For daily mean NOx concentrations in air and acid deposition no further assessment of any ecological receptors has been undertaken as the air quality assessment (see **Appendix 6** of **Chapter 6: Air Quality**) showed that effects were predicted to be not significant for each of the three assessment years (Year 2, 6 and 20) for all relevant ecological receptors.

7.10.33 **Chapter 6: Air Quality** also includes an assessment of air quality effects from roads away from the airport covering each of the three assessment years (see **Section 6.11** of **Chapter 6: Air Quality**). This concludes that any effects from the Proposed Development via NO_x concentrations in air, nutrient nitrogen deposition and acid deposition are not significant on valued ecological receptors in all years. Therefore, no further assessment is included in this Chapter for any effects away from the airport in relation to emissions generated by road traffic.

Construction and Operation Phase Effects (Year 2)

7.10.34 This represents the second year of construction activity and the first year of aircraft operation. This section is based upon the results of the air quality modelling described in **Section 6.8** of **Chapter 6: Air Quality**.

[lvi] As there are no assessment criteria for impacts longer than one year, assuming all activity takes place in one calendar year gives the highest results for comparison against annual mean assessment levels.

7.10.35 Consideration is given to those ecological receptors identified in the air quality assessment that require further consideration in respect of the annual mean NO_x concentrations (**Chapter 6: Air Quality**).

7.10.36 For Year 2, the air quality assessment shows that further consideration is required for four receptors for annual mean NO_x concentrations in air. These receptors are E08[lvii], E09, E11 and E22 (see **Figure 6.6**). Receptor E22 is located adjacent the SBHM SSSI (see **Figure 7.6**). Receptors E08, E09 and E11 are located adjacent the littoral habitats of the Thanet Coast SSSI, which are frequently and regularly covered by seawater through tidal action. Much of the habitat present comprises unvegetated rock and sediment with no impact from elevated NO_x concentrations in air. Where vegetated, the habitats have low sensitivity to nitrogen[69] and are covered by eutrophic tidal waters. In addition, for NO_x concentrations in air to have negative effects on vegetation there has to be correspondingly high levels of SO_2 and O_3 and "*The level for NOx should only be applied where levels of SO_2 and O_3 are close to their critical levels*"[70] with levels of SO_2 and O_3 are below critical levels/threshold in Thanet[71].

7.10.37 The air quality assessment assumed background (existing) NO_x at rural locations in Thanet to be 25.9 µg m^{-3}, based on monitoring at two suburban/edge-of-town sites. Therefore, actual concentrations at the SSSI will probably be somewhat lower. At the nearest point of the SSSI the airport will add up to 0.9 µg m^{-3}, giving a total concentration of 26.8 µg m^{-3}. The increase here is 3% of the AQAL and therefore above the 1% EA screening threshold (see paragraphs 7.10.16 – 7.10.18). However, the total concentration is below the 30 µg m^{-3} critical level (see paragraphs 7.10.19) level for all vegetation types.

7.10.38 Therefore, although the additional contribution of NO_x in Year 2 would be above the 1% EA screening threshold, the total concentration will remain below the critical level for these habitats and therefore there will be no significant air quality effect on the Thanet Coast SAC/SSSI and SBHM SSSI.

Construction and Operational Effects (Year 6)

7.10.39 This is the sixth year of construction activity and the year when the airport exceeds 10,000 air traffic movements a year. This section addresses the results of the air quality modelling described in Section 6.9 of **Chapter 6: Air Quality**, which, as for Year 2, shows that any effects from nutrient nitrogen and acid deposition are not significant (see also **Appendix 6** of **Chapter 6: Air Quality**).

7.10.40 Consideration is therefore given to those ecological receptors that require further assessment for annual mean NOx concentrations in air as identified by the air quality assessment (section 6.9 of **Chapter 6: Air Quality**).

7.10.41 For Year 6 further assessment is required for receptors E08 to E11, E15, E17, E18 and E21 to E24 inclusive. Receptors E08 to E18 are close to the Thanet Coast SSSI (see **Figure 6.6** of **Chapter 6: Air Quality**) and receptors 21-24 are located by residential and agricultural areas adjacent to the SBHM SSSI (see **Figure 7.6)**. The receptors close to the Thanet Coast SSSI are located close to intertidal habitats which are frequently and regularly covered by seawater through tidal action. Much of the habitat present comprises unvegetated rock and sediment with no impact from elevated NOx concentrations in air. Where vegetated, the habitats have low sensitivity to nitrogen and are covered by eutrophic tidal waters. In addition, for NOx concentrations in air to have negative effects on vegetation there has to be correspondingly high levels of SO_2 and O_3 and (as indicated above for Year 2) levels of SO_2 and O_3 are below critical levels/threshold in Thanet.

7.10.42 The air quality assessment assumed background (existing) NOx at rural locations in Thanet to be 25.9 µg m^3, based on monitoring at two suburban/edge-of-town sites. Therefore, actual concentrations at the SSSIs will probably be somewhat lower. At the nearest point of the SSSI the airport will add up to 0.9 µg m^{-3}, giving a total concentration of 26.8 µg m^{-3}. The increase here is 3% of the AQAL and therefore above the 1% EA screening threshold (see paragraphs 7.10.16 –

[lvii] The prefix 'E' denotes 'ecological' used in the air quality assessment to differentiate from human receptors.

7.10.18). However, the total concentration is below the 30 µg m^{-3} critical level (see paragraph 7.10.19) level for all vegetation types.

7.10.43 Therefore, although the additional contribution of NOx in Year 2 would be above the 1% EA screening threshold, the total concentration will remain below the critical level for these habitats and therefore there will be no significant effect from changes to air quality on the Thanet Coast and SBHM SSSIs.

7.10.44 It should be emphasised that the modelled predicted environmental concentrations (PECs) are dominated by the background contribution, and it is assumed that the background concentrations are unchanged from current (2007–2016) monitored concentrations. This is a very 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, see **Section 6.5** of **Chapter 6: Air Quality**), 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 and other sources which are expected to take effect over the next twenty years.

7.10.45 It should also be remembered that the modelling makes a number of worst-case assumptions about the emissions from the airport, so the process contribution (PC) is also likely to be overestimated.

Operational Phase Effects from Aircraft Year 20 (worst-case)

7.10.46 This section presents results for Year 20, the year with the peak number of aircraft movements ('worst case') and with construction completed.

7.10.47 The air quality assessment (see **Section 6.10** and **Appendix 6** of **Chapter 6: Air Quality**) shows no significant effects from acid or nutrient nitrogen deposition for Year 20, therefore in this section, only the annual mean NO_x concentrations in air are considered.

7.10.48 The air quality assessment (see **Appendix 6** of **Chapter 6: Air Quality**) shows for annual mean NOx concentrations in air that further assessment is required for the following ecological receptors: E08 to E11, E15, E17, E18, E19 and E21 to E24 (see **Figure 6.6**).

7.10.49 Receptors E08 to E19 are close to the Thanet Coast SSSI (see **Figure 6.6** of **Chapter 6: Air Quality**) and receptors E21-24 are located by residential and agricultural areas adjacent to the SBHM SSSI (see **Figure 7.6)**. The receptors close to the Thanet Coast SSSI are located close to intertidal habitats which are frequently and regularly covered by seawater through tidal action. Much of the habitat present comprises unvegetated rock and sediment with no impact from elevated NOx concentrations in air. Where vegetated, the habitats have low sensitivity to nitrogen and are covered by eutrophic tidal waters. In addition, for NOx concentrations in air to have negative effects on vegetation there has to be correspondingly high levels of SO_2 and O_3 and (as indicated above for Year 2) levels of SO_2 and O_3 are below critical levels/threshold in Thanet.

7.10.50 The air quality assessment assumed background (existing) NOx at rural locations in Thanet to be 25.9 µg m^3, based on monitoring at two suburban/edge-of-town sites. Therefore, actual concentrations at the SSSIs will probably be somewhat lower. At the nearest point of the SSSI the airport will add up to 0.9 µg m^{-3}, giving a total concentration of 26.8 µg m^{-3}. The increase here is 3% of the AQAL and therefore above the 1% EA screening threshold (see paragraphs 7.10.16 – 7.10.18). However, the total concentration is below the 30 µg m^{-3} critical level (see paragraph 7.10.19) level for all vegetation types.

7.10.51 Therefore, although the additional contribution of NO_x in Year 2 would be above the 1% EA screening threshold, the total concentration will remain below the critical level for these habitats and therefore there will be no significant effect from changes to air quality on the Thanet Coast and SBHM SSSIs.

Inter-related Effects

7.10.52 Effects on these receptors not assessed above have been scoped out of any potential for significant effects. Effects scoped in (e.g. habitat loss through displacement and from changes in water quality) have been assessed as being of a sufficiently low magnitude (as detailed in this Chapter) so that their potential interactive effects are not considered to be significant when acting together. Therefore, with no alteration to the favourable conservation status of the receptors effects are assessed as not significant on the nationally designated sites and their features, and there are no adverse effects on the integrity of the SPA, SAC and Ramsar site.

7.11 Assessment of Effects on the Bat Assemblage

Current Baseline

7.11.1 The site provides generally low-quality foraging and commuting habitat for bats. The ground-truthing exercise in February 2017 identified that the site has large areas of semi-improved neutral grassland and extensive areas of hard-standing, which includes a runway, aircraft taxiing areas and buildings (see **Figure 7.3**). The site is exposed and the grassland is managed by cutting, providing low quality foraging habitat for bats. Bat activity on the site would likely be concentrated along the margins; such as western and eastern boundaries and the hedgerows to the extreme north of the site and to the west of the runway.

7.11.2 The SHP desk study reported two bat roost records within a 1km grid square which potentially fall within the site boundary. These records are for a common pipistrelle roost and an unidentified bat species. Further information relating to the sizes of the roosts or roost type was not available. The next closest roost is located 2.4km to the south-west of the site. This was a large maternity soprano pipistrelle roost[72].

7.11.3 Within 5km of the Site there were 125 bat records since 2000, of at least six species: common pipistrelle; Nathusius' pipistrelle; soprano pipistrelle; brown long-eared; Natterer's and serotine. Additionally, some records are only allocated to genus level (e.g. *Pipistrellus* sp.) and there were six records of *Chiroptera* sp.

7.11.4 Building inspections in autumn 2017 revealed evidence of bats within four buildings (B8, B16, B17 and B41, **Appendix 7.6**) within the Site. The results of the inspection indicate the presence of a hibernation roost within building B8, day / transitional roosts within buildings B16 and B41, and a night roost within building B17. No bats or evidence of bats were recorded in buildings B33 or B54, which were previously confirmed as bat roosts in 2015/16. A further 32 buildings were assessed as having the potential to support roosting bats (two buildings with high potential, six with moderate potential and 24 with low potential) as they incorporate potential roosting features.

7.11.5 A ground–based assessment of trees on site to check for potential bat roost features was undertaken in late November 2017 with the findings reported in a Technical Note as **Appendix 7.11**[73]. In total 35 trees were identified as supporting PRFs with 17 trees classified as of low or negligible potential, which require no further inspection/survey with regard to bats. Eighteen trees (two of high and 16 of moderate potential) will have closer inspection or further roost survey prior to commencement of construction activities..

Stone Hill Park Survey Data (2015-2016)

7.11.6 Information from the SHP application has not informed our conclusion of significance in any assessment but merely been used to help guide our own survey work.

7.11.7 External building assessments included within the SHP extended Phase 1 habitat survey found a number (52+) of buildings/structures within the site. The majority of buildings were considered to have negligible or low potential for roosting bats. Roost potential (in accordance with best practice at the time[74]) for buildings/ structures was assessed through external inspections and revealed:

- 34 with negligible potential;

- 20 with low potential;
- Two with medium potential;
- One with high potential; and
- Four with confirmed roosts (within buildings 16, 33, 41 and 54[lviii]).

7.11.8 Many of the buildings consist of large aircraft hangars with sheet metal construction and ancillary buildings of modern construction many of which are very small (e.g. various electrical sub-station buildings).

7.11.9 Bat activity survey work for the SHP application was undertaken in September 2015 and covered four transects within the site, with a dusk and a pre-dawn activity survey being undertaken within the same 24-hour period. Bat activity at the Site was low with three species of bat being identified: common pipistrelle, soprano pipistrelle and noctule. The highest level of activity was found at the eastern end of the former runway, with 21 common pipistrelle passes and one soprano pipistrelle pass during the dusk and dawn activity survey, with activity being concentrated along the hedgerow boundary. Activity levels at the remaining transects were very low: transects one (four passes), transect two (four passes), and transect four (four passes).

7.11.10 Automated detector survey work was also undertaken for five consecutive nights in September 2015 (**Figure 7.4**). A total of five bat species were recorded within the site which included common pipistrelle (80%), soprano pipistrelle (10%), serotine (5%), noctule (3%), Nathusius' pipistrelle (single call, automated detector location 1b) and common or Nathusius' pipistrelle species (single call at 40khz, automated detector location 2b) registering the lowest number of calls (1% of the total calls each). Common/soprano pipistrelles were found at all automated detector locations. Noctule and serotine passes were recorded within the centre of the site, south of the B2050 (Manston Road) (automated detector 2b, having three calls each) and a single serotine pass was also recorded along the eastern boundary near to the junction of B2050 Manston Road and Manston Court Road (automated detector 1a). The location with the highest number of bat calls, almost 43% of total calls recorded was recorded at automated detector 4a (to the west of the Site, towards Spitfire Way). Furthermore, the earliest bat call was a common pipistrelle, at automated detector location 4a, 23 minutes after sunset. Common pipistrelle bats typically emerge from their roosts around 20-30 minutes after sunset, so it would suggest that the bat had been roosting nearby. A common pipistrelle bat was also recorded 33 minutes before sunrise (automated detector 1a), which again suggests that the bat could be returning to a roost nearby.

7.11.11 Hibernation survey work was conducted between January and March 2016 on B33, B43 and B18. All three structures had static bat detectors in place, however no echolocating bats were recorded. B33 was inspected and found to have a hibernating brown long-eared bat. B43 could not be accessed but a static detector was placed inside; although the structure was not confirmed to be a hibernation roost, the hibernation potential is still considered high. B18 was inspected on five occasions, during which no roosting bats were found.

Survey Results 2017

7.11.12 A total of 71 buildings were externally assessed between August and October 2017 (see **Appendix 7.6**). Each building was assessed and placed into a category identifying its bat roosting potential, in accordance with current best practice[75], as shown in **Table 7.14**. **Figure 7.4** and **Figure 7.5** detail locations of buildings, activity transects and automated detector survey work.

Table 7.14 Summary of Bat Roosting Potential for all Buildings on Site, August – October 2017

Overall Potential to support roosting bats*	Building Reference Number*	Total number of buildings in Category

[lviii] All building numbers in this section refer to the buildings shown in Figures 7.4 & 7.5.

Confirmed Roost	B8, B16, B17, B33, B41 and B54	6
High	B1 and B43	2
Moderate	B5, B18, B28, B29, B39 and B53	6
Low	B2, B3, B6, B7, B11, B14, B15, B22, B25, B27, B34, B40, B44, B45, B46, B47, B50, B52, B56, B61, B62, B63, B64 and B66.	24
Negligible	B4, B9, B10, B12, B13, B19, B20, B21, B23, B24, B26, B30, B31, B32, B35, B36, B37, B38, B42, B48, B49, B51, B55, B57, B58, B59, B60, B65, B67, B68, B69, B70 and B71.	33

*Highest potential stated for each building.

Note: The location of each building is shown on Figure 7.4. Note B1 is an underground bunker and B18 is a ground-level bunker.

7.11.13 Initial survey work has demonstrated that at least six bat species use the site. However, this could potentially be up to 11 species taking into account other species known from Kent and that make use of the habitats found on the site.

7.11.14 In addition to the 71 buildings, there are approximately 130 trees on site, many of which are relatively young, less than 30 years old and of simple growth form. A ground-based tree assessment for potential roost features (PRF) in November 2017 identified 14 trees which will have PRF inspections or presence/absence surveys (see **Appendix 7.11**).

7.11.15 Many of the confirmed roosts and potential roosts have more than one potential roost type e.g. a building may have the potential for hibernation and also day roosting. Based on initial survey data, the current status of on-site roosts and potential roost categories within buildings is as follows:

- Maternity roosts:
  - No confirmed roosts;
  - Three buildings with moderate potential; and
  - Eight with low potential.
- Hibernation roosts:
  - Two confirmed roosts (B8 and B33);
  - One building with high potential;
  - Two with moderate potential; and
  - 18 with low potential.
- Day/transitional roosts:
  - Four confirmed roosts (B16, B33, B41 and B54);
  - One building with high potential;
  - Five with moderate potential; and
  - 25 with low potential.
- Night/feeding roosts:
  - One confirmed roost (B17); and
  - 12 buildings with low potential.

7.11.16 Information for confirmed roosts is presented in **Table 7.15**. Further internal inspections, hibernation surveys, transect surveys and emergence/re-entry surveys will be undertaken to reinforce the worst-case assessment of bat use of the site.

Table 7.15 Current Confirmed Bat Roost Information

Building Reference	Current status	Potential Status	Bat present	2015 Surveys – droppings found	2017 Surveys – droppings found
B8	Confirmed hibernation roost.	Moderate potential as day/transitional roost. Low potential as night /feeding roost.	-	-	25 brown long-eared droppings and *Myotis* sp. droppings
B16	Confirmed day/transitional roost.	Moderate maternity roosting potential. Low potential for hibernation bats.	-	15 pipistrelle sp. droppings	Three brown long-eared droppings
B17	Confirmed night/feeding roost.	Low potential for hibernating bats.	-	-	40 brown long-eared droppings
B33	Confirmed hibernation, day/transitional roost		Single brown long-eared hibernating	20 brown long-eared droppings and one pipistrelle sp. dropping.	-
B41	Confirmed day/transitional roost.	Low potential to support maternity roosting and hibernating bats	-	Approximately 10 pipistrelle sp. droppings	30 pipistrelle sp. droppings
B54	Confirmed day/transitional roost.	Low potential to support maternity roosting and hibernating bats	-	2 pipistrelle sp. droppings present	-

Note: Species considered likely present based on visual character of droppings.

7.11.17 The likely roosting status and the potential conservation significance of the six building roosts identified, assessed in line with the criteria set out in the bat mitigation guidelines[76], is presented in **Table 7.16**. Where the status of a roost or species' population is uncertain, for example if the survey results were ambiguous, a precautionary approach has been taken in line with the worst-case assessment, and the higher level of value assumed.

Table 7.16 Interpretation of likely roosting status by species

Species	Availability of foraging/commuting habitat	Preliminary interpretation of likely roosting status on the Site according to species+ (refer to Figures 7.4 & 7.5 for building references)	Activity recorded on the Site*
Brown long-eared bat	Hedgerows and treelines are present on the western and eastern boundaries of Manston Road, and provide opportunities for foraging, connecting suitable habitat, despite built-up patches that are artificially lit. Foraging and commuting habitats are sub-optimal for this species which is a woodland specialist and	B33 is a confirmed hibernation site for brown long-eared bat. A single bat was found in B33 during inspections undertaken in January/February 2016 (SHP). B33 supports an individual brown long-eared or possibly on a precautionary basis a small roost of up to three bats of this common species B8 is a confirmed hibernation site for brown long-eared bat. 25 brown long-eared droppings were recorded inside the building during winter surveys.	No brown long-eared calls were identified during static and transect detector survey (although this is likely to be due in part to the quiet calls of this species leading to under-detection). It is anticipated that there will be very low levels of foraging and/or commuting recorded across the Site, which would be primarily along boundary features.

Species	Availability of foraging/commuting habitat	Preliminary interpretation of likely roosting status on the Site according to species+ (refer to Figures 7.4 & 7.5 for building references)	Activity recorded on the Site*
	shows preference for dark flight routes.	Based on current information B33 and B8 would be of **moderate conservation significance** for the hibernation sites respectively at a site context. B17 (40 droppings) has been confirmed as a day/transitional roost and would be of **low conservation significance** if occupied by individual bats. B16 (3 droppings) has been rated as moderate potential for a maternity colony, if found would be of **medium conservation significance**.	
Common pipistrelle	Suitable foraging habitat is available across the Site, along boundary features with some trees and hedgerows, as well as around artificial lights and landscaped areas. This species is a habitat generalist and will opportunistically forage around street lamps, scrub, hedgerows, trees and other features.	Buildings 16, 41, and 54 had droppings present and have been confirmed as day/transitional roosts (likely common or soprano pipistrelle – subject to DNA analysis). B41 and 54 have been rated as having low potential to support maternity or hibernation roosts, having potential to support only small numbers of bats. Based on this judgement these buildings would be classed as **low conservation significance**. B16 has been rated as moderate potential for a maternity colony which, if confirmed, would be of **medium conservation significance**.	Low levels of Common pipistrelle activity were recorded on the Site. Of the species recorded during the static and transect surveys this was by far the most frequently occurring species, with 77.22% of calls (61 in total) during the September 2015 monitoring period (five nights at eight locations). A total of 34 common pipistrelle calls were recorded during the September 2015 dusk/dawn activity surveys across all four transects at the Site.
Soprano pipistrelle	Suitable foraging habitat is available across the Site, along boundary features with some trees and hedgerows, as well as around artificial lights and landscaped areas. Aside from a balancing pond and an emergency water supply tank, the Site lacks the water bodies with which soprano pipistrelles are typically associated.	Buildings 16, 41, and 54 droppings present and have been confirmed as day/transitional roosts (likely common or soprano pipistrelle – subject to DNA analysis). B41 and 54 have been rated as low maternity and hibernation potential having the potential to support low to small numbers of bats if this is the case they would be classed as **low conservation significance**. B16 has been rated as moderate potential for a maternity colony; if confirmed, would be of **medium conservation significance**.	Very low levels of soprano pipistrelle foraging and commuting were recorded across the Site. Static detectors found a total of eight calls (10.13%) at eight locations during the September 2015 5 days of monitoring. A total of two soprano pipistrelle calls were recorded during the September 2015 dusk/dawn activity survey across all four transects at the Site.
Nathusius' pipistrelle	Some suitable foraging habitat is available particularly along western and eastern boundaries of Manston Road. The Site does, however, lack woodland and large water bodies which Nathusius' pipistrelle is usually associated. Although considered one of the UK's rarer bats, this species is recorded more frequently in the south-east region.	No roosts identified. If any of the trees support an individual or small number of this species, the roost would be **of medium-high conservation significance** due to the rare status of this species in the UK.	Very low levels of foraging and commuting recorded across the site. With a single confirmed call and a single possible call during static detector monitoring. Static detectors recorded one call (1.27%), during the September 2015 (5 days of monitoring).
Noctule	Suitable foraging habitat is available across the Site. Areas include boundary	No roosts currently identified. If any of the buildings support small numbers of this species, the roost would be	Very low levels of noctule activity were recorded at the Site Static detectors found three call (3.8%),

Species	Availability of foraging/commuting habitat	Preliminary interpretation of likely roosting status on the Site according to species+ (refer to Figures 7.4 & 7.5 for building references)	Activity recorded on the Site*
	features such tree lines, hedgerows, and across landscaped grassland areas within the centre of the Site.	**of medium-low conservation significance**.	during the September 2015, five days of monitoring. One noctule call was recorded during the September 2015 dusk/dawn activity survey across all four transects at the Site.
Leisler's bat	Suitable foraging habitat is available across the Site. Areas include boundary features such tree lines, hedgerows, and across landscaped grassland areas within the centre of the Site.	No roosts currently identified. If any buildings support small numbers of this rarer species, the roost would be of **medium-low conservation significance**.	No activity currently identified. Although, there is the potential for low levels of activity.
Serotine	Suitable foraging habitat is available across the Site. Areas include boundary features such tree lines, hedgerows, and across landscaped grassland areas within the centre of the Site.	No roosts currently identified. If any buildings support small numbers of this rarer species, the roost would be of **medium-low conservation significance.** If, however the roost supports a maternity colony of serotine, the roost would be considered of **medium-high conservation significance**. In the absence of further data, the higher level of importance is assumed.	Very low levels of serotine activity were recorded. Static detectors found four calls (5.06%), during the September 2015 (5 days of monitoring).
Daubenton's bat	The Site lacks woodland habitat for foraging opportunities. Boundary features Hedgerows and treelines are present on the western and eastern boundaries of Manston Road, and provide opportunities for foraging, connecting suitable habitat, despite built-up patches that are artificially lit. With the exception of a balancing pond and emergency water supply, the Site lacks the open water habitat with which Daubenton's bat are typically associated.	B8 had a possible *Myotis* sp. dropping present and has been confirmed as a hibernation site. If this building were to support small numbers of this common species, the roost would be of **medium conservation significance**.	No Myotis passes were recorded. It is anticipated that very low levels of activity would occur along boundary features and in darker areas of the Site.
Natterer's bat	The Site lacks woodland habitat for foraging opportunities. Hedgerows and treelines are present on the western and eastern boundaries of Manston Road, and provide opportunities for foraging, connecting suitable habitat, despite built-up patches that are artificially lit.	B8 had a possible Myotis sp. dropping present and has been confirmed as a hibernation site. If this building were to support small numbers of this common species, the roost would be of **medium conservation significance**.	No Myotis passes were recorded. It is anticipated that very low levels of activity would occur along boundary features and in darker areas of the Site.
Whiskered bat	The Site lacks woodland habitat for foraging opportunities. Hedgerows and treelines are present on the western and eastern boundaries of Manston Road, and provide opportunities for foraging, connecting suitable habitat, despite built-up patches that are artificially lit.	B8 had a possible Myotis sp. dropping present and has been confirmed as a hibernation site. If this building were to support small numbers of this common species, the roost would be of **medium conservation significance**.	No Myotis passes were recorded. It is anticipated that very low levels of activity would occur along boundary features and in darker areas of the Site.
Brandt's bat	The Site lacks woodland habitat for foraging opportunities. Hedgerows	B8 had a possible Myotis sp. dropping present and has been confirmed as a hibernation site. If this building were to	No Myotis passes were recorded. It is anticipated that very low levels of activity would occur

Species	Availability of foraging/commuting habitat	Preliminary interpretation of likely roosting status on the Site according to species+ (refer to Figures 7.4 & 7.5 for building references)	Activity recorded on the Site*
	and treelines are present on the western and eastern boundaries of Manston Road, and provide opportunities for foraging, connecting suitable habitat, despite built-up patches that are artificially lit.	support small numbers of this common species, the roost would be of **medium conservation significance**.	along boundary features and in darker areas of the Site. .

+Preliminary interpretation of likely roosting status: based on SHP hibernation survey work at B33 and the 2017 internal inspections of B8, 16, 17, 33, 41 and 54. No emergence or pre-dawn surveys have yet been undertaken, hence professional judgement has been used to make an assessment of the potential significance of roosts if present.

7.11.18 The assessment of roost status and activity in **Table 7.16** has been based on current data which include:

- Automated detector survey work for September 2015 (five nights at eight locations) from the SHP ES;
- Dusk/dawn activity survey at four transects across the Site during September 2015 from the SHP ES;
- Hibernation surveys at B33, B43 and B18 from the SHP ES; and
- Building inspections for bats between 21 August and 17 October 2017 (of which six buildings could not be inspected due to safety concerns and 11 buildings could not be accessed).

Future Baseline

7.11.19 It is not possible to conclude that a different future baseline (in the absence of the Proposed Development) is more likely to occur than that currently present.

Construction Phase Effects

Measures to prevent death or injury of individual bats

7.11.20 There is the potential for individual bats to be killed, injured or disturbed during site clearance prior to development. Based on the results of the survey work to date, common pipistrelle, soprano pipistrelle, brown long-eared bat and *Myotis* sp. bats are most at risk from harm or disturbance, as these species are known/considered most likely, to occur in buildings or trees that will be demolished/refurbished or pruned/felled.

7.11.21 All British bat species are protected by both UK[lix] and European[lx] legislation. This means that a licence is needed in order to carry out any otherwise illegal activities. A licence for the Proposed Development at Manston would only be granted if the three tests specified in the Habitats Directive are met. These are:

- There is 'no satisfactory alternative';
- The development is 'not detrimental to the maintenance of the species concerned at a favourable conservation status in their natural range'; and

[lix] British bats are listed in Schedule 5 of the *WCA 1981* (as amended).
[lx] British bat species receive further protection under Regulation 41 of the *Conservation of Habitats and Species Regulations 2017*.

- It is 'in the interests of public health and public safety, or other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment'.

7.11.22 In light of these legal considerations, mitigation measures will be provided based on a worst case scenario on land located within or in very close proximity to the Proposed Development (e.g. within the BA, **Appendix 7.13**) to maintain the favourable conservation status of the sites' bat populations. In this case a worst case scenario assumes that it will be necessary to provide mitigation for all species of bats that may potentially' be present on the site unless it can be conclusively demonstrated prior to the commencement of construction activities that such mitigation is not required.

7.11.23 Post-consent, a European Protected Species (EPS) mitigation licence would need to be obtained from NE prior to demolition or modification of all buildings or modification or felling of trees identified as bat roosts. These will also include further buildings or trees identified as roosts during the additional roost characterisation surveys to be undertaken prior to commencement of construction..

7.11.24 As part of the licence application, a Method Statement (MS) will be produced detailing measures, which will ensure as far as possible that no bats are harmed during modification, refurbishment or demolition of buildings, as well as setting out detailed requirements for the provision of replacement roost sites. Such mitigation will include the careful removal of potential roost spaces by hand under the supervision of a suitably licensed bat ecologist, phased building removal and timing of work to avoid sensitive periods in the bat life cycle such as breeding and hibernation (typically May – August and November – February respectively).

7.11.25 Should a tree roost be identified, an EPS licence will be required and mitigation/compensation measures would be detailed as part of the application for the licence. Where trees have the potential to support roosting bats, but no bat roost has been identified, they will be soft-felled as a precaution. All contractors working on the trees will be made aware of the potential for bats to occur, and be provided with a copy of a MS in advance of the works. Trees will be section felled, and parts of the tree containing potential roost features will be lowered to the ground gently, with holes/raised bark orientated upwards to allow any concealed bats to escape overnight. Works will be timed to avoid the main bat breeding and hibernation periods (May – August and November – March respectively). A similar approach will be adopted, under licence, for trees supporting bat roosts, although felling of these trees will be directly supervised by a suitably qualified ecologist.

7.11.26 With the measures incorporated into the Proposed Development, there will be no contravention of the legislation protecting bats and provision of roosting opportunities across the site will be an enhancement on what is currently available for bats. As such, there will be no significant effects from roost destruction.

Land-take/land-cover change through demolition or refurbishment of structures or removal of trees resulting in death or injury of bats during construction activities, leading to contravention of UK legislation

7.11.27 The majority of buildings on site will be demolished or, if retained, extensively refurbished to accommodate the Proposed Development. In the absence of roost characterisation surveys, a worst-case scenario has been adopted for the potential loss of roosts within buildings and trees at the site. This considers likely species present based on: confirmed presence of a bat, initial indications of droppings and percentage number of species found during preliminary activity and static monitoring survey work (from September 2015 for the SHP baseline).

7.11.28 This worst case assumes that the loss of three buildings contain small-moderate maternity roosts for common pipistrelle, soprano pipistrelle and/or brown long-eared bats. These would be of medium conservation significance in the context of this site; these species are common and widespread in the UK[77]and the loss of these roosts would not be expected to have a significant effect on the national or local bat populations of these species.

7.11.29 The worst case assumes that up to five hibernation roosts will be lost (two confirmed and three potential, see paragraph 7.11.10) within buildings, potentially supporting brown long-eared, *Myotis* sp., common pipistrelle or soprano pipistrelle species. These would be of medium conservation significance in the context of the site, with these species being common and widespread in the UK. The hibernacula are likely to support very low numbers of common species

and their loss would not be expected to have a significant effect on bat populations of these species.

7.11.30 At a site level, the worst-case loss of a further five buildings has been assumed with these buildings potentially containing individual or small numbers of roosting bats (transitional, or night feeding roosts). In addition, the loss of five individual or small roost sites within trees has been assumed. The majority of these potential roosts have been assumed to consist of low or small numbers of common species such as common or soprano pipistrelle and brown long-eared bats which are of low conservation status at a site level. It has also been assumed that a small number of these roosts could consist of individual or small numbers of roosting *Myotis* sp. (such as Natterer's, Daubenton's, whiskered and or Brandt's), or of serotine, noctule or Leisler's bats; if any of these roosts are present they would be of medium conservation status at a site level. Should an individual or small number of Nathusius' be found to be roosting it would be of moderate-high conservation status at a site level given the rarity of this species at national level. The loss of these buildings with potential (not confirmed) individual or small numbers of roosting bats would not be expected to have a significant effect on bat populations of these species.

Summer Roost Compensation

7.11.31 For the purposes of this assessment a realistic worst-case scenario has been adopted in the design of mitigation measures. It has been assumed that where potential exists but roosts have not been confirmed, in the absence of further surveys appropriate mitigation will be provided as detailed below and in **Appendix 7.13**.

7.11.32 The detailed specification of a purpose-built structure to provide summer roost compensation will be provided within an EPS licence application. It is assumed that a purpose-built structure will be provided to replace the roost space for three potential maternity roosts consisting of low-moderate numbers of bats targeting common pipistrelle, soprano pipistrelle and brown long-eared bat species and five transitional roosts (individual roosting or small number of bat species, see paragraph 7.11.8). The location of the purpose-built structure/roost space has yet to be determined although is likely to be located in the south of the BA (see **Appendix 7.13**), approximately 1km from the southern boundary of the site, near to an existing hedgerow boundary (**Figure 7.4**). The roost would be placed in the southern section of the land parcel to minimise the effects of lighting, noise and risk of bat collision from the aircraft and vehicle traffic.

7.11.33 The design of the compensation roost building will comprise brick construction with a dark tiled or slate roof and will provide a suitable thermal regime to support a maternity roost of common pipistrelle, soprano pipistrelle or brown long-eared bats. The roof will be lined internally with traditional bituminous felt, which will be loose-fitting with tears to permit bats to access and roost between felt and tiles, particularly for common and soprano pipistrelle bats, in addition to an internal cavity wall. Access points (bat slates) will be incorporated into the roof, with tears in the felt below, to ensure that bats can access the loft space. A loft space of greater than 2m in height will accommodate potential brown long-eared bats. The provision of additional roosting cavities will be provided inside such as bat bricks and or soffit boards.

7.11.34 This building will be constructed in advance of demolition of any bat roosts on the site. Human access to roosting areas within the structure will be restricted to suitably licensed bat ecologists for the purposes of monitoring and maintenance. Entrances will be facing vegetation, but providing a clear unobstructed flight-line to the roost space and external lighting will be avoided. Bat mitigation and compensation measures are further described in the MHCP (**Appendix 7.13**).

Winter Roost Compensation

7.11.35 For the purposes of this assessment a realistic worst-case scenario has been adopted in the design of mitigation measures. It has been assumed that where potential exists but roosts have not been confirmed, in the absence of further surveys appropriate mitigation will be provided as detailed below and in Appendix 7.13.

7.11.36 The detailed specification of a purposed built building to provide winter roost compensation will be provided within an EPS licence application. Two purpose-built bunkers are currently proposed and is likely to be installed off-site to the south of the BA to compensate for five (potential) hibernation roosts comprising a low number of bat species; brown long-eared, *Myotis* sp., common pipistrelle or soprano pipistrelle species. Within the bunker there will be features

providing crevices for bats to hibernate. Bat mitigation and compensation measures are further described in the MHCP (**Appendix 7.13**).

Tree Roost Compensation

7.11.37 Bat boxes will be placed along hedgerows on suitable trees or artificial surfaces such as poles along tree lines on-site, along the northern boundary and off-site, along the existing tree line to the west of the BA. They will be positioned so that bats have a clear flight to the box entrance, with space below where they can land. Boxes will be placed approximately 5m high using headless or domed nails, not fully hammered in, to allow the tree to push the box off as it grows without splitting. No trees with bat roosting features will be removed until replacement bat boxes have been installed. Bat mitigation and compensation measures are further described in the MHCP (**Appendix 7.13**).

7.11.38 **Table 7.17** details roost creation for target species within the Proposed Development.

Table 7.17 On-site Mitigation Target Species and Roost Creation

On-site Mitigation	Maternity	Hibernation	Transitional/Day Roost
Four Bat Colony Box 3FS boxes	Common pipistrelle and soprano pipistrelle but may also be suitable for other crevice roosting species	-	Natterer's Whiskered, Daubenton's, Brandt's, Common pipistrelle, Soprano Pipistrelle and Nathusius Pipistrelle.
Four Schwegler 1FS Large Colony Bat Box	Common pipistrelle and soprano pipistrelle but may also be suitable for other crevice roosting species	-	Brown long-eared, Daubenton's, Noctule, Leisler and Nathusius Pipistrelle.
Six Schwegler 1FW Hibernation Box	Common pipistrelle and soprano pipistrelle but may also be suitable for other crevice roosting species	Brown long-eared, Common pipistrelle, Soprano Pipistrelle, Nathusius Pipistrelle, Noctule, Leislers, Daubentons, Natterer's, Whiskered and Brandt's.	Brown long-eared, Common pipistrelle, Soprano Pipistrelle, Nathusius Pipistrelle, Noctule, Leislers, Daubentons, Natterer's, Whiskered and Brandt's.

7.11.39 **Table 7.18** summarises the target species for off-site compensation roost provision (note the locations may vary slightly subject to ground conditions). Off-site roost types have been proposed to benefit all the potential species using the site and to provide a range of roosting sites all year round.

Table 7.18 Summary of target species for off-site compensation roost provision*

Species	Maternity	Hibernation	Transitional/Day Roost
Brown long-eared bat	Bat barn	Bat barn Bat bunker Schwegler Bat Hibernation Box 1	Bat barn Bat bunker Schwegler Bat Hibernation Box 1 FW Wooden bat boxes
Common pipistrelle	Bat barn	Bat barn Bat bunker	Bat barn Bat bunker Wooden bat boxes
Soprano pipistrelle	Bat barn	Bat barn Bat bunker	Bat barn Bat bunker Wooden bat boxes
Nathusius' pipistrelle	Bat barn Schwegler Bat Box 2FN	Bat barn Bat bunker	Bat barn

Species	Maternity	Hibernation	Transitional/Day Roost
		Schwegler Bat Hibernation Box 1 FW	Schwegler Bat Hibernation Box 1 FW Wooden bat boxes
Noctule	Schwegler Bat Box 2FN	Schwegler Bat Hibernation Box 1FW	Schwegler Bat Hibernation Box 1FW – suitable as a summer roost Wooden bat boxes
Leisler's bat	Schwegler Bat Box 2FN	Schwegler Bat Hibernation Box 1FW	Schwegler Bat Hibernation Box 1FW – suitable as a summer roost Wooden bat boxes
Serotine	Bat barn	Bat barn	Bat barn
Daubenton's bat	Bat barn	Bat barn Bat bunker	Bat barn Bat bunker Wooden bat boxes
Natterer's bat	Bat barn	Bat barn Bat bunker	Bat barn Bat bunker Wooden bat boxes
Whiskered bat	Bat barn	Bat barn Bat bunker	Bat barn Bat bunker Wooden bat boxes
Brandt's bat	Bat barn	Bat barn Bat bunker	Bat barn Bat bunker Wooden bat boxes

Roost Compensation Monitoring

7.11.40 Licensed bat surveyors will monitor the effectiveness of roost mitigation and compensation and provide maintenance as required. A detailed monitoring programme will be provided within the Method Statement of the EPS licence and would be subject to approval from NE. This will enable an assessment of whether the bat populations have responded favourably to the proposed mitigation, and identify the need for any minor amendments or additional measures to increase the success of this strategy. The monitoring programme will likely include, as a minimum:

- Annual check of on-site and off-site bat boxes between May and September for a minimum of five years;
- Monitoring of temperature and humidity within newly created bat barn in June and July for at least two years post creation so that desired maternity conditions could be corrected where necessary;
- Twice annual internal inspection/emergence surveys of the compensation bat barn in June and July for a minimum of five years post building roost demolition;
- Monitoring of temperature and humidity within newly created bat bunker and artificial hibernaculum in the bat barn from December to February for at least two years post creation, to allow any variation from the desired hibernacula conditions to be corrected;
- Twice annual inspection of bat bunker and artificial hibernaculum in the bat barn in January and February for a minimum of five years post bunker demolition; and
- Static detector deployment on an annual basis within the bat barn and bat bunker for a minimum of 5 nights in spring, summer, autumn and winter for a minimum of five years.

7.11.41 Monitoring of off-site foraging activity will consist of the following:

- Monitoring of general bat activity within the BA will consist of three transect surveys visits during optimal survey season for bat activity (May and August) in years 1 – 5;
- Each survey visit to include two surveyors undertaking walked transects using real time, full spectrum recording devices such as bat loggers (to incorporate post survey call analysis) for approximately 2-3 hours after sunset;
- Surveyors will be suitably experience or qualified;
- Three surveys to be undertaken in different seasons (spring, summer and autumn); and
- All survey work to follow best practice guidance (Collins, 2016).

7.11.42 Subject to health and safety requirements and access, the monitoring approach of foraging activity on-site would follow the same principles as off-site.

7.11.43 A short annual monitoring report will be submitted to NE, Kent and Medway Biological Records Centre and the Kent Bat Group. After completion of all the monitoring, the results will be documented and supplied to the aforementioned organisations. This report will be made publicly available so that lessons can be learnt for future bat mitigation schemes.

Land-take/land-cover change (habitat removal) resulting in loss or degradation of faunal foraging and commuting habitat

7.11.44 The foraging and commuting value of the site for bats is currently low. The Site was an operational airport until recently (2014) with associated activity, noise and lighting. Much of the Proposed Development site comprises hardstanding (c.99ha) and mown grassland (c.190ha). Furthermore, to discourage the presence of birds to reduce the risk of bird strike, treelines and hedgerows on the site are limited in extent, concentrated predominantly along the northern portion of the site, such as along Manston Road and Manston Court Road. The Proposed Development incorporates additional hardstanding and buildings on site with a (c.23ha) reduction in grassland habitats, with remaining grassland mown. Given the low use of the site by foraging and commuting bats, any change, degradation or loss of habitats on site are not predicted to have a significant effect on the conservation status of bats.

Increase in artificial light levels during the construction phase resulting in temporary loss or degradation of roosting, foraging and commuting habitat, and causing disruption to the behaviour of bats

7.11.45 Spill of construction related lighting onto roosts will be avoided through the use of directional lighting during the construction phase, unless it is existing lighting. Where security lighting is required during construction, this will be operated on motion sensors using directional LED lighting and aimed only where necessary, with no light spill onto known or potential roost sites or key flight-lines. Nocturnal light spill onto hibernation sites will also be avoided between November and March inclusive. This will avoid effects of lighting on bat roosts during the construction phase.

7.11.46 The site was an operational airport, which required lighting until 2014. It is anticipated that there would be an increase in lighting at the site during construction. However, given the low use of the site by foraging and commuting bats effects a significant effect on the conservation status of bats present is not anticipated.

Increase in noise or vibration during the construction phase resulting in disturbance to bats and/or degradation of foraging habitat

7.11.47 Noise levels during the 20-year construction programme are associated with construction works, vehicle movements, aircraft flyover and taxi-ing, landing/take off noise. These could interfere with the ability of bats to roost and echolocate and, therefore, to forage and commute. It is proposed that alternative compensation roosts be erected off site, in the BA to mitigate effects. Bat exclusion will take place under an EPS licence, in advance of construction works near to roosting sites, to avoid disturbance to bats.

7.11.48 The effects from aircraft events in the day time and night time periods are likely to be short in duration in terms of take-off, landing and flyovers and so it is anticipated that there will be no significant effect, particularly in relation to the amount of foraging time available which will remain unaffected. Furthermore, bats on the site already exhibit a high tolerance to background noise e.g. from the Site being used as an airport until 2014 and the A299. Mitigation roosts are to be placed in the BA and so roosting bats will experience the same background noise as nearby human receptors. As such it is not anticipated that noise associated with construction, vehicle movement and aircraft movement will have a significant effect on roosting and foraging bats.

7.11.49 Overall, it is anticipated that there would be a slight adverse effect on bat species as a result in a change to noise levels in the area. However, this is not anticipated to be significant.

Increased vehicle and aircraft movements during the construction phase leading to collisions between fauna and construction traffic, causing death or injury

7.11.50 Bats colliding with vehicles or aircraft when flying across roads and around the airport may result in direct mortality of bats. Little research has been undertaken in the UK to establish levels of bat injury and mortality caused by this factor, however some studies have demonstrated the effectiveness of mitigation techniques[78]. For road traffic accidents, species at greatest risk are likely to be brown-long eared bat and *Myotis* species, which tend to fly low and close to vegetation, such as tree lines and hedgerows.

7.11.51 Species that often fly across open habitats, such as noctule, Leisler's and serotine bats, are not completely reliant on linear landscape features, and are likely to occasionally commute to forage over the airfield grassland. More suitable foraging and commuting habitats are present around the airport perimeter and within the surrounding countryside, which is better connected to linear habitat and landscape features. The current baseline for bat activity surveys these surrounding, varied and connected habitats, provide better foraging habitats than the airfield grassland habitat. As such, there is likely to be only a limited risk of small numbers of bats commuting or foraging across the airfield and therefore a low risk of collisions between aircraft and bats. Data for bat strikes by aircraft and vehicles at the site is unknown. That said, the site was an airport with a vehicle and aircraft movements until 2014 and the A299 is a busy existing road network.

7.11.52 It is predicted that vehicle movements on site will have a slight adverse effect on bats however this would not result in a significant effect on the conservation status of bat populations present given the low use of the site by foraging and commuting bats.

Operational Phase Effects

Operational Lighting of Development Areas

7.11.53 There will be an increase in permanent lighting levels across the site. This increase in lighting, particularly around the runway, aviation car park and passenger terminal would likely deter and cause barrier/severance effects on a low number of foraging and commuting bats in this immediate area. Based on the current low levels of usage and limited value of habitat present for foraging bats within this area there would be a slight adverse effect on foraging and commuting bat species as a result of an increase in lighting at the site. However, this would not be considered to result in a significant effect on the conservation status of bat populations presents.

Increase in Airborne Aircraft Noise or Vibration Resulting in Disturbance to Bats and/or Degradation of Foraging Habitat

7.11.54 Noise levels during the operational phases associated with the cumulative effects of aircraft flyover noise and landing take off noise could feasibly interfere with the ability of bats to roost, in addition to echolocate, and therefore forage and commute and have a slight adverse effect. However, the effects from aircraft events in the day time and night time periods are likely to be short in duration in terms of take-off, landing and flyovers and so it is anticipated that there will be no significant effect, particularly in relation to the amount of foraging time available which will remain unaffected.

7.11.55 Overall, it is anticipated that there would be a slight adverse effect on bat species as a result in a change to noise levels in the area. However, this is not predicted to result in a significant effect on the conservation status of bat populations presents.

Increased Vehicle and Aircraft Movements Resulting in Death or Injury of Bats

7.11.56 As previously mentioned in paragraphs 7.11.29 - 7.11.31, given the limited risk of small numbers of bat species commuting across or foraging over the airfield and the short duration of intermittent periods when bats are present in this area it is predicted that an increase in aircraft movements will have a slight adverse effect on bats. However, given the low numbers of bats foraging and commuting across the site this is not predicted to result in a significant effect on the conservation status of bat populations.

Conclusion

7.11.57 Based on the assessment presented in the previous sections including the adoption of a worst case scenario which is then carried forward into the MCHP presented at appendix 7.13, it is considered that the Proposed Development will not result in adverse effects on the conservation status of the bat populations that may be present on the Site. Therefore, in EIA terms the effects of the Proposed Development are considered to be not significant on local bat populations.

Inter-related Effects

7.11.58 Inclusive of the environmental measures described in **Section 7.5**, and expanded upon in **Appendix 7.13**, there is no potential for inter-related effects resulting from the proposed development on bats. Effects on this receptor not assessed above have been scoped out of any potential for significant effects. Effects scoped in (e.g. land take/cover change affecting bat habitats and/or resulting in death/injury or disturbance) have been assessed as being of a sufficiently low magnitude (as detailed in this Section) that their potential interactive effects are not considered to be significant when acting together. Therefore, effects on the favourable conservation status of the receptor are assessed as not significant.

7.12 Assessment of Effects on Reptiles

Current Baseline

7.12.1 No reptiles were recorded during the 2017 presence/absence surveys (**Appendix 7.6**). However, a single adult common lizard was recorded on 23 August 2017 basking along the western site boundary (adjacent to Minster Road) during the placement of artificial refugia (tins/felts) for the presence/absence surveys.

7.12.2 Considering the negative survey results, this single record would indicate, if this was not a transient animal, that, and in accordance with Froglife guidance[79], a low population of common lizard might be present along the southern most section of the western Site boundary.

7.12.3 Small areas (c. 4ha) of the site were not included in the 2017 presence/absence survey (as there was no access) including the 'brownfield' land (the former car park) at the eastern end of the site. These unsurveyed areas are shown in Figure 2 in **Appendix 7.6**). In addition, presence/absence surveys are required of the land (c.0.3ha) north of the B2190 (Spitfire Way) (see **Appendix 7.10**) recently added to the Order Limits. Surveys are planned of these areas to confirm or otherwise the conclusions of the worst-case assessment.

Future Baseline

7.12.4 It is not possible to conclude that a different future baseline (in the absence of the Proposed Development) is more likely to occur than that currently present, and any reptile populations, with the ongoing existing site management, are not likely to change.

Construction Phase Effects

Land take/land Cover (Habitat) Change; Disturbance, and Incidental Injury and Mortality

7.12.5 For this assessment it is considered that there is a low population of common lizard within the perimeter fence in the south-west of the site. Due to the good habitat quality of the, as yet, unsurveyed areas the assumption has been made that under a worst-case scenario, high populations of common lizard and slow worm occur in these areas and mitigation measures have been provided for on this basis. The Desk Study (see **Appendix 7.2**) revealed no records of adders, and grass snake is considered likely absent due to the negative results from the presence/absence survey and the lack of water bodies within the unsurveyed areas.

7.12.6 The predicted effects would be limited to disturbance, removal and loss of potential terrestrial habitat, and land take/land cover change (habitat removal) resulting in death or injury, all mitigated by environmental measures via method statements, included in the CEMP. The method statements would cover appropriate mitigation and/or compensation, such as fencing and trapping (and translocating) animals to prevent mortality/injury from any land take/cover change, and provision/enhancement of suitable good quality terrestrial reptile habitat (e.g. grassland, hibernacula, log/brash piles and scrub, as detailed in the **MHCP, Appendix 7.13**).

7.12.7 Implementation of the appropriate measures will ensure legal compliance and the conservation status of any reptile populations would not be affected and thus effects are expected to be not significant.

7.12.8 Due to the limited extent of construction activity and current management in the south-west of the site, effects on the low population of common lizard will be mitigated by an appropriate MS. Where high populations of common lizard and slow worm are encountered, animals will be translocated to the BA (see **Appendix 7.13**) to the south of the site. An area of similar extent although of higher quality for reptiles, will be created at this location in advance of translocation. A trapping and translocation exercise will occur prior to any site work and once the receptor site is sufficiently mature to receive any reptiles.

7.12.9 Monitoring of the reptile population within the receptor site will occur every two years for six years beginning the year after translocation. The results of the monitoring will permit any adaptive management required to ensure continued effective delivery of suitable reptile habitat. Further monitoring will be implemented if significant intervention is required as a result of monitoring results.

7.12.10 To conclude, as a result of land take of c. 4ha of areas with assumed high populations of two common reptile species, it is considered that there will be a permanent adverse effect on reptile populations at the local level. Mitigation and compensation measures (as stated above) remove the risk of incidental injury/mortality and provide suitable habitat to maintain viable populations at existing levels. Therefore, none of the effects are considered to be significant in EIA terms.

Operational Phase Effects

7.12.11 No significant effects are expected at the operational phase as the measures (translocation/habitat creation) in place to mitigate or avoid incidental injury/mortality from the new development will have been put in place during the construction phase.

Inter-related Effects

7.12.12 Inclusive of the environmental measures described in **Section 7.5**, there is no potential for inter-related effects resulting from the proposed development on reptiles. Effects on this receptor not assessed above have been scoped out of any potential for significant effects. Effects scoped in (e.g. land take/cover change affecting reptile habitats and/or resulting in death/injury) have been assessed as being of a sufficiently low magnitude (as detailed in this Section) so that their potential interactive effects are not considered to be significant. Therefore, effects on the favourable conservation status of the receptor are assessed as not significant.

7.13 Assessment of Effects on Breeding Birds

Current Baseline

7.13.1 The site provides suitable habitat for a variety of breeding birds. Hedgerows, scrub and trees are limited in extent although do provide opportunities, as do the buildings, for nesting passerines such as house sparrow, starling, song thrush and dunnock. All of these are SPI with all, except dunnock, also being red-listed BoCC (see **Box 7.1**). The site grassland, the most extensive site habitat, provides nesting habitat for skylark, grey partridge and meadow pipit. All three species have been recorded on site.

7.13.2 Skylark is an SPI, and is also BoCC red-listed due to a long-term decline in the UK breeding population, including a 29% decline in the South-East England Region from 1995-2015[80]. Skylark is described as a widespread and common but declining resident in Kent, and a common winter visitor and passage migrant[81]. The species principally breeds in arable farmland in the county, but is also found in a wide variety of other open habitats including grassland, saltmarshes and sand dunes. The decline is primarily due to the move from spring to autumn cereal sowing, which has led to a reduction in the food supply in winter and less nesting opportunities in spring (Clements *et al*., 2015). The estimated breeding population in Kent has declined from 30,000-40,000 territories during 1988-94, to 20,000-28,000 during 2008-13[82].

7.13.3 Ungrazed grasslands and improved semi-natural grasslands hold some of the highest nesting densities of skylark of any habitat in lowland England (Brown *et al*., 2000[83]). In these habitats, the nesting densities of skylarks were found to range from 29 to 52 pairs per km^2/100ha. With almost 200ha of ungrazed grassland, it is estimated, based upon these figures that the Site could support up to 104 pairs of breeding skylark. The long grass policy of the operational site will maintain grass during the breeding season to a height of 200mm (CAP 772). This cutting height is sufficiently high to prevent skylark nest destruction. Although a small risk of nest destruction will remain from machinery passage this is likely to affect very few nests due to the small amount of ground affected (i.e. just the line of the wheel tracks) and the mowing occurring infrequently over the main breeding period.

7.13.4 Grey partridge is an SPI and is BoCC red-listed due to severe, long-term decline in the UK breeding population, including a 79% decline from 1995-2015 in the South-East England Region, which includes Kent (Harris et al., 2017[84]). The species principally breeds in arable farmland in Kent, but is also found in open grassland, marshes, sand dunes and vegetated shingle (Taylor *et al*., 1984[85]). Grey partridge is described as a once widespread resident in Kent that has declined considerably in recent years, and now occurring primarily in coastal areas, particularly in Thanet/ eastern coastal areas of the county (Privett [ed] 2016)[86]. The estimated breeding population in Kent has declined from 2,000-4,000 pairs during 1988-94, to 600-1,200 during 2008-13 (Clements et al., 2015[87]). There has also been a marked contraction in the distribution of the species in Kent, having been recorded in 551 tetrads (2 x 2km squares) in 1967-73, and only 165 in 2008-13.

7.13.5 It is estimated (Game Conservancy Trust, 2007[88]) that densities of grey partridge in sub-optimal landscapes are two or four pairs per km^2 or 100ha). In habitats where conditions are more suitable (e.g. the non-agricultural grassland of the Site) densities, even without species-specific management, could be expected to be four or eight pairs per km^2. Higher densities can be found when species-specific management techniques are applied such as predator control or the provision of grassy margins, beetle banks and conservation headlands in arable crops. There are no species-specific measures operated on site for grey partridge although it is possible that some such habitat measures are adopted nearby off-site, with some land included within entry level agri-environment schemes especially to the north of the Proposed Development. Predators, such as foxes and badgers, may operate at much reduced levels in the main part of the site where the security fence reduces egress by such animals. Based on site area alone, it is theoretically possible that the site could hold up to 20 pairs of grey partridge.

7.13.6 However, it is not likely that the quality of habitat is likely to support such a population. It is also likely that grey partridge is principally breeding off-site as the favoured nest locations for this species are bank sides which are absent from the Site. However, as grey partridge chicks are

precociallxi, families may move to the Site grassland habitats for foraging, which are likely to be richer in chick invertebrate food than the surrounding conventional farmland. The informal recreational use (particularly by dog-walkers) of the Northern Grass Area is also likely to prevent or reduce numbers of breeding grey partridge. Given these restrictions to breeding habitat it is more likely that the maximum nesting population of grey partridge is in the region of 3-5 pairs.

7.13.7 Further surveys will be undertaken prior to construction commencing between April and June to provide additional information on the approximate number of grey partridge pairs/territories on the site.

Future Baseline

7.13.8 It is anticipated that existing management practices will continue in the short to medium term and it is therefore likely that, in the absence of the Proposed Development, a similar breeding bird assemblage to that currently present will remain. It is therefore appropriate to use the current baseline for the purpose of the assessment.

Construction Phase Effects

Loss of Priority/BoCC red-list Species from Habitat loss/change, Disturbance

7.13.9 The physical activity associated with the construction phase could result in disturbance/displacement of nesting birds. Demolition of buildings could result in nest destruction and/or removal of nest sites, and new areas of hard standing will result in loss of grassland and reduction in foraging habitat and nesting sites. Measures incorporated into the scheme, such as those to remove the potential to damage or destroy active nests, will prevent legal non-compliance (see **Table 7.7**).

7.13.10 As a result of construction there will be a c.20ha reduction in the extent of grassland. Most grassland in the vicinity of the runway will be maintained with loss of grassland predominantly from north of Manston Road. The regular and frequent informal public access/dog walking to the existing grassland area (extending to about 40ha) north of the B2050 (Manston Road), along with the continued mowing regime, reduce the quality of this area to breeding ground nesting species such as skylark and grey partridge. The grassland surrounding the existing runway with no public recreational activity provides better quality nesting habitat for ground nesting birds, and this area will largely remain on the operational site, albeit subject to disturbance from construction/runway upgrade activity and some new aircraft pavement.

7.13.11 To ensure that the conservation status of SPI/red-listed BoCC is maintained, appropriate habitat, using plant species appropriate for the changing climate, will be created prior to commencement of construction within the c.35.7 ha BA. The BA will consist largely of no input species-rich grassland managed specifically for ground nesting birds to provide favourable nest locations and enhanced foraging areas. Where land management activities such as cutting/mowing are necessary, this will be undertaken outside the breeding season to prevent nest/chick loss. In addition, tussocky grass buffer strip will be created around the field boundary that are managed appropriately for ground nesting birds, such as grey partridge. A detailed MHCP has been developed and this provides an outline of the mitigation and enhancement measures proposed that will ensure that a worst case scenario (i.e. mitigating for optimal rather than actual conditions) can be delivered on the mitigation land, should the breeding bird surveys that will be carried out prior to construction commencing establish that significant populations of Grey Partridge or other ground nesting birds are found. (**Appendix 7.13**).

7.13.12 The number of pairs of breeding birds will be monitored for at least five years from the first breeding season successful post-habitat creation. This will enable adaptive management of any of the measures in place to enhance the nesting suitability of the compensation site. Any changes to the type of measures implemented will generate further monitoring.

7.13.13 The habitat creation will use species of local provenance adapted to local conditions to increase resilience to climate change impacts. In the long-term, monitoring will determine if new native

[lxi] Hatched with eyes open, covered with down, and leave the nest within two days.

species better adapted and more resilient to climate change are required and management will be amended accordingly.

7.13.14 To conclude, as a result of land take and subsequent management of the site grassland, it is considered that there will be a permanent adverse effect on skylark and grey partridge populations at the district level. Mitigation and compensation measures remove the risk of legal non-compliance and also provide suitable habitat to maintain viable populations at existing levels. Therefore, none of the effects are considered to be significant in EIA terms.

Operational Phase Effects

7.13.15 The physical activity and associated noise and lighting of operations could result in the disturbance/displacement of nesting birds. In addition, on-site measures to reduce the risk of bird strike could also disturb or displace nesting birds. However, no significant effects are expected at the operational phase as the measures in place to compensate or avoid effects from the new development will have been put in place prior to commencement of the construction phase.

Inter-related Effects

7.13.16 Inclusive of the environmental measures described in **Section 7.5**, there is no potential for inter-related effects resulting from the proposed development on breeding birds. Effects on this receptor not assessed above have been scoped out of any potential for significant effects. Effects scoped in (e.g. land take/cover change affecting breeding bird habitats and/or resulting in disturbance) have been assessed as being of a sufficiently low magnitude (as detailed in this Section) so that their potential interactive effects are not considered to be significant. Therefore, effects on the favourable conservation status of the receptor are assessed as not significant.

7.14 Assessment of Effects to Breeding Barn Owl

Current Baseline

7.14.1 Barn owl, a Schedule 1 species under the *WCA 1981 (as amended)*, has been recorded on the site. Survey undertaken for SHP found evidence of roosting in a single building in June 2015. SHP suspected barn owl(s) roosted although did not nest within the Site. During building inspections undertaken in autumn 2017[89] for this DCO proposal, evidence of barn owls (in the form of pellets) were found in three buildings suggesting that building features may have been used as roost or resting sites, however nesting was not suspected. Although two of the buildings with pellets contained features that could be used for nesting, no evidence of nesting attempts was found.

7.14.2 The on-site buildings provide potential nest sites as well roosting opportunities for barn owl and the grassland provides foraging habitat.

Future Baseline

7.14.3 It is not possible to conclude that a different future baseline (in the absence of the Proposed Development) is more likely to occur than that currently present. It is therefore considered appropriate to use the current baseline for the purpose of the assessment.

Construction Phase Effects

Disturbance to Nesting Barn Owls and Loss of Nest Sites

7.14.4 The physical activity, noise and lighting associated with the construction phase is likely to result in disturbance of any nesting barn owls. Demolition of buildings could result in nest destruction and/or removal of nest sites, and new areas of hard standing will result in loss of grassland and reduction in foraging habitat. Construction works will be timed to avoid (or maintain a 200m

buffer) from any nest sites during the breeding season until young fledge (March – December inclusive) to prevent contravention of *WCA* Schedule 1.

7.14.5 Nonetheless, due to birdstrike risk and potential effects upon barn owls, nesting barn owls cannot be maintained on the operational site and therefore replacement nest sites will be provided prior to commencement of construction activities.

7.14.6 The preferred prey of barn owl is small mammals that live in rough grassland[90]. Rough grassland is characterised by having a layer of thatch, dead grass stems just above the ground surface, providing good cover and therefore ideal conditions for small mammals. The management (mowing and removal of cut material) of the site grasslands, continued since the closure of the former airport, is undertaken to prevent a thatch layer developing, in accordance with CAP 772 measures as a deterrent to attracting raptors to aerodromes to reduce birdstrike.

7.14.7 As such, the site grassland currently does not provide optimal foraging habitat for barn owl and will not in the future for the same reason. Much of the surrounding land is arable farmland that also provides poor foraging habitat for barn owls. The BA will provide an extensive area (c.31 ha) of grassland which will provide higher quality foraging for barn owls than the grassland within the Proposed Development (see Appendix 7.13).

7.14.8 Any nest site confirmed will be removed outside the breeding season prior to construction and a new alternative nest site would be installed at a sufficient distance away to prevent use of the site. Such a locality will be near to a sufficient area of appropriate grassland for foraging and at least 1km distant from any dual carriageway or other similar roads. In so doing, there would be no significant effects to the local barn owl population.

Operational Phase Effects

7.14.9 No significant effects are expected at the operational phase as the measures in place to mitigate or avoid effects from the Proposed Development will have been put in place during the construction phase.

Inter-related Effects

7.14.10 Inclusive of the environmental measures described in **Section 7.5**, there is no potential for inter-related effects resulting from the Proposed Development on barn owl. Effects on this receptor not assessed above have been scoped out of any potential for significant effects. Effects scoped in, (nest site/foraging habitat loss and displacement/disturbance) have been assessed as being of a sufficiently low magnitude (as detailed in this Section above) so that their potential interactive effects are not considered to be significant. Therefore, effects on the favourable conservation status of barn owl are assessed as not significant.

7.15 Assessment of Effects to Badger

Current Baseline

7.15.1 The most recent desk study record was from 2006, which at 3.5km from the site, was also the closest record. Walkover surveys of the site in 2017 did not reveal any evidence of badger.

7.15.2 An extended Phase 1 habitat survey of the 0.25ha area of the site off Spitfire Way in October 2017 revealed no evidence of badger (see **Appendix 7.9**). An extended Phase 1 habitat survey of land parcel 1362 in October 2017 did reveal some evidence of badger use, although this was located outside of but within 30m of the boundary of the land parcel/field (see **Appendix 7.10**). The evidence of badger in land parcel 1362 comprised a mammal run, a latrine and some mammal burrows which had the potential to be holes associated with a badger sett. Land parcel 1362 is an arable field i.e. it is intensively cultivated.

7.15.3 Badgers are common and widespread in Kent and England, and it is considered that the low level of badger activity recorded on and adjacent the site (one potential sett recorded, confidential location) is likely slightly atypical of the area. This may be due to the perimeter security fence

around much of the site and the surrounding busy roads, which would likely deter/prevent badgers from accessing the site. In addition, the generally flat, level terrain with little cover does not present optimal sett building habitat.

7.15.4 The worst-case scenario considered here is that the potential sett adjacent to the BA is an active main sett and as such, due to the widespread nature of the species no adverse effects on the conservation status of badgers is predicted. Badgers are protected due to welfare issues only, predicted effects and mitigation are to ensure no contravention of the appropriate legislation.

Future Baseline

7.15.5 It is not possible to conclude that a different future baseline (in the absence of the Proposed Development) is more likely to occur than that currently present. It is therefore considered appropriate to use the current baseline for the purpose of the assessment.

Construction Phase Effects

7.15.6 Under the worst-case scenario, it is assumed that the badger activity and holes close to the western boundary of land parcel 1362 represent a main sett. An increase in noise and vibration during the construction phase when the habitat enhancement / creation works for the BA are being undertaken could result in damage to the sett, and / or death or injury of a badger.

7.15.7 The potential sett is in a strip of woodland adjacent to the proposed BA. The habitat enhancement and creation works are to involve scrub planting along boundaries, which will not be necessary in this location due to the existing habitat, and the cultivation of annual plants. The latter activity would involve less activity by agricultural machinery than occurs at present with the conventional farming of the arable crop. Any works e.g. pruning of trees that were required within 30m of the sett would be undertaken between July and November when setts are less sensitive to disturbance. The creation/installation of bat roost structures in the south of land parcel 1362 is sufficiently distant not to affect the sett.

7.15.8 Due to the dynamic nature of badger populations, survey work would need to be carried out to update the baseline information approximately two months in advance of any construction works commencing. If a badger sett is discovered at this time within the working area or up to 30m from the site boundary the survey results would be used to inform a revised mitigation strategy.

7.15.9 Throughout the construction phase and the creation of the bat roost structure in the BA, any steep-sided excavations would be covered at night, or an escape ramp provided to avoid badgers falling in and becoming trapped.

7.15.10 Details of the environmental measures built into the scheme to minimise effects on badgers and ensure compliance with the *Protection of Badgers Act 1992* are provided in the CEMP and in **Appendix 7.13**.

Operational Phase Effects

7.15.12 Details of the environmental measures built into the scheme to minimise effects on badgers and ensure compliance with the *Protection of Badgers Act 1992* are provided in the CEMP.

Inter-related Effects

7.15.13 Inclusive of the environmental measures described in **Section 7.5**, there is no potential for inter-related effects resulting from the proposed development. Effects on this receptor not assessed above have been scoped out of any potential for significant effects. Effects scoped in (land take/land cover change affecting badger habitats and/or resulting in death, injury or disturbance)

have been assessed as being of a sufficiently low magnitude (as detailed in this Section) so that the combined land take effects do not breach legislation and thus in legal terms are not significant. Thus, potential interactive effects are not considered to be legally significant when acting alongside potential effects from vehicle movements associated with the Proposed Development.

7.16 Assessment of Effects to On-Site Terrestrial Invertebrates/Invertebrate Assemblage

Current Baseline

7.16.1 The desk study provided records of over 150 species of invertebrates within 5km of the Site, since 2000. Of these, 13 species are classified as Notable A[lxii], 69 species as Notable B[lxiii] with 53 species classified as IUCN Red-listed[lxiv]. The red-listed species recorded in the desk study are saltmarsh and sand dune specialists and are therefore confined to habitats outside and at some distance from the site. However, several species, all butterflies, have dispersal capabilities and could occur on site. These include: small heath, small blue and wall. Swallowtail butterfly has also been recorded near the site, although there is no suitable habitat on site for this species.

7.16.2 The non-amenity grassland on site, particularly any areas which are not managed (cut/mown) frequently and have not received modification through pesticide/ fertiliser applications, provide potential habitat for a range of invertebrates. In addition to the less intensively managed grassland areas, field margins and brownfield habitat / bunds also provide suitable habitat for a variety of invertebrate species. Although these areas represent a small proportion of the site area, it is possible that individual species or an assemblage of increased conservation value could be present.

7.16.3 A scoping walkover was carried out by a professional entomologist on 22 August 2017 to undertake an assessment of the invertebrate potential of the site.

7.16.4 During the walkover survey, a total of 169 invertebrate species were recorded, of which nineteen have a formal (red data book or nationally scarce) conservation status and two are new to Britain. Further detail is provided in the Manston Airport Invertebrate Scoping Survey report (see **Appendix 7.7**).

7.16.5 The sample of invertebrates taken is sufficient to demonstrate that the invertebrate interest is not negligible. The fact that species with formal conservation status comprise more than 10% of the recorded fauna suggests high species quality, but in practice a large proportion of these species are in groups which have not been recently reviewed and the formal status of some is open to doubt. Kent is, anyway, rather rich in species with formal conservation status simply because of its geographical location, and relatively ordinary places can support multiple nationally scarce species.

7.16.6 None of the species with formal status is particularly unexpected for the area or the habitats although collectively informative. They are all associated with open habitats, and some are characteristic of very open and sunny habitats, with many familiar components of rich assemblages on open calcareous habitats elsewhere in the south-east. Considering the limitations of the walkover survey the number of scarce aculeates[lxv] with restricted distribution is impressive and suggests that this group might prove of substantial interest. Furthermore, the populations of some of the scarcer species appeared to be large.

[lxii] Notable A - Taxa which do not fall within RDB categories but which are none-the-less uncommon in Great Britain and thought to occur in 30 or fewer 10 km squares of the National Grid or, for less well-recorded groups, within seven or fewer vice-counties. Superseded by Nationally Scarce, and therefore no longer in use.
[lxiii] Notable B -Taxa which do not fall within RDB categories but which are none-the-less uncommon in Great Britain and thought to occur in between 31 and 100 10 km squares of the National Grid or, for less-well recorded groups between eight and twenty vice-counties. Superseded by Nationally Scarce, and therefore no longer in use.
[lxiv] IUCN Red-listing - The IUCN Red List Index (RLI) measures overall trends in extinction risk for groups of species based on genuine changes in their Red List status over time. Habitat availability, population and subpopulation size, number of mature individuals and extent of occurrence are all quantified during the designation of red-list species.
[lxv] A group of hymenoptera that possess a sting – the bees, wasps and ants.

7.16.7 The two-species new to Britain are both leafhoppers of the genus *Tettigometra*. Both are assumed to be recent colonists, and to have limited conservation significance.

7.16.8 The scoping survey concluded that the site has high potential for invertebrates of open habitats. Factors favouring high interest are:

- Large area;
- Favourable geographical location;
- Long history of open conditions;
- High floristic diversity;
- Large populations of some important invertebrate foodplants; and
- Varied structure, including bare and sparsely vegetated ground, managed grassland, and unmanaged or lightly managed tall herbs.

7.16.9 The managed grassland which comprises most of the habitat on the site is compromised in its potential by its uniform structure; limited topographical variation; limited area of bare ground; and its semi-improved character.

7.16.10 Though substantial invertebrate interest may be present, the expectation is that this will not prove exceptional, and some species, especially solitary bees and wasps, may be in part dependent on peripheral features and habitats, especially for nesting sites. Diversity and interest are considered likely to be higher in other open habitats than in the mown grassland. Higher interest overall in these areas is favoured by:

- Varied structure, including bare and sparsely vegetated ground, unmanaged tall herbs, and complex mosaics;
- Varied substrates;
- Locally varied topography; and
- Varied floristic composition, including good populations of a number of important foodplants not present, or rare, in the grassland.

Future Baseline

7.16.11 It is not possible to conclude that a different future baseline (in the absence of the Proposed Development) is more likely to occur than that currently present. It is therefore appropriate to use the current baseline for the purpose of the assessment.

Construction Phase Effects

7.16.12 The predicted effects would be limited to land take/land cover change resulting in habitat removal/reduction. It is considered that invertebrates are not affected by noise, vibration and changes in air quality. Invertebrates likely to occur on Site are those associated with grassland habitats (which are a uniform and common type), and if any notable assemblages or notable species are revealed through survey, measures can be incorporated to maintain conservation status. Appropriate measures will include suitable grassland management that is compliant with the wildlife hazard management of CAP 772. Any brownfield species will require appropriate habitat enhancement/creation, again compliant with wildlife hazard management requirements. Such measures, where not provided on-site, are to be provided off-site. Measures would include the creation of a mosaic and variety of habitats valuable to 'brownfield' invertebrates including: sparsely vegetated mounds with predominantly south-facing (dry/warm) aspects, bare (sandy) ground, small shallow scrapes to provide ephemeral pools (e.g. less than $5m^2$ and not large enough to attract water birds); unvegetated mounds of spoil/rubble. The extensive areas of grassland and other habitats within the BA will be valuable for a wide range of invertebrates and a variety of invertebrate assemblages. Implementation of the appropriate measures would ensure the conservation status of any invertebrate species/assemblages would not be affected and thus effects are expected to be not significant.

7.16.13 Monitoring of the invertebrate habitat will occur to monitor effectiveness of incorporated measures and enable adaptive management.

Operational Phase Effects

7.16.14 No significant effects are expected at the operational phase as the measures in place to mitigate or avoid habitat loss/change from the new development will have been put in place during the construction phase. The long grass policy to reduce hazardous bird species on site is likely to benefit grassland invertebrates.

Inter-related Effects

7.16.15 Inclusive of the environmental measures described in **Section 7.5**, there is no potential for inter-related effects resulting from the proposed development. Effects on this receptor not assessed above have been scoped out of any potential for significant effects. Effects scoped in (land take/land cover change) have been assessed as being of a sufficiently low magnitude (as detailed in this Section above) so that their potential interactive effects are not considered to be significant when acting along with potential effects from noise/vibration and air quality changes. Therefore, effects on the favourable conservation status of the invertebrate assemblage are assessed as not significant.

7.17 Conclusions of Significance Evaluation

7.17.1 The conclusions on the significance of all those effects that have been subject to assessment in **Sections 7.8** to **7.14** are summarised in **Table 7.19**

Table 7.19 Summary of significance of effects

Receptor and effects	Significance Level	Rationale
SPA/SSSI qualification/notification species: golden plover Displacement – habitat loss	Not significant	Noise, physical activity, aircraft flightpaths and wildlife hazard management at the site during construction and operation could prevent this species, which uses farmland, from using otherwise suitable habitat on/adjacent the site. Survey and desk study data show no regular use of land surrounding site. Noise control measures during construction and location of aircraft flightpaths too distant from designated sites and key areas of farmland to result in disturbance. Environmental measures including location of flight pathways would render residual effects to a level which would not affect the receptor's Favourable Conservation Status.
SPA/SSSI qualification/notification species: turnstone; grey plover, ringed plover, sanderling (all non-breeding); little tern (breeding) Displacement – habitat loss	Not significant	Noise from, physical activity at the site, and aircraft flightpaths during construction and operation could disturb these species preventing use of otherwise suitable habitat within the designated sites approximately 925m from the airport. Survey and desk study data show no regular use of land surrounding site. Noise control measures during construction and location of aircraft flightpaths too distant from designated sites and key areas of farmland to result in disturbance. Little tern no longer breeds at the designated sites. Environmental measures and flight path locations would render residual effects to a level which would not affect the receptors' Favourable Conservation Status.

Receptor and effects	Significance Level	Rationale
Designated sites that include Pegwell Bay: contamination/eutrophication of habitats through discharge into the bay from Site drainage.	Not significant	Water quality regulated via a Water Discharge Activity Permit from the Environment Agency that will ensure pollutants/nutrients cannot be discharged into designated sites. Volume of discharge and design of the outfall prevents any scour of habitats. Environmental measures would render residual effects to a level which would not affect the receptor's Favourable Conservation Status
Designated sites/priority habitats: air quality changes: annual mean NOx concentrations in air; nutrient nitrogen deposition; acid deposition.	Not significant	For all local sites/habitats air quality modelling showed that emissions from the Proposed Development would not result in exceedance of EA thresholds for further assessment. In the majority of cases this was also true for receptors covering major (European and nationally designated sites). In the few cases where receptors required further assessment it was shown that due to low levels of sulphur and O_3. NO_x concentrations in air would not lead to adverse effects on plants, and that the locations in question were located in areas of bare substrate (rock and sediment) covered by seawater through tidal action, with no exceedance of 30 µg m^{-3} critical level for all vegetation types.
Bats Removal of /damage to and/ or disturbance of roosts. Disturbance of commuting and foraging bats from light spill. Disturbance of /barrier effects to commuting routes from new development.	Not significant	Environmental measures and habitat specific mitigation/ compensation (habitat and roost creation) would render residual effects to a level which would not affect the receptor's Favourable Conservation Status.
Breeding birds (SPI/red-list BoCC): Land take/land cover change (habitat removal); management changes resulting in reduction in nesting/foraging habitat	Not significant	Environmental Measures and habitat specific mitigation/ compensation (foraging and nest site habitat creation) would render residual effects to a level which would not affect the receptor's Favourable Conservation Status.
Barn owl (Schedule 1 of the Wildlife & Countryside Act 1981, as amended): Land take/land cover change (habitat removal); management changes resulting in reduction in nest sites/foraging habitat	Not significant	Environmental Measures and habitat specific mitigation/ compensation (including nest site provision) would render residual effects to a level which would not affect the receptor's Favourable Conservation Status.
Reptiles: Land take/land cover change (habitat removal) resulting in death or injury of reptiles.	Not significant	Environmental Measures (trapping and translocation) and habitat specific mitigation (creation) would render residual effects to a level which would not affect the receptor's Favourable Conservation Status.
Terrestrial Invertebrates: Land take/land cover change (habitat removal); management changes resulting in reduction in habitat.	Not significant	Environmental Measures and habitat specific mitigation (creation) would render residual effects to a level which would not affect the receptor's Favourable Conservation Status.

References

[1] Communities and Local Government (CLG) (2012) *National Planning Policy Framework*, CLG, London.

[2] Thanet District Council (TDC) *The Thanet Local Plan 2006: Saved Policies*, TDC, Thanet. Available online at : https://www.thanet.gov.uk/your-services/planning-policy/thanets-current-planning-policy/thanet-local-plan-2006/ [Accessed 06/12/2017]

[3] Chartered Institute of Ecology and Environmental Management (CIEEM) (2016). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, (Ed 2.). CIEEM, Winchester

[4] Chartered Institute of Ecology and Environmental Management (CIEEM) (2016). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, (Ed 2.). CIEEM, Winchester

[5]Eaton, M.A., Aebischer, N., Brown, A., Hearn, R., Lock, L., Musgrove, A., Noble, D., Stroud D., and Gregory, R. (2015). Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man. British Birds, 108:708-746.

[6] English Nature (2001). Great Crested Newt Mitigation Guidelines. English Nature, Peterborough. This states that 500m is generally accepted to be the dispersal distance of great crested newts over land, between breeding ponds. Note: English Nature is now Natural England.

[7] Multi-Agency Geographic Information for the Countryside (MAGIC) (2017) DEFRA. Available online at www.magic.defra.gov.uk [Accessed 06/12/17].

[8] National Biodiversity Network (NBN) (2017) Available online at https://nbn.org.uk/ [Accessed 06/12/17]

[9] UK Biodiversity Action Plan (2016) Joint Nature Conservation Committee. Available online at http://jncc.defra.gov.uk/page-7342 [Accessed 06/12/17].

[10] Kent Biodiversity Action Plan (2017) Kent Biodiversity Partnership. Available online at http://www.kentbap.org.uk/habitats-and-species/ [Accessed 06/12/17].

[11] Natural England - Section 41 Species - Priority Actions Needed (B2020-008). Available online at: http://publications.naturalengland.org.uk/publication/4958719460769792 [Accessed 21/03/18]

[12] Griffiths, M. (2004). Numbers and distribution of the wintering golden plover population in and around the Thanet Coast and Sandwich Bay SPA in 2002/2003. English Nature Research Report Number 569. English Nature: Peterborough.

[13] Henderson, A. & Sutherland, M. (2017) Numbers and distribution of Golden Plovers in the Thanet Coast and Sandwich Bay SPA during the winter of 2016/2017. A Report to Natural England.

[14] National Amphibian & Reptile Recording Scheme (NARRS) (undated) Great Crested Newt Suitability Index. Available online at: http://www.narrs.org.uk/documents/HSI%20guidance.pdf [Accessed 21/03/18]

[15] Collins, J (ed.) (2016). Bat Surveys for professional Ecologists: Good Practice Guidelines (Ed3) The Bat Conservation Trust, London.

[16] Babec Ltd. November (2017) Manston Airport, Kent: Building inspection for bats and barn owls and reptile presence / likely absence survey. Babec Ltd, Partridge Green, West Sussex.

[17] Amec Foster Wheeler (January 2018) Technical Note: Manston Airport DCO EIA: Ground level assessment of trees with bat roosting potential at the former Manston Airport.

[18] Froglife (1999). Reptile survey: an introduction to planning, conducting and interpreting surveys for snake and lizard conservation. Froglife Advice Sheet 10. Froglife, Halesworth; and, Gent, A.H. and Gibson, S.D., Eds. (1998). *Herpetofauna Workers' Manual*. Joint Nature Conservation Committee, Peterborough. Revised and reprinted 2003.

[19] Amec Foster Wheeler (October 2017) Technical Note: Manston Airport DCO EIA: Invertebrate scoping survey August 2017.

[20] Natural England and Defra (2015) Wild birds: surveys and mitigation for development projects. Available online at: https://www.gov.uk/guidance/wild-birds-surveys-and-mitigation-for-development-projects [Accessed 21/03/18]

[21] Shawyer, C. R. (2011) Barn Owl *Tyto alba* Survey Methodology and Techniques for use in Ecological Assessment: Developing Best Practice in Survey and Reporting. IEEM, Winchester.

[22] Froglife Advice Sheet 10 (1999). Reptile survey: an introduction to planning, conducting and interpreting surveys for snake and lizard conservation. Froglife. Halesworth;

[23] Rodwell, J.S. (2006). *National Vegetation Classification: Users' Handbook*. Joint Nature Conservation Committee, Peterborough; and; Rodwell, J.S., (ed.) 1992. *British Plant Communities. Volume 3. Grassland and Montane Communities*. Cambridge University Press.

[24] Amec Foster Wheeler (June 2017) Manston Airport DCO EIA Ecological Desk Study.

[25] Amec Foster Wheeler. January 2018. Technical Note: Manston Airport DCO EIA: Ground level assessment of trees with bat roosting potential at the former Manston Airport.

[26] Snow, D.W. & Perrins, C.M. (1998) *The Birds of the Western Palearctic. Concise Edition*. Oxford University Press, Oxford.

[27] Stone Hill Park (OL/TH/0550); Land East of Haine Road (OL/TH/14/0050); Land south of Great West Autos (F/TH/12/0722); Land east of Worlds Wonder (F/TH/14/0645) and Land North of Thorne Farm (F/TH/13/0596).

[28] Multi-Agency Geographic Information for the Countryside (MAGIC) (2017) DEFRA. Available online at www.magic.defra.gov.uk [Accessed 06/12/17].

[29] Froglife (1999). Reptile survey: an introduction to planning, conducting and interpreting surveys for snake and lizard conservation. Froglife Advice Sheet 10. Froglife, Halesworth.

[30] Huntley, B., Green, R. E., Collingham, Y. and Willis, S. G. (2007). A climatic atlas of European breeding birds. Durham, Sandy and Barcelona: Durham University, RSPB and Lynx Editions.

[31] Pearce-Higgins, J.W & Holt, C.A. (2013) Impacts of climate change on waterbirds. Marine Climate Change Impacts Partnership: Science Review: 149-154. Available online at:

http://mccip.cefastest.co.uk/media/1268/2013arc_sciencereview_16_wbir_final.pdf [Accessed 21/03/18]

[32] Hickling, R., Roy, D., Hill, J., Fox, R. & Thomas, C. (2006) The distributions of a wide range of taxonomic groups are expanding northwards. *Global Change Biology*, 12: 450-455.

[33] Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (Ed 2) (2016) CIEEM. Accessed at http://www.cieem.net/data/files/Publications/EcIA_Guidelines_Terrestrial_Freshwater_and_Coastal_Jan_2016.pdf [Accessed 06/12/17].

[34] IAQM & EPUK (2017) 'Land-Use Planning & Development Control: Planning for Air Quality'.

[35] Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (2nd edition). (2016). Chartered Institute of Ecology and Environmental Management (CIEEM), Winchester.

[36] Natura 2000 Standard Data Form: Thanet Coast and Sandwich Bay SPA. http://jncc.defra.gov.uk/

[37] WeBS wepage - Species Thresholds Levels (the international and national thresholds of importance for golden plover have been obtained from this website). Available at: https://www.bto.org/volunteer-surveys/webs/data/species-threshold-levels [Accessed 04/12/17]

[38] Stroud, D.A., Bainbridge, I.P., Maddock, A., Anthony, S., Baker, H., Buxton, N., Chambers, D., Enlander, I., Hearn, R.D., Jennings, K.R, Mavor, R., Whitehead, S. & Wilson, J.D. - on behalf of the UK SPA & Ramsar Scientific Working Group (eds.) (2016). *The status of UK SPAs in the 2000s: the Third Network Review*. [c. 1,108] pp. JNCC, Peterborough.

[39] Musgrove, A., Aebischer, N., Eaton, M., Hearn, R., Newson, S., Noble, D., Parsons, M., Risely, K. and Stroud, D. (2013). Population estimates of birds in Great Britain and the United Kingdom. *British Birds, 106*: 64-100.

[40] Henderson, A. & Sutherland, M. (2017) Numbers and distribution of Golden Plovers in the Thanet Coast and Sandwich Bay SPA during the winter of 2016/2017.

[41] Griffiths, M. (2004). Numbers and distribution of the wintering golden plover population in and around the Thanet Coast and Sandwich Bay SPA in 2002/2003. English Nature Research Report Number 569. English Nature: Peterborough

[42] Swandale, T. & Waite, A. (2012). *Pegwell Bay, Kent: Bird Disturbance Study 2010-2011*. Report produced by the Kent Wildlife Trust in December 2012.

[43] WeBS webpage. Data obtained from online at: https://app.bto.org/webs-reporting/ [Accessed 21/03/18]

[44] Hodgson, I. (2016). Thanet Coast Turnstone (Arenaria interpres) monitoring, January – February 2016. Report to Natural England. Sandwich Bay Bird Observatory Trust, Sandwich.

[45] Frost, T.M., Austin, G.E., Calbrade, Mellan, H.J., Hearn, R.D., Stroud, D.A., Wotton, S.R. and Balmer, D.E. (2017). *Waterbirds in the UK 2015/16: The Wetland Bird Survey*. BTO/RSPB/JNCC. Thetford. http://www.bto.org/volunteer-surveys/webs/publications/webs-annual-report; and https://app.bto.org/webs-reporting/, accessed 4 December 2017.

[46] WeBS webpage. Vacant Sites .Details of the locations and coverage of the WeBS count sectors can be found online at: https://app.bto.org/websonline/sites/vacant/vacant-sites.jsp?wide_region=3#wide_region=3 [Accessed 21/03/18]

[47] Privett, K. [ed.] (2016). *2014 Kent Bird Report*. Kent Ornithological Society.

[48] Taylor, D.W., Davenport, D.L. & Flegg, J.J.M. (1984). *Birds of Kent*. Kent Ornithological Society.

[49] *Directive 2002/49/EC* of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise - Declaration by the Commission in the Conciliation Committee on the Directive relating to the assessment and management of environmental noise [online] Available at http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32002L0049 [Accessed 14/02/2018]

[50] Designated nature conservation sites within 750m of the construction site designated for ornithological features. This is a precautionary distance based on information reported on disturbance in the literature e.g. Cutts, N., Phelp, A. & Burdon, D. (2009). *Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance*. Report to Humber Institute of Estuarine and Coastal Studies, University of Hull; and, Ruddock, M. & Whitfield, D. P. (2007). *A Review of Disturbance Distances in Selected Bird Species*. A report from Natural Research (Projects) Ltd to Scottish Natural Heritage. http://www.snh.org.uk/pdfs/strategy/renewables/BIRDSD.pdf

[51] Griffiths, M. (2004). Numbers and distribution of the wintering golden plover population in and around the Thanet Coast and Sandwich Bay SPA in 2002/2003. English Nature Research Report Number 569. English Nature: Peterborough.

[52] Mason, C.F. & MacDonald, S.M. (1999). Habitat use by Lapwings and Golden Plovers in a largely arable landscape. Bird Study: 1999 46: p89-99.

[53] Kirby, J.S. (1997). Influence of environmental factors on the numbers and activity of wintering Lapwings and Golden Plovers. *Bird Study* (1997) 44, p97-110.

[54] Henderson, A. & Sutherland, M. (2017). Numbers and distribution of Golden Plovers in the Thanet Coast and Sandwich Bay SPA during the winter of 2016/2017. A report for Natural England in March 2017.

[55] London Ashford Airport, Lydd, Kent (2012) File Refs: APP/L2250/V/10/2131934 and 2131936. Report to the Secretary of State for Communities and Local Government and the Secretary of State for Transport by K D Barton BA(Hons) (an Inspector appointed by the Secretary of State for Communities and Local Government and the Secretary of State for Transport). Date: 9 March 2012.

[56] Cutts, N., Hemingway, K. & Spencer, J., (2013). Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning & Construction Projects. University of Hull.

[57] Cutts, N., Phelp, A. & Burdon, D. (2009). *Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance*. Report to Humber Institute of Estuarine and Coastal Studies, University of Hull.

[58] Borgmann, K. L. (2010). A Review of Human Disturbance Impacts on Waterbirds. *Audubon California*, 376 Tiburon, California 94920

[59] Smit, C .J. & Visser, G .J.M. (1993). Effects of disturbance on shorebirds: a summary of existing knowledge from the Dutch Wadden Sea and Delta area. *Wader Study Group Bull*. 68: 6-19.

[60] Holloway, S. (1997). *Winter Distribution and Disturbance of Wildfowl and Waders on Findhorn Bay*. BTO Research Report 179. British Trust for Ornithology, Thetford.

[61] Meteorological Office (Met. Office): http://www.metoffice.gov.uk/public/weather/climate

[62] The Habitats Directive (94/43/EEC) contains a list of natural habitats at Annex 1, which form the basis for selecting SACs.

[63] Air Pollution Information System website: www.apis.ac.uk [Accessed 21/03/18]

[64] Air Pollution Information System webpage: http://www.apis.ac.uk/overview/pollutants/overview_NOx.htm [Accessed 21/03/18]

[65] Defra, Air Pollution in the UK 2016. September 2017:

https://uk-air.defra.gov.uk/assets/documents/annualreport/air_pollution_uk_2016_issue_1.pdf [Accessed 21/03/18]

[66] Five zones (Yorkshire and Humberside, the West Midlands, the North-East, South Wales and North Wales) were above the long-term objective for vegetation in 2016 (Defra, Air Pollution in the UK 2016. September 2017).

[67] 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.

[68] 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. Transposed into UK law as the Air Quality Standards Regulations: Statutory Instrument 2010 No. 1001. Environmental Protection: The Air Quality Standards Regulations 2010.

[69] van Dobben, H., Bobbink, R., Bal, D. & van Hinsberg, A. (2012). Overview of critical loads for nitrogen deposition for Natura 2000 habitat types occurring in The Netherlands. Wageningen, Alterra-rapport 2397, 68 pp.

[70] http://www.apis.ac.uk.htm[Accessed 21/03/18]

[71] Defra, Air Pollution in the UK 2016. September 2017:

https://uk-air.defra.gov.uk/assets/documents/annualreport/air_pollution_uk_2016_issue_1.pdf[Accessed 21/03/18]

[72] Amec Foster Wheeler (June 2017) Manston Airport DCO EIA Ecological Desk Study.

[73] Amec Foster Wheeler. (January 2018). Technical Note: Manston Airport DCO EIA: Ground level assessment of trees with bat roosting potential at the former Manston Airport.

[74] Hundt, L. (2012) Bat Surveys – Good Practice Guidelines, 2nd Edition. Bat Conservation Trust, London.

[75] Collins, J. (ed) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition). The Bat Conservation Trust, London.

[76] Mitchell-Jones, A.J. (2004). Bat Mitigation Guidelines. English Nature, Peterborough. Figure 4 (guidelines for proportionate mitigation) introduces a sliding scale of conservation significance according to roost status.

[77] BCT (August 2014). The state of the UK's bats 2014. National Bat Monitoring Programme Population Trends.

[78] Wilson, S. (2011). A Review of Bat Mitigation in Relation to Highway Severance. Highways Agency.

[79] Froglife (1999). Reptile survey: an introduction to planning, conducting and interpreting surveys for snake and lizard conservation. Froglife Advice Sheet 10. Froglife, Halesworth.

[80] Harris, S.J., Massimino, D., Gillings, S., Eaton, M.A., Noble, D.G., Balmer, D.E., Procter, D. & Pearce-

Higgins, J.W. (2017). The Breeding Bird Survey 2016. BTO Research Report 700 British Trust for Ornithology, Thetford.

[81] Privett, K. [ed] (2016). Kent Bird Report 2014. Kent Ornithological Society.

[82] Clements, R., Orchard, M., McCanch, N. & Wood, S. (2015). Kent Breeding Bird Atlas 2008-13. Kent Ornithological Society.

[83] S. Browne, J. Vickery & D. Chamberlain (2000). Densities and population estimates of breeding Skylarks *Alauda arvensis* in Britain in 1997, Bird Study, 47:1, 52-65: http://dx.doi.org/10.1080/00063650009461160 [Accessed 21/03/18]

[84] Harris, S.J., Massimino, D., Gillings, S., Eaton, M.A., Noble, D.G., Balmer, D.E., Procter, D. & Pearce-

Higgins, J.W. (2017). The Breeding Bird Survey 2016. BTO Research Report 700 British Trust for Ornithology, Thetford.

[85] Taylor, D.W., Davenport, D.L. & Flegg, J.J.M. (1984). The Birds of Kent. Kent Ornithological Society.

[86] Privett, K. [ed] (2016). Kent Bird Report 2014. Kent Ornithological Society.

[87] Clements, R., Orchard, M., McCanch, N. & Wood, S. (2015). Kent Breeding Bird Atlas 2008-13. Kent Ornithological Society.

[88] Game Conservancy Trust. Grey Partridge News. Issue 7: Summer 2007. GCT, Fordingbridge.

[89] Manston Airport, Kent: Building inspection for bats and barn owls and reptile presence / likely absence survey 2017.

[90] Snow, D.W. & Perrins, C.M. 1998. *The Birds of the Western Palearctic. Concise Edition*. Oxford University Press, Oxford.

Contents

8. Freshwater Environment

8.1 Introduction

8.1.1 This Chapter sets out the results of the assessment of the effects of the application to re-open Manston Airport (the 'Proposed Development') on the freshwater environment (including potential effects on water quality, resources and flood risk). It should be read in conjunction with **Chapter 3: Description of the Proposed Development**.

8.1.2 Following a summary of the supporting assessments, this Chapter outlines the relevant policy, legislation and guidance that has informed this assessment and the data gathering methodology that was adopted as part of the freshwater environment preliminary assessment. This leads on to a description of the overall baseline conditions, the scope of this assessment and the assessment methodology. The Chapter concludes with a summary of the results of the assessment.

8.1.3 Table 8.1 details the work that has been undertaken to support this Environmental Statement (ES). The two previous Preliminary Environmental Information Report (PEIR) submissions are referred to as the 2017 PEIR and the 2018 PEIR.

Table 8.1 Technical reports supporting this assessment

Technical report name	Description
Hydrogeological Impact Assessment	Finalised Hydrogeological Impact Assessment taking account of the 2018 PEIR consultation comments (see **Appendix 8.1**).
Flood Risk Assessment (FRA) and Outline Drainage Strategy (DS)	Finalised FRA (see **Appendix 8.2**) and Outline DS (see Appendix A of **Appendix 8.2**).
Water Framework Directive (WFD) Assessment addendum note	Assessment of WFD compliance is contained within the technical chapters. The WFD addendum note: ▶ Lists the WFD water bodies screened in for assessment; ▶ Identifies all activities impacting on WFD water bodies; and ▶ Signposts the sections of the ES which address these impacts. This has been produced following guidance in the Planning Inspectorate (PINS) advice note 18[1], which can be found in **Appendix 8.3.**

8.1.4 Constraints on land access mean that no intrusive investigations have been undertaken to inform this application. The scope of any works post-consent will be agreed with the Environment Agency (EA), Thanet District Council (TDC) and Southern Water (SW) prior to commissioning.

8.2 Policy, Legislation and Guidance

8.2.1 A study of freshwater environment-related planning policy, legislation and guidance at the national, regional and local level has been undertaken in order to highlight any requirements that the Proposed Development needs to consider. A summary of the relevant policy documents is detailed in Table 8.2.

Table 8.2 National and local planning policies relevant to the freshwater environment

Policy Reference	Policy Information
National Policies	
Airports National Policy Statement (NPS): new runway capacity and infrastructure at airports in the South East of England June 2018[2]	The airports NPS sets out key considerations in relation to potential adverse impacts on flood risk and water quality and resources from airport developments.
Soil Strategy for England 'Safeguarding Our Soils' (Department for Environment, Food and Rural Affairs (DEFRA), 2009 (2))	The policy guidance describes adverse impacts on soils, such as soil pollution and compaction. The soil strategy also deals with the management of contaminated land.
National Planning Policy Framework (NPPF) 2012 and Draft NPPF for consultation 2018	The NPPF sets out the Government's planning policies for England and how these are expected to be applied. It identifies requirements for addressing flood risk for new developments, steering more vulnerable development into areas of lower flood risk.
Local Policies	
Thanet Local Plan 2006 Policy EC2 – Kent International Airport[3]	Identifies the requirement for proposals to demonstrate that new development cannot contaminate groundwater sources and/or that appropriate mitigation measures will be incorporated into the development to prevent contamination.
Thanet Local Plan 2006 Policy EP13 - groundwater protection zones[3]	If a proposed development located within a groundwater Source Protection Zones (SPZs) is identified to have the potential to result in a risk of contamination of groundwater sources, it will not be permitted without adequate mitigation measures to prevent such contamination taking place.
TDC Flood and coastal erosion risk management policy statement[4]	Provides a public statement of the Council's approach to flood and coastal erosion risk management within the district.
Kent County Council (KCC) Drainage and Planning Policy Statement[5]	This policy statement sets out how KCC, as Lead Local Flood Authority (LLFA) and statutory consultee, will review drainage strategies and surface water management provisions associated with applications for major development.

8.2.2 The policies above have been taken into account in the assessment in **Sections 8.8 - 8.12**, alongside the legislative requirements below. Full details of all national and local planning policies relevant to the Proposed Development can be found in **Appendix 4.1**.

Legislative requirements

8.2.3 Legislation relevant to the assessment of potential effects on water quality, resources and flood risk includes, but is not necessarily limited to, the following:

- *The Environmental Permitting (England and Wales) Regulations 2016* together with subsequent amendments[6];
- *Flood and Water Management Act 2010*[7];
- *The Town and Country Planning (Environmental Impact Assessment) Regulations 2017*[8];
- The European Union (EU) *Floods Directive (2007/60/EC)*, as enacted into domestic law by the *Flood Risk Regulations 2009*[9];
- *Environmental Quality Standards Directive (2008/105/EC)*, as enacted into domestic law by The *Environmental Permitting (England and Wales) Regulations 2016*[10];

- The *EU Water Framework Directive (2000/60/EC)* (WFD), as enacted into domestic law by the:
  - *The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015*[11]; and
  - *The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017*[12];
- *Water Act 2003*[13];
- *Environment Act 1995*[14];
- *Land Drainage Act 1991*[15];
- *Water Resources Act, 1991*[16];
- *Environmental Protection Act 1990*[17]; and
- *Control of Pollution Act 1974*[18].

Guidance and Strategies

8.2.4 A range of general good practice advice and technical guidance is of relevance to this assessment, including the following:

- Pollution Prevention Guidance Notes (PPG)[19,i];
- The EA's approach to groundwater protection, March 2017 Version 1.0[20], and its predecessor Groundwater Protection: Principles and Practice (GP3) EA, August 2013 version 1.1[21];
- CIRIA Report C532: Control of water pollution from construction sites;
- CIRIA Report C649: Control of water pollution from linear construction projects – site guide;
- CIRIA Report C692: Environmental good practice on site (third edition);
- CIRIA Report C698: Site handbook for the construction of Sustainable Urban Drainage Systems (SuDS);
- CIRIA Report C753: The SuDS manual;
- CIRIA C 736 (Containment systems for the prevention of pollution);
- HSG 176 (Storage of Flammable liquids in tanks)[22];
- Energy Institute (EI) 1540 (Design, construction, commissioning, maintenance and testing of aviation fuelling facilities);
- Piling and Preventative Ground Improvement Methods on Land Affected by Contamination: Guidance on pollution prevention, EA, May 2001[23]; and
- Piling into contaminated sites, EA[24].

8.2.5 A number of bodies with responsibility for management and regulation of the water environment have also produced plans and strategies that are of relevance to this assessment. Regional

[i] The PPG notes were withdrawn by the EA in December 2015. They have been referenced in this report because they provide a good summary of environmental good practice measures which will demonstrate compliance with legislation for protection of the water environment.

management plans and strategies for the water environment of relevance to this assessment include the following:

- Preliminary Flood Risk Assessment (KCC, 2011)[25];
- Thanet Stage 1 Surface Water Management Plan (KCC, 2013)[26];
- Flood Risk to Communities: Thanet (KCC, 2017)[27];
- Strategic Flood Risk Assessment (TDC, 2009)[28];
- TDC's Local Plan Core Strategy (TDC, 2017)[29];
- River Stour Catchment Flood Management Plan (EA, 2009)[30];
- Stour Abstraction Licensing Strategy (EA, February 2013)[31]; and
- South East River Basin District River Basin Management Plan (EA, February 2016)[32].

8.3 Data Gathering Methodology

8.3.1 This section describes the desk study and surveys undertaken to inform the freshwater assessment. In order to establish the baseline situation, freshwater data were obtained from the sources listed in **Table 8.3** with respect to the Site and its surrounding area.

Table 8.3 Information used in the preparation of the ES

Topic	Source of Information
Topography, Elevation, Relief **Climate**	OS 1:10K and 1: 25K Mapping Meteorological Office[33]
Water Quality	EA maps[34] EA catchment planning[35]
Flood Risk	EA Flood Risk for Planning Map[34] GOV.UK long term flood risk information[36] Thanet District Strategic FRA[53]
Hydrogeology	EA maps[34] Envirocheck Report (March 2016)[50] British Geological Survey (BGS) website[37] Lord of the Manor Constraints Investigation (Desk Study) prepared for Southern Water (pp. 42)[38] Thanet sewers programme: Geotechnical and environmental investigation Phase A: desk study, prepared for Southern Water (pp. 110)[39] Thanet sewers programme: Geotechnical and environmental investigation Groundwater monitoring, prepared for Southern Water (pp. 208)[40] Outline for the final report on Thanet Sewers Survey Phase II prepared for Southern Water (pp. 98)[41] Groundwater Risk Assessment Interpretive Report: Isle of Thanet Groundwater Quality Assessment, prepared for Southern Water (pp. 39)[42]
Soils and Soil Type	Cranfield University website[43]

Topic	Source of Information
	Envirocheck Report (March 2016)[52]
Water Abstractions and Discharges	Envirocheck Report (March 2016)[52] TDC private water supply records EA Stour Abstraction Licensing Strategy[44]
Designated Sites	Defra MAGIC website[45] North East Kent (Thanet) Site Improvement Plan (SIP)[46]
Site Drainage	Information on baseline site drainage, referenced in the Outline DS (see Appendix A of **Appendix 8.2**).
WFD Measures	*Summary of the measures needed to achieve water body objectives for 2027 and beyond*, Environment Agency NASS spreadsheet version 2.2.17

8.3.2 The study area can be seen on **Figure 8.1** and has been defined as follows:

- The WFD surface waterbodies[ii] that receive drainage from the site; and
- The WFD groundwater bodies that underlie the site.

8.3.3 Defined in this way, the study area includes any dependent groundwater abstractions within 1km of the site. The rational for this distance is that if effects can be shown to be mitigated within this radius of the Proposed Development, then it can be inferred that more distant dependent abstractions will also be protected. This radius includes all hydrologically connected public water supply (PWS) abstractions.

Desk Study

8.3.4 A desk study has been undertaken to establish the baseline environment within the study area, using the sources outlined in **Table 8.3**. This has been supported by the production of a Hydrogeological Impact Assessment that provides a comprehensive picture of the hydrogeological baseline environment (**Appendix 8.1**).

Survey Work

8.3.5 Site walkover surveys were undertaken on the 7 March, 8 March and 9 March 2017 to support the assessment. These surveys comprised a visual inspection of the Site infrastructure and land uses.

8.3.6 No intrusive investigations have been undertaken on the site due to land access constraints therefore the assessment has been undertaken using available desk based and modelling information; for further details on the approach to historic contamination see **Chapter 10: Land Quality** (**Table 10.4**). **Chapter 5: Approach to the Environmental Statement** contains further details on this and the general approach to the carrying out of the Environmental Statement and future site investigations.

[ii] Under the WFD, the EA has produced nine River Basin Management Plans (RBMPs) for England to manage water quality targets and the overall ecological health of the water environment. The River Basin planning process has defined specific surface water bodies (river catchments), lake water bodies, groundwater bodies, transitional waterbodies (estuaries) and coastal water bodies, and assessed the ecological and chemical status of each water body and identified where status improvements were required to meet WFD targets.

Consultation

8.3.7 Since 2015 and throughout the undertaking of the walkover surveys and preliminary assessment work, RiverOak Strategic Partners (hereafter referred to as 'RiverOak') has engaged with consultees with an interest in potential freshwater environment effects. A Scoping report (**Appendix 1.1**), including a chapter covering the freshwater environment, was produced and submitted to PINS, who then provided a Scoping Opinion (**Appendix 1.2**). A summary of the Secretary of State's (SoS) comments is provided in **Table 8.4** below, together with a response to identify how the matter is dealt with in this Chapter.

Table 8.4 Issues raised in the SoS scoping opinion

Comments and considerations	How addressed in this ES
Impacts on surface water receptors should not be scoped out as Pegwell Bay is an important receptor. The DCO should consider the potential for effects on Pegwell Bay in the construction and operation stages.	Impacts on the surface water environment have been considered in **Section 8.9.**
A groundwater risk assessment (in line with GP3) should be produced. The scope of any intrusive works and associated mitigation measures should be agreed with the EA, TDC and SW.	A Hydrogeological Impact Assessment (**Appendix 8.1**), prepared in line with "The Environment Agency's approach to Groundwater Protection", has been produced to accompany the ES; the EA report has replaced GP3 (see **Section 8.2**). The Hydrogeological Impact Assessment has been produced in discussion with the EA and SW. No intrusive works have been undertaken prior to submission of the DCO. This is a DCO requirement and the scope of any works will be agreed with the EA, TDC and SW prior to commissioning.
The effect of the proposals on the objectives of the WFD, as set out in the South-East River Basin Management Plan (RBMP), should be assessed.	A WFD addendum note has been produced (**Appendix 8.3**), which: ▶ Lists the WFD water bodies screened in for assessment; ▶ Identifies all activities impacting on WFD waterbodies; and ▶ Signposts the sections of the ES which address these impacts. This note has been produced in compliance with the guidance PINS advice note 18[1]. In this Appendix the baseline WFD environment has been established and likely effects on WFD receptors have been identified, as well as appropriate draft mitigation measures.
The FRA should be developed in consultation with the EA and the LLFA, in this case KCC.	An NPPF compliant FRA (**Appendix 8.2**) has been produced, the scope of which has been agreed with KCC and the EA.
The site drainage network must demonstrate that measures to avoid existing drainage runs or to block existing drains have informed the proposed construction methodology and operation design development. Agreement should be sought from SW for proposed drainage attenuation ponds.	An outline site drainage plan (**Appendix A** of **Appendix 8.2**) has been submitted with the ES, the premise of which has been discussed with the EA, TDC, KCC and SW.
Mitigation measures should be addressed and the SoS advises that measures relating to other regimes, e.g. environmental permitting, are included, for example in relation to clean and foul water drainage discharges. Measures to attenuate runoff and to minimise water demand on site, e.g. via rainwater harvesting, should also be discussed. Ongoing monitoring should also be addressed and agreed with the relevant authorities to ensure that any mitigation measures are effective.	Mitigation and monitoring measures of this type have been detailed in this ES in **Section 8.5**.

	Comments and considerations	How addressed in this ES
	Scoping Report Chapter 7 states that significance will be based on receptor sensitivity and magnitude of change criteria. No details regarding the significance thresholds are set out in the Scoping Report. The SoS requires that specific significance criteria are set out in the ES.	Significance criteria are provided in this ES and form the basis of the assessment reported here.

8.3.8 Following receipt of the Scoping Opinion, two PEIRs (2017 PEIR and 2018 PEIR) were prepared and submitted to PINS for Section 42 consultation. A summary of the relevant consultee comments from both PEIR submissions is provided in **Table 8.5**, together with a response to identify how the matter is dealt with in this Chapter.

Table 8.5 Section 42 consultation responses

Consultee	Comments and considerations	How addressed in this ES
EA (2017 PEIR)	Any objection on the grounds of inappropriate use in SPZ1 for a PWS may carry limited weight in planning terms. We would therefore seek to work with applicants to ensure maximum environmental controls are in place for any agreed return to airport use.	**Table 8.6** contains a summary of all conversations with the EA on this issue, and the Hydrogeological Impact Assessment (**Appendix 8.1**) contains the agreed mitigation measures. **Appendix 2.1** contains more information on fuel farm design. It is expected that further conversations will be a part of the detailed design stage.
	We would want to agree in advance the scope and location of any new site investigation activity. We would suggest some further site investigation and assessment may be required for key hotspots, i.e. fuel tanks to support the full DCO submission. At the very least, a full summary of all existing ground investigation information should be drawn together and interpreted appropriately.	The applicant will agree the scope and location of any such works with the EA and SW prior to commencement. This is a DCO requirement. **Chapter 10: Land Quality** contains a summary of all prior ground investigations.
	To protect the underlying adit system and SPZ1, we would seek the bulk of existing runway and taxiways to be kept and not dismantled.	The bulk of the existing runways and taxiways will be kept. The paved area is considered to present a Foreign Object Debris (FOD) hazard, however the EA's concerns about removal have been noted. In order to mitigate against any potential FOD hazard, it is proposed to overlay the extended paved area with asphalt as part of the initial construction phase. Further detail on this issue can be found in **Chapter 3: Description of the Proposed Development, Section 3.3**.
	We would need to see a full options appraisal for any fuel depot location and agree full designs and containment processes for any agreed location.	This has been included in **Appendix 2.1**. The options appraisal has been discussed with the EA (see **Table 8.6**).
	A full Construction Environmental Management Plan (CEMP) will need to be agreed with us for all phases of works. Operational pollution prevention plans would also need to be agreed and should consider best practice and also available innovative measures for spillage management. We can discuss this further with the applicant, but for fire safety and hydrocarbon contaminant control we note there are new products available as well as traditionally used measures.	A draft CEMP has been produced to support the ES. This will be finalised following the granting of the DCO, alongside the detailed design stage of the project which is a DCO requirement.

Consultee	Comments and considerations	How addressed in this ES
	Drainage management of cargo, heavy goods vehicle (HGV) transit areas and car parking would need positive safe drainage to manage pollution risks. Early indications are that this can be achieved by outline proposals. They would need to be agreed in full at some point if development is to progress.	The proposed DS is in **Appendix 8.2** and includes proposals for positive safe drainage to manage pollution incidents. A DCO requirement is expected to agree the detailed drainage design with the EA and SW prior to the commencement of works.
	Proposals for storage of any materials for firefighting will need agreement with us and particular materials may not be approved if there is a risk of loss to ground of some types firefighting foams for instance.	Plans for the storage of any materials for firefighting will be agreed with the EA. This is a DCO requirement.
	The Proposed Development will be acceptable if the measures detailed in the Environmental Impact Assessment (EIA) submitted with this application are implemented, specifically: • Measures taken to prevent contaminants entering the surface water system (including, but not limited to, sediment, fuel, oil, building aggregates); • Hazardous liquid stored further than 10m from any surface waters or surface water gullies during the construction phase; • If there are concerns over potential impacts on the environment; works are halted and we are consulted immediately; • We are consulted on any changes to the design of the surface water system; and • We are consulted to ensure that the water quality discharge is varied in accordance with current design proposals.	Measures for the protection of controlled waters from the mobilisation of contaminants can be found in **Chapter 10: Land Quality**. Hazardous liquid will be stored further than 10m from any surface water or gullies. This measure will be included in the CEMP and the operational phase Environmental Management Plan (EMP). The CEMP and Code of Construction Practise (CoCP) will include measures for the monitoring of the water environment and procedures for stopping work and consulting with the EA if any pollution incidents are observed. Outfalls into surface waters will be monitored regularly during construction and works halted if pollution is observed. • Location of monitoring: any points of surface water discharge from the site. We assume in the ES that in Phase 1 all construction water will go to bowser to be taken off site for discharge, so no monitoring will be necessary. In construction phases 2-4 the ponds will be in use and the discharge from the ponds should be monitored. • Frequency of monitoring: Should be inspected regularly at point of outfall for low risk operations, but also in an ad-hoc way to coincide with changes in construction activities which could change the outflow water quality profile. If pollution is observed, works will be halted. There could be a requirement for continuous monitoring (e.g. turbidity, EC) if a particular contaminant were identified in the made ground on site. It should be noted that runoff is largely going to occur from areas of hardstanding due to the high infiltration capacity of the soils / aquifer – so works in areas where soils are exposed are not likely to generate runoff. In addition, East Kent is a relatively dry area, so the number of days that significant runoff is generated will be relatively few – and the number of days that the pump is in operation will also be limited. This could mean that an event based monitoring regime may be more appropriate than a continuous one. The frequency will be determined once the detailed construction phasing and dewatering plans have been finalised as well as the GI works. The EA will be consulted on the final design of the surface drainage system. This is a DCO requirement. The regulation of the site discharge will be discussed further with the EA and NE. For further information

Consultee	Comments and considerations	How addressed in this ES
		see the response to the NE comments on site discharges below.
	We recommend that: • Personnel are trained on the use of spill kits where applicable, and other mitigation measures are outlined in the spill response plan; • Penstock valves (existing or new) are considered during the design phase of the surface water system, and relevant personnel trained in the use of the emergency system; • A review of the use of any pesticides on the grassed areas is undertaken to prevent pollution to groundwater or run-off in to surface water drains; and • Outfalls to surface waters are monitored regularly during the construction phase and works halted if pollution is observed.	These measures will be put in place and included in the CEMP, Pollution Incident Control Plan (PICP), CoCP and EMP. These documents will be agreed with the EA prior to construction and operation. This is expected to form a DCO requirement.
	All foul drainage will need agreement, and any decommissioned existing drains should be removed to ensure they do not offer pathways for contaminant transport into the ground.	This agreement with be sought from SW, and initial discussion has already taken place along these lines. Measures for the protection of controlled waters from the mobilisation of contaminants through intrusive works can be found in **Chapter 10: Land Quality.**
	Any construction that requires piling would need to agree piling designs with us based on a risk assessment carried out in accordance with our guidance.	The approach to any on-site piling will be agreed with SW and the EA prior to the commencement of works. Piling methods will be designed to have a minimum of ground disturbance and will be in accordance with "Piling and Preventative Ground Improvement Methods on Land Affected by Contamination: Guidance on pollution prevention"[47] and "Piling into contaminated sites"[48].
	We would need to agree the location and configuration of any cement or asphalt batching plant during construction activities, this should be as far from the SPZ1 area as possible and designed to ensure all drainage is positively controlled.	This approach is agreed and the location/configuration of the plant will be agreed with the EA. This is a DCO requirement.
	Any new taxiway drainage will have to tie in to positive drainage controls, to guard against accidental spillages on the taxiway.	This approach is agreed and the final site drainage plan will be signed off by the EA prior to construction. This is a DCO requirement.
EA (2018 PEIR)	Hydrogeological Impact Assessment dated December 2017 should include aircraft breaking/recycling siting and proposals in the risk assessment tables as a specific item. Location and likely permitting requirements should be indicated.	Aircraft breaking has been included in the risk assessment tables in **Appendix 8.1**.
	Given postulated groundwater flow paths, business and cargo units in the N-W of the airport should be indicated as possible high-risk areas and clear management of how potential hazardous materials and vehicle handling in these areas will be undertaken is important.	The risk from hazardous materials within the business and cargo units in the N-W of the airport has been included in the risk assessment tables in **Appendix 8.1.**
Natural England (NE)	Chapter 8 – Freshwater Environment 8.10.1 – We note the intention for all site discharge in Construction Phase 1 to be contained on site and discharged to the site sewer network, following treatment by siltbusters or similar, or taken off-site. We understand that further details will	During construction Phase 1 there will be no discharge to Pegwell Bay associated with the on-site construction works. The construction drainage arrangements will change through Phases 1-4. All drainage arrangements which include Pegwelll Bay

Consultee	Comments and considerations	How addressed in this ES
(2017 PEIR)	come in the CEMP but would appreciate some more clarity at this stage as to what this proposal actually means. Does this mean that during the initial construction phase there will be no discharge from the airport down to the designated sites at Pegwell Bay?	will be discussed with NE and the EA prior to the commencement of works.
	8.10.2 – We note that for all subsequent construction phases the intention is to discharge to Pegwell Bay once silt and any other potential pollutants (e.g. hydrocarbons) have been removed, and would welcome further detail on exactly how this will be achieved.	Measures will comprise construction best practise and regulatory approach will be discussed with NE and the EA with the focus being the protection of the designated features at Pegwell Bay. This could involve the granting of an Environmental Permit from the EA (for further details see **Table 8.14** for further details).
	Natural England accepts that the most likely discharge option during the operation of the airport would be via the existing outfall at Pegwell Bay, and that the EA is the primary regulator for you to work with on this. However, given the multiple designations at Pegwell we would welcome ongoing oversight and potential input into the site drainage strategy. We maintain the position that we would not wish to see any reduction in the quality of this discharge from what was previously permitted.	An outline site DS has been submitted with this ES for comment (Appendix A of **Appendix 8.2**). The quality of the discharge water's will be agreed with the EA and NE prior to the commencement of works, these will be of sufficient quality to ensure no adverse effect at Pegwell Bay (for further details see **Table 8.14** for further details).
NE (2018 PEIR)	Seeks clarification regarding the statement in Chapter 3 of the PEIR that a new discharge consent 'may' be required from the Environment Agency. NE's position is that it considers that a new discharge consent would be required if RSP intends to continue to make use of the Pegwell Bay outfall.	An appropriate strategy for the regulation of the quality of the site discharge to Pegwell Bay will be discussed and agreed with the EA and NE as a part of the detailed site drainage design. Initial discussion with the EA (see **Table 8.6**) indicated that the resumption of the use of the discharge pipe to Pegwell Bay may not require a new Water Discharge Activities Permit as the majority of the discharge will be surface water runoff, this point will be clarified through the EPR application process once a DCO is granted.
KCC (2017 PEIR)	The PEIR (2017) **Table 8.1** indicates that a Hydrogeological Risk Assessment [HRA, otherwise known as the HIA], FRA and DS will all be produced to inform the forthcoming ES. KCC, as LLFA, would welcome the opportunity to engage with the applicant's consultants at the earliest possible stage of their preparatory works to ensure its requirements and recommendations are fully incorporated into the final DS.	The site drainage proposals have been shared with KCC. See **Table 8.9**.
KCC (2018 PEIR)	No further comments. This chapter summarises KCC's position in relation to any requirements with a clear, concise summary of representations made by other relevant authorities.	Noted.
TDC (2017 PEIR)	It is noted that a CEMP is to be submitted as part of a DCO to reduce effects of pollution from the construction phase. The CEMP must be informed by the findings of intrusive investigation works. Please note that any works must be carried out in a strictly controlled manner to ensure that contaminants are not exposed and releases allowed to air, land or controlled waters, which could cause pollution.	No intrusive works will be undertaken prior to DCO submission. However, the CEMP will be informed by these intrusive works prior to the construction phase. This is a DCO requirement.
Public Health England (2017 PEIR)	We request that the proposer works with the EA to consider the possible releases to water, possible exposure pathways and potential risks to public health. A suitable summary of these risk assessments, and if necessary, control measures should be included in the final DCO application.	Agreed, the EA has been engaged in the manner. Risk assessment can be found in the Hydrogeological Impact Assessment (**Appendix 8.1**) and **Chapter 10: Land Quality**.

Consultee	Comments and considerations	How addressed in this ES
	The submitted documentation indicates that though there are no PWS abstractions located within the site boundary, a number of people and organisations abstract water from groundwater or ponds/lakes up to 1km outside the site boundary (six located within 500m, and a further three up to 1km from the site boundary). The abstractions are for private water undertaking, PWS and agriculture.	Noted.

8.3.9 In addition to this formal scoping consultation, informal consultations have been held with the EA, SW, TDC and KCC to establish the scope of the assessment. These have comprised the meetings summarised in **Tables 8.6-8.9**, respectively.

Table 8.6 Summary of meetings with the EA

Date of meeting	Key points of discussion
11 April 2016	**Site Drainage**: The site discharge point from the runway area is believed to be in the south east corner of the site and may run under the A299. It is not thought to run below the fuel station, located to the south of the site boundary. It is not known if there are other pipes linked to this discharge or if it is from the airport only. This pipe discharges to the beach (Pegwell Bay), and the EA receives complaints and enquiries from the public as the pipe is visible on the beach. If this was going to continue to be the discharge route, then the discharge would need to be permitted and water quality considered in the DS. The EA would hope that there would not be an increase in the volume of the discharge. Drainage within the red line boundary is currently partially to ground and partially captured. This discharge to ground would not be permitted in future in areas where potentially polluting substances are in use (e.g. de-icer in runway or apron areas) or where there is fuel. Sustainable Drainage Systems (SuDS) would need careful consideration and are best outside SPZ1.[iii] **Water Quality**: The fuel station to the south east of the Site is known to be an issue, and in the EA's view there are probably groundwater and land contamination issues with that Site associated with historical activities and spills.[iv] The EA and SW hold water quality monitoring data from boreholes around the Site which should be requested. The closest SW source is treated for nitrate pollution, and there have been issues in the past with hydrocarbons and solvents. There are currently no water quality monitoring data inside the Site boundary; this is seen as a key data gap. **Delineation of Source Protection Zone**: The Western Adit[v] associated with the area of SPZ1 under the runway is thought to be at about 0m above Ordnance Datum (mAOD), so approximately 40m - 50m below ground level (mbgl). It is unknown if there are additional shafts associated with it. The SPZ delineation is very basic (50m circle) so the EA considers that the SPZ1 could potentially be larger. Further consultation with SW is necessary.
9 November 2016	**Groundwater Quality**: RiverOak would need to ensure that the Proposed Development did not make the quality issues worse. It was acknowledged that there was another large adit to the east feeding the Lord of the Manor[vi] source from the area below Ramsgate which may also contribute to poor water quality. **Hydrogeological Conceptual model**: It was agreed that the conceptual understanding of the Site is well known and therefore there was no need for any further work to establish this, although the

[iii] SPZ1 is defined as the zone around a groundwater abstraction in which contaminants have a 50-day travel time from any point below the water table to the source. This zone has a minimum radius of 50m.
[iv] Further information on ground contamination can be found in **Chapter 10: Land Quality** of this ES.
[v] The Western adit is a horizontal passage leading into the Lord of the Manor groundwater abstraction to increase flow to the source.
[vi] The Lord of the Manor source is the SW borehole in close proximity to the Site. Further details are given the baseline description.

Date of meeting	Key points of discussion
	conceptual understanding will still need to be presented and discussed in any Site report to ensure that an accurate conceptual model (source, pathway, receptors) is established. However, the EA would need to understand the distribution of contaminants across the Site so that future work didn't result in their mobilisation. The EA would not want to see intrusive works near the adit or within SPZ1, and acknowledges the desire of SW for the minimum level of intrusive work so as to avoid mobilising contaminants and creating pathways through the unsaturated zone. However, some boreholes (in target areas) would be needed to see if any pollution/contamination is reaching the water table. The desk study and other site investigations will be used to inform the need for any boreholes. It was agreed to undertake further discussions in the future to establish what is suitable for intrusive investigations in different areas of the Site. **Jentex Fuel Farm**: RiverOak is looking at different options for the location of a new fuel farm for the airport. These include the Jentex Fuels site located to the south east of the airport, although RiverOak will need to look into costs and implications of remediation and/or construction at this site. EA stated that this site has long been a concern, especially given the location close to the SPZ. The EA would be unlikely to approve this as a site for bulk fuel storage due to its location within SPZ1. **Fuel Storage**: The EA stated that it would request that any fuel tanks located anywhere on site are to be positioned above ground. There are precedents in Kent at a Tesco site, where above-ground fuel tanks have been required. **Site Discharge**: The EA is happy with the construction of ponds for water attenuation and treatment, prior to discharge to Pegwell Bay, however, it stated the following caveats: • Ponds would need to be properly constructed with sufficient operational control measures; • Need to ensure that the 'dirty' water lagoon was not a potential source for odour; • A condition check should be undertaken of the drainage pipeline to Pegwell Bay; • New discharge consent would be needed, this may require a WFD assessment; • Also need details of the operational procedure and controls to show the system will be properly managed; and • The EA would like to see water-saving measures implemented, for example grey water use, re-use of run off from roofs. **CEMP**: The EA is happy that a draft CEMP will be submitted with the DCO application, and will seek to secure conditions for the production of a final CEMP prior to construction. **Technical information for inclusion in the DCO application**: The DCO application should include sufficient information on the operational procedures for the airport, for example the use of pesticides to control insects, locations for de-icing and washing of aircraft, emergency procedure and spill response.
6 March 2017	**Site drainage**: The proposed surface water capture and treatment system was discussed. All surface water will be captured, and positive drainage would be used to send the water to the treatment facility to be located on the north side of Manston Road. There would be silt traps, oil separators and other infrastructure in the system. It is proposed that there are two ponds which will be sized according to assessed need. From the ponds the water will be pumped to the existing discharge pipe located in the south-eastern part of the Proposed Development site. There are two options, either to re-use an existing drainage network around the western end of the runway, or to install a new network around the eastern end. From the discharge pipe all drainage is positive. The drainage and surface water treatment system would be installed during the first phase on construction, before the reopening of the airport. The EA welcomed this approach. **Local sewer network**: The EA requested that the project confirm the capacity, condition and ownership of the foul sewer network on site. **Clean water requirements**: An assessment of clean water requirements will form a part of the Resources Strategy Statement. **Discharge Permit**: The EA confirmed that an application for a Discharge Permit from the Pegwell Bay outfall was made by the previous site owner but was not granted due to changes in ownership. The EA indicated that it was likely that a discharge permit would be required to regulate the Pegwell Bay Discharge. The EA agreed to confirm whether this would be necessary and confirm if it would regulate quantity as well and quality. **SuDS**: It was agreed that SuDS were not preferred on site given the groundwater risks. The EA indicated that this would need to be discussed with TDC and KCC and a formal justification provided. **Land raising**: As part of the construction, material will need to be imported to create a new raised building platform for the cargo aircraft stands and taxiway. It is proposed to reuse as much

Date of meeting	Key points of discussion
	excavated material as possible from elsewhere on the site, but where imported material is needed this would be clean and suitable for use. **Hydrogeological Conceptual Model**: SW and Amec Foster Wheeler (working for SW) have undertaken a lot of work on a conceptual model for the site. SW has confirmed that they are happy for the project to use this information, therefore it is proposed that no additional work is needed to develop a conceptual model for the site. The EA accepted that the SW information represented the best information available and that they would not expect additional information to be collected. **Hydrogeological Impact Assessment**: The Hydrological Impact Assessment was being finalised and had not yet been provided for review, but was submitted as part of the water chapter in the PEIR. It is proposed that mitigation will be put in place following the assessment to reduce the risk. The Hydrogeological Impact Assessment will not be quantitative but more qualitative following an EIA type approach to assessment. It will be based primarily on information from SW. The EA requested that the Land Quality Phase 1 and the Hydrogeological Impact Assesment are linked and cross-referenced where appropriate. **Nitrate in groundwater**: The EA stated that Thanet is a priority area for groundwater, with the main issue being nitrates. Therefore, the EA has put a lot of effort in to engaging with farmers, industrial sites, the Local Authority and others to make them aware of risks and to follow up with information and actions to be taken. The EA would therefore seek to similarly engage with the operators of Manston Airport. **Embedded mitigation measures**: The Proposed Development will use in-built (embedded design) mitigation to reduce risks. This will include developing airport management procedures, including spill response and wildlife management (including spraying for weeds/insects). The EA would be involved in their design. The EA requested that there is a condition that all documents are reviewed and signed off by all relevant consultees. **Flood Risk Assessment**: The entire site is in Flood Zone 1 and all surface water drainage is going to be discharged into the sea. Therefore, it is considered that the flood risk for the site is low. It is proposed that a FRA and DS would not be prepared for the PEIR, but will be submitted as part of the ES. Furthermore, as the drainage is to sea, the drainage system does not need to include flood attenuation measures. **Fuel Farm**: RiverOak is looking to acquire the Jentex site and develop this as the fuel farm for the project. Previously other options were being looked at, but this site has a number of operational and environmental advantages. The EA has concerns about the use of the site as it is located in/adjacent to SPZ1, and would need to understand what the approximate bulk fuel storage needs are for the site as part of the proposals. Furthermore, the new EA groundwater protection policies (published 14 March 2017) state that the EA will not support any 'new' bulk fuel storage in SPZ1. It was noted that the site is only partly within SPZ1. The EA stated that the biggest risk was the siting and location of the bulk fuel storage, and that the current proposed location was considered as the most sensitive on the site. Amec Foster Wheeler provided an example of another similar bulk fuel storage facility that was built recently at Bristol Airport. This was similarly close to SPZ1, and was designed in a way that was able to satisfy the EA and the Local Authority.
16 May 2017	**Thanet Chalk**: The Chalk on Thanet is highly sensitive due to the lack of alternative water resources. The EA indicated that the Thanet Chalk was a candidate water protection zone to highlight the sensitivity of the water resources situation, however it's been a candidate zone for ~10 years and is unlikely to be designated as such. If it were designated as a water protection zone, then that would give the EA additional powers to enforce pollution prevention measures. **Fuel Farm**: The EA would like to see within the ES a consideration of alternative locations for the fuel farm, with their preference being for a fuel farm that was away from the abstraction point and SPZ1. Furthermore, the EA requires that the location of the fuel farm is justified and it is demonstrated that all alternatives have been explored. The EA will require a very high level of mitigation, Best Available Technique (BAT), for the fuel farm, and the site will need a new permit. It was noted by the EA that the existing facilities are not BAT and will need to be replaced. Given the sensitivity of the site, the approach outlined in GP3 may not be sufficient. **Pollution prevention on site**: The EA reiterated a point from previous meetings, that it expects a high level of pollution prevention measures to be taken across the site with respect to drainage from runways / aprons, vegetation management, crashes etc. **Site Drainage**: As stated in a previous meeting, the EA is not happy with any drainage to ground or the use of soakaways on the site. The EA is happy with discharge to the sea, but is not sure of the exact permitting position because some of the discharge will be treated. There are unlikely to be volume constraints.

Date of meeting	Key points of discussion
15 September 2017	**Fuel Farm Location**: Six options for the fuel farm, including an off-site location as requested by the EA, were identified and assessed against the fuel farm requirements. This was a qualitative assessment, and the full details will form part of the ES to accompany the DCO. In summary, the option for a new fuel farm on the Jentex site performs best of all of the options. **Fuel Farm Design**: The design has been produced to meet operational requirements for fuel storage and delivery, but also to address environmental and safety and risk considerations as identified in the Hydrogeological Impact Assessment. This includes measures such as: • New double-skinned tanks within a new dedicated impermeable bund, sealed drainage, interceptor and anti-pollution control valve, and parking for airside bowser fleet; • The tanker unloading and bowser refuelling areas will also be bunded, and will have a sealed drainage system with no gravity discharge route to the site outfall; and • The tanks would be located at the western end of the Jentex and would be within SPZ2, and as far from SPZ1 as possible on the Jentex site. The fuel farm would be south of the Western Adit. These measures will also be incorporated onto the parking areas and internal access roads, which will all be connected to the drainage system. The EA acknowledged that the design has moved the fuel farm outside of SPZ1 but stated that the design of the fuel farm should include innovative solutions that go-beyond BAT. Examples would include hydrophobic materials, underlying substrate filter drains, monitors beneath the bunds, and bowser parking areas. The EA gave some examples of companies working in Kent who had developed innovative design solutions. **Hydrogeological Impact Assessment update**: Additional modelling has been undertaken since the first issue of the 2017 PEIR to look at the risk to the adit from an incident at a fuel farm located at the Jentex site. The model used was the EA East Kent Groundwater Model, with the adit represented as a series of "pumping" wells. The pumping rate was the recent accrual pump rate of 3.5 Ml/d (license value is 11.2 Ml/d and SW has estimated the Peak deployable output of 5.2 Ml/d and minimum of 2.81 Ml/d). The model results have shown that: • The majority of the water entering the Western Adit comes from the north; • Flow beneath fuel farm is both to the north (adit) and south (coast); • Groundwater flowing north is a small (0.05%) proportion of the water pumped out of the adit; • Travel times are long; and • The zone of stagnation, the point where flow stops flowing north, is close to the fuel farm. The EA requested that additional model analysis to confirm any eastward movement will be undertaken. The EA stated that it would require some groundwater monitoring, and the location of this monitoring would be dependent on the final design of the fuel farm. **Potential for runway removal**: The Civil Aviation Authority (CAA) may require the removal of redundant taxiway/runways for operational and safety reasons. The EA noted that the EA and SW have both previously stated that they would not want material above the adit and within SPZ1 to be removed if can be left in-situ. Concerns include: • Depth of material above adit is unknown, it is also seen to provide some protection to the adit; • Details of the removal process are unknown, it may result in turbidity in the adit; and • It is not known what, if any, contaminants may be within or below the surface which may be mobilised by the construction. Therefore, the EA would object any removal of the existing taxiway/runway within SPZ1 without more details of proposed techniques and further site investigation works. **DS Update**: The drainage system will be designed so that there would be no off-site flooding for a 1% Annual Exceedance Probability (AEP) event with a 40% climate change allowance (scenario agreed with KCC as LLFA). All surface water will be captured, attenuated within two ponds, treated and then discharged to Pegwell Bay via an existing pump and outfall. The discharge rate will be limited to a pump rate of 30 l/s. The EA stated that SuDS could be considered in some areas for roof water, for example on the 'Northern Grass' area. Different treatment methods will be considered, such as light liquid separator, activated sludge aeration tank and/or forced bed aeration, to treat pollutants which will include exhaust fumes, fuel and lubricant spillages, and de-icing and washing agents. The EA asked for an opportunity to review and comment on the types of de-icer to be used, so that where possible lower risk alternatives can be used. **Discharge Permit to Pegwell Bay**: The EA stated that as the discharge to Pegwell Bay would be surface water, then it would not normally require a discharge permit. A possible solution would for

Date of meeting	Key points of discussion
	a discharge permit to control the quality of the discharge from the contaminated pond to the clean pond. **Condition of the discharge pipe to Pegwell Bay**: The EA asked about the condition of the pipe. The pipe is in good condition, and therefore only limited works are expected to be needed. However, if required a new pumping station would be installed and redundant infrastructure removed as part of the project. The ownership of the pipeline will be part of the DCO process, currently it is not clear who is responsible for the pipeline. **Removal of sewers and drainage systems**: There is no specific EA guidance, but the EA stated that techniques such as blocking with concrete would be considered as appropriate.
01 June 2018	An additional meeting was held with the EA in order to agree the key points and principles to be contained within a Statement of Common Ground (SoCG). These included: • That no intrusive investigations for contaminated land or buried archaeology should take place prior to granting of the order. • That the fuel farm design would include above ground tanks. The above were agreed and in addition, the EA requested further discussions regarding foul drainage should take place with Southern Water as the application progresses. Discussions with SW are ongoing and a SoCG is also being progressed.

Table 8.7 Summary of meetings with SW

Date of Meeting	Key points of discussion
29 April 2016	**Lord of the Manor Public Water Supply (PWS)**: The adit running under the runway measures approximately 2x2m in cross section and is located at sea level (therefore approximately 40-50mbgl), and possibly dates from the 1930s. The exact spatial orientation of the adit is unconfirmed; delineation of SPZ1 is therefore regarded as approximate. The shaft is located to the east of the site. The source is currently not in use but is one of four that supply drinking water to Thanet. Sources are currently blended with imported water. There are recorded incidents of turbidity (generally caused by large changes in groundwater table elevation after heavy rainfall), plus there have been historical issues with high levels of nitrate and Trichloroethylene (TCE). SW is not concerned about changes to aquifer recharge rate due to new airport concrete infrastructure. **Site Drainage**: The site is private so SW has limited information on the existing drainage. There were previous applications to install new drainage pipes and an interceptor but it is not known whether it was installed. If the existing pipe network was to be reused a condition survey should be undertaken first to ensure that is fit for purpose/use. If there were any pumps needed the design and location of these would need to be considered to reduce risks. SW's initial position is that they would not want to see any sort of ponds or water storage tanks on the site due to risks to groundwater quality. Any water storage on site should be minimised. The fuel farm should be designed to include sufficient safeguards, e.g. above ground bunded tanks, and it should be located outside of groundwater SPZ 1 and SPZ 2 and as far as practically possible away from the adit. **Water Use:** SW requested that an estimate of the water usage for the airport be provided, there are currently issues with capacity in Thanet and the proposed increase in flights would likely require more water. SW requested that the DCO application should include details of how waste water and surface water will be managed. It was stated that existing foul water connections could be used provided flow rates for sewerage are no greater than existing, capacity checks for the existing infrastructure should also be undertaken. Nothing should be discharged to ground on the site. **Construction**: The main concern for SW is around the construction activities, for example deep piling. Any foundations should be designed to avoid deep piling where possible, SW will be notified of any works ahead of time, there should be no use of anti-freeze within piling operations. If the PWS borehole was knocked out and had to be pumped to clear waste, SW would charge a developer.

Date of Meeting	Key points of discussion
	If RiverOak wants to install any new monitoring wells to monitor groundwater quality they would need to be away from the adit and designed to minimise risk, the particular concern is turbidity. SW would need to be notified in advance of any drilling. There are two rising mains crossing the southwest of the site, the exact locations are not known as the records are old. They will need to be protected, i.e. no excavation within 6m either side, with hand digging to identify services if required.
22 February 2017	**Site Drainage**: SW would prefer a design which captured all rainfall and run-off and took it off site, though they are happy for there to be water re-use within the site. **Construction**: SW would prefer that the current runway area was left undisturbed due to turbidity concerns at their source, though if some removal of hardstanding is required then this needs to be properly designed to avoid groundshaking etc. Works in the area designated as SPZ1 should be avoided. If any piling is to be used methods must be used to minimise ground disturbance. **Site Investigations**: SW requested that any site investigation works are co-ordinated with the other potential applications for the site to result in the minimum of ground disturbance. **Hydrogeological Conceptual Model** – it was agreed that given the level of previous studies that the overall conceptual model was well understood and that there was no requirement for any additional field investigations to improve the confidence in the conceptual understanding. **Fuel Storage**: Fuel storage tanks should be placed above ground to protect the aquifer from pollution. **Mains supply & sewage**: There will need to be an application from RiverOak for a capacity check of the local foul sewage and mains supply systems to ensure that the requirements of the site can be supplied/serviced.

Table 8.8 Summary of meetings with TDC

Date of Meeting	Key points of discussion
5 July 2017	**Approach to Assessment:** The assessment is primarily concerned with the importance of the Chalk Thanet aquifer which underlies much of the site. The EIA and design teams are working closely to ensure that the design and operation of the airport is updated and that modern best practice and procedures are implemented. **Protection of Groundwater quality:** There will be no discharge to ground on site, this has been requested by SW, and the existing surface water discharge to Pegwell Bay will be used. Surveys have indicated that this is in a good condition and that with some minor works it will be suitable. SW have indicated that its main concerns are effects to the Thanet aquifer and the Lord of the Manor borehole and adit (that runs under the runway) from turbidity, nitrates and hydrocarbons. • Turbidity will result from any construction works (e.g. pilling) on or near the adit, these will be minimised and managed. • Nitrates can result from poor sewerage and drainage, so those on site will upgraded as part of the project. The location and design of the airport fuel farm, as well as the re-fuelling of aircraft, is being managed and designed in order to reduce risks from hydrocarbons. This is taking BAT and current EA guidance and advice into consideration. The fuel farm studies also include a site selection/options appraisal and a safety and risk assessment (including risks to environment). The fuel farm will be on the former Jentex site, but the facility will be new.

Table 8.9 Summary of meetings with KCC

Date of Meeting	Key points of discussion
30 August 2017	The Outline DS (submitted with the 2017 PEIR) was discussed. Following this meeting KCC issued a response regarding the Outline DS (for full details see **Appendix 8.2**). This response has been summarised below. **Outline DS**: KCC provide no specific direction as to the form of the drainage measures that should be included within the drainage design, but would encourage consideration of the policies as stated within the KCC Drainage and Planning Policy Statement. It is noted that as the development is an airport operation there may be specific requirements which override the policy statement. KCC would encourage full consideration of sustainable drainage measures, given the water quality benefits that may be provided. **Discharge to Pegwell Bay**: Design will be undertaken with an assumed pumped discharge rate of 30l/s and outfall sewer line diameter of 900mm. KCC agreed that utilisation of the Pegwell Bay Outfall was appropriate. KCC noted that this discharge destination in its own right will not require attenuation, but in relation to pump operation and water quality treatment storage for water will be required. Any detailed submission will be expected to be supported by a condition survey of the outfall pipe. **Discharge to ground**: KCC noted that there should be no expectation of discharge to ground due to potential contamination issues and underlying geology. **Drainage system design:** KCC noted the following: • The volume of the attenuation basins may depend more on treatment requirements and timing of storm events with respect to pump operations; • Additional design requirements for the ponds may be specified by firefighting requirements. KCC will take direction from other authorities with respect to any additional considerations e.g. underground tanks rather than surface features; • Surface water catchment areas should be delineated. Not all drainage catchments will require treatment e.g. roof areas. Separation of 'clean' from 'dirty' areas should be provided as much as possible/feasible; • A reduction of impermeable areas is considered as much as possible, not given drainage network constraints but given the additional water quality treatment that will be required. • Consideration should be given to the inclusion of permeable pavements, even if lined, to provide for treatment and reduce any additional attenuation volumes which may be required. This may be applicable to areas outside of aviation operations; • KCC's Drainage and Planning Policy Statement with respect to drainage design criteria, and in particular: no surcharge for 1 in 30-year rainfall events, allowance of above ground flooding for 1% AEP rainfall event, although any surface water must remain within the site and not flood any property; and • Design must allow for 20% climate change but assess sensitivity of the system to 40% allowance.

8.4 Overall Freshwater Environment Baseline

Current Baseline

Topography and Climate

8.4.1 The Proposed Development site[vii] is on relatively high ground, mainly at an elevation between 45-50m AOD. The southern portion is located at an elevation of approximately 50m AOD, along the length of the existing runway, but rises to approximately 55m AOD in the westernmost corner of the site. North of the runway the site level declines to approximately 40m AOD in the west, at the Spitfire Way Junction (crossroads of the Manston Road (B2050) and Spitfire Way (B2190) carriageways), forming the start of the headwater valley for the Brooksend Stream, while remaining at 45-50m AOD in the northernmost part of the site. The site Red Line Boundary (RLB) also

[vii] Note to reader on terminology. References to the Proposed Development site should be taken to refer to the airport site, excluding that part of the Red Line Boundary (RLB) which covers the buried pipeline. Where the reference includes the full RLB this has been made clear in the text.

encompasses the line of the buried pipeline to Pegwell Bay, which extends from the southern portion of the site at about 50m AOD to the outfall point in Pegwell Bay.

8.4.2 The average annual rainfall recorded at Manston between 1981 and 2010 was 592.5mm[33] (see **Table 8.3**).

Surface Watercourses and other Water Features

8.4.3 There are no river watercourses on or adjacent to the site (see **Figure 8.1**), partly due to the high permeability of the underlying Chalk. A series of water channels and streams that form part of the Minster Marshes are located more than 1km to the south of the main site. The buried pipeline lies in closer proximity to the north-western extent of this system, but aerial photography indicates that it does not cross any surface water features. Minster Marshes drain into the River Stour, 3km south of the site, which flows east into Sandwich and Pegwell Bays. Currently runoff from the site infiltrates locally and, due to the highly permeable nature of the underlying geology, is unlikely to reach these surface water systems via overland flow routes.

8.4.4 Ordnance Survey (OS) mapping indicates a drainage channel on the opposite side of the road at the northernmost point of the site. This is possibly associated with an operational garden nursery (Rosemary Nurseries) adjacent to the site.

8.4.5 OS mapping also indicates a number of reservoirs within 3km of the site. A number of small uncovered reservoirs are located approximately 1.5km or more from the westernmost boundary of the site. A covered reservoir is located approximately 0.5km north of the site and one further uncovered reservoir located 0.3km from the southern boundary.

8.4.6 There are a number of other small water features (e.g. ponds) located within 3km of the site.

Soils and Land Use

8.4.7 The LANDIS soils database (see **Table 8.3**) indicates that the site is underlain by slightly acid and lime rich, loamy soils that are freely draining. The leaching potential of the soils indicates that they have the potential to transmit a wide range of pollutants.

8.4.8 Although Manston Airport ceased operation in 2014, the land use across the site remains. The southern part of the site is dominated by the tarmac runway, with a network of roads and taxiways linking this to the northern parts of the site. Carparks and buildings across the Site remain, and all the infrastructure is surrounded by cleared, maintained grass areas.

8.4.9 The site is bordered by roads that run along the length of the southern and western boundaries, with the B2050 cutting across the site in the north. Beyond these roads are farmland and industrial/retail areas (including Manston Fire Museum). To the north and east of the site are areas of farmland and residential dwellings.

Geology

8.4.10 The BGS mapping indicates that the bedrock geology underlying the entire of the site is the upper Newhaven Chalk (previously the Margate Chalk), overlain by the sands and silts of the Thanet Formation just outside the site's northern boundary. The overlying superficial (drift) geology is variable, with areas having no superficial geology (predominantly in the south of the site) interspersed with areas of Head Deposits, comprising wind-blown sands with clay and silt, and Made Ground, in the form of fill material with cinders, chalk, and building rubble.

8.4.11 Further detail on the site's underlying geology can be found in **Appendix 8.1**.

Hydrogeology and Groundwater Vulnerability

8.4.12 Online EA mapping and discussions with the EA and SW indicates that the Proposed Development site is underlain by a Principal aquifer, associated with the underlying Chalk, which can provide high levels of water storage. This aquifer supports local Public Water Supplies (PWS). The Thanet

Formation has been classed as a Secondary A aquifer by the EA. A Secondary A aquifer is defined as a permeable layer capable of supporting water supplies at a local rather than strategic scale.

8.4.13 The site is located entirely within a groundwater SPZ catchment[viii,49]. The inner zone (SPZ1), where risk of contamination from pollution causing activities is greatest, is identified in an area at the eastern end of the Site and in a strip beneath the runway. This is surrounded by a wider area of outer zone (SPZ2) that also dominates the area beneath the runway, in the south of the Site. The remainder of the Site falls within the wider SPZ catchment area (SPZ3). These SPZs can be seen on Figure 2.2 of **Appendix 8.1**.

8.4.14 The entire site is also located within a Safeguard Zone (SGZ)[ix] and a groundwater Nitrate Vulnerable Zone (NVZ)[x], as shown on Figures 2.3 and 2.4 respectively of **Appendix 8.1**.

8.4.15 Further detail on the site's underlying hydrogeology can be found in **Appendix 8.1**.

Abstractions

8.4.16 There are no licensed abstractions located within the site boundary, but a number of individuals and organisations are licensed to abstract water from groundwater or ponds/lakes up to 1km outside the site boundary. The abstractions are for private water undertaking, PWS and agriculture. Abstractions licensed for non-PWS purposes have been taken from the Envirocheck Report[50] and are listed in **Table 8.10**. It is assumed that where no permit end date is provided in the Envirocheck Report that the abstraction is currently operational.

Table 8.10 Licensed abstractions within 1km of the Manston Airport Site

Licence Holder	Purpose	Source	NGR	Operational	Direction from the Site	Approx. Distance from the Site (m)
Wilson & Wilson Ltd	Private Water Undertaking: General Use (Medium Loss)	Groundwater	631690 165470	Yes	E	176
Mrs L R Saunders	Spray Irrigation	Pond or Lake	632855 166805	Yes	W	474
Mrs E Green	General farming and Domestic/ spray irrigation	Groundwater	632850 166810	Yes	W	481
Mrs L R Saunders	General farming and Domestic/ spray irrigation	Groundwater	632850 166810	Yes	W	481

8.4.17 TDC has confirmed that there are no known private water supplies within a 2km radius of the centre of the Proposed Development site.

8.4.18 There a number of PWS boreholes located in the vicinity of the site, all licensed to SW. These are described in more detail in **Appendix 8.1,** while their locations are shown on Figure 3.2 of

[viii] The EA have defined SPZs for 2,000 groundwater sources such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area. The closer the activity, the greater the risk. There are three main zones (Zone 1 - inner, Zone 2- outer and Zone 3 - total catchment).

[ix] Safeguard zones are non-statutory areas established for 'at risk' abstractions where land use, management practices and other activities can affect the quality of the raw water. Measures to prevent and reduce pollution are targeted within these zones.

[x] NVZs are areas designated as being at risk from agricultural nitrate pollution. They include about 58% of land in England. DEFRA reviews NVZs every four years to account for changes in water pollution. https://www.gov.uk/guidance/nutrient-management-nitrate-vulnerable-zones

Appendix 8.1. The closest abstraction point is the Lord of the Manor source, located to the south west of the site boundary. One of the adits which feeds this source, the so-called Western Adit, lies underneath the runway (see Figure 3.3 of **Appendix 8.1**). The Hydrogeological Impact Assessment (**Appendix 8.1**) includes the results of work to delineate the catchment of the Lord of the Manor PWS around the site, the results of which can be seen in Figure 3.4 of **Appendix 8.1**.

8.4.19 The 2013 River Stour Abstraction Licensing Strategy (ALS)[51] indicates that there is "a presumption against" the licensing of new abstractions in the Chalk aquifer due to the high volume of abstraction already licensed.

Discharges

8.4.20 Two historic permitted discharges have been identified within the site. These are as follows:

- A discharge consent held by the Modern Jet Support Centre Ltd, which discharged site drainage to land, and was revoked in 2004; and
- A discharge consent held by Kent International Airport Ltd (consent number P02258). This discharge allowed drainage from the runway and apron areas to discharge to Pegwell Bay via a pipe located on the southern edge of the airport. Discharge was pumped (against topographic gradient) from the Site to this pipe. Conversations with the EA (detailed in **Table 8.6**) have indicated that it is understood that this discharge consent was never live due to the change in owner.

8.4.21 There are a further ten permitted discharges identified up to 500m outside the RLB, and a further nine located up to 1km from the RLB. All those identified discharge to land, groundwater or saline estuary, being used for single domestic properties, surface waters, site drainage and process waters from trade effluents or storm sewage overflows for public supplies. It is assumed that where no revocation date is provided in the Envirocheck Report[52], then the discharge is currently operational. Consequently, ten of the permitted discharges (identified in **Table 8.11**) are assumed to be currently operational.

Table 8.11 Discharges within 1km of the Manston Airport Site

Operator	Discharge type	Grid Reference (NGR)	Estimated distance from Site in metres (indicated direction from Site)	Receiving Water	Status
Kent International Airport Ltd	Discharge of other matter – surface water	634030 166280	On site (south)	Saline Estuary	Non-operational
The Modern Jet Support Centre Ltd	Trade Effluent Discharge - Site Drainage	633960 166000	On site (north)	Into Land	Revoked in 2004
Cohnen Partnership	Discharge Of Other Matter - Surface Water	631650 166220	119 (south)	Into Land	Revoked in 1999
Summit Engineering Limited	Sewage Discharges - Final/Treated Effluent	631719 166241	148 (south)	Ground Waters Via Soakaway	Currently operational
Thanet Waste Management	Trade Effluent Discharge – site drainage	633980 167410	165 (north)	Into Land	Revoked in 2012
Dds (Demolition) Limited	Trade effluent Discharge – site drainage	633980 167410	195 (north)	Into Land	Currently operational

Operator	Discharge type	Grid Reference (NGR)	Estimated distance from Site in metres (indicated direction from Site)	Receiving Water	Status
Cohnen Partnership	Trade Effluent Discharge - Site Drainage	631670 166380	280 (south)	Into Land	Revoked in 2014
	Trade Effluent Discharge - Site Drainage	631670 166380	280 (south)	Into Land	Revoked in 2012
	Discharge of Other Matter-Surface Water	631670 166380	280 (South)	Into Land	Revoked in 1999
Mr. Struan Robertson	Sewage Discharges - Final/Treated Effluent	632068 166387	335 (south)	Ground Waters Via a Soakaway	Currently operational
Channel Freight Storage Limited	Sewage Discharges	631530 165326	337 (south)	Groundwater Via Borehole	Currently operational
Mr Stuart Robertson	Sewage Discharges - Final/Treated Effluent	632166 166421	342 (east)	Groundwater Via a Soakaway	Currently operational
Southern Water Services Ltd	Public Sewage: Storm Sewage Overflow	634600 164700	506 (south east)	Controlled Sea	Revoked in 1997
Mpo Homes Ltd	Sewage Discharge	634183 167736	526 (north)	Underground Water	Currently Operational
	Sewage Discharge	634183 167736	526 (north)	Underground Water	Revoked in 2012
Edward Stanton Farms	Trade Discharge - Process Water	631850 165050	575 (south east)	Into Land	Revoked in 2004
Mr John Randall	Sewage Discharges	632180 164970	620 (south east)	Underground Strata	Currently operational
Cohline Uk Ltd	Trade Effluent Discharge - Site Drainage	631800 166760	673 (north east)	Into Land	Revoked in 2014
	Trade Effluent Discharge - Site Drainage	631800 166760	673 (north east)	Into Land	Revoked in 2012
Cosgrove Leisure (Wayside) Limited	Sewage Discharges	632110 164890	707 (south east)	Underground Strata	Currently operational
Ms Lydia Scott	Sewage Discharges	632110 164890	707 (south east)	Underground Strata	Revoked 2012
Reclamet Ltd	Trade Effluent Discharge - Site Drainage	632650 167210	914 (north east)	Into Land	Revoked in 2008
Southern Water Services Ltd	Public Sewage: Storm Sewage Overflow	635160 164270	976 (south east)	Saline Estuary	Currently operational

Flood Risk

8.4.22 EA flood mapping indicates that the whole of the site is located within an area where flooding from rivers and the sea is very unlikely (Flood Zone 1, where there is a less than a 0.1% (1 in 1,000)

chance of flooding occurring each year). The nearest flood risk is coastal flooding associated with Pegwell Bay, located approximately 2km south east of the site. There is no risk of flooding to the Site from reservoirs.

8.4.23 Flooding from land (rainfall run-off and surface water flooding) is considered to be a potential source of flood risk to the Proposed Development, in particular in the lower elevation ground across the middle of the site. The flood risk would occur through rainfall falling directly onto the site, particularly when the ground is saturated. The majority of this flood risk has been identified to be of low risk (each year, the chance of flooding is between 1 in 1,000 (0.1%) and 1 in 100 (1%)). There are areas of higher risk (with a greater than 1 in 30 (3.3%) chance of flooding) which are likely to be associated with localised depressions.

8.4.24 Groundwater within the Thanet District is not identified to be of strategic concern, but a Strategic Flood Risk Assessment (SFRA)[53] completed for TDC recommended that flooding from groundwater, surface water and foul water drainage networks are considered at a site-specific level. As the site is covered with relatively permeable soils and geology, groundwater flooding is not considered to be a significant risk to the site.

8.4.25 It is anticipated that there will be sewers and associated infrastructure across the site, based on its previous use as an operational airport. Therefore, there is a potential risk of sewer flooding.

8.4.26 Further detail on the sources of flood risk to the site can be found in **Appendix 8.2**.

Site Drainage

8.4.27 The site has a significant north - south fall, with the runway at the site's highpoint. The main site outfall is at the south-eastern site boundary and comprises a large diameter (up to 1,200mm) pipe which travels on a south-easterly trajectory, discharging into Pegwell Bay. The pipe is ownership is unknown and will be subject to a compulsory purchase order upon granting of the DCO.

8.4.28 An existing pumping station is located adjacent to the passenger apron. This supplies a 300mm diameter pipe that runs along the site's western boundary and enters into a gravity system around the runway threshold. This then runs along the site's southern edge before discharging into the outfall to Pegwell Bay.

8.4.29 The condition of the pipe and outfall in Pegwell Bay has been surveyed to support the DCO application. A survey in April 2017 indicated that the pipe and outfall are in good condition, but that some work may need to be done to repair the scour-protection infrastructure at the discharge end of the pipe. Further detail on current site drainage arrangements can be found in the Outline DS (Appendix A of **Appendix 8.2**).

Public Water Supply Network

8.4.30 The Utilities Infrastructure Report (**Volume 26**) indicates that SW record drawings identify the existence of water mains in the vicinity of the site.

8.4.31 The record drawings identify a 7" cast iron main which runs from Hengist Way (A299) on the Southern side of the site, under the runway then turning East towards Manston Village. It has been assumed that this main serves the existing airport accommodation (final services connection pipes are not recorded on the drawings).

8.4.32 In addition, a 20" cast iron trunk main and a 125mm polyethylene service main are located in Spitfire Way (B2190), extending North East along Manston Road.

WFD Classifications and Measures

8.4.33 Under the WFD, in 2009 the EA produced nine RBMPs for England to manage water quality targets and river basin planning. These were updated during 2015. One of the aims of the WFD is

for all water bodies to achieve Good Ecological Status[xi] and to ensure no deterioration from current status. The site is located within the South-East River Basin District.

8.4.34 In this report the 2009 RBMPs will be referred to as the "1st cycle" and the 2015 RBMPs as the "2nd cycle".

8.4.35 Mitigation Measure information is taken from the EAs Catchment Data Explorer website and the EA dataset 'Summary of the measures needed to achieve water body objectives for 2027 and beyond' (see **Table 8.3**).

Surface Water Bodies

8.4.36 The 1st cycle water bodies were revised for the updated plans and small streams (less than 1km in length or with a catchment area of less than 10km^2) are now identified to be non-reportable and are not formally a WFD water body. This means that their overall status is not reported in the 2nd cycle RBMP. The northern part of the site is located within the Thanet Operational Catchment, which is coastal (extending between Birchington and Ramsgate) and comprises a network of small channels, within the area of Wade Marsh, that drains direct to Minnis Bay. No WFD water bodies are formally identified in this area and therefore no 2015 water quality conditions are reported, or objectives documented within the EA Catchment Data Explorer[54]. However, these stretches of water are still protected by legislation (see **Section 8.2**) and can be improved where local actions and assessments deem it to be a priority. Therefore, for the purposes of this assessment the 1st cycle RBMP designation will be used to provide an assessment baseline for those areas designated non-reportable in the 2nd cycle RBMP. In the 1st cycle RBMP the site lay within the Sarre Penn, S. Chislet and Monkton Minster Marshes 1st cycle water body and the North Chilset Marsh water body. The southern extent of the former of which has been re-designated as the 2nd cycle Monkton and Minster Marshes river water body (see paragraph 8.4.36), and the northern section is a 2nd cycle non-reportable waterbody. These waterbodies are shown on **Figure 8.1**.

8.4.37 In the 2nd cycle RBMP the southern part of the Proposed Development is located within the Monkton and Minster Marshes surface water body (within the Stour Marshes Operational Catchment), which forms the catchment of the Minster Stream before it joins the River Stour and flows into Sandwich and Pegwell Bays. **Table 8.12** provides the current water quality, objectives and mitigation measures identified for this water body and the downstream River Stour water body (East Kent Coast Operational Catchment). This latter water body encompasses the tidally influenced lower reaches of the Stour, as well as Pegwell Bay. Neither of the two water bodies are currently of good status, although mitigation measures have been identified that will provide improvement from the current status by 2027 for both water bodies.

Table 8.12 Surface water body status, objectives and mitigation (South East RBMP[55])

WFD Water body (Water body type)	Overall Water body status (ecological status)	Reasons for failure to meet Good	Overall Objective	Types of mitigation measures [xii]
Monkton and Minster Marshes (River) **(GB107040019621)**	Moderate (Moderate)	Phosphate - Probable source: sewage discharge (diffuse) from towns, cities and transport.	Good status by 2027	Reduce diffuse pollution at source. Reduce diffuse pollution pathways (i.e. control entry to water environment).

[xi] Ecological Status is classified in all WFD water bodies, expressed in terms of five classes (high, good, moderate, poor or bad). These classes are established on the basis of specific criteria and boundaries defined against biological, physico-chemical and hydromorphological elements. The overall Ecological Status of a water body is determined by whichever of these assessments is the poorer. For example, a water body might pass 'Good Status' for chemical and physico-chemical assessments, but be classed as 'Moderate Status' for the biological assessment: In this case it would be classed overall as 'Moderate Ecological Status'. http://evidence.environment-agency.gov.uk/FCERM/en/SC060065/About.aspx

[xii] In this case measures are not available for the individual water bodies listed and the measures provided are those which have been listed against the relevant operational catchment.

WFD Water body (Water body type)	Overall Water body status (ecological status)	Reasons for failure to meet Good	Overall Objective	Types of mitigation measures [xii]
				Mitigate/remediate diffuse pollution effects on receptor.
		Dissolved Oxygen – Probable source: physical modification and flow (land drainage - water level management).		Improvement to the condition of channel/bad and/or banks. Removal or modification of engineering structure. Change to operations and maintenance. Vegetation management. Water demand management. Control pattern/timing of abstraction. Use alternative source/relocate abstraction or discharge.
Sarre Penn, S. Chislet and Monkton Minster Marshes **(GB107040019620)[xiii]**	Poor	Phosphate, Fish	N/A	N/A
North Chislet Marsh **(GB107040019770)[xiii]**	Bad	*Ammonia, Phosphate, Fish, Invertebrates*	N/A	N/A
River Stour (Kent) (Transitional)	Poor (Poor)	Phytoplankton – Probable source: diffuse phosphate pollution from rural areas. Confirmed Source: Point source pollution from waste water.	Moderate by 2027	Reduce diffuse pollution at source. Mitigate/remediate diffuse pollution effects on receptor. Mitigate/remediate point source effects on receptor. Reduce point source pollution at source. Reduce point source pathways (i.e. control entry to water environment).
		Dissolved inorganic nitrogen – Confirmed source: Point source pollution from waste water.		Mitigate/remediate point source effects on receptor. Reduce point source pollution at source. Reduce point source pathways (i.e. control entry to water environment).

Groundwater Body

8.4.38 The site is located within the Kent Isle of Thanet Chalk groundwater body (within the East Kent Chalk and Tertiaries Operational catchment). The overall 2015 water body is of poor status (as a result of poor status for both quantitative and chemical components), with an overall water body objective to remain at poor status by 2015. Attaining the default (good status) is not justified under WFD because the costs of the measures exceed the benefits for the quantitative component. However, the chemical component has an objective to reach Good status by 2027. To achieve this the WFD highlights improvements in relation to the area's Chemical Drinking Water Protected Area (DrWPA) and General Chemical Test. These measures are viewed as unaffordable to implement in advance of 2027 without creating disproportionate burdens for particular sectors or parts of

[xiii] Taken from the 1st cycle RBMP https://www.gov.uk/government/publications/south-east-river-basin-management-plan.

society. Any solution delivering more rapid outcomes would also be at odds with the 'polluter pays' principle.

8.4.39 Water quality, in particular nitrate concentrations, have been a concern in Thanet for many years, with levels being close to, or exceeding, the prescribed levels. Other water quality issues also include pesticides and organic compounds. Further detail on the groundwater quality within this water body can be found in the Hydrogeological Impact Assessment, within **Appendix 8.1.**

Conservation Sites

8.4.40 The north coast of the Isle of Thanet, located approximately 3.5 km north of the site, is designated as a Site of Special Scientific Interest (SSSI), Special Area of Conservation (SAC), Special Protected Area (SPA) and RAMSAR Site. In closer proximity to the Site are Sandwich and Pegwell Bays, located 1.5km to the south-east. Together these bays are part of designated National Nature Reserve (NNR), RAMSAR, SSSI, SPA and SAC sites, which are described more fully in **Chapter 7: Biodiversity** of this ES. The proposed Site, due to the proximity of Sandwich and Pegwell Bay SSSI, has been identified as falling within the associated SSSI risk zones[xiv].

8.4.41 Implementing the WFD contributes to outcomes for nature conservation and biodiversity by improving the water environment. The RBMPs include a summary of the measures needed for water dependent Natura 2000 sites to meet their conservation objectives. Supporting Site Improvement Plans (SIPs[xv]) provide an overview of the issues (both current and predicted) affecting the current condition, and outlines the priority measures required to improve the condition of the features. Sandwich Bay SAC, Thanet Coast and Sandwich Bay SPA and Thanet Coast SAC are water-dependent and fall under the North-East Kent (Thanet) SIP.

8.4.42 Measures for the Thanet Coast SAC and Thanet Coast and Sandwich Bay SPA were completed in 2015 to enable conservation objectives to be met according to the SIP. For Sandwich Bay SAC the measures will be complete by 2027, which requires implementation of management actions to address and adapt to changes in water levels affecting sand dune vegetation.

Factors Influencing the Baseline

8.4.43 Baseline conditions for hydrology and flood risk could change over the anticipated lifetime of the Proposed Development as a consequence of changes in climate, land use, and as a result of measures taken to improve the water environment in the context of the WFD.

8.4.44 As a result of climate change, it is predicted that winters will become generally wetter and summers generally drier, as indicated by results from the UK Climate Projections 2009 (UKCP09)[56]. It is also likely that peak rainfall intensities could increase, with a consequent effect on the frequency and magnitude of high river flows. Furthermore, mean sea levels are predicted to rise, which could be accompanied by changes in storm surge and wave climate. There could be an increase in the frequency and magnitude of flood events as a consequence.

8.4.45 Changing land use, in the form of changing agricultural land management practices, urban development and major developments, on the site or in the surrounding area could cause changes to the surface water environment and flood risk within the study area. This could result in changes to patterns and rates of rainfall infiltration, changes in flow pathways, sources and magnitude of sediment inputs, direct morphological alterations to water bodies, or the introduction, alteration or removal of sources of pollution.

8.4.46 It is anticipated that the future status of all lower quality WFD river water bodies will improve, ultimately to one of good status/potential by 2027, where possible, as required by the WFD.

[xiv] Zones around each SSSI site (the extent of which reflects the sensitivities of the features for which the site is notified) that indicate the extent beyond the SSSI where development proposals may still have adverse impacts on the SSSI.
[xv] Site Improvement Plans (SIPs): provides an overview of the issues (both current and predicted) affecting the current condition and outlines the priority measures required to improve the condition of the features

Future Baseline

8.4.47 During the lifetime of the Proposed Development it is considered that the baseline will evolve in the following manner:

- Construction Phase 1 and start of operation (2019-2021): The baseline will remain unchanged;
- Construction Phases 2, 3 and 4 and ongoing operation (2022-2036): During this period the WFD targets for surface and groundwater bodies will be attained and there may be some measurable change in climate; and
- Full Operation Phase (2036 onwards): climate change will cause further variation from baseline climatic patterns.

8.5 Environmental Measures Incorporated into the Proposed Development

8.5.1 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 freshwater environment effects is provided in **Table 8.13** (construction phase) and **Table 8.14** (operation phase). A more exhaustive discussion of the mitigation measures that are to be deployed for the protection of the baseline water environment is presented in the Hydrogeological Impact Assessment (Section 4.4.3 of **Appendix 8.1**).

Table 8.13 Rationale for incorporation of environmental measures in the construction phase

Potential receptor	Predicated changes and potential effects	Incorporated measure
Surface and groundwater	Uncontrolled sediment from the construction process entering the freshwater environment as a potential pollutant.	Site access points will be regularly cleaned to prevent build-up of dust and mud. Earth movement will be controlled to reduce the risk of silt combining with the site run-off. Properly contained wheel wash facilities will be used (where required) to isolate sediment rich run-off. Cut-off ditches and/or geotextile silt-fences will be installed around excavations, exposed ground and stockpiles to prevent the uncontrolled release of sediments from the site. Sediment traps will be required on all surface water drains in the surrounding region. Silty water abstracted during excavations will be discharged to settlement tanks or siltbusters as appropriate. Cleaned run-off will be discharged through the existing foul sewer drains in Phase 1 of construction and into the site attenuation ponds in Phases 2-4. If sewer capacity is limited then silty water will need to be stored and removed from the site by tanker and disposed of at a suitably licensed location. A discharge consent for discharge to foul sewer, detailing volumes and rates of discharge will be agreed with SW prior to the commencement of works, if necessary. Stockpiles and material handling areas will be kept as clean as practicable to avoid nuisance from dust. Dusty materials will be dampened down using water sprays in dry weather or covered.
Surface and groundwater	Spillages of oils and other chemicals associated with the construction process entering the freshwater	Wherever possible, plant and machinery will have drip trays beneath oil tanks / engines / gearboxes / hydraulics which will be checked and emptied regularly and correctly disposed of via a licensed waste disposal operator. Oils and hydrocarbons will be stored in designated locations with specific measures to prevent leakage and release of their contents, including the sitting of the storage area

Potential receptor	Predicated changes and potential effects	Incorporated measure
	environment as a potential pollutant.	away from the drainage system on an impermeable base, with an impermeable bund that has no outflow and is of adequate capacity to contain 110% of the contents. Valves and trigger guns will be protected from vandalism and kept locked when not in use. A PICP will be produced, which site staff will have read and understood. On-site provisions will be made to contain a serious spill or leak through the use of spill kits, booms, bunding and absorbent material. The bulk of the existing runways and taxiways will be kept as they afford protection to the adit in SPZ1. In order to mitigate against any potential FOD hazard (a concern raised by the CAA), it is proposed to overlay the extended paved area with asphalt as part of the initial construction phase.
Surface and groundwater	Pollution incidents resulting from concrete batching and cement products on-site during the construction process.	Any mixing and handling of wet concrete that is required on-site will be undertaken in designated areas outside of SPZ1, and the location and configuration of the plant will be agreed with the EA. A designated area will be used for any washing down or equipment cleaning associated with concrete or cementing processes and facilities provided to remove sediment prior to disposal to foul sewer. Any contaminated soil will be identified by ground investigation prior to construction and either treated on-site and reused, or removed and disposed of off-site by a suitably licensed waste disposal operator. Measures such as cut-off trenches will be put in place to prevent any potentially polluted run-off from within the site entering any excavations.
Groundwater	Piling increasing turbidity of groundwater at the Lord of the Manor source.	The approach to any on-site piling will be agreed with SW and the EA prior to the commencement of works. Piling methods will be designed to have a minimum of ground disturbance and will be in accordance with “Piling and Preventative Ground Improvement Methods on Land Affected by Contamination: Guidance on pollution prevention” and “Piling into contaminated sites”.
Water supply / sewage infrastructure	Effects on the functionality of the water supply and sewer infrastructure around the site during the construction phase.	The exact locations of nearby sewers and water supply infrastructure needs to be established by on-site survey prior to demolition works. An appropriate protection system (i.e. temporary support structure, sheet piles, installation of secant piles etc.) has to be implemented to minimise any impact to the public sewer network. The piling methodology will be developed considering the neighbouring utility services. The water demand for the construction phase will be agreed with SW. Water efficiency measures will be developed for construction process as appropriate, example of relevant construction phase activities are: water needed for concrete mixing, water needed for dust suppression, water needed for cleaning activities and water needed for welfare facilities. Discharge rates from the site will not exceed current sewer capacity, and these rates will be agreed with SW to ensure appropriate storage is provided on site during the construction phase. Development of these measures as a part of the sites detailed design, and agreement of these measures with SW, which is a DCO requirement.

Table 8.14 Rationale for incorporation of environmental measures in the operation phase

Potential receptor	Predicated changes and potential effects	Incorporated measure
Surface and groundwaters	Poorly managed site drainage from site leads to pollution of water environment.	An Outline DS has been developed (see **Chapter 3: Description of the Proposed Development**). The drainage system will be designed to capture, treat and discharge water in a controlled manner. Given the sensitive nature of the underlying chalk any discharge to ground would only be considered in those locations where the ground is shown to be free from contamination, the source of water is clean (e.g. roof runoff) and the location is distant from sensitive receptors. This would be discussed with the EA at the detailed design stage. Water will either be re-used or sent to the site treatment facilities (attenuation ponds). Discharge from these ponds will be via a permitted discharge to Pegwell Bay.
Groundwater	Leakage from the on-site waste-water lagoon (s) enters the groundwater environment as a potential pollutant.	The lagoons will be constructed to high standards and monitored. Discharge of treated water and clean water will be to Pegwell Bay.
Groundwater	Leakage from fuel storage tanks and tankers enters the groundwater environment as a potential pollutant.	The following aspects can be considered within the fuel farm design following BAT principles, but these would be reviewed and revised once the final scheme is agreed with the EA and SW. All fuel storage tanks on the fuel farm will be appropriately designed to at least current standards or higher (e.g. double skinned, bunded etc.), including HSG 176 (Storage of Flammable liquids in tanks), EI 1540 (Design, construction, commissioning, maintenance and testing of aviation fuelling facilities), CIRIA C 736 (Containment systems for the prevention of pollution), Guidelines on Environmental Management for Facilities Storing Bulk Quantities of Petroleum, Petroleum Products and Other Fuels; PSLG Buncefield recommendations. Design will be in accordance with requirements of the Management of Health and Safety at Work Act, including the principle to reduce risk to As Low As Reasonably Practicable (ALARP). The design will take into account the requirement for primary and secondary containment: • Primary containment is around the design of the fuel tanks and associated pipework (materials, thickness); • Secondary containment takes a number of forms. In this case it includes a double skin on a tank; and • Bunding also provides a further level of secondary containment, affording containment to pipework and equipment associated with the tank, but outside of the double skin. Guidelines require that the bunding must have the capacity to contain the largest predictable spill. This is achieved by providing the largest of either 110% capacity of the largest tank within the bund or 25% of the total capacity of tanks within the bund. For this tank farm a high level of integrity is embedded in the design, and each tank is located in an individual bund, so that only one tank is contained within one bund with 110% of the capacity of the tank plus an allowance for 1:100 rainfall event. Bunds to be constructed with adequate protection against collision and designed in accordance with standards. Tank and associated equipment will include leak detection, process interlocks and mechanical devices.

Potential receptor	Predicated changes and potential effects	Incorporated measure
		Comprehensive areas of hardstanding across the site with an associated active drainage capture system to collect all surface drainage and hence and any leaks. Containment with sealed drainage systems would be applied to bunds and fuel points, preventing the accidental entry of contaminants into sewer/storm water drainage network. Oil interceptors and anti-pollution control valves would be installed to surface water runoff from internal roads. Systems of leak detection would be established beneath the tanks. The tank, pipework and loading/unloading would be equipped with shutdown to provide effective isolation. Where required this would include automatic detection and isolation systems (e.g. to protect against overfill of tank). Appropriate areas of hardstanding, parking and operational buildings would be constructed for the airside bowser fleet. An Emergency Plan will be developed and will include provision for major accidents and disasters (see **Chapter 17: Major Accidents and Disasters**).
Groundwater	Spillage during re-fuelling enters the groundwater environment as a potential pollutant.	Re-fuelling will be in designated areas with active drainage areas and fuel interceptors. Control levels and alarms will be used to identify leaks or overflows. Personnel will be trained in the use of spill kits where applicable, and suitable mitigation measures will be outlined in the PICP.
Groundwater	Contaminated run-off generated by de-icer storage and use enters the groundwater environment as a potential pollutant.	Application of de-icer will only be in designated areas which have active drainage i.e. where the run-off is directed to water treatment lagoons. The lagoons will be appropriately sized to account for NPPF climate change allowances, to ensure that treatment facilities continue to function.
Groundwater	Leakage from the drainage network enters the groundwater environment as a potential pollutant.	The drainage network will be upgraded to modern standards and all discharge will be collected in appropriately sized attenuation ponds and treated prior to off-site discharge. The drainage facilities will allow for the interception and segregation of contaminated water and un-contaminated water (e.g. roof run-off). Ponds will be monitored for possible leakage.
Groundwater	Leakage from foul sewer connections enters the groundwater environment as a potential pollutant.	All foul drainage pipework will be surveyed to allow the identification of leaks/failures and these will be repaired to meet modern standards.
Groundwater	Poorly managed fire water disposal enters the groundwater environment as a potential pollutant.	The application will be in designated areas with active drainage i.e. where run-off is lead to water treatment lagoons. There will not be a fire-fighting training ground on site.
Groundwater	Spilled pesticides enter the groundwater environment as a potential pollutant.	Pesticides will only be applied to hardstanding areas with active drainage to water treatment works.

Potential receptor	Predicated changes and potential effects	Incorporated measure
		The airport will develop a Wildlife Hazard Management Plan, Habitat Management Plan, and Long Grass Policy to control and manage the use of chemicals to prevent them being discharged to ground/groundwater.
Pegwell Bay and associated designated sites	Pollution from site discharges.	The regulation of the Pegwell Bay Discharge has been discussed with the EA and NE. The EA have indicated that a discharge of surface water runoff to sea does not usually require a Water Discharge Activities permit. However, it has been acknowledged in discussions that the designation features around Pegwell Bay do require protection and in this case a permit may be appropriate. The exact regulatory arrangement (and any associated monitoring) for the quality of site discharges will be discussed with the EA and NE prior to the commencement of works. The focus of these discussions will be the protection of the designated site at Pegwell Bay to ensure protection of sensitive features. A maximum discharge rate of 100 l/s[xvi] has been assumed in designing the on-site attenuation ponds, however at the detailed design stage the site drainage network design will need to include consideration of the impact of the rate of discharge at the designated features on Pegwell Bay. Further consultation on this point with NE and the EA is also expected to occur. The proposed pumping rate represents a maximum worst case scenario and lower rates could be achieved by using a variable rate pump or further attenuating water on site. If further attenuation is required this could be achieved by increasing the surface area of the ponds, by providing limited infiltration of clean run off (e.g. roof drainage), by providing additional attenuation tanks elsewhere on site, by providing additional storage capacity with the drainage network by oversizing pipes, by utilising any spare capacity in the Southern Water drainage network or by using clean run-off water elsewhere on site. The work to refine and improve attenuation and therefore reduce peak discharge rates is expected to be investigated during the detailed design stage of the project which will come after the order is made.
Water supply infrastructure	Impacts on local water availability in the public water supply network in the operation phase	A Resources/Sustainability strategy will be developed as a part of the detailed design phase of the project application following the granting of the DCO to identify how water efficiency measures will be incorporated into the development to maximise water re-use and minimise the demand on supply. Areas for consideration could include water consumption by staff and passengers, washing on-site support vehicles and planes, cleaning of equipment and fire fitting. The water demand for the operation phase will be agreed with SW and presented in the ES. Development of these measures as a part of the sites detailed design, and agreement of these measures with Southern Water, is expected to form a DCO requirement.
Surface and groundwater	General impacts on surface and groundwater quality in the operation phase, not specified above	Oil separators will be used on drains from roads and car parks to remove hydrocarbons from site run-off.

[xvi] Though initial consultation on site discharge rates mentioned a maximum rate of 30 l/s this has since been determined to be too low for the size of attenuation ponds on the masterplans as it would result in a requirement to excavate 7m below ground level. Therefore, for the purposes of the assessments in the ES, a maximum discharge rate of 100 l/s has been assumed in the DS in **Appendix A** of **Appendix 8.2**.

Potential receptor	Predicated changes and potential effects	Incorporated measure
		Foul sewerage will be discharged to the local public sewer network, managed by SW. Operational phase plans for the management of on-site spillages will be developed prior to the DCO application or will be a requirement of the DCO. These include an EMP, Emergency Response and Post-Crash Management Plan and a PICP. The integrity of the Pegwell Bay pipe will be tested prior to its use as an operational discharge route, and any appropriate repairs will be undertaken.
Mitigation of flood risk	Impacts on flood risk receptors during the operation phase.	All site-drainage from areas of hardstanding will either be captured for water re-use (in the case of roof-run-off) or captured by the site drainage systems and transferred to the attenuation ponds for treatment and discharge to Pegwell Bay. The attenuation ponds will be designed to an appropriate capacity with a 40% allowance for climate change. Discharge from these ponds will be via a pipe into Pegwell Bay. The pump will have a maximum capacity of up to 100l/s. The final site drainage design will be agreed with the EA and NE. Foul sewer capacity will be appropriately sized in consultation with SW and the EA.

8.5.2 How these environmental measures influence the assessment of significance is discussed in **Section 8.7**. However, the broad approach adopted is that where achievable environmental measures have been incorporated into the scheme, the effect that those 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 the incorporation of appropriate environmental measures.

8.5.3 A draft CEMP will be submitted with the ES. The CEMP will detail the mitigation methodology, objectives, operations, resource management responsibilities, key points of contact, auditing processes to monitor performance, provision of reporting performance and progress updates. The final CEMP measures will be agreed with SW, the EA and TDC, as appropriate.

8.6 Scope of the Assessment

8.6.1 This section sets out information regarding the process whereby potential receptors are identified; the potential receptors that could be affected by the Proposed Development and the potential effects on receptors that could be caused by the Proposed Development.

8.6.2 The scope of assessment has been informed by the Scoping Report; consultee responses to the Scoping Report; the results of the work detailed in **Section 8.4**; and the preliminary scheme design.

Approach to Identifying Receptors

8.6.3 The identification of receptors is based on the study area outlined in paragraph 8.3.2. All receptors associated with this study area have been included in the assessment and are listed in **Table 8.15**.

Potential Receptors

8.6.4 This section lists the potential receptors that have been identified based on the above considerations and on the consultation response received from PINS. The receptors listed in **Table 8.15** are considered capable of being potentially significantly affected and have been assessed further in **Sections 8.8-13**.

Table 8.15 Potential receptors

Receptor	Receptor reference no.	Distance from RLB	Reason for selection
Kent Isle of Thanet Chalk WFD groundwater body and aquifer	GW1	Underlies the site	The WFD groundwater body and aquifer underlies the site and supports nationally important abstractions.
Thanet Formation Secondary A aquifer	GW2	Adjacent to the site's northern boundary	The designated aquifer lies adjacent to the site boundary and could support locally important abstractions.
SWPWS sources	GW3	<0.5km	The adit which supplies the SW Lord of the Manor Source lies under the site boundary.
Other licensed groundwater abstractions	GW4	0.1m - 1km	The site is being developed on the exposed Chalk, which supports these supplies. There is therefore a potential pathway between the site and these supplies.
Monkton and Minster Marshes (River) WFD surface water body, downstream River Stour WFD transitional water body and non-reportable cycle 1 river waterbodies.	SW1	Underlies the southern portion of the site, around the runway.	The site lies within the boundary of this surface water body.
Pegwell Bay (and associated designated sites)	SW2	Adjacent	The current surface water drainage pipe which discharges into Pegwell Bay provides a potential pathway between the site and receptor during the construction phase. In addition, this pipe is being considered for use in the operation site drainage network.
PWS infrastructure	IN1	On- and off-site	Changes in water demand at the site has the potential to effect water availability in the PWS network.
On- and off-site public sewer network	IN2	Within the site boundaries	Changes to the site run-off regime and ground disturbance during construction has the potential to affect the public sewer network.
Site users & infrastructure	FR1	On site	Site users/infrastructure can be affected by changes to flood risk on the sites, specifically the Site's surface water drainage regime and response to surface water flooding.

Receptor	Receptor reference no.	Distance from RLB	Reason for selection
Off-site users & infrastructure	FR2	Adjacent to the site boundary	Changes to land use within the site boundaries has the potential to change surface water run-off and discharges to the local drainage network.

Spatial and Temporal Scope

Spatial Scope

8.6.5 The spatial scope of the assessment has been considered for four sets of receptor categories, based on the **Table 8.15** potential receptor listing:

- **Surface water:** Surface water receptors have been defined as those which are downstream of the site (SW receptors in **Table 8.15**). Since there is no surface water flowing over the site, surface water receptors are defined as the WFD surface water body which the site lies partially within (SW1), and Pegwell Bay and other designated sites that receive site drainage (SW2);
- **Groundwater:** Groundwater receptors (GW receptors in **Table 8.15**) have been defined as the Chalk WFD groundwater body and aquifer (GW1) that underlies the site, the Thanet Formation Secondary A Aquifer (GW2) which lies adjacent to the site (GW3 and 4);
- **Infrastructure:** Infrastructure receptors (IN receptors in **Table 8.15)** are considered to be the on- and off-site public sewer network (IN1) and the water availability in the PWS network (IN2); and
- **Flood risk:** Flood risk receptors (FR receptors in **Table 8.15)** are considered to be on-site users (FR1) and adjacent off-site users (FR2).

Temporal Scope

8.6.6 The temporal scope of assessment has been considered in the following way:

- The Outline DS (Appendix A of **Appendix 8.2**) includes a 40% allowance for climate change in designing the volume of on-site storage;
- The assessment of the construction phase effects considers the effects from all four of the construction phases as outlined in **Chapter 3: Description of the Proposed Development**. Where there are different potential effects from each construction phase, these are outlined and each assessed separately; and
- The assessment of the operation phase effects considers the maximum potential effects, which, for most potential effects, are likely to be those from Year 20 of the airport forecast, as detailed in **Chapter 3: Description of the Proposed Development**.

Likely Significant Effects

8.6.7 The likely significant effects from the Proposed Development, which are subject to further discussion in this Chapter, are summarised below.

Direct and Indirect Effects

8.6.8 The following are the likely significant direct and indirect effects of the Proposed Development:

- Likely significant effects on the groundwater quality in the Chalk WFD groundwater body and aquifer (GW1), the Thanet Formation Secondary A Aquifer (GW2) and the dependent abstractions (GW3 and 4) during the construction and operational phases of the Proposed Development. Effects that could arise from these activities include an increase in turbidity of the underlying groundwater, or pollution from the leakages and spillages of oils, fuels or other chemicals.
- Likely significant effects on Monkton and Minster Marshes (River) WFD surface water body and downstream River Stour WFD transitional water body (SW1) during the construction and operational phases of the Proposed Development. Effects that could arise include as a result of site run-off during the construction phase, or from surface water discharges during the operation.
- Likely significant effects on Pegwell Bay (and associated designated sites) (SW2) during the construction and operational phases of the Proposed Development. The effects that could arise include through the proposed use of the existing surface water discharge system, which discharges into Pegwell Bay.
- Likely significant effects on the capacity of the public water supply network (IN1) and public sewer network (IN2) during the construction and operational phases of the Proposed Development. The effects could arise from the increase in demand for potable water supply and for foul water connections during both phases of the Proposed Development.
- Likely significant effects on flood risk receptors (on and adjacent to the Proposed Development, FR1 and FR2 respectively) during the construction and operational phases of the Proposed Development. Effects could arise as a result of changes to site drainage and discharge.

Inter-related effects

8.6.9 The assessments considering inter-related effects are reported at the end of each receptor assessment. Inter-related effects are assessed in relation to a specific receptor where the effect could be caused by the interactions of different types of effect from project activities even if individually these are insignificant.

8.6.10 The following inter-related effects have been considered:

- health effects as a result of changes in surface water flood risk are considered in this Chapter. There are also potential effects on human receptors from a number of health pathways such as noise, air pollutants, traffic and socio-economic activity, and these, together with a summary of the results of the Freshwater Environment assessment, are discussed further in **Chapter 14: Health and Wellbeing**.
- infiltration of contamination from existing sources and mobilisation of contamination during groundworks. The potential for the occurrence and movement of contamination is discussed in **Chapter 10: Land Quality**, and an assessment of the effect on the freshwater environment is contained within this Chapter;
- inter-related effects on the freshwater environment as a result of major accidents or disasters has been assessed in **Chapter 17: Major accident and disasters** where the baseline, potential receptors and assessments within this chapter have informed the major accidents or disasters assessment.
- effects of changes to the water discharge regime on Pegwell Bay and the associated designated sites is presented in **Chapter 7: Biodiversity** and in **Appendix 7.1: Report to Inform the Appropriate Assessment**.
- effects on the freshwater environment in-combination with climate change have been considered within this Chapter. Additionally the baseline and mitigation measures presented in this Chapter have fed into **Chapter 16: Climate Change** where inter-related effects such as flooding and contamination have been considered in-combination with climate change.

8.6.11 The inter-related effect of multiple topics such as noise and air quality changes, in addition to surface flood risk, which although individually may be insignificant, could all act in combination on the same human receptors and affect human health, is considered in **Chapter 18: Cumulative Effects**.

Cumulative effects

8.6.12 Potential for cumulative effects is provided through an assessment in **Chapter 18: Cumulative Impacts** and includes potential cumulative effects of the proposed development together with other identified major development proposals that were scoped into the assessment.

8.6.13 All the 35 projects brought forward for assessment in **Chapter 18: Cumulative Impacts** 31 developments have been scoped out of the inter-project cumulative effects assessment for the freshwater environment. The developments have been scoped out based on their distance from Manston Airport (i.e. the development is not within the freshwater study area or it is sufficient distance away to prevent cumulative effects), and/or the scale and nature of the development (i.e. the development is unlikely to have significant interactions with the freshwater environment). The results of this assessment are presented in **Chapter 18: Cumulative Impacts**.

8.7 Assessment Methodology

Methodology for Predicted Effects

8.7.1 The baseline assessment has been used to identify receptors associated with the freshwater environment. Effects of the Proposed Development on these receptors have been identified, taking into account best practice and guidance for construction and operation of the Proposed Development. The approach used is consistent with that developed by the Institute of Environmental Management and Assessment (IEMA)[57].

Significance Evaluation Methodology

8.7.2 The assessment of likely significant effects as a result of the Proposed Development has taken into account both the construction and operational phases. The significance level attributed to each effect has been assessed based on the magnitude of change due to the Proposed Development and the sensitivity or value of the affected receptor / resource to resulting changes. Magnitude of change is assessed on a scale of high, medium, low and negligible, whilst the sensitivity of the affected receptor / resource is assessed on a scale of very high, high, medium, and low.

8.7.3 The assessment of significance in this Chapter draws on the sensitivity and magnitude definitions in **Tables 8.16** and **8.17**, respectively. The final conclusions as to the significance of any effects also includes a consideration, based on professional judgement, of the efficacy of environmental measures in reducing the magnitude of the effects.

Sensitivity of Receptor

8.7.4 Guidance on the categories and definitions of value and/or sensitivity of receptors, used in the assessment, are given in **Table 8.16**. Where a receptor could reasonably be placed within more than one value/sensitivity rating, conservative professional judgment has been used to determine which rating would be applicable.

Table 8.16 Definitions of receptor sensitivity

Value/Sensitivity	Criteria	Example
Very High	Water environment feature with a very high yield, quality or rarity with little potential for substitution. Water resources supporting human health and economic activity at a regional scale. Features with a very high vulnerability to flooding.	Conditions supporting sites with international conservation designations (SAC, SPA, Ramsar), where the designation is based specifically on water features. Strategically important groundwater PWSs. Land use types defined as 'Essential Infrastructure' (i.e. critical national infrastructure, such as essential transport and utility infrastructure) and 'Highly Vulnerable' (e.g. police/ambulance stations that are required to operate during flooding, mobile homes intended for permanent residential use) in the NPPF flood risk vulnerability classification.
High	Water environment feature with a high yield, quality or rarity with a limited potential for substitution. Water resources supporting human health and economic activity at a local scale. Features with a high vulnerability to flooding.	Conditions supporting sites with national conservation designations (SSSI, NNR), where the designation is based specifically on water features. Receptor WFD water body: all relevant WFD elements are currently attaining at least good status/potential. Licensed non-public water supply abstractions which are large relative to available resource, or where raw water quality is a critical issue, e.g. industrial process water. Land use types defined as 'More Vulnerable' in the NPPF flood risk vulnerability classification (e.g. hospitals and health centres, educational institutions, most types of residential development).
Medium	Feature with a moderate yield, quality or rarity with some potential for substitution. Water resources supporting human health and economic activity at household/individual business scale. Features with a moderate to low vulnerability to flooding.	Sites with local conservation designations (e.g. Local Nature Reserves (LNRs), County Wildlife Sites (CWS)), where the designation is based specifically on water features. Receptor WFD water body: all relevant WFD elements are currently attaining a status/potential of moderate or low. Licensed non-public water supply abstractions that are small relative to the available resource, or where raw water quality is not critical e.g. cooling water, spray irrigation. Unlicensed potable water abstractions e.g. private domestic water supplies. Land use types defined as 'Less Vulnerable' in the NPPF flood risk vulnerability classification e.g. most types of business premises.
Low	Commonplace feature with low yield or quality with good potential for substitution. Water resources that do not support human health, and are of only limited economic benefit. Features that are resilient to flooding.	Non-reportable WFD river water bodies, usually coastal catchments with an area of <10km^2 that the EA is not required to monitor, classify or report on. Unlicensed non-potable water abstractions e.g. livestock watering. Land use types defined as 'Water-compatible development' in the NPPF flood risk vulnerability classification, and undeveloped land e.g. flood control infrastructure; water transmission infrastructure.

Magnitude of Change

8.7.5 The magnitude of potential (pre-mitigation) or residual (post-mitigation) change to baseline conditions is based on an assessment of the scale or degree of change from the baseline condition as a result of the Proposed Development. This includes a consideration of the duration and reversibility of the change, and relevant legislation and/or policy standards and guidance. **Table 8.17** provides examples of how various magnitudes of change have been determined with respect to water features.

Table 8.17 Examples of water environment magnitude of change

Magnitude	Criteria	Examples of change
High	Results in major change to feature, of sufficient magnitude to affect its use/integrity	Deterioration in river flow regime, morphology or water quality, leading to sustained, permanent or long-term breach of relevant SSSI conservation objectives (COs), or downgrading of WFD status (deterioration in current thresholds as defined by current WFD status, including supporting WFD elements). Complete loss of resource or severely reduced resource availability and/or quality, compromising the ability of water users to exercise licensed rights or failure of water company infrastructure. Change in flood risk resulting in potential loss of life or major damage to property and infrastructure. Measurable decrease in surface water discharge or increase in flood storage from baseline to provide significant catchment-wide betterment.
Medium	Results in noticeable change to feature, of sufficient magnitude to affect its use/integrity in some circumstances	Deterioration in river flow regime, morphology or water quality, leading to periodic, short-term and reversible breaches of relevant SSSI COs, or downgrading of WFD status (deterioration in current thresholds as defined by current WFD status, including supporting WFD elements). Moderate reduction in resource availability and/or quality, which may compromise the ability of water users to exercise licensed rights or the functioning of water infrastructure. Change in flood risk resulting in potential for moderate damage to property and infrastructure. Measurable decrease in surface water discharge or increase in flood storage from baseline to provide significant local betterment.
Low	Results in minor change to feature, with insufficient magnitude to affect its use/integrity in most circumstances	Measurable deterioration in river flow regime, morphology or water quality, but remaining generally within SSSI COs, and with no change of WFD status (of overall status or supporting element status) or compromise of Environmental Quality Standards (EQSs). Minor reduction in resource availability and/or quality, but unlikely to affect the ability of water users to exercise licensed rights or water company infrastructure. Change in flood risk resulting in potential for minor damage to property and infrastructure. Measurable decrease in surface water discharge or increase in flood storage from baseline to provide minor local betterment.
Negligible	Results in little or no change to feature, with insufficient magnitude to affect its use/integrity	No measurable deterioration in river flow regime, morphology or water quality, and no consequences in terms of SSSI COs or WFD designations. No measurable change in resource availability or quality, and no change in ability of water users to exercise licensed rights or impacts on water company infrastructure. Change in flood risk causes more frequent inconvenience and triggering of emergency response measures, but does not result in increased risk of damage to property and infrastructure. No measurable decrease in surface water discharge or increase in flood storage from baseline to provide any betterment.

Determination of Significance

8.7.6 The approach to determining the significance of effects that will be taken for the hydrological assessment is set out in **Table 8.18**. Significance is determined by consideration of both the sensitivity of a receptor and the magnitude of change. Significance can be positive, adverse or neutral.

Table 8.18 Significance criteria

	Magnitude of Change			
Sensitivity/Value	**High**	**Medium**	**Low**	**Negligible**

Very High	Significant	Significant	Significant	Not Significant
High	Significant	Significant	Not Significant	Not Significant
Medium	Significant	Not Significant	Not Significant	Not Significant
Low	Not Significant	Not Significant	Not Significant	Not Significant

8.8 Assessment of Effects on the WFD Groundwater Bodies and Aquifers and Dependent Abstractions

Introduction

8.8.1 This assessment of effects on the groundwater receptors (GW1-4) takes account of the environmental measures referenced in **Section 8.5** i.e. it is an assessment of residual (post-mitigation) effects. The assessment is drawn from the detailed assessment in **Appendix 8.1**, which assess all sources of potential risk to groundwater quality and quantity.

Construction Phase Effects

8.8.2 The construction phase has the potential to be likely to have an adverse effect on the water quality of the underlying aquifer and dependent abstractions. This would be through the following mechanisms:

- The increase of turbidity of the underlying groundwaters as a result of sediment mobilisation and ground disturbances; and
- Pollution from the spillages of concrete, oils, fuels or other chemicals.

8.8.3 Further details regarding the hazards associated with the construction phase are provided in the Hydrogeological Impact Assessment (Section 4.4.2 of **Appendix 8.1**) and hazards associated with the mobilisation of contaminants are discussed in **Chapter 10: Land Quality**.

8.8.4 As set out in **Chapter 3: Description of the Proposed Development** construction will take place in four phases. Phase 1 will have the largest volume of construction activity, as it will involve earthworks for the levelling of the new apron areas and the installation of the drainage system. Phases 2 - 4 will still have the potential for effects, but of a potentially lower magnitude as there will be less ground disturbance, though there is still the potential for piling.

8.8.5 The detailed design of the new infrastructure and foundations, including the taxiways, aprons, stand and cargo facilities, will be completed following the geotechnical site investigations that will be conducted prior to construction Phase 1. These investigations and the final design of the foundations will be agreed in advance with the EA and SW. If pilling, and other foundation techniques with the potential to affect these receptors are required, then appropriate construction techniques and controls to mitigate any significant effects will be agreed and a Piling Risk Assessment produced.

8.8.6 Environmental measures referenced in **Section 8.5** and the Hydrogeological Impact Assessment (Section 4.4.3 of **Appendix 8.1**) are included in the CEMP for the Proposed Development. The sensitivity of the groundwater receptors means that a high emphasis is placed on the minimisation of ground disturbance within SPZ 1 and the prior agreement of any approaches to piling or other sub-surface construction. All final construction methods will be confirmed with the EA and SW at the detailed design stage, prior to the commencement of works. The development of detailed design measures to protect groundwater during the construction phase is a DCO requirement.

8.8.7 It is concluded that the combination of construction good practice and site-specific measures for the protection of the Chalk aquifer will result in no likely significant effects on the groundwater receptors GW1-4 during the construction phase. The summary presentation of these potential effects can be found in Table 8.19.

Table 8.19 Assessment of construction phase effects on the WFD groundwater bodies and aquifers and dependent abstractions

Receptor ID: Receptor name	Sensitivity	Magnitude	Significance
GW 1: Kent Isle of Thanet Chalk WFD groundwater body and aquifer	High	Negligible	Not Significant
GW2: Thanet Formation Secondary A aquifer	High	Negligible	Not Significant
GW3: SW PWS sources	Very High	Negligible	Not Significant
GW4: Other licensed groundwater abstractions	Medium -High	Negligible	Not Significant

Operational Phase Effects

8.8.8 The operational phase effects comprise the potential for pollution of the Chalk aquifer by the spillage or leakage of potential pollutants from site infrastructure or as a result of site activities. Further details regarding the hazards associated with the operational phase are provided in the HIA (Section 4.4.2 of **Appendix 8.1**). Of most relevance to the effects of site operations on groundwater is:

- The increase of turbidity of the underlying groundwaters as a result of sediment mobilisation and ground disturbances; and
- Pollution from the spillages or leakage of oils, fuels, de-icers or other chemicals from pipes, fuels storage areas, aprons and other infrastructure.

8.8.9 Environmental measures for the protection of groundwater resources are referenced in **Section 8.5** and the Hydrogeological Impact Assessment (Section 4.4.3 of **Appendix 8.1**) and are to be incorporated into the design of the Proposed Developed and EMP. These include measures such as:

- Design of the site drainage regime to prevent infiltration of surface water runoff from areas of hardstanding including aprons, carparks, roads, taxiways, fire-fighting training ground and the runway (see paragraph 8.8.12);
- The development of operational plans and policies (as outlined in **Chapter 3: Description of the Proposed Development**) including spillages control measures in the PICP and plans to control the application of pesticides and herbicides (see **Table 8.13**); and
- Measures to be integrated into the design of the fuel farm and other chemical storage. These are described in more detail in the paragraphs below.

8.8.10 The agreement of the detailed design of operational phase mitigation measures with the EA and SW is a DCO requirement.

8.8.11 The potential impact of a breach or spillage at the proposed fuel farm during the operational stage has formed an important part of the stakeholder consultation (see **Table 8.6**) and was noted in the Section 42 responses. Prior to the 2018 PEIR, discussions were held with the EA with respect to the incorporation of Best Available Techniques (BAT) into the design of this site (see **Table 8.6**). The proposed approach is summarised as follows:

- All fuel storage tanks on the fuel farm will be appropriately designed to at least current standards or higher (e.g. double skinned, bunded etc.), including HSG 176 (Storage of Flammable liquids in tanks), EI 1540 (Design, construction, commissioning, maintenance and testing of aviation fuelling facilities), CIRIA C 736 (Containment systems for the prevention of pollution), Guidelines on Environmental Management for Facilities Storing Bulk Quantities of Petroleum, Petroleum Products and Other Fuels; PSLG Buncefield recommendations;
- Design will be in accordance with requirements of the *Management of Health and Safety at Work Act*, including the principle to reduce risk to As Low As Reasonably Practicable (ALARP);
- The design will take into account the requirement for primary and secondary containment:
  - Primary containment is around the design of the fuel tanks and associated pipework (materials, thickness); and
  - Secondary containment takes a number of forms. In this case it includes a double skin tank. Bunding also provides a further level of secondary containment, affording containment to pipework and equipment associated with the tank, but outside of the double skin. The appropriate sizing of bunding around the tanks. Guidelines require that the bunding must have the capacity to contain the largest predictable spill. This is achieved by providing the largest of either 110% capacity of the largest tank within the bund or 25% of the total capacity of tanks within the bund. For this tank farm a high level of integrity is embedded in the design, and each tank is located in an individual bund, so that only one tank is contained within one bund with 110% of the capacity of the tank plus an allowance for 1:100 rainfall event. Bunds to be constructed with adequate protection against collision and designed in accordance with standards.

8.8.12 The fuel farm and wider site design will also include mitigation measures such as:

- Comprehensive areas of hardstanding across the site with an associated active drainage capture system to collect all surface drainage and any leaks;
- Containment with sealed drainage systems would be applied to bunds and fuel points, preventing the accidental entry of contaminants into sewer/stormwater drainage network;
- Oil interceptors and anti-pollution control valves would be installed to surface water runoff from internal roads;
- Systems of leak detection would be established beneath all storage tanks;
- The fuel farm tank, pipework and loading/unloading would be equipped with shutdown to provide effective isolation. Where required this would include automatic detection and isolation systems (e.g. to protect against overfill of tank);
- Appropriate areas of hardstanding, parking and operational buildings would be constructed for the airside bowser fleet; and
- Tanks and associated equipment will include leak detection, process interlocks and mechanical devices.

8.8.13 An Emergency Plan will be developed and will include provision for major accidents and disasters (see **Chapter 17: Major Accidents and Disasters**).

8.8.14 Further mitigation measures to manage the risk posed by the fuel farm are suggested as follows:

- Regular inspection of tanks and operating facilities and tank integrity monitoring programme would be required;
- Regular inspection of bunds and impermeable surfaces;

- Implementation of strict fuel delivery and control systems; and
- Detailed emergency response procedure/plan in the event of a failure.

8.8.15 Following the incorporation of these additional mitigation measures the Hydrogeological Impact Assessment concludes that the environmental measures, to be incorporated into site operation and design, will only result in a low or negligible residual risk for all potential sources of contamination (see Table 4.7 in **Appendix 8.1**). **Section 2.4** of the PEIR provides further information on the consideration of on-site alternatives in relation to the fuel farm and **Section 3.2** contains further information on the Jentex site and Fuel Storage Area design.

8.8.16 It is concluded that the combination of good practice and site-specific measures for the protection of the Chalk aquifer, together with further consultation with the EA and SW and the site-specific design mitigation measures listed above, will result in there being no likely significant effects on the groundwater receptors GW1-4 during the operational phase. The summary presentation of these potential effects can be found in **Table 8.20**.

8.8.17 **Appendix 8.3** contains a summary of the relevant ES assessments of impact and mitigation measures contained which will ensure compliance with WFD objectives for the Thanet Chalk water body. These comprise those described in the Hydrogeological Impact Assessment in **Appendix 8.1**, as summarised in this Chapter and in **Chapter 10: Land Quality**.

Table 8.20 Assessment of construction phase effects on the WFD groundwater bodies and aquifers and dependent abstractions

Receptor ID: Receptor name	Sensitivity	Magnitude	Significance
GW 1: Kent Isle of Thanet Chalk WFD groundwater body and aquifer	High	Negligible	Not Significant
GW2: Thanet Formation Secondary A aquifer	High	Negligible	Not Significant
GW3: SW PWS sources	Very High	Negligible	Not Significant
GW4: Other licensed groundwater abstractions	Medium -High	Negligible	Not Significant

Decommissioning Phase Effects

8.8.18 Decommissioning effects have been scoped out of the assessment of Ground and Surface Water effects as the Proposed Development is envisaged to operate in perpetuity.

Inter-related effects

8.8.19 Potential effects on groundwater (controlled waters) from the mobilisation of contaminants already present on site (as set out in **Chapter 10: Land Quality)** have been considered in **Appendix 8.1: HIA** and are summarised in **Chapter 10: Land Quality**. The conclusions presented here reflect the conclusions of the HIA, which consider all possible sources of potentially significant effect on the groundwater environment.

8.9 Assessment of Effects on Monkton and Minster Marshes (River) WFD Surface Water Body, downstream River Stour WFD Transitional Water Body and non-reportable cycle 1 river waterbodies.

Introduction

8.9.1 This assessment of effects on the surface water receptor SW1 takes account of the environmental measures referenced in **Section 8.5**, i.e. it is an assessment of residual (post-mitigation) effects.

Construction Phase Effects

8.9.2 The construction phase has the potential to have a significant effect on surface water quality. This would be through the following mechanisms:

- The generation of sediment laden run-off; and
- Pollution from the spillages of concrete, oils, fuels or other chemicals.

8.9.3 Environmental measures referenced in **Section 8.5** are to be incorporated into the site's CEMP and CoCP. Site run-off in the construction phase will be controlled and not allowed to freely discharge into the environment. These measures have been put in place to protect the underlying Chalk aquifer and will also serve to protect the surface water environment, which is a medium sensitivity receptor. Furthermore, the highly permeable nature of the underlying geology means that there is no direct overland flow route to these receptors as water will always preferentially infiltrate rather than flow overland. The construction site drainage plan will be agreed with the EA, NE and SW prior to the commencement of works.

8.9.4 It is concluded that the combination of good practice and site-specific measures for the protection of receptors GW1-4 will result in no likely significant effects on the surface water receptor SW1 during the operation phase. The summary presentation of these potential effects can be found in **Table 8.21**.

Table 8.21 Assessment of construction phase effects on the Monkton and Minster Marshes (River) WFD surface water body and downstream River Stour WFD Transitional water body

Receptor ID: Receptor name	Sensitivity	Magnitude	Significance
SW 1: Monkton and Minster Marshes (River) WFD surface water body and downstream River Stour WFD Transitional water body	Medium	Negligible	Not Significant

Operational Phase Effects

8.9.5 The construction phase has the potential to have a significant effect on quality of the surface water. This would be through the following mechanisms:

- The generation of sediment laden run-off; and
- Pollution from the spillages of oils, fuels or other chemicals.

8.9.6 Environmental measures referenced in **Section 8.5** are to be incorporated into the site's design and EMP. In a similar manner to the construction phase, all operational phase surface water discharges will be captured on site, treated and discharged through the pipe to Pegwell Bay. In addition, the airport will develop a Wildlife Hazard Management Plan, Habitat Management Plan

and Long Grass Policy to control and manage the use of chemicals, including pesticides, herbicides and insecticides, to prevent them being discharged to ground or surface waters.

8.9.7 It is concluded that the combination of good practice and site-specific measures for the protection of receptors GW1-4 will also result in no significant effects on the surface water receptor SW1 during the operation phase. The summary presentation of these potential effects can be found in **Table 8.22**.

Table 8.22 Assessment of operational phase effects on the Monkton and Minster Marshes (River) WFD surface water body and downstream River Stour WFD Transitional water body

Receptor ID: Receptor name	Sensitivity	Magnitude	Significance
SW 1: Monkton and Minster Marshes (River) WFD surface water body and downstream River Stour WFD Transitional water body	Medium	Negligible	Not Significant

8.9.8 A summary WFD Assessment will accompany the ES to provide an accessible summary of how the Proposed Development will not impede the achievement of WFD objectives in the WFD surface water bodies. This will be in compliance with PINS advice note 18.

Decommissioning Phase Effects

8.9.9 Decommissioning effects have been scoped out of the assessment Ground and Surface Water effects as the Airport is envisaged to operate in perpetuity.

Inter-related effects

8.9.10 Effects on surface waters (controlled waters) from the mobilisation of contaminants already present on site have been considered in **Chapter 10: Land Quality**. The conclusion is that the distance of the site from surface water receptors, and the measures in place to protect the very high sensitivity groundwater receptors will be sufficient to protect the wider freshwater environment.

8.10 Assessment of Effects on Pegwell Bay (and Associated Designated Sites)

Introduction

8.10.1 This assessment of effects on the surface water receptor SW2 takes into account the environmental measures referenced in **Section 8.5** i.e. it is an assessment of residual (post-mitigation) effects.

Construction Phase Effects

8.10.2 The construction phase has the potential to have a significant effect on water quality at Pegwell Bay. This would be through the following mechanisms:

- The generation of sediment laden run-off entering the site's drainage system in an uncontrolled manner; and
- Pollution from the spillages of concrete, oils, fuels or other chemicals entering the site's drainage system or reaching Pegwell Bay through groundwater inflows.

8.10.3 Environmental measures referenced in **Section 8.5** are included in the site's CEMP. Of particular relevance to Pegwell Bay is the design of the site drainage system, the outfall of which is located in Pegwell Bay.

8.10.4 Construction phase site discharge in Phase 1 will be contained on site and discharged to the site sewer network, following treatment by siltbusters or similar, or alternatively taken off-site. In construction Phases 2 - 4 it is envisaged that the site drainage network will be in place and discharges will be to Pegwell Bay. Paragraphs 8.10.9 - 8.10-12 present the detailed design strategy for the site drainage network to ensure that measures are put in place to protect the designated features around Pegwell Bay. These measures will be confirmed with the EA and NE prior to the commencement of works.

8.10.5 Additional measures (**Tables 8.13** and **8.14**) have also been incorporated into the Site's design and will be in the draft CEMP. These have been put in place to protect the groundwater environment during the construction phase and should also ensure that no potential pollutants reach Pegwell Bay.

8.10.6 It is concluded that the combination of good practice and site-specific measures for the protection of receptors GW1-4, the use of good practice in the treatment and storage of site drainage and the agreement of detailed site drainage strategies with the EA and NE will result in no significant effects on the surface water receptor SW2 during the construction phase. The summary presentation of these potential effects can be found in **Table 8.23**.

Table 8.23 Assessment of construction phase effects on the Pegwell Bay (and associated designated sites)

Receptor ID: Receptor name	Sensitivity	Magnitude	Significance
SW 2: Pegwell Bay (and associated designated sites)	Very High	Negligible	Not Significant

Operational Phase Effects

8.10.7 The operational phase has the potential to have a significant effect on water quality at Pegwell Bay. This would be through the following mechanisms:

- The generation of sediment laden run-off entering the Site's drainage system in an uncontrolled manner; and
- Pollution from the spillages of concrete, oils, fuels or other chemicals entering the Site's drainage system or reaching Pegwell Bay through groundwater inflows.

8.10.8 Environmental measures referenced in **Section 8.5** will be included in the Site's EMP.

8.10.9 As described in **Section 3.4** of **Chapter 3: Description of the Proposed Development,** the Outline DS for the Site (Appendix A in **Appendix 8.2**) provides for positive drainage following the Site's natural contours, discharging into two adjacent attenuation ponds, one for 'dirty' water and one for 'clean' water (see Appendix G of Appendix A in **Appendix 8.2** for the layout of the outline site drainage network). Prior to discharging into the ponds, the water will flow through interceptors (existing and new). The 'dirty' pond will treat de-icer contaminated runoff through the use of aerators, before discharging into the second pond. Flow into the 'clean' pond will be limited; the spillway will have a storage capacity of greater than a 1 in 30-year flood event. From the second pond, the clean water will be transported through the existing pumping system to be discharged from site. Discharge will only take place from the clean water pond once silt and any other potential pollutants (e.g. hydrocarbons, de-icer) have been removed from site discharge.

8.10.10 A maximum discharge rate of 100 l/s has been assumed in designing the on-site attenuation ponds which have been sized to attenuate site run off for the 1% AEP storm plus a 40% climate change allowance. At the detailed design stage the site drainage network design will need to include consideration of the impact of the peak rate of discharge at the designated features on Pegwell Bay

in the construction phase. Further consultation on this point with NE and the EA is also expected to occur at the detailed design stage to ensure that appropriate scour protection is in place. The proposed pumping rate represents a maximum worst case scenario and lower rates could be achieved by using a variable rate pump or further attenuating water on site. If further attenuation is required this could be achieved by increasing the surface area of the ponds, by providing limited infiltration of clean run off (e.g. roof drainage), by providing addition attenuation tanks elsewhere on site, by providing additional storage capacity with the drainage network by oversizing pipes, by utilising any spare capacity in the SW drainage network or by using clean run-off water elsewhere on site. Any work required to refine and improve attenuation and therefore reduce peak discharge rates is expected to be investigated during the detailed design stage of the project which will come after the order is made.

8.10.11 The Fuel Farm site will have its own separate drainage system which will connect to the drainage outfall pipe at Pegwell Bay (see Appendix G of Appendix A in **Appendix 8.2**). This drainage system will be fitted with an oil separator and an anti-pollution non-return control valve to ensure that no hydrocarbons enter the drainage outfall to Pegwell Bay and any pollution incident does not leave the fuel drainage system.

8.10.12 As discussed in **Table 8.14** the regulation of site discharges has been discussed with the EA and NE, the EA have indicated that they do not normally permit surface water drainage discharges to sea, however it is acknowledged that the sensitivity of the features at Pegwell Bay does require appropriate mitigation. It is possible that a permitting approach could be used which combined the use of a Water Discharge Activity Permit to regulate discharges from the 'dirty' to 'clean' pond, combined with the anti-pollution non- return valve on the Fuel Farm drainage system and appropriate monitoring of the clean pond outflow. The regulation of the quality of all discharges to Pegwell Bay will be discussed with the EA and NE prior to the commencement of works.

8.10.13 All discussions with NE and the EA with the respect to the interaction of the site drainage network and Pegwell Bay are a DCO requirement.

8.10.14 It is concluded that the combination of good practice and site-specific measures for the protection of receptors GW1-4, the use of good practise in the treatment and storage of site drainage and the agreement of detailed site drainage strategies with the EA and NE will result in no significant effects on the surface water receptor SW2 during the construction phase. The summary of these potential effects can be found in **Table 8.24**.

Table 8.24 Assessment of operational phase effects on the Pegwell Bay (and associated designated sites)

Receptor ID: Receptor name	Sensitivity	Magnitude	Significance
SW 2: Pegwell Bay (and associated designated sites)	Very High	Negligible	Not Significant

8.10.15

Decommissioning Phase Effects

8.10.16 Decommissioning effects have been scoped out of the assessment Ground and Surface Water effects as the Airport is envisaged to operate in perpetuity.

Inter-related effects

8.10.17 This chapter discusses the potential effects of changes to the water discharge regime on Pegwell Bay. The overall conclusion for the significance of effects from all sources on Pegwell Bay and the associated designated sites is presented in **Chapter 7: Biodiversity** and in **Appendix 7.1: Report to Inform the Appropriate Assessment**.

8.11 Assessment of Effects on the Capacity of the PWS Infrastructure and Public Sewer Network

Introduction

8.11.1 This assessment of effects on the infrastructure receptors (IN1 and IN2) incorporates the environmental measures referenced in **Section 8.5** i.e. it is an assessment of residual (post-mitigation) effects.

Construction Phase Effects

8.11.2 The construction phase has the potential to have a significant effect on the capacity of PWS infrastructure and the public sewer network. This would be through the following mechanisms:

- Increased water demand at the site causing sporadic decreases in the reliability of the local supply; and
- Increased discharge from the site in Phase 1 of the construction period causing capacity issues downstream of the site.

8.11.3 Environmental measures referenced in **Section 8.5** are included in the Site's CEMP. These comprise the following:

- The exact locations of nearby sewers and water supply infrastructure needs to be established by on-site survey prior to demolition works. An appropriate protection system (i.e. temporary support structure, sheet piles, installation of secant piles etc.) has to be implemented to minimise any impact to the public sewer network. The piling methodology will be developed considering the neighbouring utility services;
- The water demand for the construction phase will be agreed with SW. Water efficiency measures will be developed for construction process as appropriate, examples of relevant construction phase activities are: water needed for concrete mixing, water needed for dust suppression, water needed for cleaning activities and water needed for welfare facilities; and
- Discharge rates from the site will not exceed current sewer capacity, and these rates will be agreed with SW to ensure appropriate storage is provided on site during the construction phase.

8.11.4 RiverOak will agree construction phase water and foul water demands with SW prior to the commencement of works; this is a DCO requirement.

8.11.5 Following this it is concluded that it is likely any significant effects will be negligible. The summary of these potential effects can be found in **Table 8.25**.

Table 8.25 Assessment of construction phase effects on the capacity of the PWS infrastructure and public sewer network

Receptor ID: Receptor name	Sensitivity	Magnitude	Significance
IN1: PWS infrastructure	High	Negligible	Not Significant
IN2: On- and off-site public sewer network	High	Negligible	Not Significant

Operational Phase Effects

8.11.6 The operational phase has the potential to have a significant effect on the capacity of PWS infrastructure and the public sewer network. This would be through the following mechanisms:

- Increased water demand at the site causing a long-term decrease in the reliability of the local supply; and
- Increased foul discharge from the site causing capacity issues downstream of the site.

8.11.7 Environmental measures referenced in **Section 8.5** are included in the CEMP.

8.11.8 RiverOak will formally request a capacity check of the local water supply and sewage systems from SW and agree sustainable levels of supply and discharge. A Resources/Sustainability strategy will be developed as a part of the detailed design phase following the granting of the DCO of the project to identify how water efficiency measures will be incorporated into the development to maximise water re-use and minimise the demand on supply. Areas for consideration could include water consumption by staff and passengers, washing on-site support vehicles and planes, cleaning of equipment and fire fitting. The water demand for the operation phase will be agreed with SW prior to the commencement of works. Development of these measures as a part of the sites detailed design, and agreement of these measures with SW, is expected to form a DCO requirement.

8.11.9 Further to this the Utilities Infrastructure Report (**Volume 26**) sets out the water requirements of the site. The draft demand figures will need to be confirmed by SW, through the capacity check, in the detailed design stage.

8.11.10 It is concluded that likely significant effects will be negligible. The summary of these potential effects can be found in **Table 8.26**.

Table 8.26 Assessment of operation phase effects on the capacity of the PWS infrastructure and public sewer network

Receptor ID: Receptor name	Sensitivity	Magnitude	Significance
IN1: PWS infrastructure	High	Negligible	Not Significant
IN2: On- and off-site public sewer network	High	Negligible	Not Significant

Decommissioning Phase Effects

8.11.11 Decommissioning effects have been scoped out of the assessment Ground and Surface Water effects as the Airport is envisaged to operate in perpetuity.

Inter-related effects

8.11.12 This chapter considers effects on water services from changes in the sites supply or foul water discharge rates. **Chapter 10: Land Quality** also consider effects on buried services from the mobilisation of contaminants. It is considered that the mitigation measures presented here will be sufficient to ensure no significant inter-related effects on the built environment, when combined with the mitigation measures set out in these chapters.

8.12 Assessment of Effects on Flood Risk Receptors: On and Adjacent Development

Introduction

8.12.1 This assessment of effects on the flood risk receptors (FR1 and FR2) incorporates the environmental measures referenced in **Section 8.5** i.e. it is an assessment of residual (post-mitigation) effects.

Construction Phase Effects

8.12.2 The construction phase has the potential to have a significant effect on flood risk receptors. This would be through the following mechanisms:

- Changes to the site run-off volumes and site drainage regime causing an increase in surface water flood risk to off-site receptors; and
- Changes to the site drainage regime causing an increase in flood risk to on-site receptors.

8.12.3 Environmental measures referenced in **Section 8.5** are included in the site's CEMP.

8.12.4 Site discharge in the construction phase will be collected on site and either discharged, following treatment, through the pipe to Pegwell Bay or removed from the site via tankers. There will be no increase in surface water run-off from the Site and therefore no anticipated increase in surface water flood risk on or off the site.

8.12.5 It is concluded that any likely significant effects will be negligible. The summary presentation of these potential effects can be found in **Table 8.27**.

Table 8.27 Assessment of construction phase effects on Flood Risk Receptors: On and adjacent development

Receptor ID: Receptor name	Sensitivity	Magnitude	Significance
FR1: Site users & infrastructure	High	Negligible	Not Significant
FR2: Off-site users & infrastructure	High	Negligible	Not Significant

Operational Phase Effects

8.12.6 The construction phase has the potential to be likely to have a significant effect on flood risk receptors. This would be through the following mechanisms:

- Changes to the site run-off volumes and site drainage regime causing an increase in surface water flood risk to off-site receptors; and
- Changes to the site drainage regime causing an increase in flood risk to on-site receptors.

8.12.7 Environmental measures referenced in **Section 8.5** will be included in the site's EMP.

8.12.8 During the operational phase, all site drainage will be similarly contained and discharged through the Pegwell Bay pipe. The system will be designed to mitigate onsite flood risk for the 1%AEP plus 30% climate change event and offsite flood risk for the 1%AEP plus 40% climate change event. Therefore, there will be no increase in uncontrolled site run-off as a result of the increase in hardstanding. A FRA and Outline DS can be found in **Appendix 8.2**.

8.12.9 Following this, it is concluded that all effects will be negligible. The summary presentation of these potential effects can be found in **Table 8.28**.

Table 8.28 Assessment of operational phase effects on Flood Risk Receptors: On and adjacent development

Receptor ID: Receptor name	Sensitivity	Magnitude	Significance
FR1: Site users & infrastructure	High	Negligible	Not Significant

FR2: Off-site users & infrastructure	High	Negligible	Not Significant

Decommissioning Phase Effects

8.12.10 Decommissioning effects have been scoped out of the assessment Ground and Surface Water effects as the Airport is envisaged to operate in perpetuity.

Inter-related effects

8.12.11 This chapter considers effects on site users/infrastructure on and off-site from changes in surface water flood risk.

8.12.12 **Chapter 15: Human Heath** presents a summary of the effects of the development on human health, this includes the results of the assessment in this Chapter.

8.12.13 **Chapter 10: Land Quality** and **Chapter 9: Historic Environment** also consider effects on the sites built infrastructure (for example with respect to the potential impact of the mobilisation of contaminants on infrastructure (land quality) and the potential effects of the development on built heritage (historic environment). It is considered that the mitigation measures presented here in relation to surface water flood risk will be sufficient to ensure no significant inter-related effects on the built environment, when combined with the mitigation measures set out in these chapters.

8.13 Conclusions of Significance Evaluation

8.13.1 The conclusions regarding the significance of all those effects that have been subject to assessment in **Sections 8.8** to **8.12** are summarised in **Table 8.29**.

Table 8.29 Summary of significance of adverse effects

Receptor	Significance Level	Rationale
GW1: Kent Isle of Thanet Chalk WFD groundwater body and aquifer	Not Significant	Mitigation measures designed to protect the most sensitive proximate receptors – the SW PWS abstractions and associated mitigation will also serve to protect these receptors (see GW3). **Appendix 8.3** provides an addendum note to this ES to demonstrate how the assessments in the ES chapters conclude that the Proposed Development will not hinder compliance with WFD objectives.
GW2: Thanet Formation Secondary A aquifer	Not Significant	Mitigation measures designed to protect the most sensitive proximate receptors – the SW PWS abstractions and associated mitigation will also serve to protect these receptors (see GW3).
GW3: SW PWS sources	Not Significant	Construction phase effects can be mitigated by ensuring the implementation of good practice construction measures and agreeing an approach to piling and any below ground infrastructure with SW and the EA. Operational phase effects associated with potential spills from the fuel farm have been discussed and appropriate mitigation proposed. The detailed design stage will include the development of detailed design measures to be agreed with SW and the EA. Appropriate measures are included in the CEMP, EMP and CoCP the draft CEMP (the latter of which is submitted with the ES). Further mitigation measures will need to be designed as a part of the PICP, to ensure the protection of the aquifer and associated sources during the construction phase. The finalisation of these measures at detailed design stage is a DCO requirement. This conclusion is drawn from the detailed technical assessments in the Hydrogeological Impact Assessment accompanying this ES (see **Appendix 8.1**).

Receptor	Significance Level	Rationale
GW4: Other licensed groundwater abstractions	Not Significant	Mitigation measures designed to protect the most sensitive proximate receptors – the SW PWS abstractions and associated mitigation will also serve to protect these receptors (see GW3).
SW1: Monkton and Minster Marshes (River) WFD surface water body, downstream River Stour WFD transitional water body and non-reportable cycle 1 river waterbodies.	Not Significant	Site drainage from hardstanding will be captured on site by the Site drainage system and all discharge will be to foul sewer or Pegwell Bay. Any overland flow from the site will infiltrate before it reaches any surface water receptor, due to the high permeable nature of the underlying geology and measures outlined for the protection of receptor GW3 will serve to protect against any changes in the quality or quantity of baseflow. **Appendix 8.3** provides an addendum note to this ES to demonstrate how the assessments in the ES chapters conclude that the Proposed Development will not hinder compliance with WFD objectives.
SW2: Pegwell Bay (and associated designated sites)	Not Significant	The main pathway between the Site and Pegwell Bay is the Site discharge pipe. Work will be undertaken with EA/NE to finalise the detailed design of the surface water drainage network and decide on an appropriate regulatory and monitoring regime for the quality of water discharges to Pegwell Bay and the appropriate level of scour protection required. The focus of this regime should be causing no adverse effect on the water quality at Pegwell Bay and linked designated sites. This is expected to form a DCO requirement. Any groundwater inflows reaching Pegwell Bay from the site will be prevented from causing an adverse effect by the mitigation measures developed for the protection of receptor GW3.
IN1: PWS infrastructure	Not Significant	Water use will be at a rate appropriate to the capacity of the current network, which will be detailed via a capacity check with SW. To minimise demand water efficiency measures, such as grey water re-use, will be instigated wherever possible on-site and these will be summarised in a Resources Strategy, to be produced at the detailed design stage. The Utilities Infrastructure Report (**Volume 26**) sets out the draft water demand numbers for the site. It is expected that the agreement with SW of details of the site water supply in the construction and operation phases, and the water efficiency measures in the Resources Strategy, will form a DCO requirement.
IN2: On and off site public sewer network	Not Significant	The Site discharge foul sewer will be capable of a discharge rate appropriate for the capacity of the local sewer network. A capacity check of the local sewer network will be undertaken to determine site discharge rates. These will be agreed with SW at the detailed design stage, this is expected to form a DCO requirement.
FR1: Site users	Not Significant	An FRA and Outline DS has been produced (**Appendix 8.2**) in consultation with the EA, KCC and TDC.
FR2: Off-site users	Not Significant	A FRA and Outline DS has been produced (**Appendix 8.2**) in consultation with the EA, KCC and TDC.

References

[1] *The Planning Inspectorate Advice Note 18: The Water Framework Directive*. Available online at: https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2017/06/advice_note_18.pdf [Accessed 21/02/2018]

[2] The Department for Transport (2018) Airports National Policy Statement (NPS): new runway capacity and infrastructure at airports in the South East of England.

[3] Thanet District Council (2006) Thanet Local Plan. Available online at: https://www.thanet.gov.uk/your-services/planning-policy/thanets-current-planning-policy/thanet-local-plan-2006/ [Accessed 12/12/2017]

[4] Thanet District Council (2013) Flood and coastal erosion risk management policy statement. Available online at: https://www.thanet.gov.uk/media/3597307/Thanet-DC-Flood-and-Coastal-Erosion-Risk-Management-Policy-Statement-September-2013.pdf [Accessed 12/12/2017]

[5] Kent County Council (2017) Drainage and Planning Policy Statement. Available online at: https://www.kent.gov.uk/about-the-council/strategies-and-policies/environment-waste-and-planning-policies/flooding-and-drainage-policies/drainage-and-planning-policy-statement [Accessed 12/12/2017]

[6] *The Environmental Permitting (England and Wales) Regulations 2016* together with subsequent amendments. Available online at https://www.legislation.gov.uk/uksi/2016/1154/pdfs/uksi_20161154_en.pdf [Accessed 11/01/2018]

[7] *Floods and Water Management Act* (2010). Available online at: https://www.legislation.gov.uk/ukpga/2010/29/contents [Accessed 12/12/2017]

[8] *The Town and Country Planning (Environment Impact Assessment) Regulations 2017*. Available online at: http://www.legislation.gov.uk/uksi/2017/571/pdfs/uksi_20170571_en.pdf [Accessed 21/02/2018]

[9] *The Flood Risk Regulations* (2009). Available online at: http://www.legislation.gov.uk/uksi/2009/3042/contents/made [Accessed 12/12/2017]

[10] *The Environmental Permitting (England and Wales) Regulations 2016*. Available online at: http://www.legislation.gov.uk/uksi/2016/1154/contents/made [Accessed 21/02/2018]

[11] *The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.* Available online at http://www.legislation.gov.uk/uksi/2015/1623/pdfs/uksiod_20151623_en_auto.pdf [Accessed 12/12/2017]

[12] *The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017*. Available online at https://www.legislation.gov.uk/uksi/2017/407/contents/made [Accessed 12/12/2017]

[13] *Water Act 2003*. Available online at: https://www.legislation.gov.uk/ukpga/2003/37/contents [Accessed 12/12/2017]

[14] *Environment Act 1995*. Available online at: https://www.legislation.gov.uk/ukpga/1995/25/contents [Accessed 12/12/2017]

[15] *Land Drainage Act 1991*. Available online at: https://www.legislation.gov.uk/ukpga/1991/59/contents [Accessed 12/12/2017]

[16] *Water Resources Act 1991*. Available online at: https://www.legislation.gov.uk/ukpga/1991/57/contents [Accessed 12/12/2017]

[17] Environmental Protection Act 1990. Available online at: http://www.legislation.gov.uk/ukpga/1990/43/contents [Accessed 12/12/2017]

[18] *Control of Pollution Act 1974*. Available online at: https://www.legislation.gov.uk/ukpga/1974/40 [Accessed 12/12/2017]

[19] Environment Agency's website on 'Pollution Prevention advice and guidance' notes (2014). Available online at http://webarchive.nationalarchives.gov.uk/20140328090931/http://www.environment-agency.gov.uk/business/topics/pollution/39083.aspx [Accessed 04/12/17].

[20] Environment Agency (2017) The Environment Agency's approach to groundwater protection, November 2017 Version 1.1. Available online at:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/658135/LIT_7660.pdf [Accessed 12/12/2017]

[21] Environment Agency (2013) Groundwater Protection: Principles and Practice (GP3). Version 1.1. Available online at: https://www.gov.uk/government/publications/groundwater-protection-principles-and-practice-gp3 [Accessed 12/12/2017]

[22] Health and Safety Executive (2015) Storage of flammable liquids in tanks. Available online at: http://www.hse.gov.uk/pubns/priced/hsg176.pdf [Accessed 16/02/18]

[23] National Groundwater & Contaminated Land Centre report (2001) Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention. Available online at: http://webarchive.nationalarchives.gov.uk/20140329082415/http://cdn.environment-agency.gov.uk/scho0501bitt-e-e.pdf [Accessed 21/02/2018]

[24] Environment Agency (2002) Piling into contaminated sites. Available online at: http://webarchive.nationalarchives.gov.uk/20140329082414/http://cdn.environment-agency.gov.uk/scho0202bisw-e-e.pdf [Accessed 21/02/2018]

[25] Kent County Council (2011) Preliminary Flood Risk Assessment. Available online at: https://www.kent.gov.uk/about-the-council/strategies-and-policies/environment-waste-and-planning-policies/flooding-and-drainage-policies/preliminary-flood-risk-assesment [Accessed 12/12/2017]

[26] Kent County Council (2013) Thanet Stage 1 Surface Water Management Plan. Available online at: https://www.kent.gov.uk/about-the-council/strategies-and-policies/environment-waste-and-planning-policies/flooding-and-drainage-policies/surface-water-management-plans/thanet-surface-water-management-plan [Accessed 12/12/2017]

[27] Kent County Council (2017) Flood Risk to Communities: Thanet. Available online at: https://www.kent.gov.uk/__data/assets/pdf_file/0011/71669/Flood-risk-to-communities-in-Thanet.pdf [Accessed 12/12/2017]

[28] Thanet District Council (2009) Thanet District Strategic Flood Risk Assessment. Available online at: https://www.thanet.gov.uk/your-services/planning-policy/evidence-base/strategic-flood-risk-assessment/ [Accessed 21/02/2018]

[29] Thanet District Council's Local Plan. Available online at: https://www.thanet.gov.uk/your-services/planning-policy/thanets-new-local-plan/local-plan/ [Accessed 21/02/2018]

[30] Environment Agency (2009) Stour: Catchment flood management plan. Available online at: https://www.gov.uk/government/publications/stour-catchment-flood-management-plan [Accessed 21/02/2018]

[31] Environment Agency (2013) Stour abstraction licensing strategy. Available online at: https://www.gov.uk/government/publications/stour-catchment-abstraction-licensing-strategy [Accessed 21/02/2018]

[32] Environment Agency (2015) South East river basin district: River basin management plan. Available online at: https://www.gov.uk/government/publications/south-east-river-basin-district-river-basin-management-plan [Accessed 21/02/2018]

[33] Met Office data. Available online at: http://www.metoffice.gov.uk/public/weather/climate [Accessed 21/02/2018]

[34] Environment Agency online maps: Available online at: http://www.environment-agency.gov.uk/maps/ [Accessed 21/02/2018]

[35] Environment Agency Catchment Data Explorer website. Catchment Planning. Available online at: http://environment.data.gov.uk/catchment-planning/[Accessed 21/02/2018]

[36] Long term flood risk information for locations in England. Available online at:https://flood-warning-information.service.gov.uk/long-term-flood-risk [Accessed 21/02/2018]

[37] British Geological Society website: Available online at: http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html [Accessed 21/02/2018]

[38] Aquaterra (2007) Lord of the Manor Constraints Investigation (Desk Study). Prepared for Southern Water (pp. 42)

[39] Atkins (2014) Thanet sewers programme - Geotechnical and environmental investigation Phase A: desk study. Prepared for Southern Water (pp.110)

[40] Atkins (2015) Thanet sewers programme: Geotechnical and environmental investigation Groundwater monitoring, February to June 2015. Prepared for Southern Water (pp. 208).

[41] Mouchel (2007) Outline for the final report on Thanet Sewers Survey Phase II. Prepared for Southern Water (pp.98)

[42] Mouchel (2008) Groundwater Risk Assessment Interpretive Report – Isle of Thanet Groundwater Quality Assessment. Prepared for Southern Water (pp.39).

[43] Soilscapes website by Cranfield Soil and AgriFood Institute: http://www.landis.org.uk/soilscapes/ [Accessed 21/02/2018]

[44] Environment Agency (2013) Stour Abstraction Licensing Strategy. Available online at: (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/289867/LIT_2048_61c7f0.pdf) [Accessed 21/02/2018]

[45] Defra MAGIC website: www.magic.gov.uk [Accessed 21/02/2018]

[46] Natural England (2014) North East Kent (Thanet) Site Improvement Plan (SIP)

[47] Environment Agency (2001) Piling and Preventative Ground Improvement Methods on Land Affected by Contamination: Guidance on pollution prevention. Available online at: http://webarchive.nationalarchives.gov.uk/20140329082415/http://cdn.environment-agency.gov.uk/scho0501bitt-e-e.pdf [Accessed 12/12/2017]

[48] Environment Agency (2002) Piling into contaminated sites. Available online at: http://webarchive.nationalarchives.gov.uk/20140329082414/http://cdn.environment-agency.gov.uk/scho0202bisw-e-e.pdf [Accessed 12/12/2017]

[49] Environment Agency Groundwater source protection zones. Available online at: http://apps.environment-agency.gov.uk/wiyby/37833.aspx [Accessed 21/02/2018]

[50] Envirocheck report dated 2016 (reference 82787389_1_1)

[51] Environment Agency (2013) Stour Abstraction Licensing Strategy.

[52] Envirocheck report dated 2016 (reference 82787389_1_1)

[53] Entec (2009) Thanet District Strategic Flood Risk Assessment.

[54] Environment Agency (2017) Catchment Data Explorer. Available online at http://environment.data.gov.uk/catchment-planning/ [Accessed 04/12/17].

[55]Environment Agency (2015) South East River Basin District: River Basin Management Plans. Available online at https://www.gov.uk/government/collections/river-basin-management-plans-2015#south-east-river-basin-district-rbmp:-2015 [Accessed 04/12/07].

[56] Environmental good practice on site (Ed.3) (2010) Construction Industry Research & Information Association. Report C692. London: Construction Industry Research & Information Association.

[57] Institute of Environmental Management and Assessment (2011) The State of Environmental Impact Assessments in the UK.

Contents

9. Historic Environment

9.1 Introduction

9.1.1 This Chapter sets out the results of an historic environment assessment on the Proposed Development and should be read in conjunction with the Proposed Development description (**Chapter 3: Description of the Proposed Development**).

9.1.2 Following a summary of the limitations of this Environmental Statement (ES), the Chapter outlines the relevant policy, legislation and guidance that has informed the preliminary assessment, the baseline data gathering methodology and the overall baseline conditions. An assessment of the potentially significant effects of the Proposed Development is then presented. The Chapter concludes with a summary of residual effects and an evaluation of their significance.

9.1.3 The historic environment is defined by the Airports National Policy Statement (NPS) to include:

"… all aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged, and landscaped and planted or managed flora."[1]

Limitations of the ES

9.1.4 This assessment is based on visits to the site (see **Paragraph 9.3.6)**, desk based research and the results of any previously published archaeological investigations within the site and study area.

9.1.5 The desk based research has identified areas of specific archaeological potential or historic significance. Baseline archaeological field evaluation data is available across the majority of the site, comprising the geophysical and archaeological trench evaluation prepared separately for the Stone Hill Park application (OL/TH/16/0550). However, the ES recognises previously unrecorded archaeological remains may also be present within parts of the site that lie beyond the scope of the recent site archaeological evaluation surveys. In particular, it is acknowledged that the 'Northern Grass' area (**Figure 3.1**) has not been subject to intrusive investigation, with current access restrictions curtailing opportunities for field evaluation.

9.1.6 This issue has been discussed with Historic England and Kent County Council Heritage Conservation Group. It is agreed that, for the purpose of assessment, the archaeological potential within the Northern Grass is considered on a likely worst-case basis. It is also agreed that, for the purpose of mitigation, indicative development within the Northern Grass, shown as a zonal masterplan in the DCO application, will be dependent on satisfying an order requirement for archaeological evaluation. Further measures for archaeological protection and mitigation, either by avoidance, investigation or a combination thereof, are also to be agreed once the results of archaeological evaluation are known.

9.1.7 This consent requirement will be subject to approval of detailed proposals. Archaeological Written Schemes of Investigation (WSI) are to be prepared in consultation with Kent County Council (KCC) in advance of detailed design and construction works. Specific development proposals, based on the zonal masterplan and prepared in consultation with KCC and Historic England, will achieve appropriate archaeological protection where necessary, through restrictions to development layout, design and construction processes.

9.1.8 This response to the specific limits affecting availability of archaeological baseline information for part of the site ensures an application can be considered on the basis of current archaeological understanding, with the security that that there is an additional commitment to further measures for archaeological protection in accordance with planning policy. For further detailed information about the approach taken in the ES, please refer to **Chapter 5: Approach to the Environmental Statement**.

9.2 Policy and Legislative Context

9.2.1 A study of historic environment related planning policy, legislation and guidance at the national, regional and local level has been undertaken for the site and its locality. This is 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.

9.2.2 Full details of all national and local planning policies relevant to the Proposed Development can be found in **Appendix 4.1**. The following section outlines legislation and policy relevant to this assessment.

Legislative Requirements

9.2.3 The importance of cultural heritage and archaeology is recognised in legislation and heritage assets that are deemed to be of particular importance are given legal protection.

9.2.4 The *Infrastructure Planning (Environmental Impact Assessment Regulations) 2017/572* (hereafter referred to as the 2017 EIA Regulations)[2] require decision-makers to have regard to landscapes and sites of historical, cultural or archaeological significance.

9.2.5 Under the *Ancient Monuments and Archaeological Areas Act 1979*[3], subsequently amended by the *National Heritage Acts 1983*[4] *and 2002*[5], sites assessed to be of national importance are required to be compiled in a Schedule of Monuments. These sites are accorded statutory protection and Scheduled Monument Consent is required before any works are carried out which would have the effect of demolishing, destroying, damaging, removing, repairing, altering, adding to, flooding or covering up a scheduled monument (SM), although the act does not consider the settings of SMs. The *Infrastructure Planning (Decisions) Regulations 2010*[6] require decision-makers to have regard to the desirability of preserving the scheduled monument or its setting.

9.2.6 The Secretary of State is required to compile a list of buildings of special architectural or historical interest under the *Planning (Listed Buildings and Conservation Areas) Act 1990*[7]. The buildings included in this list are classified as Grades I, II* and II, and are accorded statutory protection. The *Infrastructure Planning (Decisions) Regulations 2010*[8] require decision-makers to have regard for the desirability of preserving listed buildings, any features which contribute to their special interest and their settings.

9.2.7 Under the 1990 Act, areas of special architectural or historic interest can be designated as conservation areas, the character or appearance of which it is desirable to preserve or enhance. The *Infrastructure Planning (Decisions) Regulations 2010*[9] require decision-makers to have regard for the desirability of preserving the character and appearance of conservation areas.

9.2.8 *The Hedgerow Regulations 1997*[10] set out criteria for identifying important hedgerows and for a process of gaining consent for their removal. These criteria include a number of heritage-based considerations. Removal of an important hedgerow is deemed as permitted where a planning permission or Development Consent Order (DCO) which would require removal of a hedgerow has been granted as detailed in *The Infrastructure Planning (Interested Parties and Miscellaneous Prescribed Provisions) Regulations 2015*[11].

9.2.9 Key aspects of legislation and planning policies relevant to this assessment are set out in **Table 9.1**

Table 9.1 Legislation, National and Local Planning Policies relevant to Historic Environment

Legislation or Policy reference	Legislation Summary or Policy Information relevant to Historic Environment	How addressed in this ES
Legislation:		

Legislation or Policy reference	Legislation Summary or Policy Information relevant to Historic Environment	How addressed in this ES
Ancient Monuments and Archaeological Areas Act (1979)	Changes to the fabric of SMs require consent from the Secretary of State, as advised by Historic England.	There are no scheduled monuments on the site as detailed at **Paragraph 9.4.11-9.4.12.**
Planning (Listed Buildings and Conservation Areas) Act (1990)	Covers the registration of Listed Buildings (buildings that are seen to be of special architectural or historic interest) and designation of Conservation Areas (areas of special architectural or historic interest the character or appearance of which it is desirable to preserve or enhance).	There are no listed buildings on the site and the site does not lie within a conservation area as detailed at **Paragraph 9.4.13-9.4.14.**
National Planning Policy:		
Airports NPS	On 26 June 2018, the Airports NPS: new runway capacity and infrastructure at airports in the South East of England was designated by the Secretary of State for Transport under section 5(1) of the Planning Act 2008. Whilst this document focuses on the potential for an expanded Heathrow Airport, it provides policy guidance as to how the impacts of airport development upon the historic environment should be considered. The Airports NPS is consistent with the NPPF, but emphasises the specific impacts that come from airport development. Paragraph 5.194 of the Airports NPS makes reference to noise impacts and sets out how these should be assessed using the methodology produced for Historic England detailed in *Aviation Noise Metric – Research on the Potential Noise Impacts on the Historic Environment by Proposals for Airport Expansion in England* (September 2014).	An assessment of effects of noise on heritage assets in accordance with the methodology set out in the *Aviation Noise Metric* is provided at **Paragraphs 9.10.6-9.10.7.**
National Planning Policy Framework (NPPF): Draft for Consultation (March 2018) **Paragraph 185**	The NPPF does not set out the policy for the testing of Nationally Significant Infrastructure Projects (NSIPs). However, Section 16 relates to the Historic Environment and is consistent with the Airports NPS. In determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum the relevant historic environment record should have been consulted and the heritage assets assessed using appropriate expertise where necessary. Where a site on which development is proposed includes or has the potential to include heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk based assessment and, where necessary, a field evaluation.	
Paragraph 186	The particular significance of any heritage asset that may be affected by a proposal (including by development affecting the setting of a heritage asset) should be identified and assessed, taking account of the available evidence and any necessary expertise. This is in order to avoid or minimise conflict between the heritage asset's conservation and any aspect of the proposal.	
Paragraph 189	When considering the impact of a proposal on a designated heritage asset, great weight should be given to the asset's conservation, irrespective of the degree of potential harm to its significance. The more significant the asset the greater the weight should be.	

Legislation or Policy reference	Legislation Summary or Policy Information relevant to Historic Environment	How addressed in this ES
Paragraph 192	Where development will lead to less than substantial harm to the significance of the designated asset, the harm should be weighed against the public benefit of the proposal.	
Paragraph 193	The effect of a proposal on the significance of a non-designated heritage asset should be taken into account in determining the application. In weighing applications that directly or indirectly affect non-designated heritage assets, a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset.	
Paragraph 190	Any harm or loss to a designated heritage asset (from its alteration or destruction, or from development within its setting), should require clear and convincing justification. Substantial harm to or loss of: a) grade II listed buildings, or grade II registered parks or gardens, should be exceptional; b) scheduled monuments, protected wreck sites, registered battlefields, grade I and II* listed buildings, grade I and II* registered parks and gardens, and World Heritage Sites, should be wholly exceptional**. ** Non-designated heritage assets of archaeological interest, that are demonstrably of equivalent significance to scheduled monuments, should be considered subject to the policies for designated heritage assets.	
Paragraph 195	Local planning authorities should require developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and the impact, and to make this evidence (and any archive generated) publicly accessible. However, the ability to record evidence of our past should not be a factor in deciding whether such loss should be permitted.	
National Planning Policy Framework (NPPF) (2012)	The NPPF does not set out the policy for the testing of Nationally Significant Infrastructure Projects (NSIPs). However, Section 12 relates to the Historic Environment and is consistent with the Airports NPS. A positive strategy should be implemented for the conservation and enjoyment of the historic environment, including heritage assets (both designated and non-designated) most at risk through neglect, decay or other threats. Heritage assets should be conserved in a manner appropriate to their significance. Local authorities will require applicants to describe the significance of heritage assets including the contribution made by their setting affected by the application.	Heritage assets are discussed at **Section 9.4**. The mitigation strategy for potential preservation or recording of heritage assets is detailed at **Sections 9.8-9.10** with a summary of significance presented at **Section 9.11.**
Paragraph 129	The particular significance of any heritage asset that may be affected by a proposal (including by development affecting the setting of a heritage asset) should be identified and assessed, taking account of the available evidence and any necessary expertise. This is in order to avoid or minimise conflict between the heritage asset's conservation and any aspect of the proposal.	An assessment of the significance of all heritage assets is provided at **Appendix 9.1.** A summary is presented at **Section 9.11.**
Paragraph 132	When considering the impact of a proposal on a designated heritage asset great weight should be given to the asset's conservation. The more significant the asset the greater the weight should be. Significance can be harmed or lost through alteration to the asset or development in its setting.	The impact of the proposal on designated heritage assets is limited to indirect effects as presented at **Section 9.4**, and are addressed at **Section 9.10.**

Legislation or Policy reference	Legislation Summary or Policy Information relevant to Historic Environment	How addressed in this ES
Paragraph 134	Where development will lead to less than substantial harm to the significance of the designated asset the harm should be weighed against the public benefit of the proposal.	The impact of the proposal on designated heritage assets is limited to indirect effects as presented at **Section 9.4**, and are addressed at **Section 9.10.**
Paragraph 135	The effect of a proposal on the significance of a non-designated heritage asset should be taken into account in determining the application.	The impact of the proposal on heritage assets is addressed at **Sections 9.8-9.9.**
Paragraph 139	Non-designated archaeological heritage assets of demonstrably equivalent in significance to scheduled monuments, should be managed as designated heritage assets.	A desk based assessment of non-designated heritage assets is presented at **Appendix 9.1**. The mitigation strategy is presented at **Sections 9.8-9.9.**
Paragraph 141	Information about the significance of the historic environment gathered as part of plan-making or development management should be made publicly accessible. Developers are required to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and the impact, and to make this evidence (and any archive generated) publicly accessible. Copies of evidence should be deposited with the relevant Historic Environment Record and any archives with a local museum or other public depository. The ability to record evidence of our past should not be a factor in deciding whether such loss should be permitted.	Information about the significance of the historic environment gathered as part of plan-making or development management will be made publicly accessible in accordance with an Archaeological WSI to be prepared in consultation with KCC in advance of works.
Local Policies:		
Thanet District Adopted Local Plan (2006) saved policies **Policy HE11**	To determine planning applications the District may require the provision of an archaeological assessment which, in certain cases, may involve fieldwork.	An archaeological desk based assessment is presented at **Appendix 9.1**. Fieldwork investigation is proposed at **paragraph 9.8.5** and will be detailed in the Archaeological WSI to be prepared in consultation with KCC in advance of works.
Policy HE12	Archaeological sites will be preserved and protected. Where sites do not merit preservation, planning permission will be granted subject to a suitable programme of archaeological recording.	The mitigation strategy presented at **Sections 9.8-9.9** includes preservation where appropriate and feasible, based on current knowledge and further investigation. It includes a programme of archaeological recording for assets affected by the development which will not be preserved in situ. An Archaeological WSI will be prepared in consultation with KCC in advance of works.

Guidance

9.2.10 Guidance on the implementation of the NPPF is provided by the Planning Practice Guidance (PPG)[12], published by the Department for Communities and Local Government (DCLG) and available online. Historic England have produced guidance on how to assess the impacts upon the setting of heritage assets and implementation of heritage policies from the NPPF. The Chartered Institute for Archaeologists (CIfA) has produced standards and guidance documents for the production of desk based assessments and providing consultancy advice in the historic environment. Applicable guidance and summary descriptions are given in **Table 9.2**.

Table 9.2 HE and CIfA Guidance

Source	Summary description
HE Managing significance in decision-taking in the historic environment (2015)[13]	Guidance from Historic England on how to implement the historic environment policies included in the NPPF.
HE GPA3 The Setting of Heritage Assets (2017) [14]	Guidance from Historic England demonstrating how to assess the impacts upon the setting of a heritage asset.
CIfA Standard and guidance for historic environment desk based assessment (December 2014)[15]	Assessment will determine, as far as is reasonable, from existing records the nature, significance potential and importance of the historic environment with a defined area. The assessment will also assess the impact of the Proposed Development on identified assets, both designated and undesignated.
CIfA Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment (December 2014)[16]	Advice provided should be clear, impartial, informed robust and compliant with policy and guidance. It should be proportionate, research and provide a reasoned argument assessing the known and potential significance of heritage assets impacted by the proposal.
Temple and Cotswold Archaeology for English Heritage (2014)[17]	Aviation Noise Metric - Research on the Potential Noise Impacts on the Historic Environment by Proposals for Airport Expansion in England.
English Heritage (2008)[18]	Conservation Principles.
Historic England (2017)[19]	Conservation Principles 2017 (consultation draft).

9.3 Data Gathering Methodology

9.3.1 This section describes the desk study and surveys undertaken to inform the historic environment assessment.

9.3.2 The study area has been defined as follows:

- A 1km radius around the site of the Proposed Development (as requested by the planning inspectorate (PINS) and in agreement with KCC (**Table 9.3**)). The area excludes a boundary amendment to include an underground pipeline towards Pegwell Bay which is intended for reuse with no intrusive works or visible infrastructure (see **Figure 9.1**); and
- Additional data collected on significant sites beyond the 1km study area, as identified in consultation with KCC (see **Table 9.4**).

9.3.3 The following sources and data sets were consulted for the purposes of establishing the baseline:

- KCC Historic Environment Record (HER)[20];
- KCC Historic Landscape Characterisation data (HLC)[21];
- Historic England Archive (formerly National Monuments Record)[22];
- Historic England National Heritage List for England Spatial Datasets[23];
- Historic England National Record of the Historic Environment (NRHE)[24];
- Kent Archives and Local History Service[25];
- KCC Heritage Maps[26];
- Royal Air Force (RAF) Museum, Hendon, London;
- Spitfire and Hurricane Memorial Museum[27] and RAF Manston Museum, Manston Airport[28];

- Documents submitted as part of the Stone Hill Park planning application (OL/TH/16/0550) including **Appendix 10.1** Historic Environment;
- The zone of theoretical visibility and comparative light pollution levels produced for **Chapter 11: Landscape and Visual**;
- Historic Ordnance Survey (OS) mapping provided by Envirocheck;
- Natural England historic environment mapping provided at MAGIC[29];
- The library of the Society of Antiquaries of London;
- British Geological Survey (BGS) Mapping[30];
- National Library of Scotland Map Library (NLSML)[31]; and
- Other published and online sources as necessary.

9.3.4 Particular reference has been made to the working papers issued by KCC as part of the development of the South-East Research Framework (SERF).

Desk Study

9.3.5 An archaeological desk based assessment (**Appendix 9.1**) has been undertaken in accordance with the principles laid down in the CIfA Standards and Guidance for Archaeological Desk based Assessments[32]. This has been supported by the production of gazetteers of designated heritage assets, from the Historic England Archive, within the 1km study area (**Figure 9.1**), and of other heritage assets and events from the Historic England Archive and the Kent HER, from within the 1km study area with additional data collected on significant sites beyond the 1km study area as identified in consultation with KCC (**Figures 9.2** and **9.3**). This includes the results of extensive and lengthy programmes of archaeological work undertaken in the local area, which have produced a substantial body of evidence, facilitating a good understanding of previous activity in the region.

Survey Work

9.3.6 Site walkover surveys were conducted on 7 and 8 March 2017 to support the assessment. These surveys comprised a visual inspection of the current site infrastructure and land with access obtained via a land access request. The visit concluded that large areas of open and undisturbed grassy or tarmacked land represented good potential for archaeological remains to be present. Elements of the historic infrastructure, including the runway, dispersal bays, fire station, and hangars and bunkers in the western area were extant but could only be viewed externally. Site visits to inform the assessment of the setting of designated heritage assets was conducted on 8 November 2017.

9.3.7 The results of the prior phase of geophysical survey work have been made public as part of the Stonehill Park planning application for much of the site, but exclude the 'Northern Grass' area. The published geophysical results have been considered in this assessment.

9.3.8 Archaeological evaluation in support of planning application OL/TH/16/0550 was in progress during the site walkover survey. This intrusive investigation comprised a large number of trial trenches focussed on anomalies identified during the previous geophysical survey conducted on the site as part of the same planning application. The results of this evaluation had not been released at the time the archaeological desk based assessment (Appendix 9.1) was prepared. However, a report on the Stone Hill Park archaeological evaluation has recently been released and the results have informed the ES, although, as with the geophysical study, the areas described exclude the Northern Grass.

9.3.9 Despite repeated requests to the current site owners, access has not been granted for further intrusive investigations or assessment of historic structures within the site. Please see **Chapter 5: Approach to the Environmental Statement** for further details on this and the general approach to the carrying out of the Environmental Statement.

9.3.10 As a consequence, field survey of the Northern Grass has not been possible. KCC and Historic England have identified a potential need for further intrusive investigations, particularly in the 'Northern Grass' area (see **Table 9.6**). For this reason, this assessment presents a 'worst-case scenario' approach.

Further Survey Work

9.3.11 As outlined in Chapter 5, there is a commitment to carrying out further survey work once access can be obtained. RiverOak continues to pursue access via on-going discussions, a further section 53 application and is also exploring the use of section 172 of the Housing and Planning Act 2016, which grants surveying rights to those intending to seek compulsory acquisition powers.

9.3.12 Further archaeological and historic buildings surveys will be undertaken where access can be obtained for that purpose and the scope of any such future surveys will be agreed in consultation with KCC and Historic England. It is envisaged that further survey would comprise a mixture of archaeological geophysical survey, intrusive archaeological trial trenching and historic buildings recording to inform understanding of the potential effects of the scheme and the nature of any mitigation or avoidance requirements.

Consultation

Environmental Impact Assessment (EIA) Scoping

9.3.13 Since 2016 and throughout the undertaking of the survey and assessment work, RiverOak Strategic Partners (hereafter referred to as 'RiverOak') has engaged with consultees with an interest in potential historic environment resource effects (see **Paragraph 9 9.3.12 and Table 9.3)**. A Scoping Report (**Volume 4**, **Appendix 1.1**), including a chapter covering historic environment resources, was produced and submitted to the Planning Inspectorate (PINS) on 30 June 2016 who provided a Scoping Opinion on 10 August 2016. (**Volume 4**, **Appendix 1.2**). This Scoping Opinion has informed the scope of detailed assessment significantly.

9.3.14 Organisations that were consulted by PINS for the Scoping Report include:

- KCC Heritage Conservation Group;
- Historic England; and
- Thanet District Council (TDC).

9.3.15 Responses were received from KCC Heritage Conservation Group and Historic England. A summary of PINS' and the above mentioned consultee comments and how regard to them has been had is provided in **Table 9.3**:

Table 9.3 Consultee comments and responses to EIA Scoping

Consultee	Comments and considerations	How addressed in this ES
Planning Inspectorate	A study to scope potential direct effects on heritage assets outside the proposed site boundary, on the basis that direct effects can only arise from physical disturbance of assets. The Secretary of State considers that, the potential for direct effects arising from off-site works, if required, would require evaluation and therefore must be scoped in.	No off-site works are proposed as part of this application. Direct effects on heritage assets within the order limits are included in the assessment (see **Section 9.8**).

Consultee	Comments and considerations	How addressed in this ES
Planning Inspectorate	While PINS propose not to include potential indirect effects to designated heritage assets outside of the 1km study area, the Secretary of State would like heritage assets within the Zone of Theoretical Visibility (ZTV) to be assessed as appropriate.	Significant assets which are within the Zone of Theoretical Visibility but located beyond the study area and which may experience an effect as a result of the Proposed Development, were identified through consultation with KCC and are included in the assessment (**Section 9.10** and **Appendix 9.1**).
Planning Inspectorate	The Scoping Report did not outline the extent of consultation and level of agreement with relevant consultees in regard to the historic environment assessment clearly. The Scoping Report noted that KCC and Historic England have agreed an archaeological study area of 500m radius around the site boundary. However, it is not apparent if additional requests by KCC (that consideration be given to other archaeological sites [listed] beyond this radius, effects on above-ground aviation-related archaeology, and effects of flights on heritage assets) and Historic England (the inclusion of other additional baseline views, including from Richborough Castle and the Abbey in Minster) will be included in the assessment. The Secretary of State considers that they should be assessed.	The study area has been expanded from 500m to 1km radius around the site. The archaeological sites requested to be assessed by KCC and Historic England have been agreed and considered, as have assets and conservation areas with the potential for flights to result in visual or noise effects on setting. The methodology and rationale for inclusion of assets is described in the relevant sections (see **Section 9.10** and **Appendix 9.1**).
Planning Inspectorate	The Secretary of State recommends that the study areas be extended with the input of relevant consultees. The extension should be primarily informed by the ZTV prepared as part of the Landscape and Visual Assessment (LVIA), rather than by an arbitrary buffer.	The study area has been expanded to a 1km radius around the site. Additionally, further heritage assets beyond the 1km radius which may experience an effect as a result of the Proposed Development have been identified through consultation; this process of identification was informed by the ZTV (**Figure 11.7**) and carried out in conjunction with the LVIA.
Planning Inspectorate	The rationale for selecting the heritage study areas and for deciding which features outside the selected study area will be assessed must be clearly explained in the ES.	The rationale for selecting the study areas and additional heritage assets for consideration are detailed at **Section 9.3**.
Planning Inspectorate	The inter-relationships between the historic environment and landscape and visual impact assessment should be considered in both chapters.	The inter-relationship with LVIA is considered at **Section 9.10** and **Appendix 9.1**.
Planning Inspectorate	The Applicant's attention is drawn to the comments, contained in Appendix 3 of this Opinion, of KCC in relation to baseline environment surveys and potential impacts; and National Grid's comments about potential cumulative effects of the Proposed Development together with the Richborough Connection Project (RCP) on the historic environment.	Cumulative effects as a result of other developments have been considered during the assessment process (see **Chapter 18: Cumulative Effects).**
Kent County Council Heritage Conservation Group	Requests that the Kent HER, aerial photographs, and maps of the study area, along with other records, be used to produce the baseline study.	Data held by the Kent HER, including historic maps and aerial photographs, has formed the basis of the baseline study along with additional sources and archives as documented in **Section 9.3**.
Kent County Council Heritage Conservation Group	Certain sites that lie outside the immediate study area need to be understood as they illustrate the character and richness of the archaeology that can be expected. The list set out at paragraph 8.4.1 is appropriate.	East Kent Access Road, Southern Water Weatherlees Pipeline, Ramsgate Causewayed Enclosure, Cliffsend Farm, Thanet Way duelling and Thanet Earth, have been included at **Section 9.4** and the desk based assessment **Appendix 9.1**.
Kent County Council Heritage Conservation Group	So that the archaeological landscapes are properly articulated and extrapolated into the development site, historic assets should be clearly illustrated by phase and feature.	Historic assets are assessed by phase and feature type within the desk based assessment. A phased site plan of the built heritage assets on the site is provided in **Figure 9.4**.

Consultee	Comments and considerations	How addressed in this ES
Kent County Council Heritage Conservation Group	Archaeological evaluation in the field of the Proposed Development areas, in the forms of a site walkover, geophysical survey and targeted trial trenching, need to be undertaken to inform the study and planning of this proposal.	A site walkover was conducted and is described in **paragraph 9.3.6**. A geophysical survey has been carried out by AOC Archaeology in support of the Stone Hill Park Planning Application (OL/TH/16/0550), for which preliminary results are available via the Kent Planning portal. The available results, which exclude the Northern Grass area, runway, and areas to the south of the runway, are used to inform this study. A subsequent phase of trial trenching has also been conducted as part of the Stone Hill Park planning application; however, at the time of writing the results of this latter phase of work were not available.
Kent County Council Heritage Conservation Group	The study should include a walkover to identify heritage assets related to the airfield (structural remains and earthworks) and their significance and the effect of the development on them should be explained. "The study should also consider how the airfield heritage and the airfield landscape can be used positively to create a historic sense of place and be integrated into the heritage tourism that the two on-site museums already offer."	A site walkover was conducted and is described in **Paragraph 9.3.6**. This walkover identified built heritage assets related to the airfield and their significance. These assets are considered in more detail within the desk based assessment (**Appendix 9.1**).
Kent County Council Heritage Conservation Group	Historic England and the TDC Conservation Officer (CO) will lead on the issues relating to the setting of designated heritage assets.	Historic England and the TDC CO have been and will continue to be consulted on issues relating to the setting of designated heritage assets.
Kent County Council Heritage Conservation Group	KCC requests that impacts on the former Wantsum Sea Channel be considered.	Impacts on the former Wantsum Sea Channel are considered within the desk based assessment **Appendix 9.1**.
Kent County Council Heritage Conservation Group	It is not clear how the potential impact of flight noise over heritage assets will be included in the assessment.	The methodology for assessing impact of flight noise on heritage assets is described at **Paragraph 9.6.17.**
Kent County Council Heritage Conservation Group	KCC recommends that the Trust for Thanet Archaeology be contacted for resources for this study. As well the archives at the two museums at Manston be used.	The Trust for Thanet Archaeology has been consulted (**Table 9.4**). The museums at Manston have also been consulted, in addition to the RAF Museum based at Hendon and other sources.
Historic England	A comprehensive understanding of the baseline conditions is necessary in order to design proposals that will minimise harm to the historic environment and maximise and opportunities for enhancement that may exist. Once that work has been carried out, we recommend that the applicant should reassess their Master Plan in order to identify ways in which careful design could improve the outcome for the historic environment.	The baseline conditions have been assessed using all available evidence. Further investigations will be required post-application. An Archaeological WSI will be prepared in consultation with KCC in advance of works. Harm to assets will be avoided or minimised through the relocation of some elements of some of the development in order to avoid or minimise disturbance to high sensitivity assets identified during future investigations, and by archaeological investigation.
Historic England	No details were given in the Scoping Report as to the type of site investigation works that will be conducted in order to inform the assessment of effect.	An Archaeological WSI will be prepared in consultation with KCC in advance of investigative works.

Consultee	Comments and considerations	How addressed in this ES
Historic England	Effects on the settings of designated and non-designated heritage assets, within and outside the site boundary, should be assessed. Expect published guidance on the setting of heritage assets. Suggest that confirmation of approach to use photomontages with regard to the historic environment.	Effect on the settings of designated assets within and outside site boundary has been considered in the desk based assessment (**Appendix 9.1**). Accurate visual representations of the levels of possible harm are provided in the LVIA, **Chapter 11: Landscape and Visual**.
Historic England	Other airfields developed in recent years have had varying degrees of success in achieving sustainable development that appropriately conserves their historic origins. Historic England suggests that other consideration of the success of previous developments be made to inform this application.	Response to historic airfield character is considered at **Paragraph 9.9.5** below and in the planning statement which will accompany the submitted application.
Thanet District Council	KCC and Historic England should be consulted about historic environment analysis.	KCC and Historic England have been consulted

9.3.16 In addition to this formal scoping consultation, informal consultation was held with Historic England, KCC and the Trust for Thanet Archaeology to establish the scope of the assessment. Details are provided in **Table 9.4**.

Table 9.4 Summary of meetings with consultees

Date of Meeting	Consultees	Key point of discussion.
5 May 2016	Simon Mason, Kent County Council (SM) Peter Kendal, Historic England (PK)	It was confirmed that, whilst the development is to be phased, the assessment will look at the total Proposed Development, based upon a completed masterplan. A draft ZTV was presented, PK requested additional baseline views be considered including Richborough Castle and the Abbey in Minster. Designated assets around the site should also be considered including Lord of the Manor, Ozengell Grange, Laundry Road and listed houses and farm buildings around the site. For the archaeology baseline a radius of 500m was agreed and significant sites outside this area would also be examined, including the East Kent Access Road, Southern Water Weatherlees Pipeline, Ramsgate Causewayed Enclosure, Cliffsend Farm, Thanet Way duelling and Thanet Earth. SM stated the archaeology in Thanet is very close to the surface, especially on the central chalk plateau, that due to the 'gateway' nature of Thanet there is significant and unique archaeological heritage in the area. Manston Airport should be considered as a heritage asset in its own right, due to its foundation in WWI, and its continued use in WWII. The adoption of Manston by the United States Airforce during the Cold War and subsequent role as an RAF base provide later heritage significances for the site. PK requested that a view of the runway from the museums should be maintained in any development scheme. It was confirmed the assessment would look at the operational aspects of the airport and how this impacts upon heritage assets, such as potential noise impacts upon conservation areas. PK stated Historic England would look to agree a statement of common ground before DCO submission and would hope this could be signed by KCC.
8 May 2017	Ges Moody (GM), Trust for Thanet Archaeology	Archaeological and heritage potential within the area was discussed. GM proposed that there was strong potential for encountering archaeology. GM explicitly referenced the wide number of prehistoric and Romano-British remains found within the immediate area, especially during the road construction along the edge of the DCO area. The topographical ridge extending through the site, and the potential prehistoric significance of the visible location, and the known location of significant bronze age barrow sites in close proximity to the site were additionally noted.

		The results of previous phases of archaeological investigation on the site, mainly near the customs/terminal buildings were discussed, along with a brief discussion of the Stonehill Park planning excavation (GM had not visited the site during these excavations). The heritage of the airport was discussed, including its contribution to the local history & development of the wider area (specifically the creation of married quarters housing, and development surrounding the airport). GM stressed the importance of retaining the setting and connection to the airport of the two museums, based on their historic locations.
30 October 2017	Simon Mason, Kent County Council	Availability of the evaluation report associated with the Stone Hill Park application (OL/TH/16/0550) was discussed and it was established that KCC had not yet received it. SM advised that Historic England would like to see further intrusive investigation, particularly in the 'Northern Grass' area. It was stressed that as yet unknown archaeological results could have the potential to necessitate preservation in situ, depending on significance. A building survey of historic buildings on or related to the airport, produced subsequent to the HER data collection, was requested from and provided by KCC.
25 January 2018	Simon Mason, Kent County Council	SM confirmed that the evaluation report associated with the Stone Hill Park application (OL/TH/16/0550) was still not available, and that his position on the requirement for intrusive investigation had not changed.
22 February 2018	Paul Roberts, Historic England	PR confirmed that key concerns for historic England relate to: direct effects on archaeological heritage assets, effects on airfield built heritage and effects arising through change to setting of off-site heritage assets. Direct effects: reiterated concerns that desk based assessment alone was insufficient to fully understand the potential significance and distribution of archaeological remains on the site. Noted that there is very real potential for remains of schedulable quality to survive. PR acknowledged that archaeological evaluation had, to date, not been practicable. PR advised that where intrusive surveys were either impracticable or only partial access was available, Historic England could consider a 'Rochdale Envelope' assessment based on a worst-case assessment of total disturbance of heritage assets of potentially schedulable quality. PR advised that Historic England might consider the argument that effects could be avoided or mitigated by design changes, but would need to see evidence that there was sufficient design flexibility in the quantum of development and its layout. PR requested that, while KCC should lead on archaeological issues, future consultation should be carried out, as far as possible, jointly with KCC and Historic England so that consistent advice could be provided. Airfield built heritage: PR noted HE's concerns regarding the absence of survey data and the lack of demonstrable flexibility in the masterplan. Historic England were concerned that the masterplan narrative did not adequately address the response to historic airfield character. PR noted that there was still a sense in which the open airfield layout contributed to the setting of built heritage assets even if contemporary structures/activity areas had changed or been lost. PR added that loss of built heritage assets would need to be adequately assessed and justified. Change to setting of off-site heritage assets: A methodology for assessing the effect of noise on heritage assets was presented and agreed in principle. PR requested additional baseline noise monitoring at sites assessed to be affected.
23 May 2018	Paul Roberts, Historic England	In response to comments from PINS regarding the limitations to the study resulting from a lack of access to the site a tele-conference was held with Historic England on 23 May 2018. The purpose of this call was to agree the structure and principal elements to be contained within a statement of common ground to be agreed between the applicant and Historic England. The main elements of this agreement were agreed to comprise: 1. That despite repeated attempts on the part of the applicant, it has not been possible to access the site to undertake a full suite of intrusive investigations. 2. That the investigations carried out for the Stonehill Park planning application give an adequate picture of the likelihood of below ground archaeology on the airport side of the site. 3. That it will be necessary to carry out further intrusive investigations on the northern grass prior to commencement of construction works however this cannot be carried out at this stage.

		4. That it will be acceptable to secure the further work required by DCO requirement and in these circumstances this alone should not be a reason to delay acceptance or determination of the application.
25 May 2018	Simon Mason, Kent County Council	In response to comments from PINS regarding the limitations to the study resulting from a lack of access to the site a tele-conference was held with KCC Archaeology on 25 May 2018. The purpose of this call was to agree the structure and principal elements to be contained within a statement of common ground to be agreed between the applicant and Historic England. The main elements of this agreement were agreed to comprise: 1. That despite repeated attempts on the part of the applicant it has not been possible to access the site to undertake a full suite of intrusive investigations. 2. That the investigations carried out for the Stonehill Park planning application give an adequate picture of the likelihood of below ground archaeology on the airport side of the site. 3. That it will be necessary to carry out further intrusive investigations on the northern grass prior to commencement of construction works however this cannot be carried out at this stage. 4. That it will be acceptable to secure the further work required by DCO requirement and in these circumstances this alone should not be a reason to delay acceptance or determination of the application.

Statutory Consultation

9.3.17 There was a two phased approach to statutory consultation. The first phase took place over a period of six weeks between 12 June and 23 July 2017 ('2017 Statutory Consultation') and the second between 12 January and 16 February 2018 ('2018 Statutory Consultation'), in accordance with sections 42, 47 and 48 of the Planning Act 2008[33]. Prescribed and non-prescribed consultees and members of the public were included in the consultation. Various methods of consultation and engagement were used in accordance with the Statement of Community Consultation (SoCC), including letters, website, public exhibitions, publicity and advertising, Inspection of Documentation at selected locations and parish and town council briefings. Further details can be found in the **Consultation Report and its Appendices (Document Reference TR020002/APP/6.1 and 6.2)**.

9.3.18 For each of the 2017 and 2018 Statutory Consultations, a Preliminary Environmental Information Report (PEIR)[34] was issued for wider consultation. These included results of a preliminary historic environment assessment.

9.3.19 A summary of the consultee comments received in relation to each of those drafts is provided in **Table 9.5,** along with a response to identify how the matter has been dealt with in this ES.

Table 9.5 Summary of consultee comments and responses – 2017 Statutory Consultation

Consultee	Comments and considerations	How addressed in this ES
Historic England	Noted that the draft Airports National Planning Statement will become relevant when designated and is consistent with the NPPF, and that all of the NPPF is relevant, in particular Paragraphs 128, 129, 132-135, 139 and 141 from Section 12.	The Airports NPS and relevant NPPF paragraphs have been considered in this assessment.
Historic England	Noted a gap in understanding of the 'Northern Grass' area as based on field evaluation.	Due to access constraints (see **Chapter 5: Approach to the Environmental Statement** for further comments), this will be addressed post-application. It is recognised that given this gap in understanding, alterations to the project design may be required to preserve significant assets in situ. An Archaeological WSI will be prepared in consultation with KCC in advance of works.
Historic England	Noted that an enhanced level of understanding of historic environment effects is required and is satisfied that further studies, to include intrusive investigations, will be required if	The scope of works will be discussed with KCC, TDC and Historic England as appropriate. An Archaeological WSI will be

Consultee	Comments and considerations	How addressed in this ES
	sufficient information for a DCO application to be accepted as appropriately detailed is to be made available.	prepared in consultation with KCC in advance of works.
Historic England	In order that NPPF Paragraph 139 might be correctly applied the assessment of the significance of buried archaeological remains must be part of an appropriate ES.	An understanding of the potential presence and significance of heritage assets within the site has been developed from available sources (see **Appendix 9.1**). Where required, further intrusive surveys will be conducted before any work takes place on site.
Historic England	All heritage assets can have a setting and this can make a contribution to their significance, even if this is not of a level that might be equal to a designated heritage asset. Consideration of setting therefore needs to address all heritage assets.	All known heritage assets within the agreed study area and those identified in consultation with KCC beyond the study area are assessed within this ES (a summary is presented at **Section 9.10**, a full assessment is presented at **Appendix 9.5)**, based on available data.
Historic England	There is likely to be a role for "preservation by record" but some assets may merit avoidance of the impact, for example by changes in the location, design or method of construction for elements of the project. If there are nationally significant but non-designated archaeological assets, then under Paragraph 139 of the NPPF these must be considered as if they were designated. According to Paragraph 141 of the NPPF the significance of all archaeological remains at the site and the effect of the proposal upon these should be assessed.	Direct and indirect impacts of the Proposed Development on designated and non-designated heritage assets is assessed at **Section 9.7-9.10**. The mitigation strategy proposed allows for incorporation into the design or avoidance of significant heritage assets where feasible (see **Section 9.8-9.9**).
Historic England	A full desk based assessment of buildings/structures within the airport boundary is proposed to help inform which of these might be considered as heritage assets and if so this will also enable consideration of how the setting of these would be affected. It is proposed that mitigation of harm to built heritage assets would principally be by a programme of building recording as reflected in a WSI to be submitted with the ES. It is potentially premature to assume that this is the appropriate means of mitigation. Should any of the buildings or structures be of a sufficient level of significance that listing or scheduling might be relevant as then designated heritage assets the advice of the NPPF, and specifically Paragraphs 132-134, would apply. The option to preserve any buildings or structures were they to become listed should be allowed for in the master plan. There could be a risk to the proposal should at a critical juncture buildings or structures be put forward for consideration of listing or go on to be confirmed as new designated heritage assets. Were any buildings or structures to become listed at the site this would then enhance the need to understand what their setting contributes to their significance and how this might be affected by the proposal. Even if nothing within the airport boundary was ever to become listed or scheduled consideration of setting is still relevant for the designated heritage assets which are in close proximity to the site.	An assessment of the buildings within the Manston Airport site is included in the desk based assessment (**Appendix 9.1**). Further surveys may be required prior to works to establish the condition, desirability and feasibility for inclusion of designated or non-designated heritage assets in the final project design, see **Section 9.9**. There are no designated assets within the site boundary (see **Section 9.4**). An Archaeological WSI will be prepared in consultation with KCC in advance of works for further survey and recording measures as appropriate.
Historic England	Encouraged consideration of how the museums might continue to work in unison and how they might retain visual connections with the airfield and in particular its runway. The potential for historic aircraft to operate from the site and not be squeezed out by the freight operation could be important to protecting the heritage significance of the airfield.	Both museums are being retained on the site, and their siting is considered further in the masterplan, see **Chapter 3: Description of the Proposed Development**.

Consultee	Comments and considerations	How addressed in this ES
Historic England	We have identified some high grade designated assets which are part of the same broad Wantsum Channel and Isle of Thanet landscape as the airport and consideration of views from these should form part of an appropriate assessment. Richborough castle as a part of the National Collection of Historic properties (now managed by English Heritage Trust) is one such example and the nunnery at Minster another, but we will wish to agree which locations and assets should be considered and by what means. A wire frame model of the maximum extent of new structures might be one approach.	High grade assets, as determined in consultation with KCC and Historic England are included in this ES. For wire line models and visualisations see **Chapter 11: Landscape and Visual.**
Historic England	Airports operate on a 24hour basis and the lighting required for this should be considered for any heritage assets for which night time darkness is a part of the appreciation of their significance.	Lighting is addressed in the desk based assessment (**Appendix 9.1**) and **Section 9.10**.
Historic England	Illustrations for setting purposes may be integrated with the proposed LVIA process but views specifically for heritage purposes may also be necessary.	Views were taken specifically for heritage purposes, see **Chapter 11: Landscape and Visual**.
Historic England	Consideration of setting is often approached primarily as a visual matter and this is important but there can be other effects upon setting and how this relates to the experience of an asset. Noise and activity are two examples of this. We shall be interested in the assessment of heritage assets which may be affected by airport related noise and we shall be particularly interested in anywhere noise, or rather the lack of it, is part of the existing operation of a historic site and/or how its significance can be best appreciated.	Potential noise impact is addressed at **Section 9.10** and the desk based assessment (**Appendix 9.1**).
Thanet District Council	In relation to the impact on heritage assets, there may be non-designated heritage assets not identified in the KCC HER which could be affected by the proposal, and the assessment criteria should make provision for these potentially being identified through the DCO process.	It is acknowledged that previously unknown heritage assets may be present on the site. The mitigation strategy presented at **Section 9.8** allows for investigation, reporting and/or avoidance where appropriate. An Archaeological WSI will be prepared following consultation with KCC in advance of works.
Thanet District Council	The approach to the use of photomontages for the visual representations of the levels of possible harm should be agreed with the Council as well as Historic England.	Photomontages of views from the heritage assets agreed in consultation with Historic England and KCC and supplied with the LVIA (**Chapter 11: Landscape and Visual**) have been used to inform the assessment of indirect effects (**Section 9,10**) and the desk based assessment (**Appendix 9.1**).
Thanet District Council	From the (2017) PEIR, it appears that you seek to rely upon information from trial trenching carried out in support of the current planning application for the redevelopment of the airport site to assess future studies. It is important to note the agreed trial trenching was connected to the proposed layout of that scheme, with no trial trenching on the northern grass area. Given the extent of development on the section of land within your proposal, it is considered highly likely that you will be required to carry out your own trial trenching in this location to support your DCO submission, however we defer to KCC to comment.	The scope of any required further survey work will be discussed with KCC, TDC and Historic England. An Archaeological WSI will be prepared in consultation with KCC in advance of works.
Kent County Council	Noted that the results of archaeological field survey are needed to understand the potential impacts of development and that this proposal may require separate additional works to that of the Stone Hill Park planning application (OL/TH/16/0550).	The scope of any required further survey work will be discussed with KCC, TDC and Historic England. An Archaeological WSI will be prepared in consultation with KCC in advance of works.

Consultee	Comments and considerations	How addressed in this ES
Kent County Council	Noted that the results of survey work are needed to understand the impact of the Proposed Development on buried archaeology and on historic structures in the airfield. Preliminary discussions have been undertaken, however, the scope of survey work needed should be discussed in further detail with KCC Heritage Conservation and Historic England.	The scope of any required further survey work will be discussed with KCC, TDC and Historic England. A desk based assessment included in this ES (**Appendix 9.1**) assesses the impact of the development on known heritage assets.
Kent County Council	The response to KCC Heritage Conservation Comment on the need for archaeological evaluation implies a reliance on the results of the survey works carried out for the Stone Hill Park planning application. It is acknowledged that the results of this work will be a data source, it may be that the parameters of those surveys which were specifically targeted against the Stone Hill Park proposals do not cover the parameters of the proposal for which a DCO is sought. The timetable for when the results of the surveys referred to is made available is also a matter that may influence the production of an informed ES.	The scope of any required further survey work will be discussed with KCC, TDC and Historic England.
Kent County Council	The Historic Environmental baseline will need to be strengthened in the forthcoming desk study by a closer examination of the records mentioned and the buried archaeological landscape, and in particular its articulation and significance explained. The baseline presented sets out as a summary of mainly HER entries and does not explain how they come together into a particularly rich and significant archaeological landscape.	Addressed in **Section 9.4** and the desk based assessment (**Appendix 9.1**).
Kent County Council	There are likely to be remains that merit avoidance of impact from the proposal and where mitigation by investigation is an inadequate approach. The need for a decision to be informed by an appropriate and targeted level of survey and evaluation is paramount. Similarly, it is hoped that non-designated historic aviation features are retained as part of the development proposals to ensure that what remains of the historic sense of place is maintained for the future.	The mitigation strategy presented at **Section 9.8** proposes targeted survey and evaluation. As far as possible, significant buried heritage assets will be avoided and significant built heritage assets included in the final project design, see **Chapter 3: Description of the Proposed Development**. An Archaeological WSI will be prepared in consultation with KCC in advance of any further works required.
Kent County Council	The setting of the Minster Abbey SM should be included in the assessment. There is also a need to recognise the impact of the proposals on historic landscapes, including the former Wantsum Sea Channel.	Addressed in **Section 9.10** and the desk based assessment (**Appendix 9.1**).
Kent County Council	Care should be taken in developing proposals to move the two museums to avoid both direct impacts and indirect effects caused by changes in accessibility, the inter relationship and relationship with the airfield heritage. The potential for enhancement is recognised.	Both museums are being retained on the site, and their siting is considered further in the masterplan, see **Chapter 3: Description of the Proposed Development**.
Kent County Council	There should be a recognition that non-designated heritage assets can be of high significance both individually (and the Thanet District has a unique, rich and distinctive archaeological heritage) and cumulatively, as buried landscapes or their contribution to heritage themes that provide a distinctive character to the place.	The current baseline for non-designated heritage assets is presented at **Section 9.4** in this ES and the desk based assessment (**Appendix 9.1**).
Kent County Council	The use of a two-level approach may only set out the most significant effects and suggests that lesser effects are not significant. There may be examples especially where Medium Change on Medium Heritage Significance is considered Significant. This could particularly be the case with cumulative effects.	The method used in this assessment follows that set out by Historic England and allows for professional judgement where a two-level approach is insufficient to identify significance related to other, external, factors (**Section 9.7**).

Consultee	Comments and considerations	How addressed in this ES
Kent County Council	It is understood that there will be detailed design of construction works at a later phase, however, the ES needs to set out clearly the parameters within which the effects of the proposals are appropriately understood so that decisions on the approach to mitigation can be reached.	This assessment assesses the potential impact of the Proposed Development and should be read in conjunction with **Chapter 3: Description of the Proposed Development.**
Kent County Council	It is premature to promote a scheme of archaeological investigation as providing a measure of mitigation. The buried archaeological resource may warrant a scheme of preservation to be agreed in the first instance and where this is not appropriate, mitigation through investigation.	As far as possible, the preservation of heritage assets of particular interest on the site, as identified during the desk based research, will be included in the final design, see **Chapter 3: Description of the Proposed Development**. Further intrusive works will be discussed with KCC, TDC and Historic England. An Archaeological WSI will be prepared in consultation with KCC in advance of works.
Kent County Council	Built heritage assets within the airport contribute to the historic sense of place of the airfield and should be retained as far as possible. They need to be considered in cumulative terms as well as their individual significance. Direct Effects on Archaeology – the rationale that the archaeology impact can be largely mitigated through investigation is premature and there are likely to be remains that warrant preservation. The further work should include the results of archaeological survey and evaluation tailored for the present proposals. Submitting an outline proposal at application stage will constrain incorporation of preservation measures in the mitigation. Likewise, the significance of the built heritage assets needs to be understood early in design and used to inform the master planning of the proposal and detailed design.	Group significance is addressed as part of this ES and in the desk based assessment (**Appendix 9.1**). As far as possible, the preservation of heritage assets of particular interest on the site, as identified during the desk based research, will be included in the final design, see **Chapter 3: Description of the Proposed Development**.

Table 9.6 Summary of consultee comments and responses – 2018 Statutory Consultation

Consultee	Comments and considerations	How addressed in this ES
Historic England	Noted that Northern Grassland area was of critical importance to understanding the effects of the proposed scheme on archaeological remains.	Discussion of this area has been expanded to consider potential effects in more detail. The scope of any required further survey work will be discussed with KCC, TDC and Historic England. An Archaeological WSI will be prepared in consultation with KCC in advance of any works.
Historic England	Clarified statements regarding acceptability of post-determination archaeological work and expressed view that pre-application survey work would be appropriate.	The scope of any required further survey work will be discussed with KCC, TDC and Historic England.
Historic England	Requests adoption of a 'worst-case' assessment scenario in line with 'Rochdale Envelope' approach.	The assessment presented in this ES provides a realistic 'worst-case' scenario (for further details please see **Chapter 5: Approach to the Environmental Statement**).
Historic England	Requests more detailed contingency planning and demonstrable flexibility in design to minimise effects of development on archaeological remains.	Contingency planning for avoidance of archaeological remains by design can only be discussed in principle at this stage.
Historic England	Requests specific consideration of the heritage significance of the Northern Grassland area.	More detailed consideration of the Northern Grass area is presented at **Paragraph 9.4.43** of this ES.

Consultee	Comments and considerations	How addressed in this ES
Historic England	Suggests use of Historic England Enhanced Advisory Service to identify significance of built heritage assets.	An assessment of significance of built heritage assets, based on previous reporting carried out for KCC, has been presented in the archaeological desk based assessment (**Appendix 9.1, Table 4.2** and **Table 4.3**).
Historic England	Requests more detailed consideration of change in setting of heritage assets within the airfield.	Consideration of setting of heritage assets within the airfield has been presented at **Sections 9.9.1 and 9.9.4** of this ES.
Historic England	ES to provide more detail on use of visualisations.	Discussion has been added at **Section 9.6.17**.
Historic England	ES to consider change to setting of Richborough Castle in more detail, particularly with regards to effects of lighting.	More detail has been provided at **Table 9.14** of this ES.
Historic England	Assessment of aviation noise is broadly in line with methodology set out in the Aviation Noise Metric.	Noted.
Historic England	PEIR does not fully demonstrate the application of the Aviation Noise Metric scoping method.	More detailed scoping information is set out at Appendix E of the archaeological desk based assessment (**Appendix 9.1**), including a list of heritage assets, with discussion of their sensitivity to noise effects and their present context.
Historic England	Requests caution over assessment of effects where heritage assets are at the boundaries of identified noise thresholds.	Noted.
Historic England	Suggests use of modal noise contours as well as average for understanding effects on heritage assets.	Modal noise contours have been considered in the assessment of effects on heritage assets (see **Appendix 9.1**)
Historic England	Expresses concern over the assessment matrix which could result in medium effects on high significance assets appearing as non-significant.	The assessment matrix used identifies medium magnitudes of change on a high significance asset as significant.
Kent County Council	Advises that the discoveries in the recent investigations within the airport need to be take account of; and further survey and evaluation is needed in areas of the development proposals that have not yet been surveyed and / or evaluated. Notes also that their position remains the same as discussed on the 30 October 2017- that further intrusive investigation is needed in the Northern Grass Area and Geophysical Survey.	Unsuccessful efforts have been made thus far to acquire the reports. Further investigation is proposed (**Sections 9.8-9.9**) the scope of which will be discussed with KCC, TDC and Historic England.
Kent County Council	Notes that it is not clear that adjustment to enable preservation if required following post determination evaluation would be possible within the development parameters once permitted. A WSI is not an appropriate alternative to evaluation to inform a decision. Alterations to the project design may not be sufficient as they may be constrained by approved development parameters.	Contingency planning for avoidance of archaeological remains by design can only be discussed in principle at this stage.

Consultee	Comments and considerations	How addressed in this ES
Kent County Council	The reference to the Historic England confirmation that archaeological works can be secured by requirements in the DCO does not appear in Table 9.5. We believe that Historic England is of the same view as ourselves; the decision needs to be informed by evaluation.	Further consultation with Historic England (**Table 9.4)** has confirmed a misinterpretation, which has been amended.
Kent County Council	The response to the KCC comment with respect to understanding certain sites outside the study area is not consistent with what had been agreed. The sites quoted are designated heritage assets rather than the archaeological investigations that illustrate the rich and unique character of Thanet's archaeology.	This has been revised and the relevant investigations are considered within **Section 9.4 and Appendix 9.1**
Kent County Council	Notes potential for undesignated archaeological assets of up to national significance and that archaeology can be found at shallow depth thus limiting engineering solutions.	The assessment presented in this ES provides a realistic 'worst-case' scenario (for further details please see **Chapter 5: Approach to the Environmental Statement**).
Kent County Council	Requests incorporation of on-site built heritage assets where possible in a holistic interpretation scheme around the two museums. A programme of recording rather than their preservation is very much a less favoured mitigation. The visual connection of the museums to the operational areas of the airport and especially the runway needs to be considered. It is not clear what is to be retained or demolished and the justification for this will need to be clearly set out in the EIA.	Further survey is proposed (**Section 9.9**) to identify condition and potential for sustainable use. Contingency planning for incorporation of built heritage assets by design can only be discussed in principle at this stage. For this reason, the assessment presented in this ES provides a realistic 'worst-case' scenario.

9.4 Overall Historic Environment Baseline

Current Baseline

9.4.1 The historic environment baseline is presented in detail in the desk based assessment (**Appendix 9.1**). A summary is provided below, which includes the additional archaeological evaluation results prepared for the Stone Hill Park application, which have recently become available.

Topography and Geology

9.4.2 The Proposed Development site is mainly situated at an elevation between 45-50m above ordnance datum (AOD). The southern portion is located at an elevation of approximately 50m AOD, along the length of the existing runway, but rises to approximately 55m AOD in the western most corner of the site. North of the runway the site level falls to approximately 40m AOD, in the west, at the Spitfire Way Junction (crossroads of the Manston Road (B2050) and the Spitfire Way (B2190)), while remaining at 45-50m AOD in the northern most part of the site.

9.4.3 Telegraph Hill, at the west end of the site, is a high point in the surrounding landscape, and one of the highest in the Thanet District. The existing runway is sited along the length of a ridge running east from Telegraph Hill.

9.4.4 The site is underlain by bedrock, Margate Chalk Member of the upper Newhaven Chalk Formation, overlain by the sands and silts of the Thanet Formation along the site's northern boundary. The superficial drift deposits overlying the site are variable, with some areas having no superficial geology (predominately in the south of the site) interspersed with areas of Head Formation, comprising Clay and Silt.

Historic Landscape

9.4.5 The site lies within an area of local and regional historic significance due to its location on the Isle of Thanet. Until approximately 1,000 years ago, this area of north-east Kent was an island separated from the mainland by the Wantsum Channel until it silted up in the 16th Century, creating a unique landscape, with its development and activities governed by its geographical position.

9.4.6 Intensification of settlement and agricultural activity from the Bronze Age reflects the growing importance of the Wantsum Channel and the unique cultural development of the wider region. Cropmarks on Telegraph Hill, a high point in the landscape, probably form part of the extensive Bronze Age funerary activity identified during the East Kent Access Road investigations and more widely across Thanet.

9.4.7 Due to its coastal location, Thanet has been an entry and departure point for a succession of populations, bringing new ideas regarding landuse. Recent archaeological work has identified a possible 1st century BC Roman port or landing site near Ebbsfleet, and there is significant evidence of settlement within the area from the 1st century AD onwards. The Romans utilised the Wantsum Channel as sea passage to the Thames Estuary and a harbour and point of entry to the Roman province, resulting in the construction of permanent port facilities, the fort and associated settlement at Richborough. Near the site, evidence of Romano-British activity was recovered in the East Kent Access Road and Thanet Earth excavations.

9.4.8 Ebbsfleet and Pegwell Bay are also recorded as the quasi-mythic landing sites of Hengist and Horsa and of the Augustinian Mission to Britain, and it is clear that Thanet was a key area of cultural contact during the early medieval period, and significant evidence of settlement and funerary activity has been observed in the area, particularly along the slopes on the eastern side of the Wantsum Channel, where early medieval cemeteries are known at Sarre and Ozengell Grange.

9.4.9 During the medieval and post-medieval periods land close to the site was dominated by agricultural activity, as indicated by evidence of farmsteads and numerous enclosures. The Medieval trackway known as Dunstrete, which runs through the southern part of the site, formed an important communication feature in the landscape.

9.4.10 The strategic importance of the region once again reshaped its history in the modern period. Close proximity to Europe enabled the site to play an important role in the Defence of Britain during the two World Wars and continuing aviation use.

Designated Heritage Assets

9.4.11 A gazetteer of designated heritage assets within the study area is provided as **Appendix 9.2**, those within the study area are shown on **Figure 9.1**.

9.4.12 There are no World Heritage Sites (WHS) within the study area. The nearest WHS, Canterbury Cathedral, St. Augustine's Abbey and St. Martin's Church in Canterbury, is located 16km south-west of the study area. The setting of the WHS is primarily defined by a series of short to medium distance views described in the World Heritage Site Management Plan[35]. Settings of the listed buildings within the WHS are, with the exception of the Cathedral, defined by their visual, functional and associative links with related and nearby structures within the urban core of Canterbury.

9.4.13 There are two scheduled monuments within the study area, which are both within close proximity to the site:

- Anglo-Saxon Cemetery south of Ozengell Grange (List Entry 1004228). Located 100m to the east of the site. Partial excavation since the mid-19th Century has recorded over 100 Anglo-Saxon burials, many with grave goods, on or in the vicinity of the site. Further archaeological remains survive in the vicinity of this site but are not included because they have not been formally assessed (i.e. partial excavation near Ozengell Grange, to the north of the monument, has recorded several hundred Anglo-Saxon burials, which are likely to be part of the same inhumation cemetery). This SM is primarily of significance for archaeological interests, deriving from the informative potential of surviving below ground remains. Its setting is influenced by its location on a ridge with views south and east toward the sea; and

- Enclosure and ring ditches sited 180m east-northeast of Minster Laundry (List Entry 1004203). Located directly south of the A299 which forms the southern boundary of the site. The features recorded as crop marks on aerial photographs represent the surviving ditches of a Romano-British and Iron Age settlement. This SM is primarily of significance for archaeological interests, deriving from the informative potential of surviving below ground remains. Its setting is influenced by its location on a south-facing slope with views south toward the River Stour.

9.4.14 Beyond the study area, a further two significant heritage assets merit consideration:

- The SM Monastic grange and pre-Conquest nunnery at Minster Abbey (List Entry 1016850) is located c. 1.3km to the south of the site. Situated on low-lying ground near the eastern edge of the town of Minster, the nunnery (List entry 1012674), built in AD 741, is represented by below ground traces of buildings and associated remains, which survive beneath the 12-Century Benedictine monastic grange (List entry 1223807). The grange survives in the form of standing buildings, water-filled fishponds and associated below ground remains. The standing buildings are Listed Grade I. As the pre-conquest nunnery is below ground, it is primarily of significance for the archaeological interest contained in the below ground remains, although the architectural interest of surviving elements of the monastic buildings is complemented by historic interests deriving from the visible presence of the monastery and its present use as a Benedictine nunnery. The setting of the listed buildings associated with the grange is defined by their visual and associative links with one another. The low-lying level of the ground at this location, surrounded by high walls serves to limit external views, enhancing a perception of seclusion.

- The Saxon Shore fort, Roman port and associated remains at Richborough (List entry 1014642) is located c. 5km to the south of the site. The earliest known use is as an Early Iron Age Farmstead. The Roman invasion force landed here in AD 43 and constructed a temporary camp. This became a Roman military and naval supply base, followed by a Roman port and associated settlement which was fortified in the 3rd Century. Within the area of the Saxon Shore fort SM lies the Grade I Richborough Castle (List entry 1363256). The castle contains the remains of the Roman settlement of *Rutupiae*, and the three sides of the late-3rd Century Saxon shore fort, with additional areas dating to the 10th and 12th Centuries. The original coastal setting on an island in the Stour Estuary has been lost over time as a result of the silting of the Wantsum Channel and the remains of the fort are now located on a slight hill, with other parts of the SM located on slightly higher ground to the south and on lower ground to the north. The main contribution of the setting of Richborough castle is now more immediate and related to the visible earthworks and standing walls but longer distance views across the former Wantsum Channel enhance its setting.

9.4.15 There are no listed buildings within the site, however, there are 24 listed buildings within the 1km study area. These are outlined in **Table 9.77** and shown on **Figure 9.1**.

Table 9.7 Listed buildings within the study area

List Entry	Name	Grade	Direction and Distance from Site Boundary
1224593	Wayborough Manor	II*	570m to south
1224683	Cleve Court and Cleave Lodge	II*	220m to north-west
1336669	Barn about 50m east of Ozengell Grange	II*	430m to north-east
1085377	Ozengell Grange	II	400m to north-east
1085409	53 and 55 Foad's Lane	II	820m to south
1085442	Grove Farmhouse and Walled Front Garden	II	500m to east
1085443	Remains of Monastic Building	II	35m to east

List Entry	Name	Grade	Direction and Distance from Site Boundary
1085444	Barn at Preston Farm	II	680m to east
1085445	Barn at Manston Green	II	450m to east
1204244	Flete Lodge	II	580m to north-east
1223803	Cheeseman's Farm	II	760m to north
1224336	Chapel House	II	480m to south
1224337	Psalm Cottage	II	920m to south-west
1224339	Rose Cottage and Pansy Cottage	II	675m to south
1224448	Prospect Inn	II	150m to west
1224499	Bay Tree Cottage	II	950m to south-west
1224545	Tudor Cottage	II	660m to south
1266885	Rose Cottage	II	920m to south-west
1266887	Way House and Wayborough House, and attached Garden Wall	II	350m to south
1336624	Old Forge House	II	480m to east
1336625	Manston Court and adjacent Wall	II	60m to east
1336626	Granary about 25m south of Manston Court Farmhouse	II	50m to east
1429581	Eastern of two Concrete WWII 4-inch gun emplacements	II	950m to south-east
1430779	Manston War Memorial	II	445m to east

9.4.16 The conservation area of Acol lies partially within the 1km study area.

9.4.17 There are no Registered Parks and Gardens (RPG) within a 1km radius around the site. The nearest RPG is grade II* registered Goodnestone Park which is 11km beyond the 1km study area.

9.4.18 There are no Registered Battlefields in Kent.

9.4.19 The full list of designated heritage assets considered for potential adverse effects as a result of change to setting caused by noise is presented in the archaeological desk based assessment at **Appendix 9.1**.

Non-designated Heritage Assets

9.4.20 A gazetteer of non-designated heritage assets (Historic Environment Record) within the study area is provided in **Appendix 9.3**, these are shown on **Figure 9.2a-h**.

9.4.21 There are over 800 previously identified non-designated archaeological features within the site and the 1km study area, including archaeological remains from the prehistoric through to the medieval period onwards, including various phases of use of the airport, which are evidence of long term human activity within the area.

9.4.22 Extant non-designated built heritage assets primarily comprise airfield structures which have been considered in more detail in the archaeological desk based assessment. It is considered that these are of local-regional significance.

9.4.23 A summary of the archaeological baseline is presented below. A more detailed assessment is provided in the full desk based assessment (**Appendix 9.1**).

Prehistoric Period (c. 780,000 BP – AD 43)

9.4.24 The prehistoric period encompasses the evolution from earlier pre-anatomically modern human and close human relatives to modern Homo sapiens as well as the transition from a nomadic itinerant hunter gatherer lifestyle to one of settled agriculture and pastoralism within a landscape enclosed by field boundaries.

9.4.25 Archaeological evidence relating to all of the prehistoric periods (Palaeolithic, Mesolithic, Neolithic, Bronze Age and Iron Age) has been recovered from the study area. This evidence mainly takes the form of unstratified find spots of isolated artefacts such as flint scatters; visible cropmarks indicating the locations of barrows, roundhouses, enclosures and field systems; or features encountered during archaeological investigation on the site and within the study area.

9.4.26 Two Palaeolithic flints have been found within the site boundary (TR 36 NW 546, TR 36 NW 55[A]). Within the study area a potentially in-situ Middle Palaeolithic lithic working site (TR 36 NW 489), a Lower to Middle Palaeolithic handaxe (TR 36 NE 2403), Mesolithic tranchet axe (TR 36 SW 366) and residual Mesolithic artefacts (TR 36 NE 577) are known. This evidence indicates potential transient occupation in the area during this period. More generally, several internationally significant sites from this period are found in Kent, including Swanscombe, Ebbsfleet, and Bakers Hole, demonstrating presence and survival of remains of this period in the region.

9.4.27 Evidence for Neolithic activity is found in the study area and represented by a settlement (TR 36 NE 598), domestic features containing Neolithic pottery (TR 36 SE 737; TR 36 SE 737; TR 36 SE 319) and ex-situ finds (TR 36 NE 634; TR 36 NE578; TR 36 NW482; TR 36 NW 504); while just outside the study area near Pegwell Bay, investigations of the substantial Chalk Hill causewayed enclosure attest to an occupation period of up to 115 years during the 4th millennium BC.

9.4.28 An enclosure and round barrow, possibly dating as early as the Neolithic, are recorded as cropmarks at the western end of the site (TR 36 NW 210) on Telegraph Hill. A high point in the landscape, it may be associated with other Bronze Age barrows excavated on the site (TR 36 NW 34; TR 36 NE 54) and potentially forms part of the wider prehistoric funerary landscape identified during excavations on the East Kent Access Road and beyond. Funerary activity has been shown to be an important activity throughout the wider Thanet area during this period.

9.4.29 Evidence for Bronze Age occupation takes the form of a potential hoard which has since dispersed by ploughing (TR 36 NW 193), pottery (TR 36 NW 470), eleven pieces of residual worked Bronze Age flint (TR 36 NW 487), and a curving ditch containing pottery dating to c.1000 BC (TR 36 NW 466).

9.4.30 Iron Age domestic activity and settlement is known from evidence found on the site. Iron Age pottery was recovered during evaluation works on the passenger side of the airport (TR 36 NW 469). A pit containing a rim sherd of flint-gritted pottery was found during excavations at Laundry Road on the southern edge of the site in 1995 (TR 36 NW 382). A concentration of early Iron Age pits and other features was found under the far eastern end of the Manston Airport runway (TR 36 NW 35). An extensive late Iron Age and early Roman settlement was revealed during evaluation works in advance of the construction of a new car park at the Airport (TR 36 NW 1176). Geophysical survey works carried out as part of the Stone Hill Park housing development application identified a number of anomalies that were interpreted as elements of prehistoric activity[36].

9.4.31 Aerial photography has identified the presence of cropmarks of features likely to be of prehistoric data to either end of and along the south of the runway, with a further concentration of remains, including find of material to the northern part of the Northern Grassland and immediately to the north. Beyond the prehistoric evidence identified on the site itself, the study area includes a large amount of prehistoric archaeology, including sites of settlements, burials, and cemeteries, and finds

of flint and metal artefacts. The intensification of domestic, agricultural and funerary activity and changes in land use during this period emphasises the growing importance of the Wantsum Channel.

Roman

9.4.32 Recent investigations near Ebbsfleet are thought to have identified the landing point for Julius Caesar's 54BC arrival in Britain. Subsequently, the Romans began to settle the area. The strategic location of the Wantsum Channel gave access to the River Stour and beyond to Canterbury and London, and forts were built at either end (Richborough and Reculver) to defend against Saxon attacks in the 3rd Century. The period is characterised by dense settlement patterns and proliferation of Roman structures throughout the south east including the forts, roads, and settlements. Evidence for roads and settlement has been found on or in very close vicinity to the site.

9.4.33 Investigations along the A299, adjacent to the southern boundary of the site, identified a large scatter of Roman finds and inhumation and cremation burials along its length within and just to the south of the site (TR 36 NW 187, TR 36 NW 188), which may extend into the site. An extensive Romano-British industrial and settlement site was found during the construction of a gas pipeline in 1984, along the southern edge of the Airport site (TR 36 NW 182). Further Romano-British settlement evidence was reportedly found during westward expansion of the runway during World War II (WWII) (TR 36 NW 209) while Roman ditches, gullies, pits and cremations were found during the East Kent Access Route excavations in 2009-2011 (TR 36 SW 405). A Roman pit with a hearth in the base was found during excavations on the cargo side of the airport in 2000 (TR 36 NW 467). Geophysical survey works carried out as part of the Stone Hill park housing development application identified a number of anomalies that were interpreted as elements of Romano-British activity[37].

9.4.34 Roman activity is widespread within the study area. Several settlements, field systems, road, cemetery sites, buildings and quarries, in addition to finds of pottery, coins, brooches and other objects, are typical of Roman activity known from the south-east of Britain.

Early Medieval

9.4.35 Anglo Saxon activity in the area is primarily represented by funerary activity, most notably the SM of Ozengell Grange Anglo-Saxon inhumation cemetery (1004228). At the western end of the site, a small barrow and linear features visible as cropmarks have been identified as Anglo-Saxon as a result of Anglo-Saxon finds made in close proximity (TR 36 NW 214). Within the study area, numerous cemeteries (TR 36 NW 240; TR 36 SW229; TR 36 SE 739; TR 36 NW 1144; TR 36 NW 1143; TR 36 NW 1160), burials (TR 36 NW 383; TR 36 NE 26; TR 36 NW 189; TR 36 NW 195; TR 36 SE 686); barrow and/or ring ditch crop marks (TR 36 NE 87; TR 36 NW 123; TR 36 NW 172; TR 36 NW 178; TR 36 NW 179; TR 36 NW 214; TR 36 NW 214; TR 36 SE 23) and high status burials (TR 36 NW 186) are known; there is a clear focus for this activity along the ridgeline occupied by the A299 and the runway, with the majority of known sites along the southern side of the ridge, occupying a topographical location that accords with other remains elsewhere in Thanet, where visibility over the Wantsum appears to be a factor in site selection. Geophysical survey works carried out as part of the Stone Hill Park housing development application identified a number of anomalies to either end of the runway that were interpreted as elements of early-medieval activity[38].

9.4.36 On the site, there is little evidence for domestic or agricultural activity. Isolated early medieval findspots from the site include an early-medieval bead and iron knife (TR 36 NW 216), coins (TR 36 NW 498; TR 36 NW 499) and fragments of mid-Saxon to medieval pottery (TR 36 NW 471). The study area, however, suggests sustained and continued Anglo-Saxon activity, represented by settlements, buildings, trackways and findspots of coins and jewellery.

Medieval

9.4.37 The first specific documentary evidence for settlement in the vicinity of the site comes from the medieval period with a large settlement noted at Minster in the Domesday survey of 1086. Settlement at Manston likely dates from the 12th Century[39]. Medieval trackways are visible on both historic mapping, shown as Dunstrete and on a geophysical survey of the site recently completed in support of the planning application for Stone Hill Park. Dunstrete was an important east-west aligned routeway across Thanet, a portion of which runs through the southern part of the site and was apparently observed in geophysical surveys carried out as part of the Stone Hill Park planning application[40].

9.4.38 On the site, medieval features including ditches and pits and finds of pottery, a medieval copper alloy buckle (TR 36 NW 471, MKE80179, TR 36 NW 468) indicate domestic or agricultural occupation of the site. This is typical of the study area, which primarily consists of farmsteads, buildings, and numerous enclosures. Industrial activity is also present in the form of a settlement with industrial activity (TR 36 NE 121) and a quarry (TR 36 NW 481).

Post Medieval

9.4.39 During this period the Wantsum Channel silted up and the land was reclaimed, with the marsh areas of the former channel being used as pasture land for sheep.

9.4.40 As one of the richest agricultural areas in the country, the area of the site and its vicinity remained heavily rural and agricultural in nature during the post-medieval period, but saw increasing quarrying activity, mainly for chalk but also targeting flint and clay, including the mid-18th Century Manston Caves chalk mine on the eastern part of the site (TR 36 NW 437, TR 36 NW 1125). Supporting the agricultural industry, the farmstead, Foster's Folly, on the eastern edge was a loose courtyard plan farmstead with buildings to two sides of the yard (MKE87020). Two flour mills are also known from the site, and are pictured on old OS maps of 1839 and 1972 (TR 36 NW 1107).

9.4.41 The study area is dominated by these activities. There are 26 farmsteads, of which Bush Farm (MKE87023), Rose Farm (MKE88749), Manston Court (MKE87018) and Pouces (MKE86971) are located closest to the site boundary. There are 16 incidences of quarrying, primarily chalk pits, including a small chalk pit at Pouces Cottages (TR 36 NW 1125), Mount Pleasant Chalk pit (TR 36 NW 337) and Dellside chalk pit (TR 36 NW 328) located close to the site boundary.

Modern

9.4.42 Expansion is observed in the modern period for the major townships, especially Ramsgate to the East. Increasing trade at the ports of Ramsgate and Margate following the Reformation and a surge in tourism created by the introduction of the railway linking London to these seaside towns in the mid-1840s, greatly increased the wealth of the region. The most significant change in the region sees the agricultural fields of the site itself converted for aviation use (TR 36 NW 432).

9.4.43 The airport had its origins in the early years of World War I (WWI) and was later used extensively in World War II (WWII), with the remains of several WWII structures still extant on the site (see **Appendix 9.1**, Table 4.2). The Northern Grass area remained largely open, with structures, including temporary structures, positioned to the peripheries. This enabled use of this area for additional runways (no longer present). During the early period of the Cold War until 1960, the site was used by fighter-bombers of the United States Airforce. In the 1960s the airport was returned to RAF use and an Air Fire Training Centre was established on the site. It was designated one of the country's MEDAs (Master Emergency Diversion Airfield) for both military and civilian flights. In 1999 RAF Manston closed and the airfield became a civilian airfield, which ceased aviation activity in 2014, with the exception of a helicopter training facility that remains operational. Two aviation museums, the Hurricane and Spitfire Museum and the Manston Airfield Museum, are located on the site and reflect an important local interest in the site's military history. This history of changing use means that the assemblage of historic buildings at Manston do not reflect any one period of use, but represent the results of selective reuse for a number of different purposes and chance survival.

9.4.44 The study area also contains structures related to the use of Manston as an airfield, which can be considered to be elements of a group of disparate heritage assets which are linked primarily by their historic use as part of the airfield rather than functional or designed connections within any one phase of use or operation of the airfield (see **Appendix 9.1**, **Table 4.3**).

9.4.45 In summary, the airport has the potential to preserve for remains from all periods of its use, especially for the WWII airfield, the perimeter defences, pillboxes and trenches, which have been identified in the Kent HER, and are included the gazetteer provided in **Appendix 9.3**.

Archaeological Events

9.4.46 There has been an extensive and lengthy programme of archaeological investigations undertaken within the study area. Archaeological work within the peninsula has revealed notable archaeological remains from all periods and provided evidence for settlement, burial and agricultural production. Most significantly, archaeological geophysical survey[41] and evaluation[42] carried out in support of the Stonehill Park application have provided a clearer picture of the survival of archaeological remains within the former airfield south of Manston Road.

9.4.47 A gazetteer of archaeological events is provided in **Appendix 9.4**, and a summary is presented at Table 9.8.

Table 9.8 Summary of previous archaeological investigations and observations of archaeological material from within the site

Reference	Description	Implications
Evidence for Early Prehistoric material within the site Evidence from the site and the wider areas suggests possible concentrations of material where head and gravel deposits survive, though this is likely to be restricted to scattered pockets, particularly in the western part of the site. Significance of these remains is likely to be limited.		
TR 36 NW 546	Residual Palaeolithic flint flake.	Indicative of the presence of deposits containing redeposited Palaeolithic material in the vicinity of the site.
TR 36 NW 55	Lower to Middle Palaeolithic pointed implement recovered from Telegraph Hill.	Indicative of the presence of deposits containing redeposited Palaeolithic material in the vicinity of the site.
Evidence for Later Prehistoric activity There is no recorded evidence for Neolithic activity on the site, but significant remains in the area around the site indicate a general potential that should be tested. There is clear evidence of Bronze Age settlement and funerary activity across the site. Evidence for Iron Age settlement activity is focused on the eastern part of the site, though this may reflect the concentration of past archaeological work in this area rather than any necessary concentration. Significance of these asset is likely to be high where well-preserved funerary or settlement remains are observed.		
TR 36 NW 466 EKE11793	Evaluation of passenger and cargo side taxiways and aprons, Manston: Bronze Age ditch, containing pottery and human remains.	Representative of a wider archaeological landscape and indicative of the presence of further remains of Bronze Age settlement and funerary activity.
TR 36 NW 193 EKE3995	Thanet Gas Pipeline, Phase I: possible Bronze Age hoard.	Suggestive of the presence of further remains of Bronze Age date at the southern edge of the site.
TR 36 NW 34 639613	Manston Aerodrome excavation: Bronze Age round barrow.	Round Barrows are frequently identified in groups rather than individual features, and this feature is indicative of the presence of further remains of Bronze Age date, probably including funerary remains, in the south-eastern part of the site.
TR 36 NW 210	Bronze Age enclosure and round barrow at Telegraph Hill.	Assets represent part of a wider Bronze Age settlement and funerary landscape and are indicative of the presence of further remains of Bronze Age date in the North of the site.

TR 36 NW 487	Bronze Age flint tools.	Chance finds which support the inference that this area was occupied during the Bronze Age and that material remains of that activity survive on the site.
TR 36 NW 382	Iron Age pottery.	Chance finds which are suggestive of wider Iron Age occupation of the site.
TR 36 NW 469 EKE11793	Evaluation of passenger and cargo side taxiways and aprons, Manston: Iron Age pottery found on the passenger side of the airfield.	Finds of pottery are suggestive of wider Iron Age occupation of the site.
TR 36 NW 35	Iron Age pits found under the eastern end of the runway.	Remains which are indicative of the survival of remains of settlement activity in this part of the site.
639618	Lord of The Manor Excavation: excavations of a Neolithic enclosure, and Bronze Age barrow and ring ditch.	Suggestive of further prehistoric remains extending into the south-eastern part of the site.
EKE4199	Monkton Gas Pipeline excavations Phase III-IV: significant prehistoric heritage assets identified immediately to the south of the site.	Suggestive of further prehistoric remains extending into the southern part of the site.
EKE 8131	Watching Brief on the Sparrow Castle – Manston Water Pipeline/ Sparrow Castle to Manston Pipeline, Birchington: Iron age remains found to north-west of airfield.	Remains indicative of presence of Iron Age settlement activity in the study area.
TR 36 NW 1176	Trial trenching evaluation at the site of a new car-park, Manston Airport: a series of multi-phase enclosures and a late Iron Age to early Roman Period settlement were encountered during excavations.	Indicative of further prehistoric settlement within the site.
1410715	EDF Substation Site evaluation: Bronze Age flints, an undated post hole, and an undated pit.	Suggestive of the presence of further prehistoric remains in the northern part of the site.
EKE13407	Excavations along the route of the East Kent Access route (A256): significant prehistoric remains identified immediately to the south of the site.	Suggestive of the presence of further, associated remains in the southern part of the site.
N/A	Evaluation of the Stonehill Park site by AOC Archaeology identified prehistoric ditches and ploughed-out barrows/ring ditches	Indicative of the presence of scattered and variously disturbed remains across the site.
Evidence for Romano-British activity Substantial evidence for the survival of Roman-British settlement and funerary remains, particularly within the southern part of the site, although this may relate to the location of previous investigations and remains are likely to be more widespread. Significance of these remains may be high were well-preserved settlement, industrial and/or funerary remains are observed.		
TR 36 NW 182 639598	Manston Airfield Excavation: Romano-British settlement and occupation site at southern edge of site.	Remains which are indicative of the survival of remains of further settlement activity in the southern part of the site.
TR 36 NW 209	Romano-British settlement and occupation remains at western end of runway.	Remains which are indicative of the survival of further remains of settlement activity in the southern part of the site.
TR 36 NW 467 EKE11793	Evaluation of passenger and cargo side taxiways and aprons, Manston: Roman pit and hearth found on the cargo side of the airport.	Remains which are indicative of the survival of further remains of settlement activity in the southern part of the site.
TR 36 SW 405 EKE13407	Excavations along the route of the East Kent Access route (A256): occupation and funerary remains found during the East Kent Access Road Excavations.	Remains which are indicative of the survival of further remains of settlement and funerary activity in the southern part of the site.
TR 315 657	Roman coin hoard at Telegraph Hill.	Uncertain implications but suggestive of presence of nearby settlement activity.
EKE4199	Monkton Gas Pipeline excavations Phase III-IV: significant Romano-British heritage assets identified immediately to the south of the site.	Suggestive of associated remains extending into the southern part of the site.

EKE 8131	Watching Brief on the Sparrow Castle – Manston Water Pipeline/ Sparrow Castle to Manston Pipeline, Birchington: Iron age remains found to north-west of airfield.	Indicative of presence of Iron Age settlement activity in the study area.
N/A	Trial trenching evaluation at the site of a new car-park, Manston Airport: a series of multi-phase enclosures and a late Iron Age to early Roman Period settlement were encountered during excavations.	Indicative of further prehistoric settlement within the site.
639609	Thorne Farm excavation: Romano-British cemetery identified immediately to the south of the site.	Suggestive of the presence of further funerary activity extending to the southern part of the site.
N/A	Evaluation of the Stonehill Park site by AOC Archaeology identified a substantial early-Roman ditch and bank earthwork and later Romano-British settlement and associated burial activity.	Indicative of the presence of widespread remains across the site.
Evidence for Early-Medieval activity The presence of chance finds of material of this date and possible features identified as cropmarks is suggestive of the presence of significant archaeological remains dating from this period within the site although conclusions remain tentative. Significance of remains may be high where well-preserved remains are observed.		
TR 36 NW 216	Early medieval bead and iron knife from the southern edge of the site.	Chance finds suggestive of the presence of further remains of this date within the site.
TR 36 NW 498	Silver *sceat* (coin)	Chance find suggestive of the presence of further remains of this date within the site.
TR 36 NW 499	Merovingian gold *tremiss* (coin) from the passenger area of the airport.	Chance find suggestive of the presence of further remains of this date within the site.
TR 36 NW 471 **EKE11793**	Evaluation of passenger and cargo side taxiways and aprons, Manston: early medieval pottery from the passenger area of the airport.	Chance finds suggestive of the presence of further remains of this date within the site.
TR 36 NW 214	Cropmarks of barrow and linear features identified as potentially of early-medieval date on morphological grounds.	Suggestive of the presence of funerary and settlement remains but remains to be tested.
EKE4199	Monkton Gas Pipeline excavations Phase III-IV: significant early-medieval heritage assets identified immediately to the south of the site.	Suggestive of the presence of further remains extending to the southern part of the site.
639609	Thorne Farm excavation: Early-medieval cemetery identified immediately to the south of the site.	Suggestive of the presence of further funerary activity extending to the southern part of the site.
EKE13407	Excavations along the route of the East Kent Access route (A256): significant early-medieval remains identified immediately to the south of the site.	Suggestive of the presence of further, associated remains in the southern part of the site.
N/A	Evaluation of the Stonehill Park site by AOC Archaeology identified no remains of early-mediaeval date	Indicative of very limited survival of remains of this date within the site.
Evidence for Medieval activity Recorded remains and landscape history are suggestive of the presence of relatively limited rural settlement and agricultural activity within the site. Remains are likely to be of low to medium significance.		
TR 36 NW 471	Pottery.	Chance find of uncertain significance.
MKE80179	Medieval copper alloy buckle.	Chance finds suggestive of the presence of further remains of this date within the site.
TR 36 NW 468 **EKE11793**	Features including ditches and pits.	Indicative of the presence of medieval settlement within the site.
Evidence for post-medieval activity Recorded remains and landscape history are suggestive of the presence of relatively limited rural settlement, agricultural and industrial activity within the site. Remains are likely to be of low significance.		

MKE87020	'Foster's Folly' farmstead.	Former rural settlement site, now appears to have been removed by construction of airport buildings.
TR 36 NW 437	'Manston Caves' chalk mine, now backfilled.	Indicative of the former presence of extractive industry
TR 36 NW 1107	Flour mills identified from historic mapping.	Indicative of the presence of former mill sites.
N/A	Evaluation of the Stonehill Park site by AOC Archaeology identified features associated with medieval agricultural activity	Indicative of the presence of scattered and variously disturbed remains of limited significance across the site.
Modern Features Survival of elements of the military airfield and subsequent civilian use, some features may survive as below ground features.		
TR 36 NW 1062, TR 36 NE 2168, TR 36 NW 1076, TR 36 NW 1059, TR 36 NW 1072, TR 36 NW 1048, TR 36 NW 1041, TR 36 NW 1043, TR 36 NW 1047, TR 36 NW 1059	Pillboxes.	Element of wider defensive scheme which stretch well outside the site. Features are no longer extant.
TR 36 NW 332	Air-Raid shelter.	Element of defensive scheme, no longer extant.
TR 36 NW 518 EKE13134	Survey of a Second World War air raid shelter, Manston: Air-Raid shelter.	Element of defensive scheme, no longer extant.
TR 36 NW 1220, TR 36 NW 1222	Trench system.	Element of defensive scheme, no longer extant.
TR 36 NW 1183	Oil Depot.	Element of airfield operations, now much altered.
TR 36 NW 881	T2 Hangar.	Element of airfield operations, now much altered.
TR 36 NW 882	Civil Control Tower.	
TR 36 NW 883	Crash Fire Station.	Element of airfield operations, now much altered.
TR 36 NW 884	Mechanical Transport Hangar.	Element of airfield operations, now much altered.
TR 36 NW 885	Aircraft Dispersal Bay.	Element of airfield operations, now much altered.
TR 36 NW 886	RAF Manston Control Tower.	Element of airfield operations, now much altered.
TR 36 NW 887	Office Building.	Element of airfield operations, now much altered.
TR 36 NW 888	RAF Battle HQ.	Element of airfield defensive scheme.
TR 36 NW 889	Civil Terminal.	Element of airfield operations.
TR 36 NW 894	Royal Observer Corps Listening Post.	Element of wider civil defence network.
TR 36 NW 892	Runway.	Element of airfield operations.
	Survey of Buildings and Structures Associated with Manston Airport and the Surrounding Areas.	Identifies significance and condition of historic military and civilian airport structures.

	Evaluation of the Stonehill Park site by AOC Archaeology identified buried elements of the WWII airfield defences	Indicative of the presence of scattered and variously disturbed remains of this date across the site.
Undated		
	Stonehill Park Geophysical Survey: multiple anomalies of probable archaeological origin observed to either end of the runway and on grassed areas across the site to the south of Manston Road.	Indicative of the extensive survival of archaeological features across the site, potentially of all periods from later prehistory onwards.
N/A	Stonehill Park Archaeological evaluation: extensive trial trench evaluation to either end of runways and in grassed areas south of Manston Road.	Results of trial trenching are not available.

Current Baseline Summary

9.4.48 Overall the evidence indicates a long history of human activity and occupation both on the site and within the study area, from earliest prehistory to the modern period. Development of the site throughout the 20th and 21st Century, in addition to heavy bombing during the wars and crash sites caused by emergency landings, will have disturbed and truncated archaeologically sensitive levels in some areas of the site; however, substantial buildings have been largely limited to the sides of the site, with the runway area to the south and centre portion of the northern area experiencing less development due to the nature of its use as an airfield.

9.4.49 With the exception of the Northern Grass, areas where intrusive development is proposed are focused primarily on areas where there has already been a significant degree of disturbance from the existing runway, taxiways, dispersals and associated services.

9.4.50 There is some evidence for disturbance of the Northern Grass, comprising modern hard standings and buildings around the WWII control tower, but the majority of this area has not previously been disturbed.

9.4.51 The historic character of the airfield is defined by its changing use from WWI onwards as the technology of flight progressed and the purpose of the airfield changed. Evidence for the pre-1943 airfield is still discernible, but was largely overwritten by the construction of the new runway. The secondary runways which had previously existing were gradually lost during the operation of the USAF base and subsequent civilian use, with Manston Road severing the secondary landing strip and perceptually splitting the Northern Grass, and the control tower and associated buildings within it from the rest of the airfield. The museums located in this area similarly benefit from their association with the airfield and their presence within its historic site, but have been perceptually separated from the operational areas of the airfield by Manston Road.

Future Baseline

9.4.52 In the absence of the Proposed Development, minor changes to the future baseline are anticipated during the period that the development would be constructed and operating. It is anticipated that below-ground archaeological heritage assets would remain in situ without significant further disturbance, while built heritage assets that are not in use will continue to degrade over time.

9.5 Environmental Measures Incorporated into the Proposed Development

9.5.1 This section lists the environmental measures relevant to the historic environment which have been incorporated into the design of the Proposed Development.

9.5.2 How these environmental measures influence the assessment of significance is discussed in **Section 9.6**. However, the broad approach adopted is that, where achievable, agreed environmental measures are incorporated into the design of the Proposed Development. The effect that those environmental measures have on the significance of potential effects is taken into

account during the assessment process. In some cases, a potential effect may require no further consideration following incorporation of appropriate environmental measures.

9.5.3 A summary of the environmental measures that have been incorporated into the Proposed Development in order to avoid, reduce or compensate for potential adverse effects on historic environment features during the construction phases is provided in **Table 9.9**.

Table 9.9 Environmental measures incorporated into the construction phase

Potential receptor	Predicted changes and potential effects	Incorporated measure
Non-designated heritage assets of archaeological interest	Disturbance or removal of assets could give rise to loss of archaeological interest. Potential harm to non-designated assets has been assessed in the desk based assessment (**Appendix 9.1**). The assessment identified potential for assets of national, regional and local significance. Based on topography, the area along and to the south of the ridgeline, along which the runway is located, is identified as being archaeologically sensitive.	Harm or loss of archaeological interest will be avoided or minimised to a degree through flexibility inherent in the masterplanning process following any further investigation and survey that may be required. Disturbance in the areas to the south of and to either end of the runway will be limited to services and lighting. The existing runway, taxiways and areas of hardstanding will be used to minimise further disturbance and intrusive works in the demonstrably sensitive areas, to either end and to the south of the runway, which will be restricted to provision of services.
Historic Landscape Character, designated assets and current heritage uses within the airport boundary.	Changes to the layout of the airport arising from the visibility of construction works, demolition and construction work access. Changes to non-designated structures and location of heritage assets within the airport (see **Appendix 9.1** for details of assets and **Chapter 3: Description of the Proposed Development** for changes).	Removing temporary construction features to restore plan and character of airport where possible. Reuse and/or relocation of historic structures where feasible, including the museums (see **Chapter 3: Description of the Proposed Development**).

9.5.4 A summary of the environmental measures that have been incorporated into the design of the Proposed Development proposals in order to avoid, reduce or compensate for potential adverse effects on heritage assets during the operational phase is provided in **Table 9.10.**

Table 9.10 Environmental measures incorporated into the operational phase

Potential receptor	Predicted changes and potential effects	Incorporated measure
Designated heritage assets including Historic Buildings, SM and conservation areas.	Change in setting due to construction of new buildings at the airport and uses such as aircraft stands. Potential impact from airport noise and lighting upon the setting of heritage assets and subsequent impact upon the significance of assets.	Landscaping, boundary treatment or screening to reduce views into the airport. Incorporated noise attenuation measures within the airport boundary to reduce noise effects. An operational noise mitigation strategy containing further details is presented in **Chapter 12: Noise and Vibration**.
Spitfire and Hurricane Memorial Museum and the RAF Manston History Museum	Loss of buildings presently housing the museums and their collections.	Land has been safeguarded within the masterplan for relocated museums.

9.6 Scope of the Assessment

9.6.1 This section sets out information on:

- Identification of potential receptors that could be affected by the Proposed Development; and
- The potential effects on identified receptors that could be caused by the Proposed Development.

9.6.2 The scope of assessment has been informed by:

- The Scoping Report (**Volume 4, Appendix 1.1**);
- Consultee responses to the Scoping Report (**Volume 4, Appendix 1.2**), the 2017 PIER and 2018 PEIR;
- The historic environment baseline (**Section 9.4)**; and
- The Proposed Development design (**Chapter 3: Description of the Proposed Development**).

Approach to Identifying Receptors

9.6.3 The identification of receptors is based on relevant guidance and the professional judgement of a qualified technical specialist who has undertaken a desk study for the site location (**Appendix 9.1**).

9.6.4 In some cases, even without quantified information, it is reasonable to assume that some potential receptors will not experience significant effects. This is sometimes the result of tried and trusted mitigation measures that have been incorporated into the Proposed Development, which might reasonably be expected to be effective (**see Section 9.5**).

9.6.5 The following considerations have been taken into account in identifying potential receptors:

- The sensitivity of the receptors;
- The extent to which the receptor will be affected by changes that are expected to result from the Proposed Development;
- The likely magnitude, duration and other characteristics of the effects; and
- Relevant best practice and guidance where specialist methodologies have been developed as detailed below.

Direct Effects

9.6.6 Direct effects on heritage assets are those which result from physical damage or disturbance which gives rise to a loss of heritage significance. Consequently, it is only those assets which might be physically disturbed by (i.e. within the footprint of) the Proposed Development and associated enabling works such as, intrusive surveys, site compounds and access tracks which are potentially subject to direct effects. As archaeological features are not always evident, a desk based assessment has been undertaken to examine the potential locations of archaeological heritage assets compared to the Proposed Development layout, to ascertain the potential for heritage assets to be affected.

Indirect Effects

9.6.7 Indirect effects are defined as those which result in change to heritage significance but do not give rise to physical damage or disturbance to the asset. In this context, these effects will generally arise through change to the settings of heritage assets.

Defining Setting

9.6.8 Setting is not explicitly defined in statute. It is defined in the NPPF[43] as:

> "*The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve*."

9.6.9 Historic England guidance[44] follows this definition, and sets out a methodology for considering any effects on the significance of heritage assets arising from change to setting. This methodology comprises five steps:

- Step 1: identify which heritage assets and their settings are affected;
- Step 2: assess whether, how and to what degree these settings make a contribution to the significance of the heritage asset(s);
- Step 3: assess the effects of the Proposed Development, whether beneficial or harmful, on that significance;
- Step 4: explore the way to maximise enhancement and avoid or minimise harm; and
- Step 5: make and document the decision and monitor outcomes.

9.6.10 Assessment of setting is most commonly associated with designated heritage assets, but non-designated heritage assets can also be affected by change to setting. In accordance with Step 1, the scope of the assessment has been established with reference to a ZTV of the Proposed Development (**Figure 11.7**) and a desk based appraisal and subsequent site visits to identify those assets with settings which might be sensitive to change arising from development. This has included the additional heritage assets of the Monastic Grange at Minster and Richborough Castle as requested by KCC. This process of appraisal has been an iterative process which commenced with initial consultation and has been refined through subsequent studies and engagement with consultees as set out at **Section 9.3**. The results of this process of identification of assets and their heritage significance is detailed in the desk based assessment (**Appendix 9.1**) which follows Step 1 of the 5-step sequential process set out in the Historic England guidance.

Inter-related effects

9.6.11 Inter-related effects are assessed in relation to a specific receptor where the effect could be caused by the interactions of different types of effect from project activities even if individually these are insignificant (e.g. the interaction of changes in setting, visual amenity, noise and light levels on a heritage asset, none of which are significant in their own right, but which could aggregate to comprise a significant adverse effect).

Cumulative effects

9.6.12 Potential for cumulative effects is provided through an assessment at **Chapter 18** and includes potential cumulative effects of the proposed development together with other identified major development proposals that were scoped in to the assessment.

Potential Receptors

9.6.13 The identification of receptors is based on relevant guidance, the methodology outlined above and the professional judgement of a qualified technical specialist who has undertaken the desk study (see **Appendix 9.1**) for the site location.

Potential Receptors of Direct Effects

9.6.14 There are a number of previously identified archaeological heritage assets which have been identified as areas of high or medium potential and could be affected by the Proposed Development:

- Palaeolithic remains or deposits of palaeoenvironmental and geoarchaeological interest;
- Features associated with prehistoric occupation and funerary activity;
- Features associated with Roman occupation;
- Features associated with early-medieval occupation and funerary activity;
- Features associated with landscape exploitation, including agricultural and industrial activity in the Medieval and Post Medieval periods; and
- WWI and WWII military features associated with aviation use.

9.6.15 The potential receptors identified have been presented in **Table 9.11** according to the archaeological periods they fall into.

Table 9.11 Potential receptors directly affected by the Proposed Development

Potential receptor by archaeological period	Location	Summary of evidence from desk based sources and previous phases of archaeological work as recorded in the KCC HER
Deposits likely to contain Palaeolithic and Mesolithic material	Within site and in the vicinity of the site	Desk based records held within the KCC HER note that head and gravel deposits, likely to contain Palaeolithic and Mesolithic material, have been recorded within the site, although it is believed that these deposits survive only in localised areas. The Stour Basin Characterisation project data held by KCC HER notes that the site is generally of 'very low' potential for the presence of remains of Palaeolithic or Mesolithic date, rising to 'moderate' in a small stretch of the western part of the site adjacent to Spitfire Way.
Prehistoric Archaeology	Within site and in the vicinity of the site	Prehistoric archaeological remains dating from the early Neolithic are recorded in the KCC HER as having been identified within the site in previous phases of archaeological work and as chance finds. The KCC HER also records prehistoric remains from later periods that were found during the East Kent Access Road excavations and other archaeological investigations, together with what is apparently much of a Bronze-age landscape. In the area around the site there is recorded evidence for occupation and use of the landscape from all prehistoric periods. Archaeological geophysical survey carried out for the Stone Hill Park development and cropmarks recorded in the KCC HER suggests the presence of features which may date from this period within the site, although the nature and preservation of these features is uncertain. The KCC HER notes that cropmarks of a ring ditch and possible enclosure and trackway have been observed in the Northern Grassland.

Potential receptor by archaeological period	Location	Summary of evidence from desk based sources and previous phases of archaeological work as recorded in the KCC HER
Roman Archaeology	Within the site and in the vicinity of the site	Roman archaeology identified in previous archaeological interventions within and in the area around the site recorded in the KCC HER is consistent with the wider pattern of rural settlement in East Kent. Evidence of past activity recorded in the KCC HER includes roads, settlements, agricultural use of the landscape, and burials. Within the wider landscape the presence of the Saxon Shore fort at Richborough and extensive archaeological finds from this period across the Thanet area confirm the presence of material from this period. Archaeological geophysical survey carried out for the Stone Hill Park development and cropmarks visible on aerial photographs suggests the presence of features which may date from this period within the site, although the nature and preservation of these features is uncertain. Romano-British remains are recorded by the KCC HER immediately to the North of the Northern Grass.
Anglo-Saxon Archaeology	Within the site and in the immediate area	Finds of Anglo-Saxon artefacts within the site recorded by the KCC HER indicate occupation and use of the landscape from this period. The presence of other previously identified burial grounds in this area, such as at Sarre or Ozengell Grange, confirm funerary exploitation of the landscape, particularly associated with the ridgeline and the west coast of Thanet more generally. The documented early history of Minster, to the south of the site confirms settlement in the area from this period. Archaeological geophysical survey carried out for the Stone Hill Park development and cropmarks visible on aerial photographs suggests the presence of features which may date from this period within the site, although the nature and preservation of these features is uncertain.
Medieval	Within the site and in the surroundings	A portion of the medieval trackway, *Dunstrete,* an important east-west aligned routeway across Thanet, is recorded in the KCC HER as running through the southern part of the site. Settlement in the area around the site includes villages, hamlets and isolated farms that have their origins in the medieval period. While it would normally be expected that the modern settlement pattern reflects a medieval origin, and consequently significant settlement remains are unlikely to be present, such remains may be present on the site.
Post medieval	Within the site and in the surroundings	The post-medieval use of the area follows a similar pattern to the settlement structure and hierarchy established during the medieval period, with a landscape of villages, hamlets and discrete farms in the surrounding of the airport and within the site.
The airport	Within the site	The airport has had, broadly, five phases of use. It was established during WWI and reused in WWII. After the war the United States Airforce converted Manston to a Cold War air base and the site was later used by the RAF before turning to commercial use. Each of these phases of use will have left archaeological remains and upstanding features, such as pillboxes. The layout of the airport and buildings has been defined by the later WWII use of the site as an emergency runway, and has been progressively altered during the development of the site. The airport therefore does not survive as a coherent example of any one phase of development, and has been significantly altered in overall plan for example by the B2050 Manston Road severing the disused pre-1943 grass runways, and by the overlaying of late-20th century dispersals and taxiways over the WWI and WWII airfields.

9.6.16 There is also potential for previously unrecorded archaeological features to be present. This is considered further, primarily in the desk based assessment (**Appendix 9.1**), which is summarised in the baseline description and considered in the assessment of effects.

Potential receptors of indirect effects

9.6.17 The heritage assets identified within the data search comprise a number of different asset types with differing characteristics. Where the settings of assets share common defining characteristics, either through geographical/spatial location or through thematic links, they are considered as a group, with effects on specific structures considered as appropriate.

9.6.18 The desk based assessment considered non-designated as well as designated heritage assets as potential receptors of significant indirect effects (**Appendix 9.1, Section 5.2**). Heritage assets identified as potentially subject to significant adverse indirect effects arising from visibility of the Proposed Development within their setting comprised the following:

- Designated assets within the study area as detailed in **Appendix 9.2**;
- Two scheduled monuments outside the study area, Monastic grange and pre-Conquest nunnery at Minster Abbey (List Entry 1016850) and Saxon Shore fort, Roman port and associated remains at Richborough (List Entry 1014642);
- Non-designated assets related to airfield use as detailed in **Appendix 9.1** (Tables 4.2 and 4.3);
- Ramsgate, Broadstairs, Minster and Acol Conservation Areas;
- Where designated heritage assets have been identified by consultees as requiring assessment of change to setting, these have also been considered within the scooping for the assessment of aviation noise; and
- Non-designated heritage assets within the proposed site have also been considered for assessment of change to setting. No non-designated heritage assets outside of the site boundary have been identified where significant adverse effects could arise as a result of the Proposed Development.

9.6.19 In assessing change to setting arising from the appearance of the Proposed Development in the settings of designated heritage assets, reference has been made to the ZTV (**Figure 11.7**) and visualisations presented in **Chapter 11: Landscape and Visual Effects**, particularly for Richborough Castle (**Figure 11.21**). It is important to note that these visualisations present representations of the views from a single viewpoint, and do not reflect the totality of the visibility (or absence thereof) from the heritage asset and its surroundings that contribute to setting. Assessment of visual change to setting has considered change to all possible views of and from the relevant assets which may contribute to adverse change.

9.6.20 Given the potential for the airport to generate noise that could affect the significance of designated and non-designated heritage assets, the desk based assessment examined heritage assets present within a noise envelope based on number of exceedances of a 60dB noise threshold and average aviation noise above 54dB (**Figure 9.6**).

9.6.21 The rationale and methodology for this was based upon that detailed in HE's *Aviation Noise Metric* Study[45]. The study notes that noise has the potential to have both adverse and positive effects on the setting of heritage assets. It forms soundscapes, both positive and negative, which contribute to the appreciation, enhancement and enjoyment of heritage assets. The *Aviation Noise Metric* sets out a methodology for the identification of the scope of assessment based on magnitude and frequency of noise as expressed through absolute measures of noise equalised over time (LAEQ) and frequency of maximum noise exceeding a 60dB threshold (N60). In that the effects assessed in this chapter relate to change to the perception, experience and understanding of heritage assets, the methodology used here is distinct from the assessment of noise presented in Chapter 12, although it draws on the information gathered for and presented in that chapter.

9.6.22 Therefore, noise is considered in this assessment only in terms of potential effect on change to setting of heritage assets. The method comprises a qualitative assessment to identify assets which may have their change of setting affected by changes in levels of outdoor aviation noise. The assessment comprises two steps:

- Step 1: Scoping – identify heritage assets with the potential for a noise impact through a process of scoping using the National Heritage List and noise contours. As the site is currently not operational it is not subject to aviation noise currently and so the N60 contour was used to initially identify heritage assets which might be sensitive to aviation noise.
- Step 2: Assess the sensitivity of the asset to noise related impacts – the heritage assets which are identified in the scoping exercise are categorised according to how the sound environment contributes to the significance of the heritage asset as set out in the *Aviation Noise Metric*. The four categories are:

  A: solitude, embedded with quietness, is intrinsic to understanding the form, the function, the design intentions and the rationale for the siting of a heritage asset;

  B: a non-quiet and specific existing soundscape forms part of the functional understanding of the heritage asset;

  C: the abandonment of a heritage asset; a monument, building or landscape, in antiquity (or more recently), has created a perceived 'otherworldly romanticism' enabled by the absence of anthropogenic sounds (quietness); or

  D: the absence of 'foreign (modern) sounds' allow an asset to be experienced at 'a very specific point in time' that is intrinsic to understanding the heritage assets significance.

- Heritage assets were considered for further assessment at the following levels, responding to thresholds identified in the *Aviation Noise Metric* (**Figure 9.6**):
  - below 54dB LAEQ, only the most sensitive heritage assets were considered (i.e. those falling within Categories A, C and D) – the Aviation noise metric notes that sound at 54dB LAEQ would be unlikely to be considered intrusive by the majority of people and would be unlikely to mask background noise;
  - between 54 and 57dB LAEQ, heritage assets with a specific sensitivity to noise were considered (i.e. those within Category B or with other sensitivity to modern noise) – the Aviation Noise Metric suggested that, at this level, quiet background sounds could be obscured;
  - Between 57 and 60dB LAEQ, heritage assets were considered where they are located in quiet or rural contexts, as noise levels approached the 60dB level where the aviation noise metric has the potential to disturb normal speech;
  - At sounds greater than 60dB LAEQ, noise is likely to cause speech interference outdoors and all designated heritage assets within the 60dB LAEQ contour have been taken forward for assessment.

9.6.23 Where heritage assets are occupied buildings, it is anticipated that average interior noise levels would be reduced by approximately 20dB, and mitigation measures outlined in **Chapter 12: Noise and Vibration** would reduce noise levels within buildings within this noise contour to not significant levels.

9.6.24 It is an important distinction from the Noise Assessment (**Chapter 12: Noise and Vibration**) that the consideration of effects of aviation noise on the historic environment presented here is not dependent on the gross measurement of predicted noise, but depends on the effect that change to noise would have on the perception and understanding of a heritage asset, and the nature of the heritage asset and its present setting are key considerations in this assessment.

9.6.25 Non-designated heritage assets within the 1km study area (**Appendix 9.3**) have also been considered for inclusion in the scope of assessment for change to setting arising from operational noise. The vast majority of identified non-designated heritage assets in this area comprise archaeological remains which do not have any discernible presence in the landscape and are significant for archaeological interest, which would not be affected by changes to in background noise (**Appendix 9.5**). For built heritage assets within the study area which retain a perceptual presence in the landscape related to the past use of Manston as a military airfield and civilian

airport (**Appendix 9.1,** Table 4.2 and Table 4.3), the presence of aviation noise would not give rise to any adverse perceptual change in their settings. Consequently, the effects of aviation noise on non-designated heritage assets has not been considered further.

9.6.26 All noise contours used relate to the projected peak operational period at Year 20 of operation. Any noise effects would be of a lower magnitude in earlier years. Average noise contours for N60 and LAEQ have been calculated using the projected distribution of 70% of flights arriving from the west and departing to the east over Ramsgate, with 30% of flights arriving from the East over Ramsgate and departing to the west towards Herne Bay.

9.6.27 It is acknowledged that the exact modal balance has yet to be confirmed and will be dependent on a parallel process (CAP1616 Airspace Change Proposal) which will be progressed during the process of the DCO application, but the 70/30 modal split reflects anticipated operating conditions based on a 'design swathe', which will be subject to authorisation and/or modification via the ACP. This design swathe has defined a swathe or corridor in which the final flight paths following the ACP will likely be within and is designed around the knowns of the local airspace, including other airways and navigational aids. For the Proposed Development and in areas close to the airport runways, on landing, final approaches and immediately after take-off, airspace options are limited hence effects can be predicted with the greatest certainty. Further from the airport, where there is greater flexibility for airspace change, effects will be subject to more variation during the ACP. The Noise Mitigation Plan (**Section 12.5**) sets out an aspiration to use runaway 28 for take-off and Runway 10 for landings where possible to avoid overflights of Ramsgate.

9.6.28 In addition, the consideration of single-mode contours as set out in the Historic England *Aviation Noise Metric* means that all operational modes (i.e. the assumption all that all take-offs could be either east to west or west to east have been considered within the assessment of aviation noise effects on designated heritage assets (**Appendix 9.1 (Appendix E**)). This represents an absolute worst-case for the potential contribution of noise to effects on heritage assets.

9.6.29 The desk based assessment also included an assessment of the influence of lighting on change to setting, based on comparative baseline light levels (**Figure 11.39** in **Chapter 11: Landscape and Visual Effects**), and this has been considered in the assessment of change to setting**.**

9.6.30 The potential for change to setting to give rise to harm of significance to other designated and non-designated archaeological heritage assets was considered within the scoping opinion and within the desk based assessment. Assets with no potential for adverse effects to setting were scoped out of requiring further consideration and will not be assessed further (A full list of designated heritage assets considered is provided at **Appendix 9.1**). Some of these assets share common features with assets requiring further consideration but will not be affected either by virtue of intervening screening or increased distance from the Proposed Development.

Spatial and temporal scope

9.6.31 The spatial scope for the assessment of direct effects on heritage assets is confined to the site boundary, as physical disturbance of historic buildings or below ground archaeological heritage assets would not occur outwith the site boundary. While it would be possible to mitigate these effects to a degree through archaeological investigation or through amendments to design, the state of understanding of the presence of archaeological remains means that a 'worst-case' approach has been taken to assessment which discounts the effects of mitigation.

9.6.32 The spatial scope for the assessment of change to setting arising from visual change in the setting of heritage assets comprises the 1km agreed study area as well as significant sites outside the study area which have been identified through consultation with Historic England and KCC. The spatial scope for the assessment of effects arising from aviation noise has been developed through use of the N60 contour as set out in the *Aviation Noise Metric*.

The construction period of the Proposed Development will take place over four construction phases. Operational effects are based on the Year 20 after development baseline, by which time operations at the Airport will have reached their peak (see **Chapter 3: Description of the Proposed Development** for further detail). This is therefore an assessment based on worst case

scenario both in terms of number of aircraft movements and differing modal use of the proposed development.

Potentially significant effects

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

- Potential direct effects on undesignated and previously unrecorded heritage assets within the proposed site boundary. These effects could arise from the construction phase of the Proposed Development and could include the disturbance or removal of archaeological remains by intrusive groundworks or pilling;
- Potential direct and indirect effects on the heritage significance of the airport and surviving assets relating to WW1, interwar, WWII and Cold War uses of the site. These effects could arise from losses or changes to existing heritage assets as a result of the construction of the Proposed Development, or to changes of the site as a result of the operational phase;
- Potential indirect effects on the settings of designated and undesignated heritage assets during the construction phase of the Proposed Development. These effects may arise from the effects of construction activities and equipment such as cranes and the concrete/asphalt batching plants;
- Potential indirect effects arising through change to the settings of designated heritage assets during the operational phase of the Proposed Development. These effects may arise as a result of the changes as a result of visibility of the new buildings and other elements of the project in views of and from heritage assets;
- Potential indirect effects on designated heritage assets from the operational phase of the Proposed Development. These potential effects on the settings of these assets could arise from the effects from overflights by aircraft;
- The Proposed Development includes the relocation of museum assets within the site boundary. The museums will be retained, and potentially enhanced. KCC has expressed concerns that the two museums, or new heritage area, retain a view to the airport runway;
- Potential inter-related effects are considered in this chapter. These effects may arise in relation to landscape, visual and noise effects (**Chapter 11: Landscape and Visual Impact Assessment and Chapter 12: Noise and Vibration**). Additionally, the potential for buildings and infrastructure to be damaged through flooding is assessed in **Chapter 8: Freshwater Environment** and the potential impact on heritage assets is considered in this Chapter.
- The potential for climate change to exacerbate the risk of flooding of heritage assets and increase the potential for desiccated soils and lowered groundwater levels, which increase the risk of decay to waterlogged archaeological and palaeoenvironmental remains, is assessed in **Chapter 16: Climate Change**. Potential socio-economic effects on visitor attractions, which include Minster Abbey, are considered in **Chapter 13: Socio-economics**. Potential effects on designated heritage assets as a result of major accidents or disasters has been assessed in **Chapter 17: Major Accident and Disasters**. No other inter-related effects are expected between the historic environment and other topics; and
- Potential cumulative effects are considered unlikely to give rise to any direct effects within the site, but may present a degree of cumulative change within the settings of heritage assets within and beyond the study area. The greatest scope for cumulative effects arises where other developments have intervisibility or the potential to increase levels of noise or light at the same heritage assets as the Manston Airport Project. Projects with potential for intervisibility to heritage assets within the study area or at those assets beyond the study area which have been identified as requiring consideration, in addition to those with potential for increase in noise or light within the same scope, have been brought forward for assessment in **Chapter 18: Cumulative Effects.**

9.7 Assessment Methodology

Methodology for Predicted Effects

9.7.1 To understand the significance of direct effects, the presence of any heritage assets that are known to be, or could potentially be, within the area that will be disturbed by the Proposed Development have been assessed. Comparison of the distribution of known and potential archaeological features within the study area allows the potential extent and nature of any direct disturbance to be characterised.

9.7.2 The methodology adopted for the assessment of indirect effects arising from change in setting, follows the approach set out by Historic England[46]. In this case, the potential for loss of heritage significance is most likely to occur as a result of intervisibility or direct views between the asset and the development. Change to views of an asset from a third viewpoint, even where there is no direct indivisibility between development and asset, may also be relevant.

9.7.3 In addition to purely visual considerations, other effects of the Proposed Development, such as operational lighting or noise, may also have an effect, although this is normally only relevant in relatively close proximity to the Proposed Development. These effects are understood in terms of the relationship of the asset with its current setting and may be positive, enhancing the heritage significance of the asset, or value-neutral or harmful, depending on the nature of the change, the character of the setting and its contribution to the heritage significance of the asset.

Significance Evaluation Methodology

9.7.4 The assessment of significance of any effect on a heritage asset is largely a product of the heritage significance of an asset and magnitude of the effect that may give rise to harm, qualified by professional judgement. An assessment of effects on an asset involves an understanding of the heritage significance of the asset and in the case of an indirect effect, the contribution of the setting to the significance of the asset.

9.7.5 The conservation of the significance of heritage assets is considered in Historic England guidance, in which change is characterised as an inevitable process, but one that can be managed[47]. In this context, it is important to note that loss of archaeological interest is usually considered to be only partially mitigated through archaeological fieldwork, as archaeological investigation cannot fully capture the informative potential of a heritage asset. This is often set against the knowledge that in many cases, archaeological interest of an asset may decline over time as a result of natural processes such as erosion, or cultural processes including cultivation. Heritage significance does not depend on the preservation of a feature in its current condition and can be enhanced through sensitive management. The NPPF (Paragraph 126) directs the decision-maker to take account of viable uses that sustain the significance of the historic environment, consistent with the conservation of heritage assets[48].

9.7.6 Rather than just characterising the potential physical effects of development, any assessment therefore needs to understand the effects on the significance of heritage assets and/or significant places[49]. The heritage significance of the asset is determined by reference to the heritage interests set out in the NPPF. These are:

- Archaeological interest: the potential of a place to yield evidence about the past;
- Historic interest: how the past can be connected to the present through a place through association with or illustration of the past; and
- Architectural/artistic interest: how sensory and intellectual stimulation is drawn from a place either through design or fortuitous development over time.

9.7.7 For the purposes of assessing the significance of effects in EIA terms, heritage significance has also been assigned to one of four classes, with reference to the heritage interests described above and relying on professional judgement as informed by policy and guidance. The hierarchy given in **Table 9.12** reflects the NPPF distinction between designated and non-designated heritage assets.

The NPPF further distinguishes between designated assets of the highest heritage significance (i.e. SM, protected wreck sites, battlefields, grade I and II* listed buildings, grade I and II* RPGs, and WHS) and other designated heritage assets. This further distinction is relevant to planning policy, but has less influence on the establishment of the significance of an effect in EIA terms.

Table 9.12 Definition of heritage significance

Heritage Significance	Summary rationale	Example asset class
High	Asset has significance for an outstanding level of archaeological, architectural, historic and/or artistic interest.	Designated Heritage Assets. Nationally and internationally significant non-designated archaeological sites.
Medium	Asset has significance for a high level of archaeological, architectural, historic and/or artistic interest.	Locally listed buildings and other local/county-based designations. Regionally significant non-designated archaeological sites.
Low	Asset has significance for elements of archaeological architectural, historic or artistic interest.	Locally-significant archaeological site.
Negligible	Due to its nature of form/condition/survival, cannot be considered as an asset in its own right.	Non-extant HER record.

Magnitude of Change

9.7.8 Direct effects are qualified by the extent and nature of remains associated with an asset which would be disturbed or lost, and the effect of this loss on the significance of the asset. In respect of buried archaeological remains with no visible above ground remains, this would normally result in the loss of archaeological interest, but elements of architectural and historic interest can also be affected.

9.7.9 In this context, the effects of change in the setting of a heritage asset may depend on individual aspects of that setting, and assessments must be, by their nature, specific to the individual assets being considered. Recent Historic England guidance[50] advises that the following aspects of setting should be considered in addition to any identified key attributes:

- The physical surroundings of the asset, including its relationship with other assets;
- The way the asset is appreciated; and
- The asset's associations and patterns of use.

9.7.10 It should also be noted that not all change necessarily detracts from the heritage significance of the asset. In the assessment of effects on the setting of heritage assets, the nature of the effect, i.e. positive, negative or neutral, of development is a subjective matter, usually taken to constitute a negative effect where change will constitute new and different elements to the setting of designated features, either to an imagined 'contemporary' setting or to their existing setting. While subjective, this decision is based on professional judgement and an informed understanding of the potential change arising through development, the asset, its significance and the contribution of its present setting within a frame of reference defined by guidance (as issued by Historic England) and planning policy. The decision of whether an effect is harmful or not is a matter of fact and degree that is explained in the individual assessments, and therefore does not bias the assessment.

9.7.11 Effects on receptors are assigned to one of four classes of magnitude, defined in **Table 9.13.**

Table 9.13 Methodology criteria for magnitude of change

Magnitude of change	Summary rationale
High	Loss of significance of an order of magnitude that would result from total or substantial demolition/disturbance of a heritage asset or from the disassociated of an asset from its setting.
Medium	Loss of significance arising from partial disturbance or inappropriate alteration of asset which will adversely affect its importance. Change to the key characteristics of an asset's setting, which gives rise to harm to the significance of the asset but which still allows its archaeological, architectural or historic interest to be appreciated.
Low	Minor loss to or alteration of an asset which leaves its current significance largely intact. Minor and short-term changes to setting which do not affect the key characteristics and in which the historical context remains substantially intact.
Negligible	Minor alteration of an asset which does not affect its significance in any discernible way. Minor and short term or reversible change to setting which does not affect the significance of the asset.

Determination of Significance

9.7.12 Effects are considered to be significant or not significant in EIA terms according to the matrix in **Table 9.14.** For this assessment, only a magnitude of change judged to be Medium or High would be considered to be significant, depending on the heritage significance of the asset and the exercise of professional judgement.

Table 9.14 EIA Significance assessment matrix

	Magnitude of Change			
Receptor heritage significance	**High**	**Medium**	**Low**	**Negligible**
High	Significant	Significant	Not Significant	Not Significant
Medium	Significant	Not Significant	Not Significant	Not Significant
Low	Not Significant	Not Significant	Not Significant	Not Significant
Negligible	Not Significant	Not Significant	Not Significant	Not Significant

9.8 Assessment of Effects on Buried Archaeology within the Order limits

9.8.1 This assessment of effects incorporates the environmental measures referenced in **Section 9.5**. It characterises the potential archaeological significance of the remains and the magnitude of change in the terms set out at **Tables 9.11, 9.12 and 9.13**.

Predicted Effects and their Significance

Construction Phase Effects

9.8.2 Construction activity has the potential to adversely affect archaeological remains. This would arise from the stripping of soil for construction access, compounds, roadways buildings and runway improvement.

9.8.3 Construction works associated with the taxiways and aprons, works for aircraft stands, cargo facilities, access, storage and parking have the greatest potential to impact upon archaeological remains due to the extensive land area under construction, although the existing taxiways and hardstandings will be used where possible to minimise new ground disturbance.

9.8.4 This work will have effects upon the archaeological resource on site over all four proposed construction phases. Phasing of development offers opportunities to deliver staged archaeological evaluation, investigation and mitigation, as an integrated part of the detailed development design and refinement of construction operations to be developed post-DCO.

9.8.5 The exact nature and magnitude of archaeological effects has been assessed on a 'worst-case' basis, taking into consideration the date and nature of the archaeological remains anticipated, as informed by the Stonehill Park geophysical survey[51] and more recently the Stonehill Park archaeological evaluation[52]. In line with the worst case approach, it is assumed that highly significant archaeological remains are present in the Northern Grass area and these may be harmed by intrusive groundworks.

9.8.6 Remains of high significance, such as particularly unusual or well-preserved examples of heritage assets, should they be present, are most likely to relate to prehistoric and Romano-British period of occupation, as evident from the available archaeological information. The recent Stone Hill Park evaluation results demonstrate variable survival of archaeological remains, with a localised concentration of Romano-British settlement activity to the south west of the site, on part of the ridgeline along which the runway is located. In addition, two Bronze Age ring ditches were identified, which together with the Northern Grass ring ditch, form part of an extensive prehistoric landscape, further represented by the cropmarks on Telegraph Hill and the extensive Bronze Age funerary activity examined during the East Kent Access Road investigations and more widely across Thanet.

9.8.7 As well as demonstrating the overall distribution of archaeological features, the Stonehill Park evaluation confirms that the quality of archaeological survival reflects the extent of previous disturbance. Whilst it was evident that there has been partial disturbance affecting archaeological remains in the areas evaluated, particularly across the ridge along which the runway lies, there is relatively good survival anticipated at the ends and to the south of the existing runway and within the Northern Grass.

9.8.8 The following assessment of the likely worst-case scenario, takes into account site-specific baseline information and the degree to which this conforms to wider patterns of archaeological distributions.

9.8.9 Archaeological remains of medium or high significance would be subject to a high magnitude of adverse change where new development is planned. This situation is unlikely to arise other than within the Northern Grass. Current information indicates the presence of prehistoric remains, including a burial monument, i.e ring ditch. This is one of three examples identified at the site, and is representative of the more common class of monument that typify the pattern of Bronze Age funerary and settlement remains found across Thanet. The two ring ditches examined the Stone Hill Park evaluation had clearly been disturbed, having largely or totally lost the central burial remains. Until there is further corroboration of the Northern Grass cropmark evidence through field evaluation, the quality of preservation or presence of additional archaeological monuments cannot be discounted. The total or substantive loss of the ring ditch and associated elements of the prehistoric landscape would be substantial harm and a significant effect.

9.8.10 Archaeological remains of lesser significance, due to poor survival or limited evidential value, are also likely to occur more widely within the site. These are also subject to adverse construction impacts, although the effect would be less than substantial harm given the relative value attached to this aspect of the archaeological resource. Current information suggests that adverse effects for remnant archaeological features of lesser significance include features associated with attested Romano-British and mediaeval settlement activities. The total or substantive loss of these elements of the archaeological remains present would not be a significant effect.

Mitigation

9.8.11 It is assumed that remains of high significance are present at one or more locations in the Northern Grass and that the extent of such remains will need to be determined, so that illustrative development designs, that form part of a zonal masterplan, can be refined to achieve appropriate protection of heritage significance and the avoidance of harm.

9.8.12 Elsewhere, the pattern of archaeological remains revealed in the Stone Hill Park archaeological evaluation suggests that the adverse effects are limited to archaeological remains of lesser significance. Excavation and investigation prior to construction would be an acceptable form of mitigation where adverse effects cannot otherwise be achieved by avoidance of harm.

9.8.13 Key to archaeological mitigation is the inherent flexibility offered in the zonal approach adopted for masterplan preparation, together with a structured post-consent delivery process for generating informed development and archaeological mitigation proposals.

9.8.14 Archaeological evaluation works will be undertaken during Phase 1 of the Proposed Development. An Archaeological Evaluation WSI will be prepared in consultation with KCC's Heritage advisors in advance of works. Intrusive evaluation will include examination of the Northern Grass and locations where Quaternary head deposits occur, to allow effective mitigation to be implemented for those aspects of the archaeology not adequately represented in the Stone Hill Park evaluation.

9.8.15 The results of the archaeological evaluation and detailed construction designs will be discussed with KCC's Heritage advisors to determine an appropriate programme of activities to mitigate any adverse effects and to achieve appropriate archaeological protection. Restrictions to development layout, design and construction processes will avoid significant adverse effects for remains of medium or high significance, unless it is otherwise agreed to include these in a comprehensive site archaeological investigation programme addressing impact to those known archaeological remains of lesser significance. For instance, should evaluation confirm the prehistoric ring ditch shown as a cropmark in the Norther Grass is part of a relatively isolated aspect of the wider prehistoric landscape, adverse effects may be appropriately mitigated by investigation and recording as part of a comprehensive project archaeological research strategy addressing the adverse effects on remains of lesser significance that occur more widely at the site.

9.8.16 Whether or not the programme of archaeological and geoarchaeological investigation recording extends to remains of medium or high significance, a program of works will be agreed for the mitigation of remains of lesser significance. This will take the form of an Archaeological Mitigation WSI to be prepared in consultation with KCC, to mitigate the adverse effects of development for archaeological remains of lesser significance.

Significance of effect

9.8.17 Avoidance of harm to the more significant archaeological remains together with investigation and recording would effectively reduce the adverse effects of construction and development to not-significant.

Operational and Decommissioning Phase Effects

9.8.18 No further adverse effects are anticipated during the operational or decommissioning phase of the proposed development as intrusive groundworks are not anticipated during operation, and any intrusive works during decommissioning would affect only previously disturbed ground.

Inter-related effects

9.8.19 No inter-related effects are anticipated to arise as archaeological remains within the site area do not comprise potential receptors within the definitions used for other assessments within this ES. Mitigation measures relating to any new finds of archaeological remains are described above with appropriate actions being detailed following the proposed pre-construction site investigations.

9.9 Assessment of Effects on Built Heritage within the Site Area

Current Baseline

9.9.1 While not listed, extant buildings and features both on and just outside the site can be considered to have some significance for historical interests pertaining to the history of the site and, more broadly, as architectural or structural components of RAF and USAF military history and the development of civil aviation in the UK. Their setting is directly related to the historic function of these buildings as part of an airfield complex. In general, these buildings relate primarily to the wider airfield, with the changing form of the airfield having removed direct visual and functional links between specific structures, most notably the perceptual separation of the WWII control tower from the main runway, or the loss of pillboxes associated with the WWII battle headquarters. Similarly, the brick-built bunkers structure is no longer clearly associated with any aviation use. Some visual and functional links remains, particularly between the civil control tower, the fire station and the runway, and between the modern hangars and the taxiways. While Manston airfield remains a significant heritage asset in its own right, it does not display the extent of preservation of either individual heritage assets or the overall designed scheme of better-known examples elsewhere[53].

Predicted Effects and their Significance

Construction Phase Effects

9.9.2 The Proposed Development requires the alteration, movement or removal of historic buildings and structures on the site (see **Chapter 3: Description of the Proposed Development**; built heritage assets are identified in **Appendix 9.1, Table 4.2)**.

9.9.3 These built heritage assets are currently understood to be of low and medium significance, although in consultation, the possibility that further survey may identify that some assets are considered to be of listable quality and could therefore be considered as being of high significance.

9.9.4 The exact nature and magnitude of these effects has consequently been assessed on a 'worst-case' basis, assuming these buildings are of medium-high significance and would not be retained. Where further site access can be obtained for archaeological and structural surveys, it is intended that a scheme of further work will be agreed with Kent County Council and Historic England to ensure that these 'worst-case' assumptions can be refined to better reflect an informed understanding of the significance of these assets and the feasibility of identifying sustainable reuse.

Mitigation

9.9.5 The proposed design scheme has regard to the historic airfield character. The basic plan form and functional layout of the post-war airfield is being retained, with the runway remaining in use and the new cargo terminal filling the gap between the existing taxiways and hangars. The passenger terminal will remain in the same location; effectively the historic plan form and functional layout of the airport remain discernible within the revised layout. The Museums and Memorial Garden are to be retained through a safeguarded area, and will remain perceptually as part of an active airfield, although views will be obscured by the cargo terminal intervening in views to the runway. It is only the 'Northern Grass' area that would see significant functional change, and what are now relatively open views across the airfield from the Northern Grass would be lost. Opportunities will be sought to retain historic connections through aspects such as street and building names, and an Airport Consultative Committee will be set up.

9.9.6 A survey[54] commissioned by KCC into heritage structures on the site notes the importance of other buildings and features. The RAF Battle HQ is noted to merit a special recording effort while the RAF Control Tower and USAF Fire station retain much of their original construction and are prominent structures relating to the aviation history of the site. Further investigation and assessment of these structures is required during Phase 1 of the Proposed Development to ascertain their current condition, desirability and feasibility for incorporation as a sustainable asset

in the final design. Structures which will not be retained will be subject to an appropriate level of building recording, to be agreed in consultation with KCC, in order to create a permanent record of these assets. It is recognised that some of these assets represent a high magnitude of change on medium significance assets which would, in the absence of mitigation, be significant adverse. In the case of particularly significant built heritage assets, this effect may remain significant even after mitigation has been carried out. For the purposes of the assessment, it has been assumed that assets will be assessed to be of medium or high significance and will not be retained. The adoption of an agreed scheme of building recording and a degree of flexibility within masterplanning proposals would potentially allow significant adverse effects to be avoided. In the absence of detailed building survey results, however, the extent of flexibility of design required to be able to ensure that any such effects could be avoided is such that it would not be practicable to allow the degree of flexibility required to mitigate any such effects in all cases, and as a worst-case, mitigation afforded by recording and design has been disregarded in this assessment.

Significance of Effect

9.9.7 The worst-case scenario, is that high significance receptors would be subject to a high magnitude of adverse change, resulting in a significant adverse effect that cannot be mitigated to non-significant.

Operational Phase Effects

9.9.8 Where retained, those buildings identified as having historic interest pertaining to the history of the site and, more broadly, as an architectural or structural component of RAF military history and beyond (**Appendix 9.1, Table 4.2**), will have their setting largely retained by renewed use of the site as an airfield. For the majority, it is association with the airfield which forms their primary significance, rather than specific connections between contemporary buildings, and while some specific visual links may be lost, these make a relatively limited contribution to significance as a result of past change to the layout of the airfield. Successive phases of change to the overall layout of the site from 1943 onwards means that the more significant historic structures have already been dissociated from their historic functional and designed context to greater or lesser degrees, particularly in the northern part of the site, although features closer to the runway retain clearer links to the past use of the airfield. Illumination of these assets and noise associated with operational activity has the potential to enhance setting, by reflecting former function. Where retained, the magnitude of change is assessed as low-medium on low-medium significance receptors, giving rise to a not significant effect.

Decommissioning Phase Effects

9.9.9 Further changes to the historic buildings fabric is not anticipated during decommissioning and no direct effects are anticipated.

9.9.10 Cessation of aviation activities at the site would reverse any indirect beneficial effects of retaining these structures in the context of a working airfield.

Inter-related effects

9.9.11 Inter-related effects on heritage assets are not anticipated.

9.9.12 Change to the water environment is assessed at **Chapter 8: Freshwater Environment**. Any potential inter-related effect would arise from a low risk of localised surface water flooding of parts of the site which could give rise to damage to any retained historic buildings. The potential for flooding has been recognised and would be effectively mitigated through a revised surface drainage plan. Consequently, any effect is assessed as non-significant.

9.9.13 Any adverse visual effects arising as a result of change in valued views (**Chapter 11: Landscape and Visual**) would not constitute an inter-related effect because, insofar as they relate to the significance of heritage assets, these views represent a subset of the changes already considered within the historic environment assessment. Change to significance resulting from visibility of the

airport infrastructure, aircraft movements and lighting has already been considered in the assessment of effects and consequently there would be no increase in the magnitude of change as a result of any inter-related effect. Therefore, effects are assessed as not significant.

9.9.14 Similarly, adverse effects arising from construction or operational noise (**Chapter 12: Noise**) would not constitute an inter-related effect because, insofar as they relate to the significance of heritage assets, these effects represent a subset of the changes already considered within the historic environment assessment. Change to significance resulting from construction and operational noise has already been considered in the assessment of effects and consequently there would be no increase in the magnitude of change as a result of any inter-related effect. Therefore, effects are assessed as not significant.

9.9.15 Adverse changes on socio-economic receptors, through impacts on visitor attractions have been considered in **Chapter 13: Socio-economics** and consequently no adverse interrelated effect is predicted.

9.9.16 No other inter-related effects are anticipated to arise as the designated heritage assets do not comprise potential receptors within the definitions used for other assessments within this ES.

9.10 Indirect Effects on off-site Designated Heritage Assets

Construction Phase Effects

9.10.1 Designated heritage assets beyond the 1km study area, as identified in **Figure 9.3**, have the potential to be affected by change in their settings caused by the Proposed Development.

9.10.2 Visibility of construction compounds and other temporary construction activities may present a change in the setting of heritage assets in close proximity to the airport and within the ZTV. These effects would be temporary for the duration of the construction on site. These would represent very limited change to the existing views towards the airport, and any change would be limited to the construction period. These activities would also be at least partially screened by existing bunding, planting and structures within the site.

9.10.3 During the construction phase of the Proposed Development, the airport would not be operational and there would be no aviation noise. Mitigation measures (for further details see **Chapter 12: Noise and Vibration**), would reduce construction noise and control potential impacts upon people, businesses and the natural and historic environment, meaning that it would not contribute to any adverse indirect effects.

9.10.4 The magnitude of change is assessed as negligible on high archaeological significance receptors, giving rise to a no significant effect.

Operational Phase Effects

9.10.5 Designated heritage assets beyond the boundary of the airport, within the 1km search area and beyond, also have the potential for their setting to be visually affected by the operational effects of the Proposed Development.

9.10.6 This scoping exercise has been undertaken and presented within the Desk Based Assessment (**Appendix 9.1**). Heritage assets identified by this process have the potential to be affected by aviation noise, and are considered further at **Table 9.15**.

9.10.7 Noise makes a different contribution to the setting of different types of heritage asset, for example within a busy, urban conservation area, noise to the level of 60dB would be less likely to affect the experience of the asset, whilst within a contemplative garden with water features, noise to 60dB would be more likely to impact upon the experience of the asset, potentially masking or interrupting the noise of the water feature. Based on assessment using the methodology described in **Paragraphs 9.6.17-9.6.18,** it is concluded that few heritage assets within this assessment have been identified to be within the categories identified by the *Aviation Noise Metric* as particularly

sensitive to changes in noise, in terms of their heritage significance. Those which are relate to the former Abbey at Minster. Some heritage assets which might be assigned to these particularly sensitive categories within the vicinity of the site are located in relatively noisy locations and have consequently been scoped out, while apparently less sensitive heritage assets located closer to the airport may also be affected and have been considered below. Assets which may be sensitive to noise for reasons other than heritage significance, such as residential properties, are assessed within the assessment of operational noise (**Chapter 12: Noise and Vibration**).

9.10.8 The setting significance and assessment of potential operational effects was considered for all identified designated heritage assets in the desk based assessment (**Appendix 9.1, Section 5.2**). Those identified as being subject to potential effects are further assessed for EIA significance in **Table 9.14**.

Table 9.15 Assessment of effects arising through change to setting of designated heritage assets

Asset	Significance and contribution of setting	Assessment of effect
Enclosure and ring ditches sited 180m east-northeast of Minster Laundry (List Entry 1004203)	The primary significance of this SM is for the archaeological interest contained in below-ground remains. The asset does not have a readily discernible presence in the landscape and derives significance almost entirely from archaeological interests. No archaeological remains are observable at ground level and so views towards the asset do not contribute to setting. Views from the asset to the south across the valley of the former Wantsum Channel contribute to historic interests, as these views appear to be important elements in site selection. Views to the north are limited by the underlying topography and the screening bunds to the south side of the A299 Hengist Way.	The airport is visible from the asset. There is potential for this asset to be associated with assets identified at the west end of the runway. The asset is positioned on a south-facing slope and the views south over the Wantsum Channel are most likely to have influenced the choice of location; these views would remain unchanged. Visibility of the airport and related infrastructure in views northwards would be limited by the underlying topography and by the screening bunds on the south side of the A299 Hengist Way. Change to the mode of operation of the runway would not give rise to any change in this assessment. Although within the 60dB LAEQ noise contour (**Figure 9.5**), the setting of the site is not dependent on tranquillity. It lies adjacent to the A299 and the Minster Laundry industrial estate, and is currently subject to high levels of traffic noise. Light from the adjacent Minster Laundry industrial estate is already a readily discernible element of the asset's night-time setting, and taken with the asset's lack of discernible presence, no adverse change is anticipated as a result of light from the proposed development. **Heritage significance: High** **Magnitude of change: Low** **EIA Significance: Not significant**
Anglo-Saxon cemetery S of Ozengell Grange (List Entry 1004228)	This asset comprises the buried remains of an Anglo-Saxon cemetery which have significance for archaeological interest. There is no visible surface trace of the asset, which consequently has no perceptible presence in the landscape. The asset is adjacent to the A299/A256 junction and the Minster/Ramsgate railway. Visibility from the asset is limited by the underlying topography and by	Even at the projected noise level, aviation noise would not give rise to any qualitative perceptual change to the setting of the asset and would leave the archaeological interests of the asset unchanged. Consequently, any adverse effect would be of negligible magnitude. Visibility of the Proposed Development from the asset would be precluded by shelter planting around the asset and by the underlying topography; views south

	planting to the north and east side of the asset. Views southwards over the mouth of the former Wantsum Channel, contributing to historic interests, are possible from the western part of the asset. Modern background noise is a significant element of the present setting.	over the Wantsum Channel would remain unchanged. Change to the mode of operation of the runway would not give rise to any change in this assessment. **Heritage significance: High** **Magnitude of change: Negligible** **EIA Significance: Not significant**
Chapel House (List Entry 1224336)	This asset is a farmhouse on the periphery of a modern farmstead which is in existing commercial use. The asset faces out to the north and east over gardens and agricultural land. Visual links to the surrounding farmland and associated agricultural buildings provide the principal contribution to setting, but the limited levels of modern background noise also contribute.	Noise at the projected level may become intrusive at particularly quiet periods, but sustained noise exposure would not be of a sufficient magnitude to give rise to a qualitative change to the perception of the asset as a rural farmhouse. Views towards the Proposed Development from the asset are limited by planting in the land to the north and by the underlying topography, meaning that visibility of the Proposed Development would be very restricted if not precluded entirely. There would be some visibility of flight operations from the north elevation of the house, and the existing light visible from street lighting to the A299 roundabout would be increased, but these changes would be incremental and would not give rise to qualitative change to setting. Consequently, any adverse effect would be of low magnitude and would not be significant. Change to the mode of operation of the runway would not give rise to any change in this assessment. **Heritage significance: High** **Magnitude of change: Low** **EIA Significance: Not significant**
Cleve Court and Cleve Lodge (List Entry 1224683)	This Grade II* Listed Building is primarily of significance for in architectural and historic interests which are reinforced by functional and aesthetic links between the house, its grounds and with associated buildings within the same complex. The asset has a generally rural setting, but is adjacent to a minor road and a modern farmyard which is in active agricultural use. Views from the asset are limited by the woodland planting in its grounds and hedgerow planting to the east.	There is no direct intervisibility between the asset and the airfield. While lighting may be visible at distance through the foliage at certain times of year, this asset would not have direct visibility of the Proposed Development or airfield lighting and is currently indirectly subject to similar low levels of light pollution from a nearby industrial area. The grounds of Cleve Court and Cleve Lodge fall within the 60dB LAEQ noise contour, but the buildings do not. While the setting is not dependent on tranquillity it would affect the perception of a rural setting in part of the grounds. Change to the mode of operation of the runway would not give rise to any change in this assessment. This heritage asset may qualify for the Dwelling Noise Insulation Scheme (see **Chapter 12: Noise 12.5.10-12.5.12)**, though any reduction of the magnitude of effect would be limited.

		Heritage significance: High **Magnitude of change: Medium** **EIA Significance: Significant**
Prospect Inn (List Entry: 1224448)	This Grade II Listed Building is currently part of a Holiday Inn hotel. Formerly frequented by airmen stationed at Manston, this building is associated with the historic aviation use of the site. It is located within a busy business and leisure use area, with frequent vehicle movements. It has views to the north across the A299 and roundabout.	Close to the airfield, visibility from Prospect Inn to the airfield is currently obscured by topography and planting to the A299. Visibility of flights taking off from the airport will enhance setting given the historic links. Prospect Inn lies within the 60dB LAEQ noise contour, but is adjacent to the A229, and so daytime noise is unlikely to have an adverse impact. The property will not be directly lit by the airport and is already affected by street lighting. Due to its function, any distant visible lighting associated with the airport would enhance the historic relationship. Change to the mode of operation of the runway would not give rise to any change in this assessment. **Heritage significance: High** **Magnitude of change: Low** **EIA Significance: Not significant**
Way House and Wayborough House, and garden wall attached (List Entry 1266887)	These assets are domestic houses within wooded ground in an otherwise agricultural landscape. There is some background noise from nearby agricultural uses at Wayborough Manor and from the A299 Hengist Way, but the overall perception is still of a rural house, and the relatively quiet setting of the houses contribute to significance. Visibility from the asset is limited by dense tree planting in its grounds.	These buildings would be screened from the proposed development by intervening planting, meaning that any discernible change would arise solely as a result of aviation noise. Noise at the projected level may become intrusive and sustained noise exposure would be of a sufficient magnitude to detract from the overall perception of the assets as rural houses. Consequently, any adverse effect would be of medium magnitude and would be significant adverse. Change to the mode of operation of the runway would not give rise to any change in this assessment. This heritage asset may qualify for the Dwelling Noise Insulation Scheme, though any reduction of the magnitude of effect would be limited. **Heritage significance: High** **Magnitude of change: Medium** **EIA Significance: Significant**
Monastic grange and pre-Conquest nunnery at Minster Abbey (List Entry 1016850), Minster Abbey (List Entry 1223807), Barn about 30 metres North East of Minster Abbey (List Entry 1223808), Gates and Walls to Minster Abbey (List Entry 1223810), Wall and	These assets comprise the visible remains of the former monastic site at Minster Abbey. The site remains, at least partly, in active religious use which contributes to its historic interest and the separation of the site from the village by the enclosure wall provides a sense of relative peace, with specific periods of	The Proposed Development would not be visible from or in views of the assets. Projected noise levels are below those at which the *Aviation Noise Metric* identifies potential qualitative change to setting to occur, but this asset has been considered because of its sensitivity and the relatively high N60 value which derives from proximity to flight paths for light

Gate Lodge East of Minster Abbey (List Entry 1266990), Laundry about 15 metres West of Minster Abbey (List Entry 1267022)	quiet and activity, which themselves generate a specific, though localised soundscape. Visibility form the asset is severely restricted by the surround urban form and dense tree planting. Views northwards are further restricted by the underlying topography.	aircraft. These assets also experience a degree of existing noise from the location of the site adjacent to the village centre and from the existing rail line. While there would be a slight but discernible change to setting, any adverse effects would be of a low magnitude and would not give rise to a significant adverse effect on any of the identified heritage assets. Change to the mode of operation of the runway would not give rise to any change in this assessment. **Heritage significance: High** **Magnitude of change: Low** **EIA Significance: Not significant**
Acol Conservation Area	This asset comprises the historic core of the village of Acol, which derives its historic character from its relationship to The Street, which runs north-south through the village, and the surrounding agricultural land. There is discernible modern noise from traffic passing through the village and from nearby major roads.	Projected noise levels are below those at which the *Aviation Noise Metric* identifies potential qualitative change to setting to occur but this asset has been considered because of its sensitivity and the relatively high N60 value which derives from proximity to the northern approach path. Sustained noise levels would not be sufficient to give rise to any discernible change to historic character or significance, and any effect would be of negligible magnitude. Change to the mode of operation of the runway would not give rise to any change in this assessment. **Heritage significance: High** **Magnitude of change: Negligible** **EIA Significance: Not significant**
Minster Conservation Area	This asset comprises the historic core of the village of Minster and is focused on the Abbey and Church of St Mary. The conservation area is generally inward focused, with the underlying topography, built development and tree planting restricting views outwards to the north, and draws significance from historic and architectural interests from views within the conservation area. The village centre is quite densely occupied and is frequently busy, with buildings to either side of Church Street, though pockets of green space within the former Abbey and in the churchyard of St Mary Magdalene provide a contrast to the more densely packed houses within the village.	Projected noise levels are below those at which the *Aviation Noise Metric* identifies potential qualitative change to setting to occur but this asset has been considered because of its sensitivity and the relatively high N60 value which derives from proximity to flight paths for light aircraft. Sustained noise levels would not be sufficient to give rise to any discernible change to historic character or significance, and any effect would be of negligible magnitude. Change to the mode of operation of the runway would not give rise to any change in this assessment. **Heritage significance: High** **Magnitude of change: Negligible** **EIA Significance: Not significant**
Saxon Shore fort, Roman port and associated remains at Richborough (List Entry: 1014642)	The raised location of Grade I Richborough Castle (List Entry 1363256) and the airport means that long distance visibility between the two sites is present; however, the main contribution of the setting of Richborough castle to architectural interests is now more immediate and related to the visible earthworks and standing walls. Views	The asset is located at 5km distance from the site and is outside the N60 and LAEQ measures used for scoping. Long-distance views from the asset include the airfield and other large developments such as Thanet Earth. These views are inhibited by topography, as the ridgeline creates a plateau which screens much of the airport site. Aviation operations will be

	north and east across the Wantsum and towards other landing sites at Ebbsfleet and Pegwell Bay provide an understanding of the asset's landscape context and contribute to the sense of landscape change that is a key element of the its historic interest. The association between the fort and other elements of the scheduled monument, particularly the amphitheatre adds historic and archaeological interest, as do visual and associative links with the immediate surroundings which contain non-designated elements of the contemporary landscape. Views to the east include the former industrial complex at Discovery Park. Noise from the A256 Ramsgate Road and the railway line is clearly audible. The original coastal setting has been lost over time and the remains now lie within a primarily rural setting which has views towards discernibly more urban and industrial areas. The rest of the SM and associated remains around it lie at lower levels, and its significance is primarily for archaeological interest, with the structure of the Saxon shore fort itself (List Entry 1363256), providing the architectural interest.	visible from Richborough Castle, but at a distance, and this visibility would not be sufficient to give rise to any adverse perceptual change to setting. Maximum noise contours at 60dB do not extend as far as Richborough Castle, and taken with the existing noise from the railway and the A256, would not give rise to any perceptual change. Views to the north at night that could potentially be affected by light spill from the Proposed Development are already affected by light spill from Thanet Earth and Ramsgate as well as the villages of Minster, Cliffsend and Manston and street lighting along Hengist Way. In addition, the site is not usually open during night-time hours, further limiting the effect of the potential long-distance views of operational lighting. Change to the mode of operation of the runway would not give rise to any change in this assessment. **Archaeological significance: High** **Magnitude of change: Negligible** **EIA Significance: Not significant**

Mitigation

9.10.9 Further mitigation of change to setting of off-site heritage assets is not proposed, as boundary design and treatment to screen new development, aircraft movements and standing aircraft in views of and from off-site heritage assets, and to reduce potential noise impacts from within the site have been considered as embedded measures of the design of the Proposed Development (**Chapter 11: Landscape and Visual Effects; Chapter 12: Noise and Vibration**).

Decommissioning Phase Effects

9.10.10 The airport is anticipated to be operational for many years. There are no current plans for decommissioning. At such time, designated heritage assets beyond the boundary of the airport, may experience change to setting as a result of the decommissioning of the airport. These can be anticipated to reverse any adverse change in the setting of heritage assets in close proximity to the site or within ZTV of the Proposed Development.

9.10.11 The cessation of aircraft movements would result in the reversal of any change to setting arising from aviation noise. There may be limited change to setting arising from construction noise, but it is anticipated that this would not be of sufficient volume to have an effect.

Inter-related effects

9.10.12 Inter-related effects on heritage assets are not anticipated.

9.10.13 Any adverse visual effects arising as a result of change in valued views (**Chapter 11: Landscape and Visual**) would not constitute an inter-related effect because, insofar as they relate to the significance of heritage assets, these views represent a subset of the changes already considered within the historic environment assessment. Change to significance resulting from visibility of the airport infrastructure, aircraft movements and lighting has already been considered in the assessment of effects and consequently there would be no increase in the magnitude of change as a result of any inter-related effect. Therefore, effects are assessed as not significant.

9.10.14 Similarly, adverse effects arising from construction or operational noise (**Chapter 12: Noise**) would not constitute an inter-related effect because, insofar as they relate to the significance of heritage assets, these effects represent a subset of the changes already considered within the historic environment assessment. Change to significance resulting from construction and operational noise has already been considered in the assessment of effects and consequently there would be no increase in the magnitude of change as a result of any inter-related effect. Therefore, effects are assessed as not significant.

9.10.15 Adverse changes on socio-economic receptors, through impacts on visitor attractions have been considered in **Chapter 13: Socio-economics** and consequently no adverse inter-related effect is predicted. Potential effects on designated heritage assets as a result of major accidents or disasters has been assessed in **Chapter 17: Major Accident and Disasters** where the baseline, potential receptors and assessments within this chapter have informed the major accidents or disasters assessment and consequently no adverse effect is predicted.

9.10.16 No other inter-related effects are anticipated to arise as the designated heritage assets do not comprise potential receptors within the definitions used for other assessments within this ES.

9.11 Conclusions of Significance Evaluation

9.11.1 The conclusions on the significance of all those effects that have been subject to assessment in **Sections 9.8** to **9.10,** are detailed in **Appendix 9.5** and summarised in **Table 9.16**.

Table 9.16 Summary of significance of effects

Receptor and effects	Magnitude of change	Heritage significance	EIA significance	Rationale
Direct construction phase effects on undesignated and previously unrecorded archaeological remains	High	Early Prehistoric: Medium-High; Later Prehistoric: Medium-High; Roman: Medium-High Early Medieval: Medium-High Medieval: Low Post-medieval: Low Modern: Medium-High	Following the application of an agreed scheme of mitigation comprising avoidance or investigation of significant archaeological remains or a combination of both approaches adverse effects on archaeological remains are assessed as **not significant**.	It is recognised that while the desk based assessment and archaeological disturbance plan have identified the presence/absence of known remains across the Proposed Development site based on available knowledge, adjustment may be required following receipt of pending reports and a programme of further archaeological investigations in Phase 1, especially in the 'Northern Grass' area. An Archaeological WSI for investigation will be agreed with KCC and Historic England in advance of works. The avoidance of particularly significant archaeological remains and the appropriate investigation of remains of lesser significance means that any adverse effect would be mitigated and has been assessed as **not significant**.
Change to Historic Buildings within the airport boundary	Low-High	Low-Medium	High magnitude of change on low significance assets (such as those relating to late 20th Century/early 21st Century airfield use or assessed as of low significance during further	The setting and significance of buildings within the airport boundary was assessed in the desk based assessment (**Appendix 9.1**). A phase plan is provided in **Figure 9.4**.

Receptor and effects	Magnitude of change	Heritage significance	EIA significance	Rationale
			survey) is assessed as **not significant**. High magnitude of change on medium or high significance assets (as assessed through further survey and likely to include assets relating to historic aviation use, particularly WWI, WWII and USAF periods) is assessed as **significant**. Mitigation by archaeological investigation and avoidance measures will be applied, but in the absence of further survey, the present understanding of the historic buildings and flexibility inherent within the masterplan is insufficient to allow the effect of these measures to be assessed, and they have consequently been disregarded for the purposes of this assessment.	Further assessment during Phase 1 of the Proposed Development will establish the condition, desirability and feasibility for retention of built heritage assets in the final design. Those not retained will be subject to an appropriate level of building recording, to be determined with Historic England and KCC, which will create a permanent record. In the absence of existing survey information, it is assumed that assets will be assessed as medium or high significance which would need to be mitigated by incorporation in the final design. In the absence of survey results, it is not practicable to accurately assess the degree of flexibility required to mitigate any such effects in all cases, resulting in a significant effect which cannot be mitigated to not significant. In terms of setting, the Proposed Development will inevitably result in changes to the setting of retained assets; however, reuse of the airfield for aviation purposes reflects the recent historic use of the site. Assessment identified that subsequent use has resulted in changes to the setting of these assets and, while the design has the potential to enhance setting through, no significant adverse effects to setting would arise.
Designated heritage assets within the 1km boundary and extended study area as requested by KCC and HE	Negligible-Low	High	**Not significant**	The potential impact of the proposal upon the contribution made to significance by setting of designated assets within the 1km boundary, within the identified scope of assessment for aviation noise and others identified by Historic England and KCC was assessed in the desk based assessment (**Appendix 9.1**). Overall, the potential impact is low. The detailed design of the proposal has yet to be completed, including building locations and finalised landscape design or boundary treatments. The design will consider the locations of designated assets within the 1km boundary including those identified as significant beyond this radius by KCC and HE.

Receptor and effects	Magnitude of change	Heritage significance	EIA significance	Rationale
				Effects will persist throughout the operational period and have consequently been considered as permanent. Embedded measures which would minimise adverse change to setting (e.g. acoustic and visual screening) are presented in **Chapter 11: Landscape and Visual** and **Chapter 12: Noise and Vibration**.
Change to Setting of heritage assets as a result of operational noise	Negligible-Medium	High	**Significant** **Mitigation** will be afforded through the Noise Mitigation Plan and the affected buildings may qualify for the Dwelling Noise Insulation Scheme (**Section 12.5**). These measures would reduce the magnitude of any adverse change but are unlikely to reduce the magnitude of change sufficiently for a significant effect to be entirely avoided.	Significant adverse effects on heritage assets arising from operational noise from the Proposed Development have been identified at Way House and Wayborough House, and garden wall attached (List Entry 1266887) and at Cleve Court and Cleve Lodge (List Entry 1224683). Effects on other designated and non-designated heritage assets have been considered and have been found to be not significant.

References

[1] Department for Transport (2018) Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England [online] Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/714106/airports-nps-new-runway-capacity-and-infrastructure-at-airports-in-the-south-east-of-england-web-version.pdf [Accessed 03/07/2018].

[2] National Infrastructure Planning (EIA Regulations) (2017) S3, Reg 9(1), 2(1) [online] Available at www.legislation.gov.uk/uksi/2017/572/pdfs/uksiem_20170572_en.pdf [Accessed 08/02/2018].

[3] Ancient Monuments and Archaeological Areas Act (1979) Chapter 46, Part I [online] Available at www.legislation.gov.uk/ukpga/1979/46 [Accessed 08/02/2018].

[4] National Heritage Act (1983) Chapter 47, 32-38 [online] Available at www.legislation.gov.uk/ukpga/1983/47/contents [Accessed 08/02/2018].

[5] National Heritage Act (2002) Chapter 14, 1-8 [online] Available at www.legislation.gov.uk/id/ukpga/2002/14 [Accessed 08/02/2018].

[6] Infrastructure Planning (Decisions) Regulations (2010) 3, 1-3 [online] Available at www.legislation.gov.uk/ukdsi/2010/9780111490266/regulation/3 [Accessed 08/02/2018].

[7] Planning (Listed Buildings and Conservation Areas) Act (1990) Chapter 9, Part 1, Chapter I [online] Available at www.legislation.gov.uk/ukpga/1990/9/part/I/chapter/1 [Accessed 08/02/2018].

[8] Infrastructure Planning (Decisions) Regulations (2010) 3, 1-3 [online] Available at www.legislation.gov.uk/ukdsi/2010/9780111490266/regulation/3 [Accessed 08/02/2018].

[9] Infrastructure Planning (Decisions) Regulations (2010) 3, 1-3 [online] Available at www.legislation.gov.uk/ukdsi/2010/9780111490266/regulation/3 [Accessed 08/02/2018].

[10] The Hedgerow Regulations (1997) Section 4-5 [online] Available at www.legislation.gov.uk/uksi/1997/1160/contents/made [Accessed 08/02/2018].

[11] The Infrastructure Planning (Interested Parties and Miscellaneous Prescribed Provisions) Regulations (2015) [online] Available at www.legislation.gov.uk/id/uksi/2015/462 [Accessed 08/02/2018].

[12] DCLG (2017) Planning Practice Guidance [online] Available at https://www.gov.uk/government/collections/planning-practice-guidance [Accessed 07/02/2018].

[13] Historic England (2015) Managing Significance in Decision-Taking in the Historic Environment [online] Available at https://historicengland.org.uk/images-books/publications/gpa2-managing-significance-in-decision-taking/ [Accessed 08/02/2018].

[14] Historic England (2015) The Setting of Heritage Assets [online] Available at https://content.historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/heag180-gpa3-setting-heritage-assets.pdf/ [Accessed 08/02/2018].

[15] CiFA (2015) Standard and Guidance for Historic Environment Desk Based Assessment.

[16] CIfA (2014) Standard and Guidance for Commissioning Work or Providing Consultancy Advice on Archaeology and the Historic Environment [online] Available at https://www.archaeologists.net/sites/default/files/CIfAS&GCommissioning_1.pdf [Accessed 08/02/2018].

[17] Temple and Cotswold Archaeology (2014) Aviation Noise Metric - Research on the Potential Noise Impacts on the Historic Environment by Proposals for Airport Expansion in England. Available at http://content.historicengland.org.uk/images-books/publications/aviation-noise-metric/eh-aviation-noise-final-report.pdf/ [Accessed 14/02/2018].

[18] English Heritage (2008) Conservation Principles, Policies and Guidance. Available at: https://content.historicengland.org.uk/images-books/publications/conservation-principles-sustainable-management-historic-environment/conservationprinciplespoliciesguidanceapr08web.pdf/ [Accessed 14/02/2018].

[19] Historic England (2017) Conservation Principles: Consultation Draft [online] Available at https://content.historicengland.org.uk/content/docs/guidance/conservation-principles-consultation-draft.pdf [Accessed 08/02/2018].

[20] Kent County Council (2018) Exploring Kent's Past: The Kent HER [online] Available at http://webapps.kent.gov.uk/kcc.exploringkentspast.web.sites.public/SingleResult.aspx?uid=TKE1046 [Accessed 08/02/2018].

[21] Archaeology Data Service (2014) Kent Historic Landscape Characterisation (HLC) [online] Available at http://archaeologydataservice.ac.uk/archives/view/kent_hlc_2014/downloads.cfm [Accessed 08/02/2018].

[22] Historic England (2018) Historic England Archive [online] Available at http://archive.historicengland.org.uk/ [Accessed 08/02/2018].

[23]Historic England (2018) Download Listing Data [online] Available at https://www.historicengland.org.uk/listing/the-list/data-downloads/ [Accessed 14/02/2018].

[24] Data.Gov.UK (2018) National Record of the Historic Environment (Unpublished) [online] Available at https://data.gov.uk/dataset/national-record-of-the-historic-environment [Accessed 14/02/2018].

[25] Kent County Council (2018) Kent Archives and Local History [online] Available at https://www.kentarchives.org.uk/ [Accessed 08/02/2018].

[26] Kent County Council (no date) Heritage Maps [online] Available at http://webapps.kent.gov.uk/KCC.HeritageMaps.Web.Sites.Public/Default.aspx [Accessed 08/02/2018]

[27] Spitfire and Hurricane Memorial Museum (no date) [online] Available at http://www.spitfiremuseum.org.uk/ [Accessed 08/02/2018]

[28] RAF Manston History Museum (no date) [online] Available at https://www.manstonhistory.org.uk/ [Accessed 08/02/2018].

[29] Natural England (no date) MAGIC [online] Available at http://www.natureonthemap.naturalengland.org.uk/MagicMap.aspx [Accessed 08/02/2018].

[30] British Geological Survey (2017) GeoIndex [online] Available at http://www.bgs.ac.uk/geoindex/ [Accessed 08/02/2018].

[31] National Library of Scotland (no date) Map Library [online] Available at https://maps.nls.uk/ [Accessed 08/02/2018].

[32] CIfA (2014) Standards and Guidance for Archaeological Desk-Based Assessments [online] Available at www.archaeologists.net/sites/default/files/CIfAS&GDBA_2.pdf [Accessed 08/02/2018].

[33] Planning Act 2008 S23(4)(a)-(b) and (5)(a)-(b) [online] Available at http://www.legislation.gov.uk/ukpga/2008/29/pdfs/ukpga_20080029_en.pdf [Accessed 08/02/2018].

[34] RiverOak (2017) Manston Airport Development Consent Order Preliminary Environmental Information Report Volumes 1 to 9 [online] Available at http://rsp.co.uk/documents-page/ [Accessed 08/02/2018].

[35] Canterbury World Heritage Site Management Steering Committee (2002) Canterbury World Heritage Site Management Plan. Available at http://augustineofcanterbury.org/wp-content/uploads/2013/02/CanterburyWHSManagementPlan.pdf [Accessed 14/02/2018].

[36] WSP (2016) Land at former Manston Airport, Historic Environment Desk Based Assessment.

[37] WSP (2016) Land at former Manston Airport, Historic Environment Desk Based Assessment.

[38] WSP (2016) Land at former Manston Airport, Historic Environment Desk Based Assessment.

[39] Page, W (1926) A History of the County of Kent: Volume 2. Victoria County History, London.

[40] WSP (2016) Land at former Manston Airport, Historic Environment Desk Based Assessment.

[41] AOC Archaeology Group (2016) Land at Former Manston Airport Ramsgate, Kent: Archaeological Geophysical Survey

[42] AOC Archaeology Group (2017) Land at Former Manston Airport, Ramsgate, Kent: An Archaeological Evaluation Report.

[43] DCLG (2012) National Planning Policy Framework: Annex 2: Glossary [online] Available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf [Accessed 08/02/2018].

[44] Historic England (2015) The Setting of Heritage Assets [online] Available at https://content.historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/heag180-gpa3-setting-heritage-assets.pdf/ [Accessed 08/02/2018].

[45] Temple Group Ltd. (2014) Aviation Noise Metric - Research on the Potential Noise Impacts on the Historic Environment by Proposals for Airport Expansion in England, Project. No. 6865.

[46] Historic England (2015) The Setting of Heritage Assets [online] Available at https://content.historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/heag180-gpa3-setting-heritage-assets.pdf/ [Accessed 08/02/2018].

[47] English Heritage (2008) Conservation Principles. London: English Heritage.

[48] DCLG (2012) National Planning Policy Framework [online] Available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf [Accessed 08/02/2018].

[49] Historic England (2015) Good Practice Advice in Planning Note 2: Managing Significance in Decision-taking in the Historic Environment [online] Available at https://historicengland.org.uk/images-books/publications/gpa2-managing-significance-in-decision-taking/ [Accessed 08/02/2018].

[50] Historic England (2015) The Setting of Heritage Assets [online] Available at https://content.historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/heag180-gpa3-setting-heritage-assets.pdf/ [Accessed 08/02/2018].

[51] WSP (2016) Land at former Manston Airport, Historic Environment Desk Based Assessment.

[52] WSP (2017) Land at former Manston Airport, Ramsgate, Kent: An archaeological evaluation report

[53] Historic England (2016) Historic Military Aviation Sites. Available at https://content.historicengland.org.uk/images-books/publications/historic-military-aviation-sites/heag048-historic-military-aviation-sites.pdf/ [Accessed 16/2/2018].

[54] Taylor, R and Smith, V. (2016) Survey of Buildings and Structures associated with Manston Airport and the Surrounding Areas (available from KCC HER).

Contents

10. Land Quality

10.1 Introduction

10.1.1 This chapter sets out the results of an assessment of the effects of the Proposed Development on Land Quality.

10.1.2 This Chapter should be read in conjunction with the Proposed Development description (**Chapter 3: Description of the Proposed Development**). Following a summary of the limitations of the assessment contained in this Chapter, the Chapter outlines the relevant policy, legislation and guidance that has informed the assessment, and the data gathering methodology that was adopted as part of the land quality 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.

Limitations of this Environmental Statement

10.1.3 The baseline information informing this Environmental Statement (ES) is derived from a desk study and a site visit, carried out in accordance with the Environment Agency (EA) Model Procedures for the Management of Land Contamination (Contaminated Land Report (CLR) 11), 2004[1]. The site visit did not include the outfall route to Pegwell Bay, service routes from the highway to the outfall pipeline and a waste storage area located in the western part of the site, comprising wood pallets, tires, drums, mattresses and a skip containing pieces of scrap and wood (based on an aerial map dated August 2016 (Google maps 2017)). However, a survey of the pipeline has been carried out by RPS (the masterplanner consultants) who report "*the pipeline is in a condition which will not require any structural works before being used for drainage purposes, works will be limited to maintenance activities (i.e.: jetting and cleaning with some defects which needs to be monitored and could be treated in future)*" [i]-.

10.1.4 No intrusive investigations have been undertaken to date and the assessment in this Chapter has therefore been based on a realistic worst-case scenario. It is considered unlikely that having the data that would be derived from such investigation would significantly change the findings of this Chapter. However, intrusive investigations will be carried out at a later date, with the approach to undertaking these already under discussion with the EA, Southern Water (SW) and Thanet District Council (TDC). For full details of how the EIA assessment has been approached, please see **Chapter 5: Approach to the Environmental Statement**.

10.2 Policy, Legislation and Guidance

10.2.1 A study of Land Quality related planning policy, legislation and guidance at the European, national, regional and local levels has been undertaken for the site and its locality in order to highlight any requirements which the Proposed Development needs to consider. Information on relevant policies can be found in **Table 10.1**.

10.2.2 Full details of all national and local planning policies relevant to the Proposed Development can be found in **Appendix 4.1**. The following section outlines legislation and policy relevant to this assessment.

[i] Email from RPS (Chris Johnson) to Amec Foster Wheeler dated 11th December 2017

Table 10.1 European, National, Regional and Local Planning Policies, Legislation and Guidance relevant to Land Quality

Legislation or Policy Reference	Legislation Summary or Policy Information relevant to Land Quality
European Policies	
Environmental Liability Directive (2004/35/EC)[2]	Requires an operator to take preventative, as well as remedial, measures. It applies both to damage that has occurred and where there is an imminent risk of it occurring. The *Environmental Liability Directive* is implemented in England by the *Environmental Damage (Prevention and Remediation) Regulations 2009 (SI 2009/153*).
Water Framework Directive (WFD) (2000/60/E)[3]	The overall purpose is to establish a framework for the protection of surface fresh water, estuaries, coastal water and groundwater. The primary objectives are to improve surface water and groundwater quality and to ensure that pollutants are prevented from entering groundwater and surface water. This is implemented into English law through *The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003*[4].
Groundwater Directive (80/68/EEC)	Aims to protect groundwater against pollution caused by dangerous substances. The directive is primarily implemented in England and Wales by the *Environmental Permitting (England and Wales) Regulations 2016*[5].
Directive on the Protection of Groundwater Against Pollution and Deterioration (2006/118/EC) as amended by Commission Directive 2014/80/EU of 20 June 2014	Sets out specific measures for preventing and controlling groundwater against pollution and deterioration.
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017[6]	Requires that the EIA identify, describe and assess the significant direct and indirect effects of the Proposed Development on human health, biodiversity, land, soil and water. As per Schedule 3 Regulation "*9(1): the characteristics of development must be considered with particular regard to (c) the use of natural resources, in particular land soil water and biodiversity; (d) the production of waste; € pollution and nuisances; (f) the risk of major accidents and/or disasters relevant to the development concerned […]; (g) the risks to human health (for example due to water contamination or air pollution)".*
National Policies	
The National Planning Policy Framework (NPPF): Draft for Consultation (March 2018)	States that local planning policies and decisions should ensure that: *"A site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation);* *After remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and* *Adequate site investigation information, prepared by a competent person, is available to inform these assessments."* In addition, the draft NPPF states that planning policies and decisions should contribute and enhance the natural and local environment by: *"Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability.* *Remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate"*
The National Planning Policy Framework (NPPF) (2012)[7]	States that local planning policies and decisions should ensure that: *"A site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any*

Legislation or Policy Reference	Legislation Summary or Policy Information relevant to Land Quality
	proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation". *After remediation, as a minimum, land should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990[8];* and *Adequate site investigation information, prepared by a competent person, is presented".* In addition, the NPPF states that the planning system should *"contribute to and enhance the natural and local environment by (a) preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability; and (b) remediating and mitigating …contaminated…land, where appropriate*". Since April 2015 the integration of sustainable drainage systems (SuDS) for the management of run-off in major developments has become a planning requirement.
National Legislation	
Town and Country Planning Act 1990[9]	Historical land contamination is a material consideration under this act. It is necessary to ensure that any land which is to be redeveloped is suitable for its proposed end use. Therefore, prior to development, the planning authority may require investigation of the site and, if necessary, remediation to take place.
Environmental Protection Act 1990[10]	The contaminated land regime is set out within Part 2A of the *Environmental Protection Act 1990*. Part 2A provides a statutory definition of 'contaminated land' and sets out the nature of liabilities that can be incurred as a result of contaminated land and groundwater. Contaminated land is defined as: *"Any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land that:* • *Significant harm is being caused, or there is significant possibility of such harm being caused; or* • *Significant pollution of controlled water is being caused or there is significant possibility of such pollution being caused".* The accompanying statutory guidance states that Part 2A takes a risk based approach to defining contaminated land. The guidance follows established principles of risk assessment, including the concept of a 'contaminant linkage' (i.e. a linkage between a 'contaminant' and a 'receptor' by means of a 'pathway') where: *'A contaminant is a substance which is in, on or under the land and which has the potential to cause significant harm to a relevant receptor, or cause significant pollution of controlled waters;* *A receptor is something that could be adversely affected by a contaminant, for example a person, an organism, an ecosystem, property or controlled waters; and* *A pathway is a route by which a receptor is or might be affected by a contaminant.*' Environmental Protection Act 1990: Part 2A, Contaminated Land Statutory Guidance[11] was published in April 2012.
Water Resources Act 1991[12] and Environmental Permitting (England and Wales) Regulations 2016	For sites where contamination of controlled waters is a potential issue, in addition to the provisions of Part 2A consideration should also be given to the *Water Resources Act (WRA) 1991*. Parts of the Act have been replaced by the *Environmental Permitting (England and Wales) Regulations 2016 SI 2016 No.475* (referred to here as EPR), although some of the core definitions (e.g. controlled waters) still refer to the WRA. The two aspects of the EPR so far as controlled waters are concerned are: • Schedule 21: Water discharge activities – these are concerned with discharges to surface waters, that are controlled waters, of any poisonous, noxious or polluting matter; waste matter; trade effluent or sewage effluent; and • Schedule 22: Groundwater activities – these are concerned with discharges of pollutants, or other discharges that may lead to input of a pollutant, to groundwater. The "activities" relate both to those that require a permit and activities that are unlawful (e.g. causing pollution to controlled waters), with only a small number of activities being exempt, although even these need to be registered with the EA. We note that a "passive" release of pollutants, such as may occur to groundwater from land where the original cause of pollution has ceased is not considered to be an activity requiring permitting.

Legislation or Policy Reference	Legislation Summary or Policy Information relevant to Land Quality
	Under the WRA, the EA still has the power to remediate pollution of controlled waters by means of Anti-Pollution Works Notices, via Section 161A of the WRA. The provisions of the WRA and EPR (and the consequent powers of the EA) can apply when the land is not Statutory Contaminated Land under the terms of Part 2A. The EA has indicated that in general Part 2A will be applied in preference to WRA powers if it is applicable (i.e. passive discharges are occurring).
Building Regulations 2016[13]	The Approved Document C Site Preparation and Resistance to Contaminants and Moisture 2013, indicates the need for risk assessment and remediation to be undertaken to ensure safe development.
Airports National Policy Statement[14]	The government issued the Airports National Policy Statement (NPS): new runway capacity and infrastructure at airports in the South East of England in June 2018. Whilst this document focuses on the potential for an expanded Heathrow Airport, it provides policy guidance as to how the impacts of airport development upon Land Quality should be considered. Land use including open space, green infrastructure and Green Belt: Section 5.110:'*Construction and operation of airport facilities is a potential source of contaminative substances (for example, through de-icing or leaks and spills of fuel). Where pre-existing land contamination is being considered through development, the objective is to ensure that the site is suitable for its intended use. Risks would require consideration in accordance with the contaminated land statutory guidance as a minimum'*. Water quality and resources: Section 5.174: '*Development may result in an increased potential for impacts on the water environment, especially the quality of the surface and groundwater through the discharge of waters contaminated with de-icer along with hydrocarbons and other pollutants';* Section 5.175: *'The applicant should make sufficiently early contact with the relevant regulators, including the EA, for abstraction licensing and environmental permitting, and with the water supply company likely to supply the water. Where the proposed development is subject to an environmental impact assessment and the development is likely to have significant adverse effects on the water environment, the applicant should ascertain the existing status of, and carry out an assessment of, the impacts of the proposed project on water quality, water resources and physical characteristics as part of the ES'.*
Local Policy	
Thanet Local Plan (2006) (Saved Policies)[15],[16]. Policy SE01:	Permission for development which is sensitive to pollution will be permitted only if it is sufficiently separated from any existing or potential source of pollution as to reduce pollution impact upon health, the natural environment or general amenity to an acceptable level, and provide adequate safeguarding and mitigation on residential amenity.
Thanet Local Plan (2006) (Saved Policies) Policy SE03: Contaminated Land	Development on land known or suspected to be contaminated or likely to be adversely affected by such contamination will only be permitted where: 1) An appropriate site investigation and assessment (agreed by the council) has been carried out as part of the application […]; 2) The proposed remedial measures would be acceptable in planning terms and would provide effective safeguards against contamination hazards during the development and subsequent occupation of the site.
Thanet Local Plan (2006) (Saved Policies) Policy SE04: Ground Water Projection Zones	Proposals for development within the Groundwater Source Protection Zones (SPZ) identified on Thanet's Groundwater SPZ map will only be permitted if there is no risk of contamination to groundwater sources. If a risk is identified, development will only be permitted if adequate mitigation measures can be implemented.
Thanet Local Plan (2006) (Saved Policies).	Saved Policy EP2 – Landfill Sites states: "*On or near landfill sites or where there is otherwise reason to suspect that potential danger from evolving or migrating gas may be present, development or redevelopment, including change of use, will only be permitted where:* *1) The applicant/ developer has demonstrated either that there is no danger from evolving or migrating gas or that reliable arrangements can be made to overcome such danger; and* *2) Any necessary remedial measures can be achieved without unacceptable environmental impact."* TDC will seek by agreement or by imposition of conditions on any consent for development, to ensure management of gas from closed landfill, and that suitable precautions are taken in construction

Legislation or Policy Reference	Legislation Summary or Policy Information relevant to Land Quality
	methods together with any other arrangements considered necessary to safeguard against hazards associated with landfill gas.
'Kent Minerals Local Plan Chalk and Clay/Oil And Gas"[17] and 'Brick Earth Subject Local Plan'	Saved policies of Kent County Council (KCC)'s: Oil and Gas saved policies: Policy OG8: Nature conservation: before granting permission for an oil and gas related proposal, the planning authority will require to be satisfied that the Earth Science and Ecological interests of the site and its surroundings, including those set out in paragraphs 5.39 and 5.40, have been established.
Kent Minerals and Waste Local Plan 2013-2030[18]	Policy CSW 14 seeks to ensure that contaminated land is treated in situ or in combination with other contaminated land when those sites are to be redeveloped. KCC confirmed that the site does not lie within a Mineral Safeguarding Area as defined by the Kent Minerals and Waste Local Plan 2013-30 Policies Maps.
Dover District Council Core Strategy. Policy DM17[19]	Safeguards against contamination in groundwater source protection zones
Guidance:	
EA Contaminated Land Report (CLR) 11, Model Procedures for the Management of Land Contamination, 2004[20]	Provides the technical framework for structured decision making about land contamination.
EA Groundwater Protection: Principles and Practice (GP3)[21]	Outlines the regulator's framework for the management and protection of groundwater.
Guidance for the safe development of housing on land affected by contamination, R&D publication 22: 2008[22]	Framework for assessment of contaminated land for development based on CLR11.
BS10175:2011+A1 2013[23]	Investigation of Potentially Contaminated Sites - Code of Practice.
CIRIA Report C532[24]	Control of Water Pollution from Construction Sites.
CIRIA Report C692[25]	Environmental Good Practice on Site (3rd Edition).
Health and Safety Executive (HSE)	Protection of workers and the general public during the development of contaminated land[26].
BS8485:2015[27]	Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings.
BS8576:2013[28]	Guidance on Investigations for Ground Gases. Permanent Gases and Volatile Organic Compounds (VOCs).
Construction Industry Research and Information Association (CIRIA) Report C665	Assessing Risks Posed by Hazardous Ground Gases to Buildings.
BS6031:2009[29]	Code of Practice for Earthworks: Best practice guidance on geotechnical aspects of earthworks and on working practices.
CL:AIRE (2011) [30]	The Definition of Waste: Development of Industry Code of Practice.
CIRIA Report 132[31]	A guide for safe working practices on contaminated Sites.

Legislation or Policy Reference	Legislation Summary or Policy Information relevant to Land Quality
Department for Environment, Food and Rural Affairs (Defra)	Safeguarding our Soils; a Soil Strategy for England[32].
Government Circular 06/2005 'Biodiversity and Geological conservation[33]	Statutory obligations and their impact within the planning system.

10.3 Data Gathering Methodology

10.3.1 This section describes the desk study and site walkover undertaken to inform the Land Quality assessment.

10.3.2 The site was defined by the red line boundary (see **Figure 1.1**).

10.3.3 Tasks undertaken were as follows:

- Searches of regulatory and historical information were made within a 1km radius around the site of the Proposed Development (see **Appendix 10.1**); and
- Additional data was collected on controlled water receptors beyond 1km of the main red line boundary in Pegwell Bay and Sandwich Bay from MAGIC[34], which provides authoritative geographic information about the natural environment from across government to assess their sensitivity.

10.3.4 In order to establish the baseline situation, Land Quality data were obtained from the sources listed in **Table 10.2** for the site and the surrounding area.

Table 10.2 Information used in the Preparation of this ES

Source of Information	Details of information used in this ES
British Geological Survey (BGS) mapping website[35]	Borehole logs, BGS maps (geological map, sheets no. 274, Ramsgate, 1:50,000, published 1980 and hydrogeological map of the Chalk and Lower Greensand of Kent, sheet no. 3, 1:126,720, published 1970).
Environment Agency website: "What's in your backyard?"[36]	Aquifer designations, groundwater source protection zones, catchment and surface water quality, etc.
MAGIC website[37]	Land-based designations.
EA catchment data search[38]	Information held by the EA on the water environment which supports and builds upon the data in the River Basin Management Plans.
Guidance for the Safe Development of Housing on Land Affected by Contamination R&D66: 2008[39]	Assessment methodology of receptor sensitivity.
Envirocheck report dated 2016 (reference 82787389_1_1)[40]	Historical/ Ordnance Survey (OS) plans and environmental datasheets.
Land Quality Assessment Phase One: Desk Study Land Quality Statement. Project No. 10133 – Final report, August 1998, GIBB Environmental[41]	Phase 1 desk study prepared for the Ministry of Defence (MOD) for Manston airfield, comprising the review of publicly available and historical information from books, information provided by the Establishment Works Consultant (EWC), a summary of the site walkover carried out in May 1998, and a qualitative risk assessment.

Source of Information	Details of information used in this ES
Geo-environmental Assessment, Jentex petroleum, 2015[42]	Phase 1 desk study including the findings of an intrusive Phase 2a investigation carried out at the petroleum depot located directly southeast of Manston airfield at Canterbury Road. A preliminary risk assessment was prepared to advise on the geo-environmental implications of the re-development of the site from industrial/commercial to residential.
Geo-environmental Assessment Report, Jentex, 2016[43]	The report presents the findings of a supplementary intrusive investigation conducted at the petroleum depot, located directly southeast of Manston airfield at Canterbury road, in order to verify whether or not the hydrocarbon impact identified during the 2015 investigation had extended to the chalk strata.
Kent International Airport Manston, Radar Mast development, Phase 1 and 2 Contaminated Land Assessment, June 2010. Planning Applications F/TH/09/0637[44]	Ground investigation report.
Site Investigation Tank 2, Base Validation, Jentex, 2007[45]	Ground investigation report.
Preliminary Unexploded Ordnance (UXO) Risk Assessment (reference P5188)[46]	Kent International Airport Ltd, Kent International Airport, Manston, Ramsgate, Kent, CT12 5BL.
Spitfire and Hurricane Memorial Museum, Manston, Kent[47]	Historical website for the site and its surroundings.
TDC, Environmental Protection Manager	TDC provided a map for details of landfill sites near the site (EA Landfill Atlas Data)[48] that included; • Current or historical contaminative land uses e.g. petrol stations, industrial processes etc.; • Any contaminated land identified under Part 2A (EPA 1990) inspection strategy and the prioritisation status of the site (if appropriate); • Details of nearby regulatory authorisations that may be held by TDC; • Any other data held by TDC with regard to contaminated land, such as previous investigations and remediation reports; and • Any planning liaison or development control issues. TDC also provided access to their own and external databases, including groundwater or surface water abstractions (for example, wells used for private water supply), disused petrol tanks, protected areas, local coal mining information and the contaminated land register.
Water Quality, RiverOak Strategic Partners, Manston Airport, Kent, Hydrogeological Impact Assessment (HIA), 2018, Amec Foster Wheeler	Water quality data and baseline information.

Desk Study

10.3.5 A Phase 1 Geoenvironmental Desk Study was undertaken to inform the Land Quality assessment (**Appendix 10.1**) in accordance with the EA CLR 11[49]. The purpose of this study was to assist in understanding environmental risks and liabilities associated with land quality and potential geotechnical hazards, in order for the Proposed Development to support the safe and economic development of the site. The definitions for the qualitative risk assessment have been taken from the Guidance for the Safe Development of Housing on Land Affected by Contamination report[50] that states:

"*The guidance, whilst written to be relevant to housing development on such sites, is also generally applicable to other forms of development, to existing developments and to undeveloped land, where such sites are on land affected by contamination*."

10.3.6 The desk study comprised of the following scope of works:

- Review of any existing information, including information obtained from sources such as Landmark Information Group's Envirocheck report – refer to **Table 10.2**;
- Review of preliminary Unexploded Ordnance (UXO) Assessment Report – refer to **Table 10.2**;
- Site walkover;
- Desk study reporting including collation of the results of the above tasks into a concise report and the development of a Conceptual Site Model and a preliminary Qualitative Risk Assessment (QRA), according to the source - pathway - receptor model;
- Identification of information gaps relating to land contamination and any requirements for further assessment; and
- Geotechnical assessment to identify potential hazards and constraints.

Survey Work

10.3.7 A site walkover was undertaken by a senior consultant from Amec Foster Wheeler from 7 February to 9 February 2017 to obtain additional information about the site's current setting and any potential land quality issues. As noted above, it did not include the outfall route to Pegwell Bay, service routes from the highway to the outfall pipeline or a waste storage area located in the western part of the site, comprising wood pallets, tires, drums, mattresses and a skip containing pieces of scrap and wood (based on an aerial map dated August 2016 (Google maps 2017)). However, a survey of the pipeline has been carried out by RPS who report "*the pipeline in a condition which will not require any structural works before being used for drainage purposes, works will be limited to maintenance activities (i.e. jetting and cleaning with some defects which needs to be monitored and could be treated in future)*"[1].

Consultation

10.3.8 Since 2016 and throughout the undertaking of the survey and assessment work, RiverOak Strategic Partners (RiverOak) has engaged with consultees with an interest in potential Land Quality effects. A Scoping Report (**Appendix 1.1**), including a chapter covering Land Quality, was produced and submitted to the Planning Inspectorate (PINS) in June 2016, with PINS providing a Scoping Opinion **(Appendix 1.2**) in August 2016.

10.3.9 Organisations, relevant to this Chapter, that were consulted by PINS include:

- The EA; and
- TDC.

10.3.10 A summary of the Scoping Opinion comments relevant to Land Quality and how they are addressed in this ES is provided in **Table 10.3**.

Table 10.3 Consultee comments on the Land Quality issues presented in the Scoping Report

Consultee	Comments and considerations	How addressed in the ES
PINS	It is proposed to scope out potential contamination effects on human health due to spills and leaks from	Environmental measures expected to be incorporated into the Proposed Development

Consultee	Comments and considerations	How addressed in the ES
	mechanised plant during the construction phase. Chapter 9 limits this to the installation of the planned tank farms. The Secretary of State is satisfied that these matters can be dealt with through measures such as training and Construction Environmental Management Plans (CEMPs). Drafts of such plans should be provided with the Development Consent Order (DCO) application.	are listed in **Section 10.5** of this ES. A Construction Environmental Management Plan (CEMP) (**Appendix 3.2**) is also provided as part of the DCO application.
PINS	It is proposed to scope out potential effects on human health from any contaminated land during construction. Chapter 9 limits this to effects on construction workers from contaminated soil or buried animals. In light of the potential for contamination from a range of sources, e.g. aviation fuels, trichloroethylene (TCE) and unexploded ordnance (UXO), the Secretary of State considers that an assessment should be carried out, with appropriate mitigation identified and secured in the DCO.	Environmental measures expected to be incorporated into the Proposed Development are listed in **Section 10.5** of this ES. A CEMP (**Appendix 3.2**) is also provided with the DCO application. An assessment of the potential effects from contaminated land sources during construction has been undertaken for the site and is detailed in **Sections 10.8** to **10.12**.
PINS	Scoping Report Section 9.4 highlights the potential risk of contamination and UXO being present on site and outlines that a Phase 1 Land Quality Assessment (LQA) (Manston Airport, Kent, Draft Geoenvironmental Desk Study, Amec Foster Wheeler, March 2017) supported by a site walkover and a 6 Alpha detailed UXO threat & risk assessment will be undertaken. The Secretary of State considers that the Phase 1 LQA should be carried out in accordance with the EA Model Procedures for the Management of Land Contamination (CLR11)[51], and the UXO studies should be carried out in accordance with CIRIA Guide C681 - Unexploded ordnance (UXO): A guide for the construction industry.	A Phase 1 Land Quality Assessment (LQA) has been carried out in accordance with CLR11 and is attached as **Appendix 10.1** of this ES. A Preliminary UXO Risk Assessment has been undertaken for the site and included in Appendix B of the Phase 1 LQA. (**Appendix 10.1**) The report identified that there is a medium to high probability of UXO encounter on the site (probability rating of 4, on a scale up to 5). As such, a detailed UXO threat & risk assessment will be carried out in accordance with CIRIA C681 Chapter 5[ii52] on managing UXO risks, prior to any intrusive works.
PINS	Given the confirmed presence of contamination on site, the Secretary of State agrees that the risk assessment should be supported by ground investigation data, where appropriate. The scope of any intrusive investigation should be agreed with the EA and TDC.	Discussions about the findings of the Phase 1 LQA (**Appendix 10.1**) and a proposed intrusive investigation have been initiated with the EA. An intrusive investigation will be undertaken at a later date and will be agreed following consultation with EA and TDC.
PINS	The Secretary of State requires that the assessment consider the risk of discharges of contaminated material to European designated sites in Pegwell Bay and the potential for mobilisation of contamination within the aquifer. Given the potential for substantial material imports to level areas of the site, the Secretary of State considers that the assessment should also set out the Applicant's proposed control measures to ensure that fill materials do not introduce new sources of contaminants to the site.	The Phase 1 LQA (**Appendix 10.1**) has assessed the risk to Pegwell Bay. Control measures have been detailed and assessed in **Sections 10.5** and **10.8** to **10.12** of this ES. In addition, control measures set out in the **Chapter 8: Freshwater Environment** will be implemented to control contamination migration.
PINS	The Secretary of State requires that for the purposes of any proposed investigation or construction works aquifer protection measures should be set out and agreed with SW.	For any proposed investigation or construction works aquifer protection measures will be agreed following consultation with SW.

Consultee	Comments and considerations	How addressed in the ES
PINS	Section 9.6 of the Scoping Report states that the Phase 1 LQA risk assessment will be used to identify potentially significant effects. The detailed significance criteria are not set out in the Scoping Report. The Secretary of State requires that specific significance criteria are described in the ES.	The significance evaluation methodology and the significance criteria are described in **Section 10.7** of this ES.
EA	As discussed in the Scoping Report, the Environmental Impact Assessment (EIA) should include detailed information on all potential sources of contamination. There are likely to be numerous potential sources of contamination from a former airfield. These potential sources should include (but are not be limited to) drainage infrastructure including interceptors, pesticide storage and use, aprons and taxiways where refuelling occurred, open trenches, used in fog clearance and any underground tunnels that may have been used for storage.	A review of the site's history and environmental setting has identified potential contaminant sources on the site and the surrounding area and is included in the Phase 1 LQA (**Appendix 10.1**).
EA	The EIA will need to provide information on potential contamination of the site, but we would also expect a preliminary risk assessment and site investigation to accompany the DCO application for this site. We recommend that the applicant: 1. Follows the risk management framework provide in CLR11, Model procedures for the management of land contamination[53] 2. Uses BS 10175 2001, Investigation of potentially contaminated sites – Code of Practice as a guide to undertaking the desk study and site investigation scheme 3. Uses MCERTS accredited methods for testing contaminated soils at the site, 4. Further information may be found on the land contamination technical guidance pages on the direct.gov website https://www.gov.uk/government/collections/land-contamination-technical-guidance	A Phase 1 LQA (**Appendix 10.1**) has been carried out in accordance with CLR11. It includes recommendations for a staged intrusive investigation. The intrusive investigation will be undertaken at a later date. BS 10175, Investigation of potentially contaminated sites – Code of Practice[54] has been referred to in preparing the Phase 1 LQA and will be used to design the intrusive investigation. MCERTS[55] accredited methods for testing contaminated soils at the site will be used. The land contamination technical guidance[56] pages on the direct.gov website have been consulted.
EA	Site investigations and any disturbance of the ground before, during and after development, will need to take into account the vulnerability of the groundwater in the underlying aquifer. Any ground disturbance could cause turbidity of the groundwater at the abstraction well, and also pose a risk of causing instability in the adit. We recommend early consultation with Southern Water Services with regard to any planned intrusive investigations, on site demolition and subsequent development of the site.	Discussions about the findings of the Phase 1 LQA (**Appendix 10.1**) and a proposed intrusive investigation have been initiated with the EA and SW. Details of the consultations are provided in **Table 10.4**.
TDC	The EIA should consider all potential sources of contamination associated with the former airport/military uses. A Phase 1 contamination survey is reported to have been commissioned but it is not known whether this has been completed. The Phase 1 has not been supplied as part of the Scoping Report. This department understands that the applicant will request access to the site to undertake a site walkover survey. This will be required to inform the Phase 1 Land Quality Assessment.	A Phase 1 LQA (**Appendix 10.1)** has been carried out in accordance with CLR11. A site walkover was carried out from 7th February to 9th February 2017. The findings have been included in the Phase 1 LQA.

Consultee	Comments and considerations	How addressed in the ES
TDC	The scoping opinion states that it is likely that the proposed Phase 1 Assessment will conclude that intrusive work be carried out following the granting of the DCO. Without access to the Phase 1 report it is not possible to conclude whether this is sufficient and a degree of caution must be considered given the sensitivity of the bedrock below. While not stated in this section of the Scoping Report, Table 7.3 in Section 7 states: *'The fuel station to the south east of the site is known to be an issue and there are probably groundwater and land contamination issues with that site associated with historical activity and spills... the closest Southern Water source is mixed to treat for nitrate pollution, and there have been issues in the past with hydrocarbons and solvents*.' A degree of caution is therefore advised in allowing soil sampling to be deferred to post consent of the DCO particularly without knowing the construction methods proposed. The EA is key consultee. In general, where necessary approved remediation must be undertaken to ensure the redevelopment will not represent an unacceptable risk to future/adjacent site users or the environment, including vulnerable groundwater receptors.	A Phase 1 LQA (**Appendix 10.1)** has been carried out in accordance with CLR11. It includes a review of previous site investigation reports, TDC and the EA data and recommendations for a staged intrusive investigation. Discussions about the findings of the Phase 1 LQA and a proposed methodology for an intrusive investigation have been initiated with the EA and SW.
TDC	Impacts on land quality and underlying groundwater resources from future proposed site uses, including the breaking of aircraft, are a material planning consideration and should be considered as part of the EIA for the operational phase of the development. Appropriate safeguarding measures must be incorporated at the design stage to inform the viability of the development.	Impacts on land quality and underlying groundwater resources from future proposed site uses have been considered for the operational phase of the development in **Sections 10.8** to **10.12** of this ES. Future aircraft recycling would be a permitted activity. The permit would require the operator to mitigate the risks cited. This is not part of the Land Quality assessment.
TDC	At page 9.6.10, the report scopes out potential effects from contaminated soil or buried animals on construction workers during construction works due to appropriate use of Personal Protective Equipment. Given the potential presence of Polychlorinated biphenyls (PCBs) from substation buildings and/or contaminants associated with former military uses (e.g. weapons/explosives), potential effects on construction workers should be further assessed. It is agreed that the effects outlined as unlikely to be significant have existing standard and proven mitigation measures to prevent the risk of these effects occurring, but a commitment to such measures should be stipulated through a CEMP.	Environmental measures proposed to be incorporated into the Proposed Development are listed in **Section 10.5** of the ES. A CEMP is provided with the DCO application.

Statutory Consultation

10.3.11 Statutory Consultation took place over a period of 42 days between 12 June and 23 July 2017 ('2017 Statutory Consultation') and a period of 35 days between 12 January and 16 February 2018, in accordance with sections 42, 47 and 48 of the 2008 Act[57]. Prescribed and non-prescribed consultees and members of the public were included in the consultation. Various methods of consultation and engagement were used in accordance with the Statement of Community Consultation (SoCC) (refer to **Appendix 1.3**), including letters, website, public exhibitions, publicity and advertising, inspection of documentation at selected locations and parish and town council briefings.

10.3.12 For each of the 2017 and 2018 Statutory Consultations, a Preliminary Environmental Information Report (PEIR)[58] was issued for wider consultation. These included results of a preliminary assessment of historic and current site activities.

10.3.13 A summary of the consultee comments received in relation to those drafts is provided in **Table 10.4** and **Table 10.5**, along with a response to identify how the matter has been dealt with in this ES.

Table 10.4 Consultee Comments 2017 Statutory Consultation

Consultee	Comments and considerations	How addressed in this ES
TDC	Draft Phase 1 Geo-environmental report – It is noted that breaking of aircraft at the former airport is not included and should also be added as a potential contaminant source within the conceptual model.	Previous reports do not mention this as historic activity and no permits or licences for such activity have been identified in the Envirocheck search or a search of current waste permits, nor is it included in the data TDC provided in response to a request ref WK/201616961. Maintenance of aircraft is addressed as potential contaminant source in our Phase 1 LQA provided in **Appendix 10.1**.
TDC	In addition to EA requirements in relation to groundwater, the Council should be consulted regarding the scope of the proposed intrusive investigations, and any subsequent remediation requirements, as these are material planning considerations.	TDC will be consulted regarding the scope of the proposed intrusive investigations and any subsequent remediation requirements, as these are material planning considerations. It is specified in **Section 10.8** of this ES – construction phase effects - that: "*an intrusive investigation will be undertaken before construction to determine if there is any evidence of contamination, the programme and scope of these investigations will be agreed, following consultation with the EA, TDC Environmental Health Officer (EHO) and other stakeholders as appropriate*."
TDC	Within the PEIR significance evaluation for land quality, negligible magnitude of the adverse effects on human health and groundwater has been considered for the application site itself, with the proviso that appropriate investigation and mitigation will be undertaken to safeguard sensitive receptors. However, a number of 'site specific measures' will be required to address effective identification, protection, containment, attenuation, management and recovery of potential contaminants at the site during the construction and operational phases. These are yet to be agreed by the regulators.	'Site specific measures' required to address effective identification, protection, containment, attenuation, management and recovery of potential contaminants at the site during the construction and operational phases are being discussed with the regulators, including the EA and TDC. The measures will be incorporated into the CEMP (**Appendix 3.2**) for the construction phase and in an airport manual that will be produced by RiverOak for the operational phase in accordance with EASA requirements[59].
TDC	Although the likelihood is low, impacts of a plane crash outside contained areas must also be considered as part of the PEIR. This has not been looked at in the preliminary significance evaluation and it is understood that further work is currently being undertaken by Amec Foster Wheeler to address this. Manston airport benefits from a particularly wide (and long) runway. However, the adverse effects for this scenario should be considered in conjunction with appropriate emergency and pollution response plans. These must have capacity to prevent potential spread of contamination (e.g. fuels and fire-retardant foams), which could impact the public water supply or SSSI at Pegwell Bay following an incident; including possible damage to impermeable hardstandings.	See **Chapter 17: Major Accidents and Natural Disasters**. An airport manual will also be produced by RiverOak for the operational phase in accordance with EASA requirements[60]. The manual will include measures: • To manage the availability of aviation fuel and its storage, handling and quality control; • To manage the removal of disabled aircraft to comply with regulatory requirements relating to accidents, incidents and Mandatory Occurrence Reporting (MOR); and • That ensure the integrated management of response to an aircraft incident/accident taking

Consultee	Comments and considerations	How addressed in this ES
		account of the complexity and size of the aircraft operations.
TDC	The magnitude of effects on human health from UXOs are described as negligible provided detailed threat and risk assessments are completed prior to groundworks. Additional precautions may need to be considered as part of the CEMP however as effects may be significant should unsuspected munitions be encountered during any digging operations. Further specialist advice is required regarding the UXO assessment and any necessary precautions.	This will be done in a phased approach, with additional assessment carried out as part of the detailed site investigation. Future work relating to UXO will follow CIRIA guidelines (details are in **Table 10.1**). The CEMP (**Appendix 3.2**) will be informed by the findings of the site investigation.
TDC	The requirements for siting and options for above ground tanks must be explored with the EA. A relevant Bristol airport case study is referenced in the PEIR and further details should be provided.	The majority of the Jentex site is in SPZ 2. The meetings with the regulators (EA, TDC and SW) regarding the possible re-use of the Jentex site are summarised in **Table 10.5, Table 10.6**, **Table 10.7** and detailed in **Chapter 8: Freshwater Environment.**
TDC	It is noted that a CEMP is to be submitted as part of the DCO to reduce effects of pollution from the construction phase. The CEMP must be informed by the findings of intrusive investigation work. Please note that any works must be carried out in a strictly controlled manner to ensure that contaminants are not exposed and releases allowed to air, land or controlled waters, which could cause pollution, harm or nuisance. Construction works must also comply with the Control of Pollution Act 1974[61] (e.g. any works likely to cause nuisance to neighbouring properties must not commence prior to 8:00am with stated weekday working hours are 07:30-17:30hrs).	A CEMP (**Appendix 3.2**) has been submitted as part of the application, with a requirement to comply with its provisions. It would include the measures described in the Land Quality and Freshwater Environment Chapters of this ES to prevent mobilisation of and exposure to existing potential contamination during construction activities. Please refer to **Table 10.5.** Construction works will be carried out in accordance with relevant legislation and policy and good practice industry techniques for the protection of the environment from construction activities. These are outlined in the CEMP (**Appendix 3.2**) submitted as part of the DCO submission.
EA	Any objection on the grounds of inappropriate use in a Source Protection Zone 1 (SPZ1) for a public water supply may carry limited weight in planning terms. We would therefore seek to work with applicants to ensure maximum environmental controls are in place for any agreed return to airport use.	Discussions with the EA have been undertaken regarding the fuel farm and airport design. Further consultation is expected during the detailed design process.
EA	We would want to agree in advance the scope and location of any new site investigation activity. We would suggest some further site investigation and assessment may be required for key hotspots, i.e. fuel tanks and ASTs, to support the full DCO submission. At the very least a full summary of all existing ground investigation information should be drawn together and interpreted appropriately.	It is specified in **Section 10.8** that: "*an intrusive investigation will be undertaken before construction to determine if there is any evidence of contamination, the programme and scope of these investigations will be agreed following consultation with the EA, TDC as appropriate*." A summary of the existing ground information is presented in **Section 10.4**.
EA	To protect the underlying adit system and SPZ1, we would seek the bulk of existing runaway and taxiways to be kept and not dismantled.	As stated in **Table 10.8** and **Table 10.9** and in **Sections 10.8** to **10.12**, '*any removal of contamination beneath the existing runway will be risk based and will weigh advantages of contamination removal against removal of the runway*'.

Consultee	Comments and considerations	How addressed in this ES
EA	We would need to see a full options appraisal for any fuel depot location and agree full designs and containment processes for any agreed location.	Discussion on fuel farm design measures was held with the EA on 15 September and 3 November 2016, and 6 March, 16 May, 15 September and 3 November 2017. The additional measures detailed during these meetings were acknowledged by the EA have been incorporated into **Table 10.8** and **Table 10.10** and assessed in **Sections 10.8** to **10.12**.
EA	Any new taxiway drainage will have to tie in to positive drainage controls, to guard against accidental spillages on the taxiway.	Please refer to **Table 10.9** and **Table 10.10** and **Sections 10.8** to **10.12,** as well as **Chapter 8: Freshwater Environment.**
EA	A full CEMP will need to be agreed with us for all phases of works. Operational pollution prevention plans would also need to be agreed and should consider best practice and also available innovative measures for spillage management. We can discuss this further with the applicant, but for fire safety and hydrocarbon contaminant control we note there are new products available as well as traditionally used measures.	A CEMP (**Appendix 3.2**) has been submitted as part of the application, with a requirement that a full CEMP is produced and consulted upon with key consultees as a DCO requirement – refer to **Table 10.9**. An airport manual will be produced by RiverOak for the operational phase in accordance with EASA requirements[62]. The manual will comprise measures: • To manage the availability of aviation fuel and its storage, handling and quality control; • To manage the removal of disabled aircraft to comply with regulatory requirements relating to accidents, incidents and Mandatory Occurrence Reporting (MOR); and • That ensure the integrated management of response to an aircraft incident/accident taking account of the complexity and size of the aircraft operations. Further information available in **Chapter 8: Freshwater Environment.**
EA	Any spoil re-use on site will have to be agreed with us and managed under appropriate frameworks with verification reporting. Mobile treatment permits may have to be deployed to enable re-use of certain materials, the location would have to be agreed with us and be outside sensitive SPZ areas.	It is stated in **Table 10.5** that any contaminated soil will be identified by ground investigation prior to construction and either treated onsite and reused, or removed and disposed of off-site by a suitably licensed waste disposal operator. **Table 10.6** confirms that soil to be re-used will be controlled under the CL:AIRE Definition of Waste: Development Industry Code of Practice[63] to confirm they are suitable both chemically and geotechnically.
EA	Drainage management of cargo, HGV transit areas and car parking would need positive safe drainage to manage pollution risks. Early indications are that this can be achieved by outline proposals. They would need to be agreed in full at some point if development is to progress.	Please refer to **Table 10.8, Table 10.9** and **Sections 10.8** to **10.12,** as well as **Chapter 8: Freshwater Environment.**
EA	If / when existing buildings and infrastructure are demolished then appropriate site assessment will be needed under footprints to ensure any historic contamination risk is fully understood and addressed. This is especially relevant for any chemical or fuel storage areas, including the current Jentex site. Temporary surface water management or cover	Further site investigations, as appropriate, will be undertaken for any such areas.

Consultee	Comments and considerations	How addressed in this ES
	systems may be needed of exposed footprints until any remediation has been completed.	
EA	Proposals for storage of any materials for firefighting will need agreement with us and particular materials may not be approved if there is a risk of loss to ground of some types firefighting foams for instance.	The materials proposed for firefighting and the appropriate storage of these will be agreed following discussion with the EA and the Fire Service. Measures will be included in the airport manual that will be produced by RiverOak for the operational phase in accordance with EASA requirements.
EA	All foul drainage will need agreement and any decommissioned existing drains should be removed to ensure they do not offer pathways for contaminant transport into the ground.	This is covered in the drainage strategy in **Chapter 8: Freshwater Environment -** Outline Drainage Strategy (Appendix A of **Appendix 8.2).**
EA	We would need to agree the location and configuration of any cement or asphalt batching plant during construction activities, this should be as far from the SPZ1 area as possible and designed to ensure all drainage is positively controlled.	Addressed in **Table 10.5**: '*A designated area, the location and configuration of which will be agreed following consultation with the EA, will be used for any washing down or equipment cleaning associated with concrete or cementing processes and facilities provided to remove sediment prior to disposal to foul sewer*'.
EA	Any construction that requires piling would need to agree piling designs with us based on a risk assessment carried out in accordance with our guidance.	This is specified in **Table 10.5**: *'Suitable foundation design and piling method will be implemented to prevent migration of any potential/residual contamination and will be agreed following consultation with SW and the EA prior to the commencement of works*' and further discussed in **Sections 10.9** and **10.11.**
Kent County Council (KCC)	The application site does not lie within a Mineral Safeguarding Area as defined by the Kent Minerals and Waste Local Plan 2013-30 Policies Maps[64]. Therefore KCC, as Minerals and Waste Planning Authority, does not consider there to be any associated Mineral Safeguarding issues.	This is noted and appropriate amendments have been made**.**
Public Health England (PHE)	The potential for spillages and releases during the development phases is not fully discussed or developed in the current version of the EIA. The current documentation relies on the assumption that the CEMP and normal construction site good practice will be able to address these issues as they arise.	The potential for spillages and releases during the operational phases of development are discussed in the ES including in **Chapter 17: Major Accidents and Natural Disasters** (Table 17.6). The CEMP (**Appendix 3.2**) outlines the drainage and runoff controls likely to be required.
PHE	PHE accepts that the CEMP is the mechanism that will be used to control the majority of these potential impacts but believes that it should be developed in response to a suitable and sufficient risk assessment. A satisfactory assessment will need to identify any chemicals or substances which may be released into the environment, consider pathways by which sensitive receptors may be exposed and assess the significance of any such releases. PHE recommends that this risk assessment process should be documented and included in the final version of the EIA.	**Chapter 17: Major Accidents and Natural Disasters** considers the risks associated with chemicals and substances. A Health Impact Assessment (HIA) has also been developed, in addition to **Chapter 15: Health and Wellbeing**. The Phase 1 desk study outlines the potential soil contaminants and it is proposed to only excavate and remove soil where it poses a risk. Where possible hardstanding will be left in place. The CEMP (**Appendix 3.2**) outlines the controls likely to be required and how those controls will be developed.

Consultee	Comments and considerations	How addressed in this ES
PHE	In operation, the airport and supporting infrastructure will require the storage and use of a number of chemicals including fuel, de-icing fluids, lubricants etc. A number of these chemicals have the potential to cause impacts on the local population if they are exposed by releases to air, land or water.	An airport manual will be produced by RiverOak for the operational phase in accordance with EASA requirements. The manual will include measures: • To manage the availability of aviation fuel and its storage, handling and quality control; • To manage the removal of disabled aircraft to comply with regulatory requirements relating to accidents, incidents and Mandatory Occurrence Reporting (MOR); and • That ensure the integrated management of response to an aircraft incident/accident taking account of the complexity and size of the aircraft operations. The outline of controls to be incorporated in the design of the fuel farm and run-off of de-icer area included in **Table 10.9.**
PHE	PHE recommends that the major chemicals and substances of concern be identified and that the final EIA includes an inventory of these chemicals and substances, an assessment of their risk to human health and details of how these risks will be managed.	A HIA has been developed in addition to risks associated with major chemicals and substances being assessed and reported on in **Chapter 17: Major Accidents and Natural Disasters**. An airport manual will be produced by RiverOak for the operational phase in accordance with EASA requirements. The manual will include measures: • To manage the availability of aviation fuel and its storage, handling and quality control; • To manage the removal of disabled aircraft to comply with regulatory requirements relating to accidents, incidents and Mandatory Occurrence Reporting (MOR); and • That ensure the integrated management of response to an aircraft incident/accident taking account of the complexity and size of the aircraft operations.
PHE	Where available, the most recent UK environmental standards for the appropriate media (e.g. air, water, and/or land) and health-based guideline values should be used when quantifying the risk to human health from chemical pollutants. Where UK standards or guideline values are not available, those recommended by other organisations including the European Union, and World Health Organisation, subject to suitable explanation and justification, should be used.	The relevant and recommended environmental standards will be used at the site investigation and detailed quantitative risk assessment stage.
PHE	In general terms, PHE is satisfied with the approach taken to assessing land quality and notes that a programme of intrusive site investigation to identify and characterise contamination across the site will be undertaken if required. The applicants state that they will seek to agree a remediation programme with the EA and TDC. PHE is satisfied with this approach and will make additional comments at the DCO stage, once the Local Authority and EA positions have been clarified and the final reports are available.	The Phase 1 desk study will be submitted together with this ES chapter for Land Quality. The scope and design of the site investigation to be carried out at a later date will be agreed following consultation with TDC, SW and the EA.

Consultee	Comments and considerations	How addressed in this ES
PHE	The documentation proposes to scope out the potential for impacts on human health from spills and leaks associated with mechanised plant during the construction phase. It is argued that this position is justified on the basis that any spills or leaks are likely to be limited, and those that might occur will be managed and controlled by the use of best practice. PHE is of the opinion that, in the absence of a CEMP, it is difficult to justify the assumption that adequate controls will be in place. Consequently, we recommend that leaks and spills should not be scoped out until such time as the CEMP has been produced and both TDC and the EA are happy that the proposed controls are adequate.	A generic risk assessment has been carried out. However, mitigation is dealt with in the CEMP (**Appendix 3.2**), which as specified in **Table 10.8** will be prepared following consultation with the EA and TDC.
PHE	There is currently no Waste Management Plan (WMP) for the operational phase of the site and the timeline for the development places this document outside the DCO process. In terms of waste produced during the construction phase the documentation once again refers to the CEMP as a key management document. As the CEMP is not yet available PHE is unable to provide detailed comments at this time and will consider the matter further at the application for DCO stage.	Waste handling procedures for the operational phase will be included in the airport manual to be produced by RiverOak. Soil waste produced during construction phase will be controlled under the CL:AIRE Definition of Waste: Development Industry Code of Practice (version 2)[65]. The proposal is to include a CEMP (**Appendix 3.2**) as part of the application, with a requirement that a final CEMP is produced following consultation with key consultees, such as EA, as a DCO requirement.
PHE	PHE notes that a report from the Defra Radiation Protection Services suggested that, as with many RAF sites, radioactive materials, and particularly radium luminising material, may have been present in equipment buried at the site and may have been disposed of in waste pits or areas where ash was disposed of. PHE requests that the nature and extent of potential radioactive material be further considered and that the potential for radiological contamination and any necessary handling / decontamination procedures be included in both the discussions on land contamination and the CEMP (once written). PHE reserves the right to make further comments once more detailed information is provided at the application for DCO stage.	Radium has been added to burning area in paragraph 10.4.37– Current/Historic Activities and in the preliminary risk assessment of the Phase 1 LQA (**Appendix 10.1**). The further site investigation will screen arisings for radioactivity especially in areas of ash or waste tips. This will allow any necessary mitigation to be addressed.
PHE	The submitted documentation indicates that there are no public water supply abstractions located within the site boundary, but that a number of people and organisations abstract water from groundwater or ponds/lakes up to 1km outside the site boundary (six located within 500m, and a further 3 up to 1km from the site boundary). The abstractions are for private water undertaking, public water supply and agriculture.	Information about water supply abstractions is provided in **Section 10.4**.
PHE	Given the known issues of land contamination and the potential for further releases into the environment during future operations, there is the potential for exposure of the public via ground or surface waters. We note that there are a number of permitted discharges to land, ground water and the saline estuary and are concerned that there may be the potential for recreational uses of the area to be inadvertently exposed to releases form the site.	Please refer to **Chapter 8: Freshwater Environment**. Any discharges would be covered by the permitting regime.
PHE	We request that the proposer works with the EA to consider the possible releases to water, possible	An assessment of the Proposed Development's effects on controlled waters, including Pegwell

Consultee	Comments and considerations	How addressed in this ES
	exposure pathways and potential risks to public health. A suitable summary of these risk assessments and, if necessary, control measure should be included in the final DCO application.	Bay, has been carried out in **Section 10.10.** Please also refer to **Chapter 8: Freshwater Environment.** A HIA has been developed in addition to **Chapter 15: Health and Wellbeing**.

Table 10.5 Summary of Consultee Comments 2018 Statutory Consultation

Consultee	Comments and considerations	How addressed in this ES
Cliffsend Parish Council	Care should be taken to avoid contamination of open water (including to not attract mosquitos).	As stated in **Chapter 8: Freshwater Environment**, water treatment will take place on-site in attenuation ponds and water will only be pumped to the discharge pipe from these ponds once appropriate quality standards are reached. It is proposed that there are two ponds on site, one of which will receive “dirty” run-off (for example that containing de-icer) and one receiving “clean” run-off. Water will only be discharged from the “dirty” run-off pond once treatment is complete and pumped discharge will only take place from the “clean” pond. These ponds will be sized to take account of the capacity of the pipe and pump and will appropriately consider the February 2016 update to the NPPF climate change allowances. Further details can be found in the outline site drainage plan (Appendix A of **Appendix 8.2**) and Flood Risk Assessment, which also form part of accompany the DCO application.
EA	Ask RiverOak to carry out a further site investigation of the fuel tanks and above ground storage tanks, and produce a summary of the ground investigation.	A further site investigation will be carried out post consent. The scope will be discussed with the EA and TDC. As per paragraph **10.8.3**, the management of soil contamination at the tank farm will be informed by the site investigation to define and delineate impacted areas.
EA	Ask RiverOak to carry out an assessment of contamination when any buildings are demolished (especially where a building is a fuel farm), including surface water management or cover systems.	Subject to confirming which buildings will be demolished, these areas likely to be targeted as part of the site investigation. A watching brief will be in place during demolition, ground and construction works. If unexpected contamination is encountered or suspected, the works will cease in that area and assessment by a suitably qualified land contamination specialist will be made to determine appropriate actions. Soil (soil vapour/ groundwater) samples will be collected and analysed. The risks associated with contamination will be assessed. When required, a remediation strategy will be designed and agreed following consultation with the EA and the relevant local authority as appropriate before implementation.
EA	Asked to agree foul drainage provisions.	This is covered in the drainage strategy and in **Chapter 8: Freshwater Environment.**

Consultee	Comments and considerations	How addressed in this ES
Natural England	State that further information is needed about how site discharges will be covered by the CEMP.	Please refer to **Chapter 8: Freshwater Environment**: Any discharges would be covered by permitting regime. Also, paragraph 10.10.3: "*In construction phases 2-4 it is envisaged that the site drainage network would be in place and discharges would be to Pegwell Bay. Such discharges would only take place once silt and any other potential pollutants (e.g. hydrocarbons) had been removed from site discharge. Site specific measures required to address effective identification, protection, containment, attenuation, management and recovery of potential contaminants at the site during the construction and operational phases are being discussed with the regulators, including the EA, and TDC, and other stakeholders as appropriate. The measures will be incorporated into the finalised CEMP for the construction phase and in an airport manual that will be produced by RiverOak for the operational phase in accordance with EASA requirements*."
PHE	Recommend that the Environmental Statement includes an inventory of chemicals likely to be stored on the site and how any risks to human health will be managed.	A HIA has been developed and is included within **Chapter 15: Health and Wellbeing**. An airport manual will be produced by RiverOak for the operational phase in accordance with EASA requirements.
PHE	RiverOak is asked to work with the Environment Agency to consider any releases to water sources, and to insert a summary and control measures in the Environmental Statement.	An assessment of the Proposed Development's effects on controlled waters, including Pegwell Bay, has been carried out in **Section 10.10**. Please also refer to **Chapter 8: Freshwater Environment**. Discussions with the EA have been held - refer to **Table 10.5** Summary of meetings with the EA.
PHE	Further consideration needs to be given to the potential for existing contamination from radioactive materials.	As mentioned in paragraph 10.4.45, a report from the Defence Evaluation and Research Agency (DERA) Radiation Protection Services included within the GIBB report suggested that, as with many RAF sites, radioactive materials, and particularly radium luminising material, may have been present in equipment buried at the site and may have been disposed of in waste pits or areas where ash was disposed of. The further site investigation will screen arisings for radioactivity especially areas of ash or waste tips. This will allow any necessary mitigation to be addressed.
TDC	Regulators need to agree how contaminants will be handled.	Site specific measures required to address effective identification, protection, containment, attenuation, management and recovery of potential contaminants at the site during the construction and operational phases are being discussed with the regulators, including the EA, and TDC, and other stakeholders as appropriate. The measures will be incorporated into the CEMP (**Appendix 3.2**) for the construction phase and in an airport manual that will be produced by RiverOak for the operational phase in accordance with EASA requirements.

Consultee	Comments and considerations	How addressed in this ES
TDC	Impact of a plane crash should form part of the assessment of contaminant.	An airport manual will be produced by RiverOak for the operational phase in accordance with EASA requirements. The manual will include measures: • To manage the availability of aviation fuel and its storage, handling and quality control; • To manage the removal of disabled aircraft to comply with regulatory requirements relating to accidents, incidents and Mandatory Occurrence Reporting (MOR); and • That ensure the integrated management of response to an aircraft incident/accident taking account of the complexity and size of the aircraft operations. See also **Chapter 17: Major Accidents and Natural Disasters**.
TDC	Assessment of unexploded ordnance is required.	A Preliminary UXO Risk Assessment has been undertaken for the site and included in Appendix B of the Phase 1 LQA (**Appendix 10.1**). The report identified that there is a medium to high probability of UXO encounter on the site (probability rating of 4, on a scale up to 5). As such, a detailed UXO threat & risk assessment will be carried out in accordance with CIRIA C681 Chapter 5 on managing UXO risks, prior to any intrusive works.
TDC	Consider above-ground tanks at Jentex site because of its location in SPZ1.	The possible re-use of the Jentex site has been discussed with the EA, TDC and SW - please refer to **Table 10.5**, **Table 10.6**, **Table 10.7** and also **Chapter 8: Freshwater Environment**. The majority is not in SPZ1. Consideration will be given to the design of the tanks, including whether they will be above ground or underground tanks, taking into account the environmental issues and safety issues; the EA indicated a preference for above ground tanks, as does HSE. As such, the preliminary design is based on the former.
TDC	Care must be taken that contaminants are not released when doing investigations.	The Phase 1 desk study (**Appendix 10.1**) includes recommendations for a staged intrusive investigation: *"Due to the sensitivity of the groundwater we understand there is a desire from the water company operating the abstractions to avoid installation of groundwater wells at the site. It is therefore appropriate that the intrusive investigation takes a staged approach. In the first instance investigating the shallow soil using trial pits and window samples to determine if there is evidence of contamination. This would then determine the need for and scope of any direct investigation of the groundwater while minimising disturbance of the aquifer highly sensitive to turbidity*." A proposed intrusive investigation has been initiated with the EA. The intrusive investigation will be undertaken at a later stage, and will be agreed following consultation in advance with EA and TDC.
TDC	Aircraft recycling should be included as a potential contaminant source.	Historical activities have been considered in the Land Quality assessment. Future aircraft recycling

Consultee	Comments and considerations	How addressed in this ES
		would be a permitted activity. The permit would require the operator to mitigate the risks cited. This is not part of the Land Quality assessment.
TDC	Aircraft recycling has not been assessed and should be, especially in respect of potential contamination.	Historical activities have been considered in the Land Quality assessment. Future aircraft recycling would be a permitted activity. The permit would require the operator to mitigate the risks cited. This is not part of the Land Quality assessment.
TDC	PEIR: Land Quality Scope of the assessment All consultees make comment on the requirement for an intrusive site investigation, and the importance of the CEMP as a tool for managing risks due to land quality.	Statement – no comment.
TDC	PEIR: Land Quality The Land Quality Assessment undertaken and reported in the PEIR 2018 comprised: a desk study, including review of existing desk study reports and two intrusive investigation reports (each for a small area of the site); a site walkover; identification of information gaps; and a geotechnical assessment. The intrusive investigations that exist cover a very small portion of the site, and there is no intrusive site investigation data for most of the site.	Statement – no comment.
TDC	PEIR: Land Quality Assessment methodology There is no allowance in the scheme of definitions for 'harm' such as allergic reaction, dermatitis, skin irritation, headache or nausea that might arise from exposure to contaminated soils, but which does not result in significant harm.	The definition is based on Part 2A which is the part of the site where a minimum should not meet and is consistent with the approach in the C4SLs which have been accepted as relevant under planning where toxicological end points are based on low levels of toxicological concern, not minimal risk.
TDC	PEIR: Land Quality An assessment of effects is carried out on each receptor, and a summary of significance of effects is provided in Table 10.14. The assessment would benefit from a table showing the sensitivity of each receptor, which is currently buried in the text.	Receptors' sensitivity has been added to Table 10.11.
TDC	PEIR: Land Quality Table 10.13 provides the significance criteria, which include a site sensitivity of very high. This has not been defined – receptor sensitivities as set out in Table 10.11 are defined for high, medium and low. A definition of 'very high' sensitivity should be included in the assessment. The matrix allows for two categories of significance, these being 'significant' and 'not significant'. Only three of the matrix squares results in a significant effect, which is not consistent with other Chapters (e.g. Chapter 12, Noise). Further justification for the significance criteria is required.	A definition of 'very high' sensitivity has been included in table 10.12 The significance criteria in Table 14 have been amended to be consistent with the other chapters.
TDC	PEIR: Land Quality	The receptors are identified in Section 10.6.11

Consultee	Comments and considerations	How addressed in this ES
	The sequencing of the assessment methodology is confusing and potentially misleading for the reader. Potential environmental effects (on groups of receptors) and Mitigation Measures are discussed in Table 10.8, before receptors have been defined. Receptors are then introduced in Table 10.10. Environmental effects on receptors are then assessed in Section 10.8, variably assuming that Environmental (Mitigation) Measures are already in place. It is difficult for the reader to map back to Table 10.8 from section 10.8, as the receptor groupings are not consistent.	Section 10.8 to 10.12 detail the effects on the receptors. The assessment assumes that mitigation is in place where this is required.
TDC	PEIR: Land Quality In consequence, it is difficult to judge whether the proposed Environmental (Mitigation) Measures are appropriate, as they are described prior to a discussion of effects. The assessment would be improved by removing Table 10.8 and including a preliminary assessment of environmental effects, pre-mitigation, identification of Environmental (Mitigation) Measures, followed by a revised assessment of the residual environmental effects and environmental significance in Table 10.14.	Amec Foster Wheeler's approach is to only assess impacts post mitigation – this conforms to the EIA regulations.
TDC	PEIR: Land Quality Baseline A Phase 1 Geoenvironmental Desk Study is presented in Appendix 10.1, from which much of the baseline section of the assessment is derived. Reports are cited on two phases of site investigation a tank farm (the Jentex Tank Farm), located directly southeast of the airfield on Canterbury Road. A site investigation report also exists for the area of the radar mast in the north western area of the site. There are no intrusive site investigation data for the majority of the development site. Baseline soil and groundwater quality is therefore unknown. The conclusions of the Phase 1 geoenvironmental assessment (10.4.49) do not include radiological sources, although these are identified in the preceding text. Historic and recent aircraft breaking activities have not been included in the baseline assessment, although these have been raised by the Council as requiring consideration.	The phase 1 desk study does include radium in the risk assessment (which the radiological source commonly associated with airfields from historical disposal of radium dials.) 10.4.49 updated to link burning grounds to radiological sources. All sources of contamination will be thoroughly investigated after acceptance or determination, depending on access to the site. We have no records of aircraft breaking activities in the past, however, should these be provided to us we would of course take these into account.
TDC	PEIR: Land Quality The site is underlain by the Principal chalk aquifer, overlain in places by quaternary head deposits. The baseline describes the site being underlain by quaternary deposits comprising clay and silt, whereas mapping shows these to be absent over much of the site. Clarification of the extent of superficial cover overlying the chalk is required.	Section 10.4.1 has been updated.
TDC	PEIR: Land Quality The site lies entirely within the catchment of the Source Protection Zone (SPZ) for the Lord of the Manor groundwater abstraction. This abstraction, which is a significant groundwater resource, relies substantially on an adit in the Chalk which runs below the existing runway, approximately 50m below the site. The runway and part of the site are in SPZ Zone 1, and the south-central and south-east part of the site is in SPZ Zone 2. The Chalk aquifer derives its permeability from secondary permeability (fracture flow) and is therefore	The ecological sensitivity and the sensitivity of the chalk aquifer and coastal waters has been updated in Appendix 10.1 and Section 10.4 of the chapter.

Consultee	Comments and considerations	How addressed in this ES
	highly susceptible to pollution due to rapid transport of dissolved and particulate contaminants through fracture networks. The geoenvironmental report (Appendix 10.1) is considered to understate the sensitivity of coastal water (moderate to high) which should be high due to international designations, and the ecological sensitivity, which does not include the ecological importance of Pegwell Bay.	
TDC	PEIR: Land Quality The baseline description of groundwater is not consistent with the Hydrogeological Impact Assessment (HIA) presented in Appendix 8.1, and would be improved by using this document as a source. Groundwater flow directions are inconsistent between the two documents. Baseline groundwater quality is not described in Chapter 10, however Appendix 8.1 states that the local groundwater quality is impacted by nitrates, and organic compounds including TCE and carbon tetrachloride, both chlorinated solvents that are thought to have been in use at the airfield (see 3.3.4.1 in HIA, App 8.1). Baseline groundwater quality should be included in the baseline, and flow and quality descriptions should be consistent between Chapters 8 and 10.	Baseline groundwater quality has been included in Chapter 10 and Appendix 10.1. Groundwater flow has been updated.
TDC	PEIR: Land Quality The baseline does not describe the likely distribution of soil or groundwater contamination at the site, as there has been little site investigation undertaken across the site. It is considered that the identification of significant effects is hampered by a lack of intrusive site investigation data, as baseline soil and groundwater quality is not known.	A site investigation will be carried out following the DCO.
TDC	PEIR: Land Quality The assessment proposes that the current baseline be used as a future baseline, as 'in the absence of the Proposed Development, there are no known factors that are expected to affect the current baseline conditions'. Climate change is anticipated to affect rainfall infiltration rates and groundwater levels, both of which are likely to have a measurable effect on contaminant mobility and migration. The ES should consider the effects of climate change on the estimate of the significance of effects, and on the likely Environmental Measures that might be required to mitigate environmental effects.	Climate change is considered to an appropriate level within the Freshwater chapter and the HIA.
TDC	PEIR: Land Quality Assessment of effects The Lord of the Manor Public Water Supply (PWS) is not identified as a separate receptor. This is an omission and should be included, due to the presence of an adit which feeds the PWS directly below the runway. Specific measures may be needed to protect this receptor that would not apply to the wider aquifer.	The Lord of Manor PWS is included in the groundwater receptor as stated in Section 10.6.7: "Groundwater: Groundwater receptors have been defined as the Kent Isle of Thanet Chalk WFD groundwater body (i.e. identified under the WFD as a Drinking Water Protected Area – refer to Chapter 8: Freshwater Environment) which underlies the site and dependant abstractions." The title of section 10.9 has been amended to reflect this.
TDC	PEIR: Land Quality The effects are considered in three phases; the construction phase, operational phase, and the	The measures considered in the CEMP to protect construction workers will offer adequate protection for any members of the public using the site. In

Consultee	Comments and considerations	How addressed in this ES
	decommissioning phase. It is not recognised that part of the airport will be operational whilst further phases of construction are undertaken, which has particular implications for protection of human health.	addition, all construction works will be governed by the CAA regulations, which ensure public safety as a priority.
TDC	PEIR: Land Quality Combined effects are considered, but none are identified with regard to any of the receptors. The combined effects of flooding and land quality should be considered, as should the combined effects of potentially contaminated groundwater baseflow and surface run-off to drains and Pegwell Bay via the site discharge. Chapter 8 and Chapter 10 have many areas of overlap, and the combined effects should be stated explicitly. Any combined effects with Chapter 15 (Public Health) should also be identified.	Inter-related effects have been considered in Sections 10.6.12 to 10.6.14. Inter-related effects in relation to groundwater and coastal water have been considered in Sections 10.9.14 and 10.10.16. Inter-related effects in relation to human health have been considered in Section 10.8.8.
TDC	PEIR: Land Quality Cumulative effects are not discussed; Chapter 18 states that cumulative effects will be assessed in the ES but not as part of the PEIR. Environmental effects are not described explicitly in terms of direct, indirect, secondary, transboundary, short-term, medium-term, long-term, permanent or temporary, positive or negative effects.	Cumulative effects are addressed in Chapter 18 of this ES
TDC	PEIR: Land Quality The following sections describe uncertainties and omissions in the assessment:	
TDC	PEIR: Land Quality Effects on humans: The potential presence of radiological material is not acknowledged. Solvents may include chlorinated solvents, which are not mentioned specifically. The potential for asbestos to be present in soils (possibly in deliberate disposal pits of significant volume) has not been recognised.	These are considered in Appendix 10.1 where the risk assessment has been completed. Radium is discussed and has been assessed including the need for screening of soil as part of the investigation. Asbestos in the waste storage area and in disposal areas including the air raid shelter and acid pits are included in Appendix 10.1 We are not aware on any deliberate disposal of asbestos in burial pits at the site.
TDC	PEIR: Land Quality Nowhere does it explicitly state that there is a potential risk to future site users arising from in-situ soil and groundwater contamination, and that these will be mitigated through site investigation, risk assessment, remediation and verification to ensure that the site is suitable for use with respect to protection of human health.	Table 10.4 TDC will be consulted regarding the scope of the proposed intrusive investigations, and any subsequent remediation requirements, as these are material planning considerations. It is specified in Section 10.8 of this ES – Construction phase effects - that: “an intrusive investigation will be undertaken before construction to determine if there is any evidence of contamination, the programme and scope of these investigations will be agreed, following consultation with the EA, TDC Environmental Health Officer (EHO) and other stakeholders as appropriate.” Table 10.10 The site investigation and subsequent risk assessment will identify whether any further remediation is required. Any removal of contamination beneath the existing runway will be risk based and will weigh advantages of

Consultee	Comments and considerations	How addressed in this ES
		contamination removal against removal of the runway.
TDC	PEIR: Land Quality The assessment of effects assumes that mitigating measures can be found and implemented via a CEMP, however there is insufficient baseline data to outline what those mitigating measures might be, how long they might take, or where they may be required. Potential impacts of the measures on the phasing and design of the scheme are therefore unknown.	The CEMP is to be informed by the site investigation
TDC	PEIR: Land Quality The assessment of the operational phase does not include protection of site users due to ongoing construction i.e. managing those phases of construction that occur when the airport is open to the public. Environmental measures may be required to protect site users of the operational part of the airport from construction effects.	The measures considered in the CEMP to protect construction workers will offer adequate protection for any members of the public using the site. In addition all construction works will be governed by the CAA regulations, which ensure public safety as a priority.
TDC	PEIR: Land Quality Crucially, for this proposed development which has the potential to impact a significant public water supply, the human health effects of pollution of the water supply have not been assessed.	This is part of the chalk aquifer assessment and we disagree it should be separated out. The water supplied to people must meet the Drinking Water Standards.
TDC	PEIR: Land Quality The assessment of the effect on human health of the permeation of drinking water supply pipes with contaminants has not been assessed.	These are very unlikely to be significant. This would be assessed as part of the site investigation
TDC	PEIR: Land Quality Effects on groundwater (Chalk Aquifer): The effects of construction (including site investigations) on turbidity in the Lord of the Manor PWS have not been considered, nor have Environmental Methods been proposed to mitigate against this risk. The effects of the day to day operation of the airport and the potential for landing large aircraft on the runway to cause turbidity or instability in the adit have not been considered.	Comment is made on the discussion with the EA and SW about minimising the disturbance of the runway near this adit.
TDC	PEIR: Land Quality Foundation construction, particularly piling, has the potential to directly impact the Lord of the Manor PWS by creating pathways for contaminant transport. Foundation design should be informed by geotechnical and land quality investigations, and should be agreed with the EA. Approval of these designs by the EA should be a pre-commencement requirement of the DCO.	This is considered in Section 10.9.3. The staged manner of the investigation is discussed which will start with shallow investigation. Near the adit as noted the aim is to avoid digging up the runway and the chapter notes the remediation to be risk based.
TDC	PEIR: Land Quality The operational phase assessment does not include the effects of general spillages of hazardous materials across the estate, fire-fighting activities, the use of pesticides, or de-icing activities on the aquifer or PWS.	Pesticides and de-icer are discussed in Section 10.10.

Consultee	Comments and considerations	How addressed in this ES
TDC	PEIR: Land Quality The report states that 'A combination of good practice and site-specific measures for the protection of the chalk aquifer, in combination with further consultation with the EA and with Southern Water, will result in a negligible magnitude of effect'.	Factual Statement.
TDC	PEIR: Land Quality It is possible that standard approaches to groundwater protection will not be sufficient to protect the PWS, due to its location only 50m below the runway (bearing in mind that the chalk is recharged via fractures and fissures that allow rapid transport of contaminants and suspended solids) on a site that is likely to be impacted by fuels and chlorinated solvents, and potentially by radiological material. Site investigations are required to establish the nature and spatial extent of contamination at the site. It is equally considered possible that the results of site investigations and risk assessment will result in changes to the phasing and/or design of the scheme, in order to accommodate remediation activities or to provide mitigating features through redesign. For these reasons, it is proposed that some exploratory intrusive site investigation is undertaken prior to the DCO submission, to provide further information on sources of contamination. The significance of effects can then be judged with greater certainty, and mitigating measures identified with greater confidence.	There is no reason to believe radiological material would be near the runway it is also of low mobility. The staged manner of the investigation is discussed which will start with shallow investigation. Near the adit as noted the aim is to avoid digging up the runway and chapter notes the remediation to be risk based.
TDC	PEIR: Land Quality The effects of a plane crash on the chalk principal aquifer and PWS are not considered and should be included in the assessment.	Operational effects on groundwater, drinking water sources and aquifers have been assessed in Chapter 17 (Major accident and disasters).
TDC	PEIR: Land Quality Effects on Coastal Waters: There is the potential to affect coastal waters as it is understood that discharge from the site will be via an existing pipe that discharges to Pegwell Bay. There is ambiguity regarding the sensitivity of the receptor. Coastal waters are stated to have high sensitivity (10.10.2), but Pegwell Bay is stated to have moderate sensitivity (10.10.3). The national ecological designations at Pegwell Bay indicate that it is a high sensitivity receptor and should be considered as such.	The sensitivity of coastal waters (Pegwell Bay and designated sites) has been updated to very high.
TDC	PEIR: Land Quality Paragraph 10.10.10 describes how water treatment will take place on site in attenuation ponds, and water will only be pumped to the discharge pipe from these ponds once appropriate water quality standards are reached. The potential for leakage from these ponds and impact on groundwater quality has not been assessed.	It is assumed that they will not leak and they will be designed to ensure there will be no leakage.
TDC	PEIR: Land Quality Effects on Soils: The effects of a plane crash on soil quality have not been considered and should be included in the	Plane crashes and other potentially major incidents are addressed in the Major Accident and Disasters chapter (Chapter 17). Refer to Table 10.10 (Chapter 10: Land Quality) and Chapter 8: Freshwater Environment.

Consultee	Comments and considerations	How addressed in this ES
	assessment. The effects of de-icing activities should also be included in the assessment.	
TDC	PEIR: Land Quality Effects on building and services: It is accepted that the proposed measures if appropriately implemented can result in a not significant effect on buildings and services.	Agreed.
TDC	PEIR: Land Quality Conclusions of preliminary significance The conclusions of preliminary significance are presented in Table 10.14. The conclusions are that none of the Environmental Effects identified in the assessment are significant, if the identified Environmental Measures are implemented.	Agreed.
TDC	PEIR: Land Quality It is not easy to link the information contained in Tables 10.8 and 10.9, which contains the Environmental Measures, and Table 10.14, nor to link these tables to the discussions in Sections 10.8 – 10.12. It is suggested that the sequencing of the report is altered in the DCO submission to allow the reader to be led from receptors to effects to environmental measures to preliminary significance. As it stands, the report does not allow the reader to readily assess whether all the issues that have been raised through the chapter are adequately addressed.	The structure of the report provided follows a tried and tested method and whilst we recognise there are alternative approaches, the report submitted is considered to be robust and sufficiently clear for these purposes.
TDC	PEIR: Land Quality A weakness of the conclusions is that many of the Environmental Measures are yet undefined. It is proposed to develop a CEMP which will detail these measures, with a draft plan to be submitted with the DCO application, and a full version to be developed 'if necessary prior to commencement of works'.	The CEMP (Appendix 3.2) has been prepared and submitted with this DCO.
TDC	PEIR: Land Quality The design of mitigation measures and hence the detail of the CEMP must be informed by a thorough intrusive site investigation and risk assessment. It is proposed that 'the need to complete an intrusive investigation will be secured through the DCO'.	A SI will be completed prior to the construction works.
TDC	PEIR: Land Quality It is considered that the former land use is likely to have resulted in potentially significant land quality impacts, particularly in the runway area where FIDO was carried out and runway foams were used. The use of chlorinated solvents and radiological materials are also potentially significant issues that may be complex to deal with. The adit under the runway which feeds the Lord of the Manor PWS is a highly sensitive receptor; protecting this receptor may require rephrasing or redesign of the scheme once the distribution of contamination is better understood. It is considered that the CEMP that will be submitted to with the DCO application should be supported by some intrusive site investigation and assessment, even if the level of investigation is exploratory. It is considered that further	This is not the conclusion of the desk study in Appendix 10.1 Information from the monitoring at the Lord of the Manor PWS has been incorporated into the risk assessment. FIDO has been assessed and given the time since its use it is likely to have degraded as noted in this chapter and Appendix 8.1. Based on experience on other airfields radiological sources, if present, would be localised and are relatively easy to manage providing protocols are followed. Radium has low solubility/mobility.

Consultee	Comments and considerations	How addressed in this ES
	information is required in order to support the conclusions of preliminary significance.	
TDC	PEIR: Land Quality The potential for receptors to be impacted currently by land quality, and for investigation and remediation measures to be required to prevent ongoing pollution has not been assessed. The potential for site investigation and remediation measures in themselves to pose a risk to receptors has not been assessed.	This was the Preliminary Risk Assessment. This is considered in relation to the staged investigation. The remediation will be risk based.
TDC	PEIR: Land Quality The effects of a plane crash on land quality and the Environmental Measures to be taken to mitigate risks to the identified receptors has not been assessed.	Addressed in Chapter 17.
TDC	Non Technical Summary The NTS section on Land Quality does not mention the Lord of the Manor groundwater abstraction, or the adit that lies under the runway that feeds this PWS.	This is covered under the Freshwater section of the non-technical summary.
TDC	Non Technical Summary The NTS does not mention the likely use of chlorinated solvents at the site, and known impact of the Lord of the Manor PWS with chlorinated solvents, nor does it mention the historic FIDO practices which may mean that there is potentially significant impact to land and groundwater quality with hydrocarbons. The NTS also fails to state how the land may be impacted by a wide range of contaminants, including radiological materials, associated with historic site activities.	These are points of detail that would not normally be specifically referenced in the NTS.
TDC	Non Technical Summary It states that the 'highest risk of contamination is associated with the risk to groundwater from the Jentex Fuel Farm site.', although in the absence of intrusive site investigation data, this assertion is not supported.	Jentex is the highest known risk, however, if other contaminants are found the site investigation these will be dealt with appropriately.
TDC	Non Technical Summary The NTS states that a finalised CEMP will be submitted with the DCO application, to include measures to manage any land quality effects. This contradicts Table 10.8 of Chapter 10 which states that 'a CEMP will be prepared and agreed following consultation with the EA and other relevant stakeholders if necessary prior to commencement of works. A draft outline CEMP will be submitted as part of the DCO application'.	The CEMP is a live document and therefore the document submitted with the application (Appendix 3.2 to the ES) should be considered a draft.
TDC	Non Technical Summary The NTS states that 'An aerodrome manual will be produced for the operational phase of the proposed development and will include measures to manage effects on land quality' An aerodrome manual is however not included in Tables 10.8 or 10.14 of Chapter 10 which describe Environmental Measures and conclusions of preliminary significance respectively.	An airport manual will be prepared and this is now referenced in Tables 10.9 and 10.10.

Consultee	Comments and considerations	How addressed in this ES
Summary of issued raised in community consultation in response to question 3 of the feedback form	1 respondent was concerned about possible contamination and damage that might be done to the water table and Manston aquifer. A further respondent raised the issue of potential mosquito infestation as a result of the attenuation ponds.	**Chapter 8: Freshwater Environment** and the Hydrogeological Impact Assessment (**Appendix 8.1, Section 4**) include an assessment of the risk to the groundwater environment from activities and suggests appropriate measures to be included in the CEMP (**Appendix 3.2**) and implemented in the construction phase / incorporated into the site's design. As stated in **Chapter 8: Freshwater Environment** of the ES, water treatment will take place on site in attenuation ponds and water will only be pumped to the discharge pipe from these ponds once appropriate quality standards are reached. It is proposed that there are two ponds on site, one of which will receive 'dirty' run-off (e.g. that containing de-icer) and one receiving 'clean' run-off. Water will only be discharged from the 'dirty' run-off pond once treatment is complete and pumped discharge will only take place from the 'clean' pond. These ponds will be sized to take account of the capacity of the pipe and pump and will appropriately consider the February 2016 update to the National Planning Policy Framework (NPPF) climate change allowances. Further details are included in the outline Site Drainage Plan (Appendix A of **Appendix 8.2**) and Flood Risk Assessment, which forms part of the DCO application.
Summary of issues raised in community consultation in response to question 4 of the feedback form	6 respondents were concerned that pollution from the operation of the airport and associated activities would contaminate or degrade the site. 2 respondents raised concerns about oil, fuel and heavy metal from aircraft breaking would contaminate the Site and 1 said that pollution would damage farmland. In contrast, 1 respondent said that the effect on the land would be negligible.	Site specific measures required to address effective identification, protection, containment, attenuation, management and recovery of potential contaminants at the site during the construction and operational phases are being discussed with the regulators, including the EA, and TDC, and other stakeholders as appropriate. The measures will be incorporated into the CEMP (**Appendix 3.2**) for the construction phase and in an airport manual that will be produced for the operational phase in accordance with EASA requirements.

10.3.14 The Phase 1 LQA (**Appendix 10.1**) has been provided to the EA and TDC for review and their comments are listed in **Table 10.4.**

10.3.15 Further consultations with the EA, SW and TDC have been undertaken post-scoping. These have comprised the meetings listed in **Table 10.6, Table 10.7** and **Table 10.8**. More information regarding discussions about site drainage and flood risk can be found in **Chapter 8: Freshwater Environment**.

Table 10.6 Summary of Meetings with the EA

Date of Meeting	Key points of Discussion
11 April 2016	Site Drainage: The site discharge point from the runway area is believed to be in the south east corner of the site and may run under the A299. It is not thought to run below the fuel station, located to the south of the site boundary. It is unknown if there are other pipes linked to this discharge or if it is from the airport only. This pipe discharges to the Pegwell Bay and the EA receive complaints and enquiries from the public as the pipe is visible on the beach. If this was going to continue to be the discharge

Date of Meeting	Key points of Discussion
	route then discharge would need to be permitted and water quality considered in the drainage strategy. They would hope that there would not be an increase in the volume of the discharge. Drainage within the red line boundary is currently partially to ground and partially captured. This discharge to ground would not be permitted in future in areas where potentially polluting substances are in use (e.g. de-icer in runway or apron areas) or there is fuel. SUDS would need careful consideration and are best outside SPZ1[iii]. Water Quality: The fuel station to the south east of the site is known to be an issue and in the EA's view there are probably groundwater and land contamination issues with that site associated with historical activities and spills. The EA and SW hold water quality monitoring data from boreholes around the site which should be requested. The closest SW source is treated for nitrate pollution, and there have been issues in the past with hydrocarbons and solvents. There are currently no water quality monitoring data inside the site boundary; this is seen as a key data gap. Delineation of SPZ: The Adit [iv] associated with the area of SPZ1 under the runway is thought to be at about 0m Above Ordnance Datum (AOD), so approximately 40 to 50m below ground level (bgl). It is unknown if there are additional shafts associated with it. The SPZ delineation is very basic (50m circle) so they consider that the SPZ1 could potentially be larger. Further consultation with SW is necessary.
9 November 2016	Groundwater Quality: RiverOak would need to ensure that the Proposed Development did not make the quality issues worse. It was acknowledged that there was another large adit to the east feeding the Lord of the Manor[v] source from the area below Ramsgate which may also contribute to poor water quality. Hydrogeological Conceptual model: It was agreed that the conceptual understanding of the site is well known and therefore there was no need for any further work to establish this. Although the conceptual understanding will still need to be presented and discussed in any site report to ensure an accurate conceptual model (source, pathway, receptors) is established. However, the EA would need to understand the distribution of contaminants across the site so that future work did not result in their mobilisation. The EA would not want to see intrusive works near the adit or within SPZ1, and acknowledge the desire of SW for the minimum level of intrusive work so as to avoid mobilising contaminants and creating pathways through the unsaturated zone. However, some boreholes (in target areas) would be needed to see if any pollution/contamination is reaching the water table. The desk study and other site investigations will be used to inform the need for any boreholes; it was agreed to undertake further discussions in the future to establish what is suitable for intrusive investigations in different areas of the site. Jentex Fuel Farm: RiverOak is looking at different options for the location of a new fuel farm for the airport. These include the Jentex Fuels site located to the southeast of the airport; although RiverOak will need to look into costs and implications of remediation and/or construction at this site. EA stated that this site has long been a concern, especially given the location close to the SPZ; the EA would be unlikely to approve this as a site for bulk fuel storage due to its location within SPZ1. Fuel Storage: EA stated that they would request that any fuel tanks located anywhere on site are to be positioned above ground, there are precedents in Kent at a Tesco site where above ground fuel tanks have been required. Site Discharge: The EA is happy with the construction of ponds for water attenuation and treatment, prior to discharge to Pegwell Bay, however, it stated the following caveats: • Ponds would need to be properly constructed with sufficient operational control measures; • Need to ensure that the 'dirty' water lagoon was not a potential source for odour; • A condition check should be undertaken of the drainage pipeline to Pegwell Bay; • New discharge consent would be needed, this may require a WFD assessment; • Also need details of the operational procedure and controls to show the system will be properly managed; and • The EA would like to see water-saving measures implemented, for example grey water use, re-use of run off from roofs. CEMP: EA is happy that a CEMP will be submitted with the DCO application and will seek to secure conditions for the production of a final CEMP prior to construction.

[iii] SPZ1 is defined as the zone around a groundwater abstraction in which contaminants have a 50-day travel time from any point below the water table to the source. This zone has a minimum radius of 50m.
[iv] An Adit is a horizontal passage leading into the Lord of the Manor groundwater abstraction to increase flow to the source.
[v] The Lord of the Manor source is the SW borehole in close proximity to the site. Further details are given the baseline description.

Date of Meeting	Key points of Discussion
	Technical information for inclusion in the DCO application: The DCO application should include sufficient information on the operational procedures for the airport, for example the use of pesticides to control insects, locations for de-icing and washing of aircraft, emergency procedure and spill response.
6 March 2017	Site drainage: The proposed surface water capture and treatment system was discussed. All surface water will be captured and positive drainage would be used to send the water to the treatment facility to be located on the north side of Manston Road. There would be silt traps, oil separators and other infrastructure in the system. It is proposed that there are two ponds which will be sized according to assessed need. From the ponds, the water will be pumped to the existing discharge pipe located in the south-eastern part of the airport site. There are two options, either to re-use an existing drainage network around the western end of the runway, or to install a new network around the eastern end. From the discharge pipe all drainage is positive. The drainage and surface water treatment system would be installed during the first phase on construction, before the reopening of the airport. The EA welcomed this approach. Local sewer network: The EA requested that the project confirm the capacity, condition and ownership of the foul sewer network on site. Discharge Permit: The EA confirmed that an application for a Discharge Permit from the Pegwell Bay outfall was made by the previous site owner but was not granted due to changes in ownership. The EA indicated that it was likely that a discharge permit would be required to regulate the Pegwell Bay Discharge. The EA agreed to confirm whether this would be necessary and confirm if it would regulate quantity as well and quality. Land raising: As part of the construction, material will need to be imported to create a new raised building platform for the cargo aircraft stands and taxiway. It is proposed to reuse as much excavated material as possible from elsewhere on the site, but where imported material is needed this would be clean and suitable for use. Hydrogeological Conceptual Model: Southern Water and Amec Foster Wheeler (working for Southern Water) have done a lot of work on a conceptual model for the site. Southern Water have confirmed that they are happy for the project to use this information, therefore it is proposed that no additional work is needed to develop a conceptual model for the site. The EA accepted that the Southern Water information represented the best information available and that they would not expect additional information to be collected. Hydrogeological Risk Assessment (HRA): The HRA was being finalised and had not yet been provided for review, but was submitted as part of the water chapter in the updated PIER (after this meeting). It is proposed that mitigation will be put in place following the assessment to reduce the risk. The HRA will not be quantitative but more qualitative following an EIA type approach to assessment. It will be based primarily on information from SW. The EA requested that the Land Quality Phase 1 and the HRA are linked and cross-referenced where appropriate. Nitrate in groundwater: The EA stated that Thanet is a priority area for groundwater, with the main issue being nitrates. Therefore, the EA have put a lot of effort in to engaging with farmers, industrial sites, the local authority and others to make them aware of risks and to follow up with information and actions to be taken. The EA would therefore seek to similarly engage with the operators of Manston Airport. Embedded mitigation measures: The project will use in-built (embedded design) mitigation to reduce risks. This will include developing airport management procedures, including spill response and wildlife management (including spraying for weeds/insects). The EA would be involved in their design. The EA requested that is be a condition that all documents and reviewed and signed off by all relevant consultees. Fuel Farm: RiverOak are looking to acquire the Jentex site and develop this as the fuel farm for the project. Previously other options were being looked at, but this site has a number of operational and environmental advantages. The EA have concerns about the use of the site as it is located in/adjacent to SPZ1 and would need to understand what the approximate bulk fuel storage needs are for the site as part of the proposals. Furthermore, the new EA groundwater protection policies (published 14 March 2017) state that the EA will not support any 'new' bulk fuel storage in SPZ1. It was noted that the site is only partly within SPZ1. The EA stated that the biggest risk was the sitting and location of the bulk fuel storage, and that the current proposed location was considered as the most sensitive on the site. Amec Foster Wheeler provided an example of another similar bulk fuel storage facility that was built recently at Bristol Airport. This was similarly close to SPZ1, and was designed in a way that was able to satisfy the EA and Local Authority.
16 May 2017	Thanet Chalk: The chalk on Thanet is highly sensitive due to the lack of alternative water resources. The EA indicated that the Thanet Chalk was a candidate water protection zone – to highlight the sensitivity of the water resources situation, however, it has been a candidate zone for ~10 years and is unlikely to be designated as such. If it were designated as a water protection zone that would give the EA additional powers to enforce pollution prevention measures. Fuel Farm: The EA would like to see within the ES a consideration of alternative locations for the fuel farm, with their preference being for a fuel farm that was away from the abstraction point and SPZ1.

Date of Meeting	Key points of Discussion
	Furthermore, they require that the location of the fuel farm is justified and it is demonstrated that all alternatives have been explored. They will require a very high level of mitigation, Best Available Technique (BAT), for the fuel farm and the site will need a new permit. It was noted by the EA that the existing facilities are not BAT and will need to be replaced. Given the sensitivity of the site the approach outlined in GP3 may not be sufficient. Pollution prevention on site: The EA reiterated a point from previous meetings - that they expect a high level of pollution prevention measures to be taken across the site with respect to drainage from runways / aprons, vegetation management, crashes etc. Site Drainage: As stated in previous meeting the EA are not happy with any drainage to ground or use of soakaways on the site. The EA are happy with discharge to sea but are not sure of the exact permitting position because some of the discharge will be treated. There are unlikely to be volume constraints.
15 September 2017	Fuel Farm Location: Six options for the fuel farm, including an off-site location as requested by the EA, were identified and assessed against the fuel farm requirements. This was a qualitative assessment, and the full details will form part of the ES to accompany the DCO. In summary, the option for a new fuel farm on the Jentex site performs best of all of the options. Fuel Farm Design: The design has been produced to meet operational requirements for fuel storage and delivery, but also to address environmental, safety and risk considerations as identified in the HIA. This includes measures such as: • New double-skinned tanks within a new dedicated impermeable bund, sealed drainage, interceptor and anti-pollution control valve, and parking for airside bowser fleet; • The tanker unloading and bowser refuelling areas will also be bunded and will have a sealed drainage system with no gravity discharge route to the site outfall; and • The tanks would be located at the western end of the Jentex and would be within SPZ2, and as far from SPZ1 as possible on the Jentex site. The fuel farm would be south of the Western Adit. These measures will also be incorporated into the parking areas and internal access roads, which will all be connected to the drainage system. The EA acknowledged that the design has moved the fuel farm outside of SPZ1, but stated that the design of the fuel farm should include innovative solutions that go-beyond BAT. Examples would include hydrophobic materials, underlying substrate filter drains, monitors beneath the bunds, and bowser parking areas. The EA gave some examples of companies working in Kent who had developed innovative design solutions. Hydrogeological Impact Assessment update: Additional modelling has been undertaken since the first issue of the PEIR (2017) to look at the risk to the adit from an incident at a fuel farm located at the Jentex site. The model used was the EA East Kent Groundwater Model, with the adit represented as a series of “pumping” wells. The pumping rate was the recent accrual pump rate of 3.5 Ml/d (license value is 11.2 Ml/d and SW has estimated the peak deployable output of 5.2 Ml/d and minimum of 2.81 Ml/d). The model results have shown that: • The majority of the water entering the western Adit comes from the north; • Flow beneath fuel farm is both to the north (adit) and south (coast); • Groundwater flowing north is a small (0.05%) proportion of the water pumped out of the adit; • Travel times are long; and • The zone of stagnation, the point where flow stops flowing north, is close to the fuel farm. The EA requested that additional model analysis to confirm any eastward movement be undertaken. The EA stated that it would require some groundwater monitoring and the location of this monitoring would be dependent on the final design of the fuel farm. Potential for runway removal: The Civil Aviation Authority (CAA) may require the removal of redundant taxiway/runways for operational and safety reasons. The EA noted that the EA and SW have both previously stated that they would not want material above the adit and within SPZ1 to be removed if can be left in-situ. Concerns include: • Depth of material above adit is unknown, it is also seen to provide some protection to the adit; • Details of removal process are unknown, it may result in turbidity in adit; and • It is not known what, if any, contaminants may be within or below the surface which may be mobilised by the construction. Therefore, the EA would object any removal of the existing taxiway/runway within SPZ1 without more details of proposed techniques and further site investigation works. DS Update: The drainage system will be designed so that there would be no off site flooding for a 1% Annual Exceedance Probability (AEP) event with a 40% climate change allowance (scenario agreed with KCC as LLFA). All surface water will be captured, attenuated within two ponds, treated and then

Date of Meeting	Key points of Discussion
	discharged to Pegwell Bay via an existing pump and outfall. The discharge rate will be limited to a pump rate of 30 l/s. The EA stated that SuDS could be considered in some areas for roof water, for example on the 'Northern Grass' area. Different treatment methods will be considered, such as light liquid separator, activated sludge aeration tank and/or forced bed aeration, to treat pollutants which will include exhaust fumes, fuel and lubricant spillages, and de-icing and washing agents. The EA asked for an opportunity to review and comment on the types of de-icer to be used, so that where possible lower risk alternatives can be used. Discharge Permit to Pegwell Bay: The EA stated that as the discharge to Pegwell Bay would be surface water, then it would not normally require a discharge permit. A possible solution would be for a discharge permit to control the quality of the discharge from the contaminated pond to the clean pond. Condition of the discharge pipe to Pegwell Bay: The EA asked about the condition of the pipe. The pipe is in good condition, and therefore only limited works are expected to be needed. However, if required, a new pumping station would be installed and redundant infrastructure removed as part of the project. The ownership of the pipeline will be part of the DCO process, currently it is not clear who is responsible for the pipeline. Removal of sewers and drainage systems: There is no specific EA guidance, but the EA stated that techniques such as blocking with concrete would be considered as appropriate.
3 November 2017	Fuel farm design to incorporate innovative design measures: The EA confirmed that they were happy with the level of detail shown for the Fuel Farm and that no specific additional details were requested. However, acknowledgement of this was not confirmation that no further comments would be made. Updated Drainage Strategy to include confirmation of works for old taxiway/runway: RPS outlined the need for runway drainage for the operational part of the existing runway in order to keep the runway free of surface water and also the need for electrical ducting for lighting. This will require penetrations through the existing runway. The EA would prefer that penetrations are limited where the runway overlies the adit and questioned the need for penetrations. They would like to see solutions that minimise penetration and details of how penetrations will be constructed to avoid creating pathways for drainage. The EA would only require removal of contamination where there was a clear risk – if there is no unacceptable risk then it would be better to leave in place. Updated hydrogeological risk assessment: The EA accepted that the approach taken is groundwater flow modelling – no contaminant transport modelling will be undertaken. The risks to groundwater will be assessed in a qualitative risk assessment and emphasis placed on mitigation measures to avoid spills to ground.
01 June 2018	An additional meeting was held with the EA in order to agree the key points and principles to be contained within a Statement of Common Ground (SoCG). These included: • That no intrusive investigations for contaminated land or buried archaeology should take place prior to granting of the order. • That the fuel farm design would include above ground tanks. The above were agreed and in addition, the EA requested further discussions regarding foul drainage should take place with Southern Water as the application progresses. A SoCG with Southern Water is also bring sought.

Table 10.7 Summary of Meetings with SW

Date of Meeting	Key points of Discussion
29 April 2016	Lord of the Manor Public Water Supply (PWS): The adit running under the runway measures approximately 2x2m in cross section and is located at sea level (therefore approximately 40-50m below ground level (bgl)) and possibly dates from the 1930s. The exact spatial orientation of the adit is unconfirmed; delineation of SPZ1 is therefore regarded as approximate. The shaft is located to the east of the site. The source is currently not in use but is one of four that supply drinking water to Thanet. Sources are currently blended with imported water. There are recorded incidents of turbidity (generally caused by large changes in groundwater table elevation after heavy rainfall), plus there have been historical issues with high levels of nitrate and Trichloroethylene (TCE). There are currently no facilities in place to remove TCE and the increases in use at the airport

Date of Meeting	Key points of Discussion
	may result in increases in the levels of TCE, therefore Southern Water would require mitigation measures which minimise the use of, or target the interception of TCE's. SW is not concerned about changes to aquifer recharge rate due to new airport concrete infrastructure. Site Drainage: The site is private so SW has limited information on the existing drainage. There were previous applications to install new drainage pipes and an interceptor but it is not known whether it was installed. If the existing pipe network was to be reused, a condition survey should be undertaken first to ensure that is fit for purpose/use. If there were any pumps needed, then the design and location of these would need to be considered in order to reduce risks. SW's initial position is that they would not want to see any sort of ponds or water storage tanks on the site due to risks to groundwater quality. Any water storage on site should be minimised. The fuel farm should be designed to include sufficient safeguards, e.g. above ground bunded tanks and it should be located outside of groundwater SPZ1 and 2 and as far as practically possible away from the adit. Water Use: SW requested that an estimate of the water usage for the airport be provided, there are currently issues with capacity in Thanet and the proposed increase in flights would likely require more water. SW requested that the DCO application should include details of how waste water and surface water will be managed. It was stated that existing foul water connections could be used, provided flow rates for sewerage are no greater than existing rates. Capacity checks for the existing infrastructure should also be undertaken. Nothing should be discharged to ground on the site. Construction: The main concern for SW is around the construction activities, for example deep piling. Any foundations should be designed to avoid deep piling where possible, SW should be notified of any works ahead of time, there should be no use of anti-freeze within piling operations. If the PWS borehole was knocked out and had to be pumped to clear waste, SW would charge a developer. If RiverOak wants to install any new monitoring wells to monitor groundwater quality, they would need to be away from the adit and designed to minimise risk, the particular concern is turbidity. SW would need to be notified in advance of any drilling. There are two rising mains crossing the south-west of the site, the exact locations are not known as the records are old. They will need to be protected, i.e. no excavation within 6m either side, with hand digging to identify services if required.
22 February 2017	Site Drainage: SW would prefer a design which captured all rainfall and run-off and took it off site, though they are happy for there to be water re-use within the site. Construction: SW would prefer that the current runway area was left undisturbed due to turbidity concerns at their source, though if some removal of hardstanding is required then this needs to be properly designed to avoid ground shaking etc. Works in the area designated as SPZ1 should be avoided. If any piling is to be used methods must be used to minimise ground disturbance. Site Investigations: SW requested that any site investigation works are co-ordinated with the other potential applications for the site to result in the minimum of ground disturbance. Hydrogeological Conceptual Model: It was agreed that, given the level of previous studies, the overall conceptual model was well understood and that there was no requirement for any additional field investigations to improve the confidence in the conceptual understanding. Fuel Storage: Fuel storage tanks should be placed above ground to protect the aquifer from pollution. Mains supply & sewage: There will need to be an application from RiverOak for a capacity check of the local foul sewage and mains supply systems to ensure that the requirements of the site can be supplied/serviced.

Table 10.8 Summary of Meetings with TDC

Date of Meeting	Key points of Discussion
5 July 2017	Freshwater Environment Amec Foster Wheeler gave an overview of the works undertaken in relation to the Freshwater Environment. The works are looking at the importance of the Chalk Thanet Aquifer which underlies much of the site. The EIA and design teams are working closely to ensure that the design and operation of the airport are updated and that modern best practice and procedures are implemented.

Date of Meeting	Key points of Discussion
	There will be no discharge to ground, this has been requested by SW. Instead, the existing surface water discharge to Pegwell Bay will be used. Surveys have indicated that this is in a good condition and that it will be suitable with some minor works. SW have indicated that their main concerns are effects to the Thanet Aquifer, the Lord of the Manor Borehole and the adit (which runs under the runway) from turbidity, nitrates and hydrocarbons. Turbidity will result from any construction works (e.g. pilling) on or near the adit, these will be minimised and managed. Nitrates can result from poor sewerage and drainage, those on site will upgraded as part of the project. The location and design of the airport fuel farm, as well as the re-fuelling of aircraft, is being managed and designed in order to reduce risks from hydrocarbons. This is taking BAT and current EA guidance and advice into consideration. Amec Foster Wheeler stated that the fuel farm studies also include a site selection/options appraisal and safety and risk assessment (including risks to environment). The fuel farm will be on the former Jentex site, but the facility will be new. Land Quality: Amec Foster Wheeler gave a brief overview of the works and issues surrounding land quality. A Phase 1 Geo-environmental Desk Study has been completed. There are a number of potential sources of contaminant associated with the former airport operation. This assessment is closely linked to that for the Freshwater Environment as most of the potential receptors are water related. TDC asked about the potential effects/risk from incidents outside of the fuel farm. Amec Foster Wheeler confirmed that this was also be picked up by the wider Safety and Risk studies being undertaken. Amec Foster Wheeler also confirmed that the risks from Unexploded Ordnance (UXO) had also been identified and that this would be addressed.

10.4 Overall Land Quality Baseline

Current Baseline

Geology/Hydrogeology

10.4.1 The north and east of the site is underlain by Quaternary deposits (Head 1 and Head 2) comprising mainly interglacial wind-blown sands with Clay and Silt. The British Geological Survey 2016 mapping[66] indicates that Sand, Silt and Clay from the Thanet Formation may be present north east of the site, but this is not supported by the BGS borehole information available for the site. Made Ground is recorded in the centre of site on the BGS logs, however, this is likely to be present across the site, associated with past development. The underlying geology is bedrock in the form of the Margate Chalk Member and the Seaford Chalk Formation. This is present at the surface, particularly in the south of the site.

10.4.2 The entire site and surrounding area is underlain by solid geology in the form of the Chalk Formation that provides approximately 70% of the water to the SW Kent Thanet Water Resource Zone (KT-WRZ). The chalk bedrock is classified as a Principal Aquifer. A Principal Aquifer is described by the EA[67] as layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.

10.4.3 Borehole and trial pit records are available on the BGS website for several areas across and around the site. The information recorded indicates that groundwater was encountered during drilling at 44.3m below ground level (bgl) in the east of the site and 40.25m bgl in the south east of the site. Across the Manston Airport site groundwater flow is from the north east to south west, with water levels falling from around 7mAOD to 3mAOD (See Appendix 8.1).

10.4.4 The site lies entirely within a groundwater SPZ catchment. The inner zone (SPZ1), where risk of contamination from pollution causing activities is greatest, is identified in a strip beneath the runway. This is surrounded by a wider area of outer zone (SPZ2) that also dominates the area

beneath the runway, in the south of the site. The remainder of the site falls within the wider SPZ catchment area (SPZ3).

10.4.5 There are no public water supply (PWS) abstractions located within the site boundary, but a number of people and organisations abstract water from groundwater or ponds/lakes up to 1,000m outside the site boundary (six located within 500m, and a further three up to 1,000m from the site boundary). The abstractions are for private water undertaking, public water supply and agriculture. TDC has confirmed that there are no known private water supplies within a 2km radius of the centre of the Proposed Development site.

10.4.6 The Lord of the Manor PWS abstraction is closest to the Proposed Development, located approximately 385m from the eastern site boundary – Envirocheck report (**Appendix 10.1**). The source consists of two wells, Lord of the Manor and Whitehall (the latter is disused and sealed) with three adits[vi]. The source was constructed at the southern edge of Thanet to abstract groundwater which would have discharged south towards the sea, and to intercept any high permeability zones. The Whitehall abstraction was drilled in 1850 and suffered from saline intrusion, being close to the coast. Lord of the Manor was constructed to intercept the same adit system to alleviate the saline intrusion issue (Aquaterra[68]) – refer to **Appendix 8.1**. There are three adits at the Lord of the Manor PWS: the Eastern; Western; and South-Western Adit, constructed in the 19th and early 20th Century. The most significant abstraction relevant to the Proposed Development is the Lord of the Manor source. The catchment includes Manston Airport which sits in the south west of the catchment, with its runway over the western adit, the main rail-line to London and the A299. The groundwater SPZ for this borehole extends below the existing airport runway.

10.4.7 The site lies within a groundwater body with a poor chemical quality under the Water Framework Directive (WFD)[69].

10.4.8 The groundwater sensitivity is assessed as high to very high[70]. The site in underlain by a Principal Aquifer, the nearest abstraction is less than 0.5km from the site and the site is in a SPZ.

Hydrology

10.4.9 There are no surface water features on the site. The nearest major river is the River Stour, located approximately 3km south of the site boundary, which flows eastwards to the North Sea. The River Stour is classified as Moderate ecological quality status within the WFD as issued on the EA website.

10.4.10 Thanet coast is located approximately 900m south east of the main site boundary. The coastal water sensitivity is assessed as very high[71]. It is anticipated that if the Lord of the Manor abstraction is in use, it would likely capture much of the groundwater. The groundwater system is known to provide flow to Pegwell Bay when the Lord of the Manor abstraction is not in use. Site drainage also ultimately discharges to Pegwell Bay.

10.4.11 The surface water sensitivity is assessed as moderate to low[72], due to the potential for pollutant transmission to water located 2.5km from site via baseflow or via an interconnected unclassified drain or stream.

10.4.12 Additional information is provided in **Chapter 8: Freshwater Environment.**

Ecologically Sensitive Land Use

10.4.13 The site is located within a nitrate vulnerable zone. Approximately 900m south-east of the main site boundary are Sandwich Bay, Pegwell Bay and the Thanet coast which are classified as:

- National Nature Reserves (Sandwich and Pegwell Bay);
- Ramsar sites (Thanet Coast and Sandwich Bay);

[vi] An Adit is a horizontal passage leading into the Lord of the Manor groundwater abstraction to increase flow to the source

- Sites of Special Scientific Interest (Thanet Coast and Sandwich Bay); and
- Special Areas of Conservation and Special Protection Areas (Thanet Coast and Sandwich Bay)[73].

10.4.14 The ecological sensitivity is therefore assessed as very high reflecting the sensitivity of Pegwell Bay as outlined above an in section 10.4.9.

Current / Historic Land Use

10.4.15 Based on historical mapping, the site was grassland and agricultural land from 1873 to 1915[74]. At least two chalk pits were located within the site boundaries in the central eastern area of the site until 1896 and may have been infilled from this date. A 'Pit' is also recorded in the south western part of the site in 1873, presumed to be a former underground chalk mine.

10.4.16 Information obtained from the Spitfire and Hurricane Memorial museum website[75] indicates that aircraft started to use the open farmland of Manston for emergency landings during the winter of 1915-16. An airport was established at the site shortly after, including operational flights and a training school. Several training schools were established between 1921 and 1936 and additional facilities – classrooms and barracks – were built[76]. Aerial photographs dated 1947-1949 show the presence of a runway in the southern part of the site. During World War II (WWII), Manston was heavily bombed. The site was used as an emergency landing field for returning bombers suffering from low fuel or problems to their hydraulic systems. Three emergency landing strips (concrete) and associated taxiways and dispersals were built and the runway opened in April 1944. The airfield became a storage area for heavy bombers. During the 1950s the US Airforce used the site as a Strategic Air Command base for its fighter and fighter-bomber units. From 1960, the airfield was back under RAF control from the US Airforce and was designated one of the country's Master Emergency Diversion Airfields for both military and civilian flights due to its runway and its facility for foam-laying (product is understood to contain carbon-tetrachloride)[77].

10.4.17 A map from 1968 shows that the site had been developed with taxiways, aprons and buildings in addition to the runway which was already present at the site. A substation is noted in the extreme eastern part of the site from 1977. Two museums had also been developed in the western part of the site by 1995[78]. The RAF operation of the site finished in 1999[79] and the airport became Kent International Airport operating civilian air traffic (cargo and passenger flights). Kent International Airport ceased operations in 2014[80]. A freight handling facility located in the western part of the site is still in use by a range of haulage companies. There is also a small charter helicopter business operating from the area adjacent to the facility.

10.4.18 Historically, the immediate surrounding area was largely agricultural land but has been subject to increased residential development over time, as well as extensions and additions to the road network. A tank farm located in the direct south eastern vicinity of the site, and which was already visible on an aerial photograph dating from 1949, has reduced in the number of tanks since 1995. The A299 highway, a roundabout and a solar energy farm were constructed to the south of the site during the period 1995-2016.

Agricultural Land Quality

10.4.19 A review of publicly available data has been undertaken for the Agricultural Land Classification (ALC) of the site and its surroundings. This classifies the area (of approximately 325m^2) located directly south-west of the site as being Grade 2 (very good quality agricultural land) and Grade 3a (good quality agricultural land) lands. The site itself is not classified as agricultural land[81].

Soils

10.4.20 The soils on and directly surrounding the site are classed as variably permeable urban soils of high leaching potential[82].

Waste Disposal / Landfilling

10.4.21 Based on the available information, there are six historical landfills in close proximity to the site (within a 500m distance). At least two chalk pits were located within the site boundaries in the central eastern and south eastern areas and may have been backfilled at the beginning of the 20th Century.

Previous Reports

10.4.22 Five reports have been reviewed for the assessment.

Land Quality Assessment Phase One: Desk Study Land Quality Statement 1998[83], hereafter referred as "GIBB report"

10.4.23 A Phase 1 desk study was prepared for the Ministry of Defence (MOD) for Manston airfield. It comprised the review of publicly available and historical information from books, information provided by the Establishment Works Consultant (EWC), a summary of the site walkover carried out in May 1998 and a qualitative risk assessment.

10.4.24 The observations from this report have been used to inform Sections 3.4 and 3.7 of the Phase 1 LQA (**Appendix 10.1**).

Geo-environmental Assessment, Jentex petroleum, Cliffsend, Kent, 2015[84]

10.4.25 The Phase 1 desk study includes the findings of an intrusive Phase 2a investigation carried out at the petroleum depot located directly south-east of Manston airfield at Canterbury Road. A preliminary risk assessment was prepared to advise on the geo-environmental implications of the re-development of the site from industrial/commercial to residential. The intrusive investigation included three cable percussion boreholes advanced down to 10.45m below ground level (bgl) and 15 trial holes dug to 4m bgl. The western part of the site was not included in the investigation.

10.4.26 According to Idom Merebrook, the geology encountered was Made Ground directly overlying chalk. Neither groundwater nor perched water were encountered. 25 soil samples, including 14 samples from natural ground and 11 samples from Made Ground, were collected and analysed for asbestos, pH, heavy metals, total petroleum hydrocarbon (TPH), benzene, toluene, ethylbenzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs) and phenols. Shallow soils were found to be impacted with PAHs and asbestos.

10.4.27 The risk to the current and future site users was assessed as being low to moderate, likely requiring mitigation measures. No volatile contamination was identified. The risk to the underlying chalk aquifer was considered to be low. However, a further supplementary investigation was agreed with the EA in order to confirm whether or not the contamination had extended to the chalk strata. This supplementary investigation is described below.

Geo-environmental Assessment Report, Jentex – Supplementary Assessment, Cliffsend, Kent, 2016[85]

10.4.28 The report presents the findings of a supplementary intrusive investigation conducted at the petroleum depot, located directly southeast of Manston airfield at Canterbury Road, in order to verify whether or not the hydrocarbon impacts identified during the 2015 investigation had extended to the chalk strata.

10.4.29 Two boreholes were advanced down to 10m bgl and eight trial pits dug to a maximum depth of 3.5m bgl. The geology encountered was Made Ground overlying Head deposits which were underlain by chalk. Ground or perched-water was not encountered during the drilling works.

10.4.30 24 soil samples, including 16 from natural ground and eight from Made Ground, were collected and analysed for asbestos, pH, heavy metals, TPH, BTEX, PAHs, Cyanide and Phenols. Localised hydrocarbon (mainly TPH) and lead (at a few locations) impact was detected in shallow soils. No contamination was found to be extending to depth therefore the risk to the chalk aquifer was estimated as not being likely to be significant.

Kent International Airport Manston, Radar Mast development, Phase 1 and 2 Contaminated Land Assessment, 2010[86].

10.4.31 A Phase 1 & 2 Contaminated Land Study was undertaken by Jacobs to support the planning application for the installation of radar mast at the airport. The radar mast was proposed to be located in the north-western part of the site next to Manston Road and north of the Spitfire and Hurricane Museum. A site visit was carried out in October 2009. The findings were that the area where the radar mast was intended to be installed consisted of an area of concrete hardstanding which was possibly the foundation for a previous installation. The surrounding areas were open grassed lands.

10.4.32 The Phase 1 study summarises the findings of the previous investigations that were undertaken at various parts of the site - at the runway, the bulk fuel installation facilities, the fire rescue building and the former MOD domestic site. Elevated concentrations of hydrocarbons were detected above the soil screening guidelines used at the time of those investigations. Concentrations of up to 41,657 mg/kg, i.e. above the Dutch Intervention level of 5,000 mg/kg used at the time, were identified during the fuel compound's investigation in 1999. In addition, the study identified the other following potential sources of contamination:

- Made Ground identified as widespread across the airport during the 1999 intrusive investigation – contaminants could include heavy metals, hydrocarbons, asbestos and volatile organic compounds;
- Historical Fog Intensity Dispersal Operations (FIDO) – potential presence of hydrocarbons;
- Potential leaks from mobile fuel tanks that were not equipped with spill protection;
- Several off-site waste management sites, including a historic landfill, two active waste transfer sites and a closed landfill, located less than 300m east of the site – contaminants could include heavy metals, hydrocarbons and organic compounds;
- An active petrol station and garage (Drome) and an inactive car body works located less than 250m north east of the Site – contaminants could include hydrocarbons, solvents;
- An active road haulage services facility located approximately 450m east of the site – contaminants could include hydrocarbons and solvents;
- Potential presence of radioactive material as a hotspot of radioactive material was previously detected at the fire training school which is located close to the potential location of the radar mast;
- Potential residual buried UXO from previous site use as an RAF airfield during WWII; and
- Use of glyphosate based weed killers at the airport.

10.4.33 An intrusive Phase 2 Site investigation was carried out in March 2010. It included five window sample borings excavated down to 4m bgl in the area of the proposed radar mast location. The geology encountered was Made Ground (between 0m and 0.3m bgl) overlying clay (between 0.25m and 3.2m bgl) which were underlain by chalk (between 1.4m and 4m bgl). Groundwater was not encountered during the intrusive works. Ten soil samples were collected within the Made Ground and the chalk and analysed for heavy metals, pH, total organic carbon (TOC), PAHs, TPH, speciated extractable petroleum hydrocarbons, volatile and semi volatile organic compounds, asbestos screen and glycols. In all the samples the concentrations detected were below the relevant screening criteria (generic assessment criteria (GAC) 2009 for human health for commercial end use and withdrawn soil guideline value 2002 for lead). TPH, for which no GAC were available, were detected with concentrations ranging from 4.11mg/kg to 258mg/kg.

Site Investigation Tank 2, Base Validation, Jentex, The Storage Installation, Canterbury Road West, Ramsgate, Kent CT12 DU, 2007[87]

10.4.34 An intrusive site investigation was carried out at the petroleum depot, located directly south east of Manston airfield by Randall & Walsh Associates (RAW) to validate the decommissioning and demolition of a fuel oil storage tank (named Tank 2) and assess the site amenity for future land

use. The report summarises the findings of the intrusive site investigation Tank 2 was originally built on a brick bund directly over the Chalk Formation. It had a capacity of 2,000,000l. The intrusive investigation comprised eleven trial pits excavated down to 0.3m bgl across Tank 2's former location and six soil borings advanced down to 1m bgl in the embankment that surrounded the former location of the tank. Chalk was encountered from ground level to 0.3m bgl in the trial pits.

10.4.35 Topsoil including chalk fragments was encountered from 0m to 1m bgl in the embankment. Fifteen soil samples were collected from selected trial pits and soil boreholes. A soil sample was also collected from stockpiled sand that had previously been scraped back from underneath tank after it had been decommissioned. Samples were analysed for speciated TPH by gas chromatography with flame ionization detection (GC-FID), volatile organic compounds and BTEX. A maximum TPH concentration of 11mg/kg was detected beneath the former location of Tank 2. A maximum TPH concentration of 390mg/kg was detected in the area surrounding former Tank 2's location. A maximum TPH concentration of 320mg/kg was detected in the soil embankment. In all the samples the concentrations detected were below the 2002 Soil Guidance Values (SGVs) published by the Department for Environment, Food and Rural Affairs (Defra) and the EA, and the RAW in-house generic soil screening values (SSV) derived using the Scotland & Northern Ireland Forum for Environmental Research (SNIFFER) model for commercial/industrial land use where SGVs were not available.

10.4.36 The risks to human health and building structures were assessed by RAW as being not significant. The TPH (mainly C21-C35) concentration of 390mg/kg detected in the area surrounding the former tank location was not considered to pose a significant risk to groundwater given the low mobility and solubility properties of the hydrocarbon compounds in this carbon range. No further investigations or remediation works were recommended.

Current and Historic Site Activities

10.4.37 The following current and historic site activities have been identified based on the previous reports available for the site and the site walkover carried out in February 2017. More details are provided in **Appendix 10.1**.

10.4.38 Fuel Storage and use:

- Nine underground storage tanks (USTs) located within the current site boundary and six USTs located outside of the current site boundary had been identified in the previous GIBB report. Their presence could not be verified during the 2017 site walkover and it is not known whether all the USTs are still present and if any remediation works have been carried out. Four above (ground) storage tanks (ASTs) were identified onsite during the 2017 site walkover. Four further ASTs located outside of the current site boundary that had been identified in the previous GIBB report could not be identified during the 2017 site walkover;
- A fuel station was identified onsite (former aviation training centre) during the 2017 site walkover;
- Historical FIDO was reported by GIBB to have been used from 1943. FIDO consisted of burning petrol along the runway to disperse fog. An AST that is believed to have been associated to the FIDO activities was still present at the south eastern boundary of the site during the 2017 site walkover;
- During the 2017 site walkover the outlets of two fuel pipes that are believed to be connected to a bulk fuel installation (BFI) onsite and/or to the runway were found at the Jentex tank farm located in the direct south eastern vicinity of the site;
- During the 2017 site walkover, two waste oil tanks in bunds were found at the front (north) of the KIA jet support building and a waste oil container located on a concrete pad was identified at the former aviation training centre in the south eastern part of the site; and

- The Jentex tank farm is located in the direct south eastern vicinity of the site, within the SPZ1 zone. Five ASTs located in bunded areas were observed during the Amec Foster Wheeler 2017 site walkover. Soil staining and a slight hydrocarbon odour were noticed.

10.4.39 Firefighting activities including:

- Use and storage of "Pyrene" runway foam: The GIBB report indicates a Pyrene foamer was used to cushion aircraft during emergency landings which operated between 1964 and 1980. The equipment was operated from mobile tankers which were held on standby adjacent to Hangar 3. The composition of this foam is understood to contain carbon tetrachloride[88]; and
- Burning grounds: A burning area previously identified to the east of the fire station (Building (Bldg.) 869)[89] in 1998 was still present at the February 2017 site walkover but did not appear to be still in use. It comprises a pile of ashes partly contained in a heavily corroded caged trolley. There is a potential for radium to be present from historic activities in this area. It is located on an asphalted area but extends towards a grassed area. There is no bund.

10.4.40 Maintenance activities:

- At the former and current Motor Transport (MT) workshops: The former MT workshop is now part of the RAF Manston History museum that was closed to visitors at the time of the 2017 site walkover. The current MT workshop belongs to and is operated by the MOD. Storage of tyres and wooden pallets outside of the building along the fence was observed during the 2017 site walkover;
- Storage of potentially hazardous materials at engineering workshops: During the 2017 site walkover an engineering workshop, Bldg. 450 and two buildings/shelters that did not appear to be in use were identified, as well as an active lorry haulage company with a truck park. These were all located within the site near the western boundary. The engineering workshop and Bldg. 450 are connected; and
- Cleaning of aircraft/ helicopters: The area of Hanger 3 (Bldg. 253) was historically used to clean helicopters and store pyrene runway foam. The KIA Jet Support building area was also used to clean aircraft, and to carry out aircraft and vehicle servicing. The whole area of Hanger 3 and the KIA Jet Support building and the aviation training centre buildings could not be inspected during the 2017 site walkover.

10.4.41 Significant quantities of de-icing chemicals used to be stored in the current MT area. It was not known whether specific containment measures were in place.

10.4.42 Areas of Infill: Made Ground is potentially present across part of the site and infilled chalk pits are present on the site, infilled in the early 1900s.

10.4.43 Waste disposal areas comprising:

- Two waste storage areas including one on soft ground identified at the KIA jet support building during the 2017 site walkover;
- Potential materials disposed of at an air-raid shelter which used to be located near the Glider School were no longer present during the 2017 site walkover; and
- Two historical acid pits mentioned in GIBB report as being potentially infilled with unknown materials. During the 2017 site walkover it was apparent that there is now a road and a pavement at the emplacement of the historical acid pit to the east of the site near the KIA car park. There is a reworked area covered with grass at the location of the historical acid pit at the former MT building.

10.4.44 Substations:

- 12 substations and transformers identified by GIBB were inspected during the 2017 site walkover and none of them were noted to have staining indicating potential leakages. Staining/damp was observed around a transformer (that was not listed in the GIBB report)

situated along the south western border of the site in an area that currently belongs to the MOD and lies inside the current site boundary.

10.4.45 Radiological sources:

- A report from the DERA Radiation Protection Services included within the GIBB report suggested that, as with many RAF sites, radioactive materials and particularly radium luminising material, may have been present in equipment buried at the site and may have been disposed of in waste pits or areas where ash was disposed of.

10.4.46 Asbestos in buildings:

- The asbestos register reviewed by GIBB in 1998 identified 12 locations/products either containing or suspected of containing asbestos. The material was listed as being in good to fair condition.

10.4.47 Site drainage:

- GIBB indicated that no oil/fuel interceptors were found to be installed along the airfield drainage system, located along the outer lengths of the runway and flowing in an easterly direction. System discharge was into Pegwell Bay although no discharge consent was held for the site. A site drainage investigation was performed during the February 2017 site walkover and is discussed in **Chapter 8: Freshwater Environment**.

10.4.48 Off-site historical landfills:

- Alland Grange and Sunny Bank landfills, within 300m of the site, are licensed to take inert wastes mixed with slow degradable and putrescible waste. There is a possibility that landfill gases and leachate may migrate from these sites. In addition, the Envirocheck report (**Appendix 10.1**) indicates there is another landfill to the north on Manston Road. This was an inert landfill present from 1976 to 1987.

10.4.49 Water quality

- Water quality data from Lord of the Manor PWS for a range of substance were provided by Southern Water Services (SWS) for the period 2001 to 2015[vii]. These are summarised below:
- High nitrate concentrations have been an issue at the Lord of the Manor PWS since the 1920s, when levels already exceeded the current drinking water standards (DWS) (SWA, 1985). Data supplied by SWS show that the trend for the period 2001 to 2005 was relatively flat, with concentrations varying between around 50 to 65mg/l NO3. However, concentrations appear to have subsequently risen from around 57mg/l NO3 in 2004 to 62mg/l NO3 in 2010, observations that are consistent with the predictions made in the 1985 SWA study. After 2010 the PWS appears to not have been used and samples rarely taken, probably because the source can only be put into supply if nitrate treatment is undertaken. Past activities at the airport are not considered to be a source of nitrate.
- The solvent detected most frequently at concentrations above the combined drinking water Standard (DWS) is tetrachloroethene (PCE). The DWS for PCE and TCE is 10µg/l. From June 2001 to December 2002 there was a rising trend in PCE, with concentrations generally ranging between 5 and 17µg/l with a peak of 26µg/l in September 2002. Between May 2003 and December 2006 concentrations were between 0.5 and 15.2µg/l, although the sampling frequency was reduced. From 2006 to 2009 concentrations were generally between 10 to 17µg/l. There was no detection in samples taken in 2009. Samples taken after January 2010, when the PWS was out of service, contained PCE at between 4.7 and 7.5µg/l.
- TCE was also detected, but always at concentrations below the combined DWS, with a peak concentration in June 2001 of 2.9µg/l. Concentrations follow a similar temporal pattern to that

[vii] Water Quality, RiverOak Strategic Partners, Manston Airport, Kent, Hydrogeological Impact Assessment (HIA), 2018, Amec Foster Wheeler

of PCE, with the majority of elevated concentrations between 2001 and 2004, and 2007 to 2010, decreasing to lower levels in recent years, suggesting a common source.

- Other solvents detected at the Lord of the Manor PWS include:
  - 1,1,1 Trichloroethane between December 2007 and February 2008, at concentrations of 2.8 to 4.8µg/l;
  - Vinyl chloride with a peak value of 2.4 µg/l in September 2009, but otherwise remaining at the 0.11µg/l (the likely laboratory detection limit). The UK DWS is 0.5µg/l;
  - Carbon tetrachloride was consistently detected at a low concentration throughout the dataset, with a peak value of 1µg/l in August 2002. The UK DWS is 3µg/l; and
  - Trihalomethanes was at a peak value of 6µg/l in September 2001. The UK DWS for trihalomethanes is 100µg/l.
- The changing concentrations of PCE and potentially TCE appear to be correlated with groundwater levels at the abstraction. In general, samples where PCE was absent coincide with periods of lower-than-usual water table (around 2m AOD), whilst peaks in concentration typically occur when the water table is higher. This pattern may suggest that a source or plume of PCE and other solvents is present, although the decrease in concentrations in recent years suggests that the plume may have degraded over the years.

Conclusions of the Stage 1 Preliminary Risk Assessment and Recommendations

10.4.50 The initial conceptual model has identified a number of potential contaminant linkages for receptors including current and future site users, controlled waters (aquifer and coastal water features) and property. The identified potential contaminant linkages are; the bulk fuel installations (BFIs), the onsite petrol station at the aviation training centre, and the gas oil tank located at the KIA jet support building, the burning of petrol along the runway, fuel pipes potentially connected to the BFI to the north east and/or to the runway, the waste oil tanks at the KIA jet support building and the aviation training centre, the Jentex tank farm, the use and storage of Pyrene runway foam, the burning ground area (including possible radiological sources), the Motor Transport (MT) workshops (former and current) (including possible use of chlorinated solvents), the cleaning of aircrafts / helicopters, the use and storage of de-icing chemicals, the made ground associated with the former development, the infilled chalk pits, the waste storage and disposal areas, the acid pits infilled with unknown materials including asbestos, the onsite substations and the off-site landfills.

10.4.51 The site visit did not include the outfall route to Pegwell Bay, service routes from the highway to the outfall pipeline or a waste storage area located adjacent to the west of the site. However, a survey of the pipeline has been carried out by RPS who report *"the pipeline is in a condition which will not require any structural works before being used for drainage purposes, works will be limited to maintenance activities (i.e.: jetting and cleaning with some defects which needs to be monitored and could be treated in future)" -.*

10.4.52 The risk rating of the potential linkages ranges from low to high (**Appendix 10.1)**. The highest risk is associated with risks to groundwater from the Jentex fuel farm which partly overlies the groundwater SPZ1.

Future Baseline

10.4.53 The current baseline will be used for the purpose of this assessment, as in the absence of the Proposed Development there are no known trends or factors that are expected to affect the current baseline conditions.

10.5 Environmental Measures Incorporated into the Proposed Development

10.5.1 A summary of the proposed environmental measures in order to avoid, reduce or compensate for potential adverse Land Quality effects is provided in **Table 10.99** and **Table 10.10**. Effects of turbidity on groundwater are addressed in **Chapter 8: Freshwater Environment**.

10.5.2 The environmental measures will include a site investigation to inform the need for additional mitigation within the Proposed Development. The site investigation and associated mitigation measures will be agreed with the regulators, including the EA, TDC and other stakeholders as appropriate, and incorporated into the final development as outlined below. 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. The way that these environmental measures influence the assessment of significance is discussed in **Section 10.7**.

Table 10.9 Proposed Effects and Environmental Mitigation Measures for the Construction Phase

Potential Receptor	Predicated Changes and Potential Effects	Incorporated Measure
Humans /Surface (coastal) and ground water	Mobilisation of and exposure to existing potential contamination through soil disturbance and generation of dust during construction activities	The works will be carried out in accordance with relevant *Construction Design Management (CDM) Regulations 2015*. An intrusive investigation will be carried out and the findings of this intrusive investigation will inform the package of measures to be included within the detailed design. Any removal of contamination beneath the existing runway will be risk based and will weigh advantages of contamination removal against removal of the runway. A CEMP (**Appendix 3.2**) has been submitted as part of the DCO application. It will include a plan addressing the following pollution measures: • A survey (pre- site preparation survey as defined by the HSE) and removal of asbestos containing materials, and other materials and structures contaminated with asbestos fibres, are expected to be performed by a competent/licensed contractor prior to any demolition works; • For site workers and visitors, the potential for exposure to contaminants will be mitigated by the Control of Substances hazardous to Health (COSHH) Regulations 2002[90] and the Management of Health and Safety at Work Regulations 1999[91] and controlled through good construction practices such as site induction, good hygiene practices, dust suppression (especially in loading / unloading bays and tracks), requirement for suitable PPE to prevent exposure and/or restricted access during higher risk activities; • A watching brief will be in place during demolition, ground and construction works. If unexpected contamination is encountered or suspected, the works will cease in that area and assessment by a suitably qualified land contamination specialist will be made to determine appropriate actions. Soil (soil vapour/ groundwater) samples will be collected and analysed. The risks associated with contamination will be assessed. When required, a remediation strategy will be designed and agreed following consultation with the EA and the relevant local authority as appropriate before implementation;

Potential Receptor	Predicated Changes and Potential Effects	Incorporated Measure
		• Any construction activity with the potential to produce or release dusts will be assessed and dust avoided where possible through design, or, if unavoidable will be controlled on-site using construction good practice to prevent site users and neighbouring site occupiers being exposed to contaminants; • Site access points will be regularly cleaned to prevent build-up of dust and mud; and • Any imported landscaping material will be clean and free of contaminants and of suitable thickness. In addition, measures to control sediment from the construction process also set out in **Chapter 8: Freshwater Environment** will be implemented to control contamination migration including: • Site access points will be regularly cleaned to prevent build-up of dust and mud; • Earth movement will be controlled to reduce the risk of silt combining with the site run-off; • Properly contained wheel wash facilities will be used (where required) to isolate sediment rich run-off; • Cut-off ditches and/or geotextile silt-fences will be installed around excavations, exposed ground, stockpiles to prevent the uncontrolled release of sediments from the site; • Sediment traps will be required on all surface water drains in the surrounding region; • Silty water abstracted during excavations will be discharged to settlement tanks or siltbusters as appropriate. Cleaned run-off will be discharged through the existing foul sewer drains. If sewer capacity is limited then silty water will need to be stored and removed from the site by tanker and disposed of at a suitably licensed location. A discharge consent for discharge to foul sewer, detailing volumes and rates of discharge will be agreed with SW prior to the commencement of works, if necessary; and • Stockpiles and material handling areas will be kept as clean as practicable to avoid nuisance from dust. Dusty materials will be dampened down using water sprays in dry weather or covered.
Humans / Soils/ Surface (coastal) and ground water	Exposure to contaminants/ Pollution incidents resulting from spillage due to spillages of oils and other chemicals associated with the construction process	The risks from accidental spillages/leaks during handling and storage of chemicals and fuels will be mitigated by the COSHH Regulations 2002[92] and the Management of Health and Safety at Work Regulations 1999[93]. Fuel, oil and chemical storage and handling will be minimised in the design of the works and safe working procedures / method statements for handling fuel and minimising the potential for spillage will be put in place, for instance by emptying and properly decommissioning fuel tanks prior to removal. The risks from accidental spillages/leaks during handling and storage of chemicals and fuels will be mitigated by pollution prevention measures and good working practices (CEMP) in accordance with current guidelines. In addition, measures to control spillages from the construction process also set out in **Chapter 8:**

Potential Receptor	Predicated Changes and Potential Effects	Incorporated Measure
		Freshwater Environment will be implemented to control contamination migration including: • Wherever possible, plant and machinery will have drip trays beneath oil tanks / engines / gearboxes / hydraulics which will be checked and emptied regularly and correctly disposed of via a licensed waste disposal operator; • Oils and hydrocarbons will be stored in designated locations outside of SPZ1 with specific measures to prevent leakage and release of their contents, including the siting of the storage area away from the drainage system on an impermeable base, with an impermeable bund that has no outflow and is of adequate capacity to contain 110% of the contents. Valves and trigger guns will be protected from vandalism and kept locked when not in use; • A Pollution Incident Control Plan (PICP) will be produced, which site staff will have read and understood. On-site provisions will be made to contain a serious spill or leak through the use of booms, bunding and absorbent material; and • The bulk of the existing runways and taxiways will be kept as they afford protection to the adit in SPZ1. In order to mitigate against any potential FOD hazard (a concern raised by the CAA), it is proposed to overlay the extended paved area with asphalt as part of the initial construction phase.
Humans / Buildings and services	Discovery and potentially explosion of UXO associated with construction process	A detailed UXO threat and risk assessment will be carried out in accordance with CIRIA C681 Chapter 5[94] on managing UXO risks prior to any intrusive works such as a ground investigation and the re-development of the site to determine any mitigation required to address this risk. This will be done in a phased approach, with additional assessment carried out as part of the site investigation. Future work relating to UXO will follow CIRIA guidelines (please refer to **Table 10.1**). The final CEMP will be informed by the findings of further site investigation and mitigation implemented in the construction phase.
Soils / Ground water	Pollution incidents resulting from the release of contaminants from building materials or construction activities	During the site works tendering process the expected level of environmental control will be included in the tender documents, so that all contractors allow for mitigation measures in their work scope. These environmental controls will be included within the final CEMP and implemented in the construction works. Suitably qualified and experienced geo-environmental engineers would be used to supervise the ground works. Designated washdown areas outside of SPZ1 with fully contained drainage will be used for plant/vehicles in contact with contaminated soils to avoid contaminants being moved around the site or taken off-site. The foundation excavations will be dewatered by pumping if required. The water will be collected in suitable tanks and held on site for collection by a licensed waste contractor. No water from foundation dewatering operations will be discharged directly to ground. If required, any discharge would occur under the appropriate regulator's consent.

Potential Receptor	Predicated Changes and Potential Effects	Incorporated Measure
		The risks will be mitigated through specification of impermeable concrete to the appropriate British Standard to minimise any potential adverse impacts.
Ground and coastal water	Pollution incidents due to creation of pathways for the migration of potential contamination	Suitable foundation design and piling methods will be implemented to prevent migration of any potential/residual contamination and will be agreed with SW and the EA prior to the commencement of works. Piling methods will be in accordance with "Piling and Preventative Ground Improvement Methods on Land Affected by Contamination: Guidance on pollution prevention"[95] and "Piling into contaminated sites"[96]. Any removal of contamination beneath the existing runway will be risk based and will weigh advantages of contamination removal against removal of the runway. Remediation of potential residual contaminants at the Jentex tank farm will be undertaken, subject to risk-based assessment.
Humans / Groundwater/ coastal water	Pollution incidents due to removal of tanks during construction phase	Procedures incorporated into the CEMP (**Appendix 3.2**) to prevent mobilisation of fuel and these will be implemented as part of the construction phase. Safety precautions will be implemented and will include preparing an emergency response plan within the site health and safety documentation. Remediation of potential residual contaminants at the Jentex tank farm will be undertaken, subject to risk-based assessment.
Surface (coastal) and ground water	Pollution incidents resulting from concrete batching and cement products on site during the construction process	Any mixing and handling of wet concrete that is required on-site will be undertaken in designated areas outside of SPZ1. A designated area, the location and configuration of which will be agreed following consultation with the EA, will be used for any washing down or equipment cleaning associated with concrete or cementing processes and facilities provided to remove sediment prior to disposal to foul sewer. Any contaminated soil will be identified by ground investigation prior to construction and either treated onsite and reused, or removed – subject to risk-based assessment - and disposed of off-site by a suitably licensed waste disposal operator. Measures such as cut-off trenches will be put in place to prevent any potentially polluted run-off from within the site entering any excavations.

Table 10.10 Proposed Effects and Environmental Mitigation Measures for the Operational Phase

Potential Receptor	Predicated Changes and Potential Effects	Proposed Mitigation Measure
Humans / Buildings and services	Health hazard / Damage to property due to ingress and accumulation of vapour or ground gas resulting in health hazard from vapour or explosion / asphyxiation for users of site buildings	Following the site investigation, buildings will be designed to comply with Building Regulations 2017[97] including, where necessary, ground gas and vapour protection measures such as gas vapour membranes and sub-floor ventilation in buildings and ensuring appropriate ventilation exists in any confined spaces.

Potential Receptor	Predicated Changes and Potential Effects	Proposed Mitigation Measure
Humans	Health hazard due to future maintenance works (particularly any in ground maintenance works) that may disturb any residual contamination	The site investigation and subsequent risk assessment will identify whether any further remediation is required. Any removal of contamination beneath the existing runway will be risk based and will weigh advantages of contamination removal against removal of the runway. This might include the use of defined service corridors or clear service trenches so that maintenance workers are not exposed to potential residual contamination. The health and safety file for the construction will include information on ground contamination and will be kept and used to develop a risk assessment and method statement including mitigation measures to address these risks in line with health and safety legislation during the operational phase.
Humans / Soils / Ground and coastal water	Health hazard due to, or pollution incidents resulting from, spillages during re-fuelling	The risks from accidental spillages/leaks during handling and storage of chemicals and fuels will be mitigated through compliance with the COSHH Regulations 2002[98] and the Management of Health and Safety at Work Regulations 1999[99]. Fuel, oil and chemical storage and handling will be minimised in the design of the works and safe working procedures / method statements for handling fuel and minimising the potential for spillage will be put in place. The risks from accidental spillages/leaks during handling and storage of chemicals and fuels will be mitigated by pollution prevention measures and good working practices in accordance with current guidelines. Re-fuelling will be in designated areas with active drainage areas and fuel interceptors. Different treatment methods will be considered, light liquid separator, activated sludge aeration tank and/or forced bed aeration, to treat pollutants which will include exhaust fumes, fuel and lubricant spillages. Control levels and alarms will be used to identify leaks or overflows. Fuelling system will include automatic shut off drainage system whilst vehicles will be on refuelling stand.
Humans / Buildings and services / Groundwater	Health hazard / Damage to property due to residual contamination being present as a result of the inappropriate re-use / use of contaminated fills and soils during the construction phase	Soil to be re-used will be controlled under the CL:AIRE Definition of Waste: Development Industry Code of Practice (version 2)[100] to confirm they are suitable both chemically and geotechnically. Any imported landscaping material will be clean, free of contaminants and of suitable thickness. The construction development will bring forward a mostly impermeable cover on the site.
Humans/ Soils / coastal and Ground -water	Health Hazard / Pollution incidents due to leakage and / or failure from fuel storage tanks	Further site investigations will be undertaken to inform the detailed design of the fuel farm facility. The fuel farm will largely be located in SPZ2 with only a small piece in SPZ1. All fuel infrastructure will be in SPZ2. Design will be undertaken beyond BAT and will include: bund construction, specification of double bunded tanks, bund to be underlain by impermeable membrane (e.g. visqueen), joints to be sealed with a hydrophobic sealant to prevent leakage, and concrete to include self-sealing material (e.g. xypex) and to be specified to water impermeable standard with additional reinforcement to limit cracks to e.g. <0.2mm

Potential Receptor	Predicated Changes and Potential Effects	Proposed Mitigation Measure
		The new fuel farm facility will incorporate suitable blast protection and other measures to control and mitigate any risks to nearby commercial, residential and other property from an incident at the fuel farm. The design of these measures will be discussed with the Health and Safety Executive. A new airside/landside security facility will 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. Re-fuelling will be in designated areas with active drainage areas and fuel interceptors. Control levels and alarms will be used to identify leaks or overflows. Regular tank inspections will be conducted. Fuelling system will include automatic shut off of drainage system whilst vehicles will be on refuelling stand. In the bunded area, sump drainage will be to a low point from where it will be manually pumped into the drainage system (if clean) or to tanker if contaminated. All pipes will go over the bund wall (no below ground pipes).
Soils / Ground and coastal water	Pollution incidents resulting from pesticide use	Pesticides will only be applied to hardstanding areas with active drainage to water treatment works. The airport will develop a Habitat Management Plan which will be in the operational environmental management plan (OEMP) to control and manage the use of chemicals to prevent them being discharged to ground.
Buildings and services	Permeation of plastic pipes by contaminants	The intrusive investigation will inform the package of measures to be included within the detailed design, which could include use of appropriate type and material specification of potable water pipes and other buried services (e.g. use of barrier pipe and/or clean service trenches).
Humans / Soils / Ground and coastal water	Risk of pollutants entering Lord of the Manor source as a result of the use of pesticides	There may be a need to control leatherjackets and other pests and in such circumstances a suitable licensed contractor will be employed to carry out such works in accordance with the provisions of the order relating to Pollution Prevention and Control. Environmentally compatible control of leatherjackets and similar bird attractants is possible and would be handled through the advice of an agronomist who is specifically qualified to assess the best available products at the time of use. All such products are subject to EU rules and regulatory compliance.
In addition to the environmental measures relevant to Land Quality, the following environmental measures relevant to the freshwater environment detailed in Chapter 8: Freshwater Environment, are proposed for the Proposed Development		
Soils/ Groundwater	Contaminated run-off generated by de-icer storage and use	Application of de-icer will only be in designated areas with active drainage where the run-off is lead to water treatment lagoons. Different treatment methods will be considered to treat de-icing and washing agents. Consultation on the types of de-icer to be used will be undertaken with the EA, so that, where possible, lower risk alternatives could be used.

10.5.3 The above proposed measures are standard industry practice for addressing contamination risks, although exact details would be confirmed following further site investigation.

10.6 Scope of the Assessment

10.6.1 This section sets out information on:

- The process whereby receptors are identified;
- The potential receptors that could be affected by the Proposed Development; and
- The potential effects on receptors that could be caused by the Proposed Development.

10.6.2 The scope of assessment has been informed by:

- The Scoping Report (**Appendix 1.1**);
- Consultee responses to the Scoping Report (**Appendix 1.2**);
- The results of the work detailed in **Section 10.4**; and
- The Proposed Development design.

Approach to Identifying Receptors

10.6.3 The identification of receptors is based on relevant guidance and the professional judgement of a qualified technical specialist who has undertaken a desk study for the site location and site walkover for the site location.

10.6.4 In some cases, even without quantified information, it is reasonable to assume that some potential receptors will not experience significant effects. This is sometimes the result of tried and trusted mitigation measures that have been incorporated into the Proposed Development design, which might reasonably be expected to be effective (see **Section 10.5**).

10.6.5 The following considerations have been taken into account in identifying potential receptors:

- The extent to which the receptor will be affected by changes that are expected to result from the Proposed Development;
- The sensitivity of the receptors to the changes that are likely to occur;
- The likely magnitude, duration and other characteristics of the effects;
- The importance or value of the receptor at a local, regional and national level; and
- Relevant best practice and guidance where specialist methodologies have been developed as detailed below.

Potential Receptors

10.6.6 This section identifies the potential receptors that have been identified based on the above factors and on the consultation responses received from PINS, the EA and TDC. The receptors listed in **Table 10.11** are considered capable of being significantly affected and will therefore be taken forward for further assessment.

Table 10.11 Potential receptors during and post construction

Receptor	Distance from Site Boundary	Reason for Selection	Sensitivity
Humans: **Site and adjacent site users (off-site neighbours) – construction phase;** **Future site users (commercial users, personnel on-site, passengers), site adjacent users (off-site neighbours)– operational phase**	Onsite	The Phase 1 LQA (**Appendix 10.1**) preliminary risk assessment has identified risks from current and historic sources.	High High
Buildings and Services	Onsite	The Phase 1 LQA (**Appendix 10.1**) has identified risks from current and historic sources.	Medium
Soils: agricultural land / soil classification	Offsite (adjacent south west)	Grade 2 (very good quality agricultural land); and Grade 3a (good quality agricultural land) lands.	High Medium
Controlled Waters: Coastal water (Pegwell Bay and Sandwich Bay)	900m south east of the main site boundary	The Phase 1 LQA (**Appendix 10.1**) has identified risks from current and historic sources.	Very high
Controlled Waters: Principal Aquifer in bedrock	Onsite	The Phase 1 LQA (**Appendix 10.1**) has identified risks from current and historic sources.	High (in SPZ2) to Very High (in SPZ1)

Spatial and Temporal Scope

10.6.7 The assessment considers the potential effects of the Proposed Development in relation to Land Quality on receptors on the site as well as off-site receptors. The spatial scope has been defined in paragraph 10.3.2:

- Human receptors: have been defined as those onsite and the off-site neighbours;
- Buildings and Services: have been defined as those onsite;
- Agricultural Soils: have been defined as those located off-site adjacent southwest and classified as very good and good agricultural lands;
- Coastal waters: have been defined as Pegwell Bay and Sandwich Bay located off-site as it is anticipated that if the Lord of the Manor abstraction is not in use, the groundwater system would provide flow for potentially contaminated groundwater to the coast. The site drainage ultimately discharges to Pegwell Bay; and
- Groundwater: Groundwater receptors have been defined as the Kent Isle of Thanet Chalk WFD groundwater body (i.e. identified under the WFD as a Drinking Water Protected Area – refer to **Chapter 8: Freshwater Environment**) which underlies the site and dependant abstractions.

10.6.8 An assessment of the potential effects of the Proposed Development in relation to Land Quality has been undertaken for the construction, operational and decommissioning phases of the Proposed Development.

10.6.9 The assessment of the construction phase effects considers the reasonable worst-case effects from all four of the construction phases as outlined in **Chapter 3: Description of the Proposed Development**. Where there are different potential effects from each construction phase, these will be outlined and each assessed separately.

10.6.10 The assessment of the operation phase effects will consider the reasonable worst-case scenario potential effects, which, for most potential effects, are likely to be those from Year 20 of the airport forecast as detailed in **Chapter 3: Description of the Proposed Development**.

Potentially Significant Effects

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

Direct and Indirect Effects

- Effects on Human Health, including during construction phase;
- Effects on Buildings and Services;
- Effects on Agricultural Soils;
- Effects on Coastal Waters; and
- Effects on Groundwater in the chalk aquifer.

Inter-related effects

10.6.12 The assessments have considered inter-related effects, located at the end of each receptor assessment. Inter-related effects are assessed in relation to a specific receptor where the effect could be caused by the interactions of different types of effect from project activities even if individually these are insignificant.

10.6.13 The following inter-related effects have been considered:

- The effects on human receptors as a result of potential exposure to contaminants as a result of the Proposed Development has been assessed within this chapter. This assessment has also been considered within **Chapter 15: Health and Wellbeing** alongside other topics such as noise, socio-economics and visual, which all have the potential to affect health.
- The effects of dust on human receptors is assessed in **Chapter 6: Air Quality**, however the potential for contaminants to be present in dust has been assessed within this chapter.
- The effects of contaminants on controlled water receptors has been informed by the Hydrogeological Impact Assessment in **Chapter 8: Freshwater Environment** and is assessed in this chapter. Inter-related effects on freshwater receptors, such as uncontaminated sediment and turbidity effects, in addition to contamination effects (the potential of which is determined in this chapter), is assessed in **Chapter 8: Freshwater Environment**.
- Inter-related effects on land quality receptors, such as controlled waters and soils, as a result of major accidents or disasters has been assessed in **Chapter 17: Major Accident and Disasters** where the baseline, potential receptors and assessments within this chapter have informed the major accidents or disasters assessment.

10.6.14 The inter-related effect of multiple topics such as noise and air quality changes, in addition to water or ground contamination, which although individually may be significant, could all act in combination on the same human receptors, is considered in **Chapter 18: Cumulative Effects**.

Cumulative effects

10.6.15 Potential for cumulative effects is provided through an assessment at **Chapter 18: Cumulative Effects** and includes potential cumulative effects of the proposed development together with other identified major development proposals that were scoped in to the assessment. From a land quality perspective, potential cumulative effects are considered to be limited and only 10 of the 35 shortlisted developments have been scoped in for further assessment.

10.7 Assessment Methodology

10.7.1 This section sets out the methodologies used to predict effects and to undertake the significance evaluation.

Methodology for Predicted Effects

10.7.2 The potential effects of contaminated land issues are usually assessed by undertaking a contaminated land risk assessment. The risk assessment process is based on a tiered framework in accordance with CLR 11. The preliminary risk assessment approach is:

- Development of a Conceptual Model;
- Preliminary Risk Assessment examining potential contaminants, pathways and receptors to identify the potential 'contaminant linkages'; and
- Identification of further risk assessment requirements.

10.7.3 The conceptual model represents the characteristics of the site and indicates the possible relationships between contaminants, pathways and receptors, where:

- A contaminant is a substance which is present in, on, or under the land and has the potential to cause harm;
- A receptor is something which could be adversely affected by the contaminant, for example, human beings, animals, plants, buildings and controlled waters; and
- A pathway is a route or means by which a receptor could be exposed to, or affected by, a contaminant.

10.7.4 For a potential risk to exist at a site, all three of the above elements must be present and linked together so that a contaminant has been identified, a receptor is located on or near the site and there is an exposure pathway that links the contaminant to the receptor. The term 'contaminant linkage', is used to describe a particular combination of contaminant pathway-receptor relationship.

10.7.5 The potential risk associated with each contaminant linkage has been assessed by considering the nature of the contaminant, the degree of potential exposure of a receptor to a contaminant, the likelihood of the exposure and the sensitivity of the receptor.

10.7.6 A detailed explanation of the methodology is provided in Appendix C of the Phase 1 LQA (**Appendix 10.1**).

10.7.7 Where potential sources of contamination have been identified, each of the receptors has been considered. However, where a plausible pathway cannot be established from source to receptor, a risk is not deemed to be present and therefore the potential effect is not considered further and is scoped out from further assessment.

Sensitivity of Receptor

10.7.8 The categories and definitions of value and/or sensitivity that will be used in the assessment are displayed in **Table 10.12** Where a receptor could reasonably be placed within more than one value and sensitivity rating, professional judgment has been used to determine which rating would be applicable.

Table 10.122 Definitions of Receptor Sensitivity

Sensitivity	Definition
Very High	Receptor of very high sensitivity (e.g. sensitive individuals, highly vulnerable aquifer, actively used in vicinity of site with short travel times to sources of supply or sensitive watercourses. Likely to be within an inner or outer groundwater protection zone). All contaminant releases to the ground environment of concern. High quality watercourse within close proximity (less than 250m) of site or with potential for rapid transmission of pollutants to that watercourse via a fissured aquifer. Or interconnected unclassified drain or stream. Within 100m of a sensitive coastal water, that is, a recognised bathing water, a "more sensitive area" or a marine SSSI or at a greater distance but with a direct connection.
High	Receptor of high sensitivity and high intrinsic value (e.g. humans, ecological receptors with international or national designations, strategically important / high value buildings and built environment; Principal Aquifer with significant public water supply abstractions and/or within Inner or Outer Source Protection Zones, high value or sensitive surface watercourses). Most contaminant releases to the ground environment of concern Soil grade 1 (extremely good quality) and/or Grade 2 (very good quality) agricultural land / soil classification.
Medium	Receptor of medium sensitivity and value, i.e. possesses key distinctive characteristics (e.g. important buildings to be constructed on-site with moderate value, habitats or ecology of regional importance; Principal Aquifer with public and or private water supply abstractions and/or within Catchment Source Protection Zone; or Secondary Aquifer with significant water supply abstractions, water quality of receptor supports high biodiversity (not designated); receptor has low capacity to accommodate change to water quality status; water quality of receptor waterbody classified under WFD as good ecological status/potential). Soil grade 3 (good to moderate quality) agricultural land / soil classification.
Low	Receptors of low sensitivity and value, (e.g. low value / sensitivity built environment e.g. hardstanding, drains / sewers; ecology / ecosystem with only local and / or no designations or protection; Secondary A/B Aquifers without abstractions in the vicinity or Unproductive Aquifers; surface waters where baseline conditions define an environment that has a high capacity to accommodate proposed change to water quality status due, for example, to the large relative size of receiving water feature and effect of dilution; surface waters where specific water quality conditions of receptor water feature likely to be able to tolerate proposed change with very little or no impact upon the baseline conditions; water quality of receptor could be expected to be classified under the WFD as moderate to poor and /or ecological status/potential). Soil grade 4 or 5 (poor and very poor quality) agricultural land /soil classification.

Magnitude of Effect

10.7.9 This is based on the assessment of the scale of change and the consequences the Proposed Development would have upon sensitive receptors. The scale of change would be considered both spatially and/or temporally when categorising the magnitude of an effect and would be categorised as high, medium, low or negligible. The definitions of the magnitude of an effect are provided in **Table** 10.13**3.**

Table 10.13 Definitions of Magnitude of Effect

Magnitude	Human Health	Controlled Water	Ecology	Property Structures / Crops and Animals	Examples
High	*Adverse* Highly elevated concentrations likely to result in "significant harm" to human health as defined by the Environmental Protection Act (EPA) 1990, Part 2A, if exposure occurs. *Beneficial* Removal of all identified contaminant linkages that pose a risk to receptors.	*Adverse* Equivalent to EA Category 1 pollution incident including persistent and/or extensive effects on water quality; leading to closure of a potable abstraction point; major impact on amenity value or major damage to agriculture or commerce. *Beneficial* Removal of all identified contaminant linkages that pose a risk to receptors.	*Adverse* Major damage to aquatic or other ecosystems, which is likely to result in a substantial adverse change in its functioning or harm to a species of special interest that endangers the long-term maintenance of the population. *Beneficial* Removal of all identified contaminant linkages that pose a risk to receptors.	*Adverse* Catastrophic damage to crops, buildings or property. *Beneficial* Removal of all identified contaminant linkages that pose a risk to receptors.	Significant harm to humans is defined in Defra circular 01/2006 – contaminated land[ci] as death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions. Major fish kill in surface water from large spillage of contaminants from site. Highly elevated concentrations of Hazardous or priority substances present in groundwater close to small potable abstraction (high sensitivity). Explosion, causing building collapse (can also equate to immediate human health risk if buildings are occupied).
Medium	*Adverse* Elevated concentrations which could result in "significant harm" to human health as defined by the EPA 1990, Part 2A if exposure occurs. *Beneficial* Removal of the majority of identified contaminant linkages so that risks to receptors are reduced.	*Adverse* Equivalent to EA Category 2 pollution incident including significant effect on water quality; notification required to abstractors; reduction in amenity value or significant damage to agriculture or commerce. *Beneficial* Removal of the majority of identified contaminant linkages so that risks to receptors are reduced.	*Adverse* Significant damage to aquatic or other ecosystems, which may result in a substantial adverse change in its functioning or harm to a species of special interest that may endanger the long-term maintenance of the population. *Beneficial* Removal of the majority of identified contaminant linkages so that risks to receptors are reduced.	*Adverse* Significant damage to crops, buildings or property. *Beneficial* Removal of the majority of identified contaminant linkages so that risks to receptors are reduced.	Significant harm to humans is defined in Defra circular 01/2006 – contaminated land as death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions. Damage to building rendering it unsafe to occupy e.g. foundation damage resulting in instability. Ingress of contaminants through plastic potable water pipes.
Low	*Adverse* Exposure to human health unlikely to lead to "significant harm".	*Adverse* Equivalent to EA Category 3 pollution incident including minimal or short-lived effect on water quality; marginal effect on amenity value, agriculture or commerce.	*Adverse* Minor or short-lived damage to aquatic or other ecosystems, which is unlikely to result in a substantial adverse change in its functioning or harm to a species of special interest that	*Adverse* Minor damage to crops, buildings or property.	Exposure could lead to slight short-term effects (e.g. mild skin rash). Surface spalling of concrete.

			would endanger the long-term maintenance of the population.		
	Beneficial N/A	*Beneficial* N/A	*Beneficial* N/A	*Beneficial* N/A	
Negligible	*Adverse* No measurable effects on humans.	*Adverse* Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems.	*Adverse* Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems.	*Adverse* Repairable effects of damage to buildings, structures and services.	The loss of plants in a landscaping scheme. Discoloration of concrete.
	Beneficial N/A	*Beneficial* N/A	*Beneficial* N/A	*Beneficial* N/A	
No change of effect	*No discernible change of effect.*	*No discernible change of effect.*	*No discernible change of effect.*	*No discernible change of effect.*	

Significance Evaluation Methodology

10.7.10 The significance level attributed to each effect has been assessed based on the magnitude of change due to the Proposed Development and the sensitivity of the affected receptor as displayed in **Table 10.144**. Magnitude of change is assessed on a scale of high, medium, low and negligible, whilst the sensitivity of the affected receptor is assessed on a scale of very high, high, medium, and low.

10.7.11 The effects can be of major, moderate, minor or negligible significance. In addition, effects are judged to be adverse or beneficial and temporary or permanent. The final assessment of the significance of the effect, i.e. the residual effect, is judged on the relationship of the magnitude of effect to the sensitivity and/or importance of the receptor or resource and likelihood of the effect, with any 'incorporated' mitigation.

Table 10.144 Significance criteria

	Magnitude of Change			
Sensitivity/Value	**High**	**Medium**	**Low**	**Negligible**
Very High	Significant	Significant	Significant	Not Significant
High	Significant	Significant	Not Significant	Not Significant
Medium	Significant	Not Significant	Not Significant	Not Significant
Low	Not Significant	Not Significant	Not Significant	Not Significant

10.8 Assessment of Effects on Human Receptors

Construction Phase Effects

10.8.1 The construction phase will involve disturbance of soils which have the potential to contain concentrations of various contaminants including hydrocarbons, heavy metals, asbestos and solvents. Spillages of oils and other chemicals can also occur during the construction activities. The construction phase therefore has the potential to have an adverse effect on human receptors through direct contact, ingestion and/or inhalation of impacted soils. The receptors' sensitivity has been assessed as high. A HIA (**Appendix 15.1**) has been included within this ES. In addition, environmental measures and construction good practices to control exposure and prevent spreading of contamination have been incorporated into the CEMP (**Appendix 3.2**) which has been submitted as part of this application and which will be implemented in the construction phase, including a survey and removal of asbestos containing materials (**Table 10.9)**. In addition, an intrusive investigation will be undertaken before construction to determine if there is any evidence of contamination, the programme and scope of these investigations will be agreed following consultation with the EA, TDC Environmental Health Officer (EHO) and other stakeholders as appropriate. This will allow the incorporation of any additional mitigation measures. With all these measures in place, there is a high degree of certainty that the effects on human receptors would be negligible (i.e. combination of a high receptor sensitivity and negligible magnitude of effect) and therefore effects would be not significant during the construction phase.

10.8.2 The discovery and potential for explosion of UXO could also occur during the construction activities. The receptor sensitivity has been assessed as high. A detailed UXO threat and risk assessment will be undertaken prior to any ground works and the findings of the risk assessment implemented. This will be done in a phased approach, with additional assessment carried out as part of the site investigation. Future work relating to UXO will follow CIRIA guidelines (refer to

Table 10.1). The final CEMP will be informed by the findings of further site investigation and updated with findings and proposed mitigation from the site investigation. With these measures in place, there is a high degree of certainty that the effects on human receptors would be negligible (i.e. combination of a high receptor sensitivity and negligible magnitude of effect) and therefore not significant during the construction phase.

10.8.3 At the existing fuel storage areas (Jentex tank farm), new tanks and other infrastructure will be required to meet the needs of the airport and to ensure that the facility is adequately designed and fit for purpose. Before the construction of the new facility, the existing tanks and infrastructure will be decommissioned. The receptors' sensitivity has been assessed as high and the magnitude of effect as high; the effects on human receptors during the construction phase would be expected to be major adverse. Environmental measures have been incorporated into the design and construction of the Proposed Development during the construction phase, including an emergency response plan (**Table 10.9** and **Table 10.10**). Remediation of potential residual contaminants will be undertaken, subject to risk-based assessment. Controls on areas requiring excavation are proposed to include minimising the exposed excavation areas, managing stockpiles to control run-off and covering stockpile to minimise dust and odour. In addition, the following measures will be included in the CEMP (**Appendix 3.2**) and implemented in the construction phase:

- For existing fuel storage decommissioning phase:
  - All services will be traced;
  - All fuel lines and tanks will be emptied, cleaned and degassed prior to removal; and
  - The management of soil contamination will be informed by the site investigation to define and delineate impacted areas.
- For new fuel storage commissioning phase:
  - A commissioning plan will be designed and followed; and
  - All lines and tanks will be checked by competent people prior to commissioning.

10.8.4 It is expected that with these measures in place the potential effects on human receptors would be negligible and therefore not significant during the construction phase.

Operational Phase Effects

10.8.5 The potential effects on human receptors that could occur during the operational phase comprise:

- Health hazard due to ingress and accumulation of ground gas resulting in explosion or asphyxiation for users of site buildings;
- Health hazard due to future maintenance works (particularly any in-ground maintenance works such as works on buried services) that may disturb any residual contamination;
- Health hazard due to spillages during re-fuelling; and
- Health hazard due to residual contamination being present as a result of the inappropriate re-use / use of contaminated fills and soils during the construction phase.

10.8.6 With the environmental measures outlined in **Table 10.10** and those detailed in **Chapter 8: Freshwater Environment,** the planned intrusive site investigation and the health and safety file for the construction in place, it is considered that the effects on human receptors would be negligible and therefore not significant during the operational phase (i.e. combination of a high receptor sensitivity and negligible magnitude of effect).

Decommissioning Phase Effects

10.8.7 The same approach as for the construction phase would be undertaken for the decommissioning phase, therefore no potentially significant effects are anticipated except for decommissioning of

tanks and infrastructure at the fuel storage areas (Jentex tank farm). The environmental measures that will be incorporated in the construction phase – refer to **Table 10.9** as well as the additional measures that have been developed in this ES will be implemented to mitigate the potential effects to be not significant in EIA terms on human receptors.

Inter-related Effects

10.8.8 It is anticipated that there will not be any significant inter-related effects on human receptors, which could occur from exposure to contaminated dust, water and vapours at the same time, providing that each potential contamination source is addressed appropriately and that environmental measures are implemented as set out in the draft CEMP.

10.9 Assessment of Effects on Groundwater (Chalk Aquifer including dependant abstractions)

Construction Phase Effects

10.9.1 The construction phase has the potential to have an adverse effect on groundwater through:

- Disturbance of soils (earthworks) and mobilisation of existing contamination;
- Pollution from spillages of oils and other chemicals; and
- Pollution incident due to the creation of pathways for the migration of potential contamination.

10.9.2 Construction Phase 1 would have the greatest volume of construction activity, as it would involve earthworks for the levelling of the apron areas and the installation of the drainage system. Phases 2-4 would still have the potential for effects, but of a potentially lower magnitude as there would be less ground disturbance, although the potential for piling during the construction of the cargo facilities remains.

10.9.3 The detailed design of the new infrastructure and foundations, including the taxiways, aprons, stand and cargo facilities, would be completed following the geotechnical site investigations which would be conducted in construction Phase 1. These investigations, and the final design of the foundations would be agreed following consultation with the EA and SW. If piling, and other foundation techniques with the potential to affect the receptor are required, then appropriate construction techniques and controls to mitigate any significant effects will be agreed.

10.9.4 The groundwater/chalk aquifer sensitivity has been assessed as very high in SPZ1 and high in SPZ2 because it is a Principal Aquifer with significant public water supply abstractions and the site lies within the inner and outer SPZ1 and SPZ2. Environmental measures are incorporated into the CEMP (**Appendix 3.2**) and will be implemented in the construction phase (**Table 10.9)**. They include avoidance of ground disturbance and potentially polluting activities within SPZ1 and agreement of piling approaches following consultation with the EA and SW prior to commencement of construction works. Any removal of contamination beneath the existing runway will be risk based and will weigh advantages of contamination removal against removal of the runway.

10.9.5 It is concluded that the combination of construction good practice and site-specific measures for the protection of the chalk aquifer, in combination with further consultation with the EA and SW, will result in negligible magnitude of effect upon a very high to high receptor sensitivity, and therefore no potentially significant effects during the construction phase.

10.9.6 In relation to pollution incidents due to removal of tanks at fuel storage areas (Jentex tank farm) during the construction phase, these will be appropriately decommissioned prior to removal. Remediation of potential residual contaminants will be undertaken, subject to risk-based assessment. The receptor sensitivity has been assessed as very high and the magnitude of effect as high; the effects on groundwater during the construction phase, without any mitigation, would be expected to be major adverse. Environmental measures have been incorporated into the Proposed Development including an emergency response plan (**Table 10.9**). Controls on areas requiring

excavation are likely to include minimising the exposed excavation areas, managing stockpiles to control runoff and covering stockpiles to minimise dust and odour. In addition, the following measures are included in the CEMP (**Appendix 3.2**) and will be implemented in the construction phase:

- For existing fuel farm decommissioning phase:
  - All services will be traced;
  - All fuel lines and tanks will be emptied, cleaned and degassed prior to removal; and
  - The management of soil contamination will be informed by the site investigation to define and delineate impacted areas.
- For new fuel farm commissioning phase:
  - A commissioning plan will be designed and followed; and
  - All lines and tanks will be checked by competent people prior to commissioning.

10.9.7 It is expected that with these measures in place the effects on groundwater would be negligible and therefore not significant (i.e. combination of a very high receptor sensitivity and negligible magnitude of effect).

Operational Phase Effects

10.9.8 The following operational phase effects have been identified:

- Pollution incident due to future maintenance works (particularly any in ground maintenance works) that may disturb and mobilise any residual contamination;
- Pollution incident due to spillages during re-fuelling; and
- Pollution incident due to residual contamination being present, as a result of the inappropriate re-use / use of contaminated fills and soils during the construction phase.

10.9.9 The receptor sensitivity has been assessed as high. The environmental measures outlined in **Table 10.10**, including pollution prevention measures and good working practices (the pollution response plan) in accordance with current guidelines, those detailed in **Chapter 8: Freshwater Environment**, and the design informed with the findings of the intrusive site investigation, it is considered that the effects (with exception of the risk from the fuel storage areas at the Jentex tank farm) on groundwater would be negligible and therefore not significant during the operational phase (i.e. combination of a high receptor sensitivity and negligible magnitude of effect).

10.9.10 At the Jentex tank farm, new tanks and other infrastructure will be required to meet the needs of the airport, and to ensure that the facility is adequately designed and fit for purpose. The receptor sensitivity has been assessed as high due to the location of the fuel infrastructure (see 10.9.11) and the magnitude of effect as high; the effects on groundwater during the operational phase would be expected to be major adverse. In order to mitigate the effects on groundwater, environmental measures have been suggested for incorporation into the Proposed Development (**Table 10.10)**.

10.9.11 Following discussion with the EA and SW the following additional mitigation measures have been included to manage this risk:

- The fuel farm will largely be located in SPZ2 with all fuel infrastructure located in SPZ2;
- Design will be undertaken to BAT and will include:
  - Bund construction;
  - Specification of double bunded tanks;
  - Bund to be underlain by impermeable membrane (e.g. visqueen);

- Joints to be sealed with a hydrophobic sealant to prevent leakage; and
- Concrete with self-sealing material (e.g. xypex) and specified to water impermeable standard with additional reinforcement to limit cracks to <0.2mm.

- Fuelling system will include automatic shut off drainage system whilst vehicles will be on the refuelling stand;
- In the bunded area, sump drainage will be to a low point from where it will be manually pumped into the drainage system (if clean) or to tanker if contaminated. All pipes will go over the bund wall (no below ground pipes); and
- Groundwater flow modelling has been undertaken to feed into the Hydrogeological Risk Assessment (**Appendix 8.1** of **Chapter 8: Freshwater Environment**).

10.9.12 With these additional measures in place, it is expected that the effects on groundwater would be negligible and therefore not significant (i.e. combination of a high receptor sensitivity and low magnitude of effect).

Decommissioning Phase Effects

10.9.13 It is envisaged that decommissioning phase effects would be similar to construction phase effects, albeit without ground disturbance due to piling. Good practice methods and the discussion of site specific approaches with the relevant statutory consultees should ensure that there are no potentially significant effects in the decommissioning phase.

Inter-related Effects

10.9.14 The Hydrogeological Impact Assessment of **Chapter 8: Freshwater Environment** (**Appendix 8.1**, **Section 4**) includes an assessment of the risk to the groundwater environment from activities. It suggests appropriate measures that are included in the CEMP to prevent mobilisation of contamination during the groundworks (either via runoff of contaminated sediment or mobilising contamination through increased rainwater infiltration in sensitive areas) and implemented in the construction phase / incorporated into the site's design. The Hydrogeological Impact Assessment should be read alongside this Chapter. In particular, effects from uncontaminated sediment and turbidity effects are addressed in the Hydrogeological Impact Assessment of **Chapter 8: Freshwater Environment**. The residual risks, after mitigation has been put in place, were assessed as negligible to low.

10.10 Assessment of Effects on Coastal Waters (Pegwell Bay (and associated designated sites))

Construction Phase Effects

10.10.1 The construction phase has the potential to have an adverse effect on coastal waters through:

- Soil disturbance and mobilisation of existing contamination;
- Pollution from spillages of oils and other chemicals; and
- Pollution incident due to the creation of pathways for the migration of potential contamination.

10.10.2 The sensitivity of coastal waters has been assessed as very high. The potential for contaminant mobilisation via baseflow is unknown. However, it is anticipated that if the Lord of the Manor PWS abstraction is in use, it would likely capture much of the groundwater. The groundwater system is known to provide flow to Pegwell Bay when the Lord of the Manor abstraction is not in use. Therefore, mitigation measures that are incorporated into the CEMP (**Appendix 3.2**) and the construction phase PICP and implemented in the construction phase (**Table 10.9**) to protect the groundwater environment during the construction phase, will also ensure that no potential

pollutants reach Pegwell Bay. Therefore the effects on coastal waters would be negligible and not significant during the construction phase (i.e. combination of a very high receptor sensitivity and negligible magnitude of effect).

10.10.3 In construction Phases 2-4, it is envisaged that the site drainage network would be in place and discharges would be to Pegwell Bay. Such discharges would only take place once silt and any other potential pollutants (e.g. hydrocarbons) had been removed from site discharge. The receptor sensitivity has been assessed as very high and the magnitude of effect negligible.

10.10.4 Therefore, it is not envisaged that there will be any potentially significant effects on coastal waters/Pegwell Bay and any associated designated sites during the construction phases.

10.10.5 To avoid pollution incidents due to removal of tanks at fuel storage areas (Jentex tank farm) during the construction phase, it is recommended that the tanks are appropriately decommissioned prior to removal and remediation of residual contaminants be undertaken, subject to risk-based assessment. Based on a very high receptor sensitivity and high magnitude of effect; the potential effects on coastal waters during the construction phase would be expected to be major adverse and therefore significant.

10.10.6 Environmental measures for groundwater that have been incorporated into the Proposed Development will ensure that no pollutants reach coastal waters. Controls on areas requiring excavation are likely to include minimising the exposed excavation areas, managing stockpiles to control runoff and covering stockpiles to minimise dust and odour. In addition, the following measures will be implemented and included in the CEMP (**Appendix 3.2**):

- For decommissioning phase:
  - All services will be traced;
  - All fuel lines and tanks will be emptied, cleaned and degassed prior to removal; and
  - The management of soil contamination will be informed by the site investigation to define and delineate impacted areas.
- For commissioning phase:
  - A commissioning plan will be designed and followed; and
  - All lines and tanks will be checked by competent people prior to commissioning.

10.10.7 With these additional measures in place it is expected that the effects on coastal waters would be negligible and therefore not significant (i.e. combination of a very high receptor sensitivity and negligible magnitude of effect).

Operational Phase Effects

10.10.8 The following operational phase effects have been identified:

- Pollution incident due to future maintenance works (particularly any in ground maintenance works) that may disturb any residual contamination;
- Pollution incident due to spillages during re-fuelling;
- Pollution incident due to residual contamination being present as a result of the inappropriate re-use / use of contaminated fills and soils during the construction phase;
- Pollution from spillages of oils and other chemicals;
- Pollution incident due to fire-fighting activities; and
- Pollution incidents resulting from pesticide use.

10.10.9 The receptor sensitivity has been assessed as very high. The potential for contaminants mobilisation via baseflow is unknown. However, it is anticipated that if the Lord of the Manor PWS

abstraction is in use, it would likely capture much of the groundwater. The groundwater system is known to provide flow to Pegwell Bay when the Lord of the Manor abstraction is not in use. Therefore, mitigation measures that are incorporated into the CEMP (**Appendix 3.2**) and the PICP to protect the groundwater environment during the operational phase will also ensure that no potential pollutants reach Pegwell Bay, resulting in expected negligible effects on coastal waters which are not significant (i.e. combination of a very high receptor sensitivity and negligible magnitude of effect).

10.10.10 As stated in **Chapter 8: Freshwater Environment**, water treatment will take place on-site in attenuation ponds and water will only be pumped to the discharge pipe from these ponds once appropriate quality standards are reached. It is proposed that there are two ponds on site, one of which will receive “dirty” run-off (for example that containing de-icer) and one receiving “clean” run-off. Water will only be discharged from the “dirty” run-off pond once treatment is complete and pumped discharge will only take place from the “clean” pond. These ponds will be sized to take account of the capacity of the pipe and pump and will appropriately consider the February 2016 update to the NPPF climate change allowances[cii]. Further details can be found in the site drainage strategy (see Appendix A of **Appendix 8.2**) and Flood Risk Assessment (see **Appendix 8.2**) which form part of the DCO application.

10.10.11 Water from fire-fighting activities will be retained in site drainage pipes through provision of oversized pipes with automatic shut off to prevent discharge to Pegwell Bay.

10.10.12 Different treatment methods will be considered to treat de-icing and washing agents. Consultation on the types of de-icer to be used will be undertaken with the EA, so that where possible lower risk alternatives could be used.

10.10.13 There is a risk of pollution incidents due to leakage from fuel storage tanks (Jentex tank farm). The receptor sensitivity has been assessed as very high and the magnitude of effect as high; the effects, without mitigation, on coastal waters during operational phase would be expected to be major adverse. Environmental measures that have been incorporated into the Proposed Development in order to mitigate the effects on groundwater should ensure that no pollutants reach the coastal waters (refer to **Table 10.10)**. Due to the sensitivity of the receptor and the high magnitude of effect, additional measures have been developed. They include:

- The fuel farm will largely be located in SPZ2 with all fuel infrastructure located in SPZ2;
- Design will be undertaken to BAT and will include:
  - Bund construction;
  - Specification of double bunded tanks;
  - Bund to be underlain by impermeable membrane (e.g. visqueen);
  - Joints to be sealed with a hydrophobic sealant to prevent leakage; and
  - Concrete with self-sealing material (e.g. xypex) and specified to water impermeable standard with additional reinforcement to limit cracks to <0.2mm.
- Fuelling system will include automatic shut off drainage system whilst vehicles will be on refuelling stand; and
- In the bunded area, sump drainage will be to a low point from where it will be manually pumped into the drainage system (if clean) or to tanker if contaminated. All pipes will go over the bund wall (no below ground pipes).

10.10.14 It is expected that with these additional measures in place, the effects on coastal waters would be negligible during the operational phase and therefore not significant (i.e. combination of a very high receptor sensitivity and negligible magnitude of effect).

Decommissioning Phase Effects

10.10.15 The same environmental measures outlined for the construction phase would be incorporated for the decommissioning phase, therefore no potentially significant effects are anticipated.

Inter-related Effects

10.10.16 The Hydrogeological Risk Assessment of **Chapter 8: Freshwater Environment** (**Appendix 8.1**, **Section 3.4**) includes an assessment of the risk to the groundwater environment from activities. It suggests appropriate mitigation measures to be included in the CEMP to prevent mobilisation of contamination during the groundworks (either via runoff of contaminated sediment or mobilising contamination through increased rainwater infiltration in sensitive areas and implemented during construction phase / incorporated into the site's design. The Hydrogeological Impact Assessment should be read alongside this Chapter. In particular, effects from uncontaminated sediment and turbidity effects are addressed in the Hydrogeological Risk Assessment of **Chapter 8: Freshwater Environment**. The residual risks, after mitigation has been put in place, were assessed as negligible to low.

10.11 Assessment of Effects on Soils

Construction Phase Effects

10.11.1 The effects on groundwater that have been identified for the construction phase apply also for soils. The environmental measures (refer to **Table 10.9**) that will be implemented to protect the groundwater environment will ensure that that there are no potentially significant effects in the construction phase.

10.11.2 There is a risk of pollution incidents due to removal of tanks from fuel storage tanks (Jentex tank farm) during the construction phase. The receptor sensitivity has been assessed as high to medium and the magnitude of effect as high. The effects on soils, without mitigation, during construction phase would be expected to be major to moderate adverse. Environmental measures have been incorporated into the Proposed Development (refer to **Table 10.9**). Controls on areas requiring excavation are likely to include minimising the exposed excavation areas, managing stockpiles to control runoff and covering stockpiles to minimise dust and odour. In addition, the following measures are included in the CEMP (**Appendix 3.2**):

- For existing fuel farm decommissioning phase:
  - All services will be traced;
  - All fuel lines and tanks will be emptied, cleaned and degassed prior to removal; and
  - The management of soil contamination will be informed by the site investigation to define and delineate impacted areas.
- For new fuel farm commissioning phase:
  - A commissioning plan will be designed and followed; and
  - All lines and tanks will be checked by competent people prior to commissioning.

10.11.3 With these additional measures in place it is expected that the effects on soils would be negligible during construction phase and therefore not significant (i.e. combination of a high to medium receptor sensitivity and low magnitude of effect).

Operational Phase Effects

10.11.4 The effects on groundwater that have been identified for the operational phase apply also for soils. The environmental measures (refer to **Table 10.10**) that will be implemented to protect the

groundwater environment will ensure that that there are no potentially significant effects in the construction phase.

10.11.5 There is a risk of pollution incidents due to leakage from fuel storage tanks (Jentex tank farm).

10.11.6 The receptor sensitivity has been assessed as high to medium and the magnitude of effect as high. The effects, without mitigation, on soils during operational phase would be expected to be major to moderate adverse. Environmental measures proposed include an emergency response plan and appropriate design to current standards of all storage tanks (refer to **Table 10.10**). These are to mitigate the potential effects on groundwater and will also ensure that the effects on soils would be negligible during the operational phase. These would ensure the effects are not significant (i.e. combination of a high to medium receptor sensitivity and low magnitude of effect).

Decommissioning Phase Effects

10.11.7 It is envisaged that decommissioning phase effects would be similar to construction phase effects, albeit with less ground disturbance due to piling. Good practice methods and the discussion of site specific approaches with the relevant statutory consultees should ensure that there are no potentially significant effects in the decommissioning phase.

Inter-related Effects

10.11.8 It is not anticipated that there will be any inter-related effects on soils providing each potential contamination source is addressed appropriately and environmental measures implemented and incorporated in the CEMP (**Appendix 3.2**).

10.12 Assessment of Effects on Building and Services

Construction Phase Effects

10.12.1 The discovery and potential explosion of UXO could occur as a result of the construction activities. The sensitivity of buildings and services to UXO has been assessed as medium (important buildings to be constructed on-site with moderate value). The effects on human health have been assessed in **Section 10.8**. A detailed UXO threat and risk assessment will be undertaken prior to any ground works. This will be done in a phased approach, with additional assessment carried out as part of the site investigation. Future work relating to UXO will follow CIRIA guidelines (refer to **Table 10.1)**. The final CEMP (**Appendix 3.2**) will be informed by the findings of the site investigation and updated with findings and proposed mitigation from the site investigation. With these, as yet unknown measures in place, there is a high degree of certainty that the effects on buildings and services would be negligible during the construction phase (i.e. combination of a medium receptor sensitivity and negligible magnitude of effect) and therefore would be not significant.

Operational Phase Effects

10.12.2 The potential effects on buildings and services that could occur during the operational phase comprise:

- Damage to property due to ingress and accumulation of ground gas resulting in explosion of site buildings;
- Damage to property due to residual contamination being present as a result of the inappropriate re-use / use of contaminated fills and soils during the construction phase; and
- Permeation of plastic pipes by contaminants.

10.12.3 The receptor sensitivity has been assessed as medium. The environmental measures outlined in **Table 10.10** and the intrusive site investigation that will inform the package of measures to be included in the detailed design are considered sufficient. They will ensure the effects on buildings

and services would be negligible (i.e. combination of a medium receptor sensitivity and negligible magnitude of effect) and therefore not significant during the operational phase.

Decommissioning Phase Effects

10.12.4 The same environmental measures outlined for the construction phase would be incorporated for the decommissioning phase, therefore no potentially significant effects are anticipated.

Inter-related Effects

10.12.5 It is not anticipated that there will be any inter-related effects on buildings and services providing each potential contamination risk is addressed appropriately and environmental measures implemented as set out in the CEMP (**Appendix 3.2**).

10.13 Conclusions of Preliminary Significance Evaluation

10.13.1 The conclusions on the significance of all those effects that have been subject to assessment in **Sections 10.8** to **10.12** are summarised in **Table 10.15**.

Table 10.15 Summary of Significance of Effects

Receptor and effects	Significance Level	Rationale

Groundwater – removal of tanks and leakage from tanks	Not Significant	Environmental measures have been incorporated into the Proposed Development including an emergency response plan and appropriate design to current standards of all storage tanks and remediation of residual contaminants be undertaken, subject to risk-based assessment – refer to **Section 10.5** – as well as the additional measures that have been developed in this ES following discussion with the regulators:
		Construction Phase:
		Controls on areas requiring excavation are likely to include minimising the exposed excavation areas, managing stockpiles to control runoff and covering stockpiles to minimise dust and odour. In addition, the following measures will be included in the CEMP (**Appendix 3.2**) and implemented in the construction phase:
		• For decommissioning phase:
		  ○ All services will be traced;
		  ○ All fuel lines and tanks will be emptied, cleaned and degassed prior to removal; and
		  ○ The management of soil contamination will be informed by the site investigation to define and delineate impacted areas.
		• For commissioning phase:
		  ○ A commissioning plan will be designed and followed; and
		  ○ All lines and tanks will be checked by competent people prior to commissioning.
		Operation Phase:
		• The fuel farm will largely be located in SPZ2 with all fuel infrastructure located in SPZ2;
		  ○ Design will be undertaken to BAT and will include:
		  ▪ Bund construction;
		  ▪ Specification of double bunded tanks;
		  ▪ Bund to be underlain by impermeable membrane (e.g. visqueen);

Receptor and effects	Significance Level	Rationale
		▪ Joints to be sealed with a hydrophobic sealant to prevent leakage; and ▪ Concrete with self-sealing material (e.g. xypex) and specified to water impermeable standard with additional reinforcement to limit cracks to <0.2mm. • Fuelling system will include automatic shut off of drainage system whilst vehicles will be on refuelling stand; and • In the bunded area, sump drainage will be to a low point from where it will be manually pumped into the drainage system (if clean) or to tanker if contaminated. All pipes will go over the bund wall (no below ground pipes).
Coastal waters – removal of tanks and leak from tanks	Not Significant	Environmental measures have been suggested for incorporation into the Proposed Development including an emergency response plan and appropriate design to current standards of all storage tanks and remediation of residual contaminants be undertaken, subject to risk-based assessment – refer to **Section 10.5** – as well as the additional measures that have been developed in this ES following discussion with the regulators: **Construction Phase:** Controls on areas requiring excavation are likely to include minimising the exposed excavation areas, managing stockpiles to control runoff and covering stockpiles to minimise dust and odour. In addition, the following measures will be included in the CEMP (**Appendix 3.2**) and implemented in the construction phase: • For decommissioning phase: ○ All services will be traced; ○ All fuel lines and tanks will be emptied, cleaned and degassed prior to removal; and ○ The management of soil contamination will be informed by the site investigation to define and delineate impacted areas. • For commissioning phase: ○ A commissioning plan will be designed and followed; and ○ All lines and tanks will be checked by competent people prior to commissioning. **Operation Phase:** • The fuel farm will largely be located in SPZ2 with all fuel infrastructure located in SPZ2; • Design will be undertaken to BAT and will include: ○ Bund construction; ○ Specification of double bunded tanks; ○ Bund to be underlain by impermeable membrane (e.g. visqueen); ○ Joints to be sealed with a hydrophobic sealant to prevent leakage; and ○ Concrete with self-sealing material (e.g. xypex) and specified to water impermeable standard with additional reinforcement to limit cracks to <0.2 mm. • Fuelling system will include automatic shut off drainage system whilst vehicles will be on refuelling stand; and • In the bunded area, sump drainage will be to a low point from where it will be manually pumped into the drainage system (if clean) or to tanker if contaminated. All pipes will go over the bund wall (no below ground pipes).

Receptor and effects	Significance Level	Rationale
Soils – removal of tanks and leak from tanks	Not Significant	Environmental measures have been suggested for incorporation into the Proposed Development including an emergency response plan and appropriate design to current standards of all storage tanks and remediation of residual contaminants be undertaken, subject to risk-based assessment – refer to **Section 10.5** as well as the additional measures that have been developed in this ES following discussion with the regulators: **Construction Phase:** Controls on areas requiring excavation are likely to include minimising the exposed excavation areas, managing stockpiles to control runoff and covering stockpiles to minimise dust and odour. In addition, the following measures will be included in the CEMP (**Appendix 3.2**) and implemented in the construction phase: • For decommissioning phase: o All services will be traced; o All fuel lines and tanks will be emptied, cleaned and degassed prior to removal; and o The management of soil contamination will be informed by the site investigation to define and delineate impacted areas. • For commissioning phase: o A commissioning plan will be designed and followed; and o All lines and tanks will be checked by competent people prior to commissioning. **Operation Phase:** • The fuel farm will largely be located in SPZ2 with all fuel infrastructure located in SPZ2; • Design will be undertaken to BAT and will include: o Bund construction; o Specification of double bunded tanks; o Bund to be underlain by impermeable membrane (e.g. visqueen); Joints to be sealed with a hydrophobic sealant to prevent leakage; and o Concrete with self-sealing material (e.g. xypex) and specified to water impermeable standard with additional reinforcement to limit cracks to <0.2 mm. • Fuelling system will include automatic shut off drainage system whilst vehicles will be on refuelling stand; and • In the bunded area, sump drainage will be to a low point from where it will be manually pumped into the drainage system (if clean) or to tanker if contaminated. All pipes will go over the bund wall (no below ground pipes).
Humans; **mobilisation of and exposure to existing potential contamination through soil disturbance, generation of dust during construction activities;** **exposure to contaminants/ Pollution incidents resulting from spillage due to spillages of oils and other chemicals**	Not Significant	Environmental measures and construction good practices described in **Table 10.9** to control exposure and prevent spreading of contamination have been suggested for incorporation into the CEMP (**Appendix 3.2**) and implementation in the construction phase. A survey and the removal of asbestos containing materials will be carried out.

Receptor and effects	Significance Level	Rationale
Surface (coastal) and ground water: **mobilisation of and exposure to existing potential contamination through soil disturbance, generation of dust during construction activities;** **Pollution incidents resulting from spillage due to spillages of oils and other chemicals**	Not Significant	Environmental measures described in **Table 10.9** will be implemented and incorporated into the CEMP (**Appendix 3.2**) and the pollution response plan. They include avoidance of ground disturbance and potentially polluting activities within SPZ1, and agreement of piling approaches with the EA and SW prior to commencement of construction works.
Soils - Pollution incidents resulting from spillage due to spillages of oils and other chemicals	Not Significant	The environmental measures that will be implemented to protect the groundwater environment will ensure that that there are no potentially significant effects in the construction phase.
Humans / Buildings and services - discovery and potentially explosion of UXO associated with construction process	Not Significant	A detailed UXO threat and risk assessment will be carried out in accordance with CIRIA C681 Chapter 5[ciii] on managing UXO risks prior to any intrusive works such as a ground investigation and the redevelopment of the site to determine any mitigation required to address this risk. This will be done in a phased approach, with additional assessment carried out as part of the site investigation. Future work relating to UXO will follow CIRIA guidelines (refer to **Table 10.1**). The CEMP (**Appendix 3.2**) will be informed by the findings of the site investigation and updated with findings and proposed mitigation from the site investigation.
Soils / Groundwater - pollution incidents resulting from the release of contaminants from building materials or construction activities	Not Significant	Environmental measures described in **Table 10.10** will be incorporated into the CEMP (**Appendix 3.2**) and implemented.
Ground and coastal water - pollution incidents due to creation of pathways for the migration of potential contamination	Not significant	Environmental measures described in **Table 10.9** will be implemented and incorporated into the CEMP (**Appendix 3.2**) and the pollution response plan. They include avoidance of ground disturbance and potentially polluting activities within SPZ1, and agreement of piling approaches with the EA and SW prior to commencement of construction works.
Humans / Buildings and services - health hazard / Damage to property due to due to ingress and accumulation of vapour or ground gas resulting in health hazard from vapour or explosion/ asphyxiation for users of site buildings	Not Significant	Following the site investigation, buildings will be designed to comply with The Building Regulations 2010 (SI 2010/2214)[civ] last amended 2013: Document C Site preparation and resistance to contaminants and moisture[cv], including, where necessary, ground gas and vapour protection measures such as gas vapour membranes and sub-floor ventilation in buildings and ensuring appropriate ventilation exists in any confined spaces.
Humans - health hazard due to future maintenance works (particularly any in ground maintenance works) that may disturb any residual contamination	Not Significant	Environmental measures outlined in **Table 10.10** will be implemented and incorporated into the CEMP (**Appendix 3.2**).

Receptor and effects	Significance Level	Rationale
Humans / Soils / Ground and coastal water - health hazard due to / Pollution incidents resulting from spillages during re-fuelling	Not Significant	Environmental measures outlined in **Table 10.10** and those detailed in **Chapter 8: Freshwater Environment**, will be implemented and incorporated in the CEMP (**Appendix 3.2**).
Humans / Buildings and services / Groundwater - health hazard / Damage to property due to residual contamination being present as a result of the inappropriate re-use / use of contaminated fills and soils during the operational phase	Not Significant	Environmental measures outlined in **Table 10.10** will be implemented and incorporated in the CEMP (**Appendix 3.2**).
Soils / Ground and coastal water - pollution incidents resulting from spillage from fire-fighting activities	Not Significant	Environmental measures outlined in **Table 10.10** and those detailed in **Chapter 8: Freshwater Environment**, will be implemented and incorporated in the CEMP (**Appendix 3.2**).
Soils / Ground and coastal water - Pollution incidents resulting from pesticide use	Not Significant	Environmental measures outlined in **Table 10.10** and those detailed in **Chapter 8: Freshwater Environment**, will be implemented and incorporated in the CEMP (**Appendix 3.2**).

References

[1] Environment Agency (2004) CLR 11 Model Procedures for the Management of Land Contamination [online] Available at https://www.claire.co.uk/index.php?option=com_content&view=article&id=187&catid=45&Itemid=256 [Accessed 12/02/2018]

[2] Environmental Liability Directive (2004/35/CE) [online] Available at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:143:0056:0075:en:PDF [Accessed 12/02/2018]

[3] Water Framework Directive (WFD) (2000/60/E) [online] Available at http://ec.europa.eu/environment/water/water-framework/info/intro_en.htm [Accessed 12/02/2018]

[4] The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 [online] Available at http://www.legislation.gov.uk/uksi/2003/3242/contents/made [Accessed 12/02/2018]

[5] Environmental Permitting Regulations (England and Wales) 2016 [online] Available at https://www.legislation.gov.uk/uksi/2016/1154/contents/made [Accessed 12/02/2018]

[6] The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 [online] Available at http://www.legislation.gov.uk/uksi/2017/572/contents/made [Accessed 12/02/2018]

[7] Department for Communities and Local Government (2012) The National Planning Policy Framework [online] Available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf [Accessed 12/02/2018]

[8] Environmental Protection Act 1990 [online] Available at http://www.legislation.gov.uk/ukpga/1990/43 [Accessed 12/02/2018]

[9] Town and Country Planning Act 1990 [online] Available at https://www.legislation.gov.uk/ [Accessed 12/02/2018]

[10] Environmental Protection Act 1990 [online] Available at http://www.legislation.gov.uk/ukpga/1990/43 [Accessed 12/02/2018]

[11] Defra (2012) Environmental Protection Act 1990: Part 2A – Contaminated Land Statutory Guidance [online] Available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/223705/pb13735cont-land-guidance.pdf [Accessed 12/02/2018]

[12] Water Resources Act 1991 [online] Available at https://www.legislation.gov.uk/ukpga/1991/57/contents [Accessed 12/02/2018]

[13] The Building Regulations 2016 [online] Available at http://www.legislation.gov.uk/uksi/2016/285/regulation/2/made [Accessed 12/02/2018]

[14] Department for Transport (2018) Airports National Policy Statement: New Runway Capacity and Infrastructure at Airports in the South East of England [online] Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/714106/airports-nps-new-runway-capacity-and-infrastructure-at-airports-in-the-south-east-of-england-web-version.pdf [Accessed 03/07/2018]

[15] Thanet District Council (2006) Thanet Local Plan 2006 Saved Polices [online] Available at https://www.thanet.gov.uk/your-services/planning-policy/thanets-current-planning-policy/thanet-local-plan-2006/ [Accessed 12/02/2018]

[16] Thanet District Council (2015) Draft Thanet Local Plan to 2031: Preferred Options Consultation [online] Available at https://www.thanet.gov.uk/media/3432043/Final-Thanet-Preferred-Option-Draft-Local-Plan-Inovem-Inc-Appendices-with-cover.pdf [Accessed 12/02/2018]

[17] Kent County Council (2007) Oil and Gas Saved Policies [online] Available at https://www.kent.gov.uk/about-the-council/strategies-and-policies/environment-waste-and-planning-policies/planning-policies/minerals-and-waste-local-plan/existing-plans#tab-3 [Accessed 12/02/2018]

[18] Kent County Council (2016) Kent Minerals and Waste Local Plan 2013-2030 [online] Available at https://www.kent.gov.uk/about-the-council/strategies-and-policies/environment-waste-and-planning-policies/planning-policies/minerals-and-waste-local-plan/minerals-and-waste-local-plan [Accessed 12/02/2018]

[19] Dover District Council (2010) Core Strategy [online] Available at https://www.dover.gov.uk/Planning/Planning-Policy-and-Regeneration/PDF/Adopted-Core-Strategy.pdf [Accessed 12/02/2018]

[20] Environment Agency (2004) Model Procedures for the Management of Land Contamination [online] Available at http://webarchive.nationalarchives.gov.uk/20140328160926/http://cdn.environment-agency.gov.uk/scho0804bibr-e-e.pdf [Accessed 12/02/2018]

[21] Environment Agency (2013) Groundwater protection: principles and practice GP3 [online] Available at https://www.gov.uk/government/publications/groundwater-protection-principles-and-practice-gp3 [Accessed 12/02/2018]

[22] NHBC, Environment Agency and Chartered Institute of Environmental Health (2008) Guidance for the safe development of housing on land affected by contamination [online] Available at http://www.nhbc.co.uk/NHBCpublications/LiteratureLibrary/Technical/filedownload,33595,en.pdf [Accessed 12/02/2018]

[23] British Standard (2013) Investigation of Potentially Contaminated Sites – Code of Practice [online] Available at http://bailey.persona-pi.com/Public-Inquiries/M4-Newport/C%20-%20Core%20Documents/12.%20Geology%20and%20Soils/12.2.13%20-%20BS10175%20Code%20of%20Practice%20for%20Investigation%20of%20Potentially%20Contaminated%20Sites%20%28inc.%202013%20Amendment%29.pdf [Accessed 12/02/2018]

[24] CIRIA (2001) Control of Water Pollution from Construction Sites: Guidance for Consultants and Contractors [online] Available at http://www.orkneywind.co.uk/advice/SEPA%20Pollution%20Advice/ciria%20c532.pdf [Accessed 12/02/2018]

[25] CIRIA (2010) PUB C692 Environmental Good Practice on Site (3rd Edition) [online] Available at https://www.thenbs.com/PublicationIndex/documents/details?Pub=CIRIA&DocID=296239 [Accessed 12/02/2018]

[26] NBS (1991) HSG66: Protection of Workers and the General Public during the development of contaminated land (no longer current by cited in Building Regulations) [online] Available at https://www.thenbs.com/PublicationIndex/documents/details?Pub=HSE&DocID=81882 [Accessed 12/02/2018]

[27] British Standard (2015) BS 8485; 2015 Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings [online] Available at https://www.thenbs.com/PublicationIndex/documents/details?Pub=BSI&DocID=310951 [Accessed 12/02/2018]

[28] British Standards (2013) BS 8576:2013 Guidance on Investigations for Ground Gas – Permanent Gases and Volatile Organic Compounds (VOCs) [online] Available at http://bailey.persona-pi.com/Public-Inquiries/M4-Newport/C%20-%20Core%20Documents/12.%20Geology%20and%20Soils/12.2.12%20-%20BS8576%20Guidance%20on%20Investigations%20of%20Ground%20Gas.pdf [Accessed 12/02/2018]

[29] CIRIC (2007) Assessing Risks posed by hazardous ground gases to buildings [online] Available at https://www.ciria.org/ProductExcerpts/C665.aspx [Accessed 12/02/2018]

[30] CL:AIRE (2008) The Definition of Waste: Development Industry Code of Practice [online] Available at https://www.claire.co.uk/projects-and-initiatives/dow-cop/28-framework-and-guidance/111-dow-cop-main-document [Accessed 12/02/2018]

[31] Steeds, J, Shepherd, E and Barry, P (1996) A Guide to Safe Working on Contaminated Sites: R132. CIRIA, PP232.

[32] Defra (2009) Safeguarding our Soils: A Strategy for England [online] Available from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69261/pb13297-soil-strategy-090910.pdf [Accessed 12/02/2018]

[33] Office of the Deputy Prime Minster (2005) Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and their impact within the Planning System [online] Available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7692/147570.pdf [Accessed 12/02/2018]

[34] Natural England (2018) MAGIC Maps [online] Available at http://www.natureonthemap.naturalengland.org.uk/MagicMap.aspx [Accessed 12/02/2018]

[35] British Geological Survey (2017) Geology of Britain viewer [online] Available at http://mapapps.bgs.ac.uk/geologyofbritain/home.html [Accessed 12/02/2018]

[36] Environment Agency (2017) What's In Your Backyard? [online] Available at http://apps.environment-agency.gov.uk/wiyby/default.aspx [Accessed 12/02/2018].

[37] Natural England (2018) MAGIC Maps [online] Available at http://www.natureonthemap.naturalengland.org.uk/MagicMap.aspx [Accessed 12/02/2018]

[38] Environment Agency (2017) Catchment Data Explorer [online] Available at http://environment.data.gov.uk/catchment-planning/ [Accessed 12/02/2018]

[39] NHBC, Environment Agency, Chartered Institute of Environmental Health (2008) Guidance for the Safe Development of Housing on Land Affected by Contamination [online] Available at http://www.nhbc.co.uk/NHBCpublications/LiteratureLibrary/Technical/filedownload,33595,en.pdf [Accessed 12/02/2018]

[40] Envirocheck report dated 2016 (reference 82787389_1_1)

[41] GIBB Environmental (1998) Land Quality Assessment Phase One: Desk Study Land Quality Statement. Project No. 10133. Final Report.

[42] Idom Merebrook Ltd. (2015) Geo-environmental Assessment, Jentex petroleum: GEA-18996-15-134.

[43] Geo-environmental Assessment Report, Jentex – Supplementary Assessment, GEA-18996B- 16-144 (2016) Idom Merebrook Ltd.

[44] Jacobs (2010) F/TH/09/0637 | Erection of mast for primary and secondary radar installations with associate transmitter and receiver building, within compound enclosed by 2.9 metre fence and associated substation. Kent International Airport, Manston [online] Available at https://planning.thanet.gov.uk/online-applications/applicationDetails.do?activeTab=documents&keyVal=ZZZZMWQEBJ103 [Accessed 12/02/2018].

[45] Randall and Walsh Associates (2007) Site Investigation Tank 2, Base Validation: Jentex. Ref: s

[46] Landmark Information Group Ltd (2016) Preliminary Unexploded Ordnance (UXO) Risk Assessment (Ref P5188): Bomb Search.

[47] Spitfire and Hurricane Memorial Museum website (2017) RAF Manston Spitfire

& Hurricane Memorial Trust [online] Available at http://www.spitfiremuseum.org.uk/ [Accessed 12/02/2018]].

[48] Appendix F Environmental Search Thanet District Council of Appendix 10.1

[49] Environment Agency (2004) Model Procedures for the Management of Land Contamination: Contaminated Land Report 11 [online] Available at http://webarchive.nationalarchives.gov.uk/20140328160926/http://cdn.environment-agency.gov.uk/scho0804bibr-e-e.pdf [Accessed 12/02/2018].

[50] NHBC, Environment Agency, Chartered Institute of Environmental Health (2008) Guidance for the Safe Development of Housing on Land Affected by Contamination [online] Available at http://www.nhbc.co.uk/NHBCpublications/LiteratureLibrary/Technical/filedownload,33595,en.pdf [Accessed 12/02/2018].

[51] Environment Agency (2004) CLR 11 Model Procedures for the Management of Land Contamination [online] Available at https://www.claire.co.uk/index.php?option=com_content&view=article&id=187&catid=45&Itemid=256 [Accessed 12/02/2018].

[52] Unexploded ordnance (UXO): C681 (2009) CIRIA. London.

[53] Defra and Environment Agency (no date) CL:AIRE: Model Procedures for the Management of Land Contamination, Contaminated Land Report 11 [online] Available at https://www.claire.co.uk/index.php?option=com_content&view=article&id=187&catid=45&Itemid=256 [Accessed 12/02/2018]

[54] British Standards (2013) Investigation of potentially contaminated sites. Code of practice (BS 10175:2011+A1:2013).

[55] Environment Agency (2014) MCERTS: Performance standard for laboratories undertaking chemical testing of soil [online] Available at https://www.gov.uk/government/publications/mcerts-performance-standard-for-laboratories-undertaking-chemical-testing-of-soil [Accessed 12/02/2018].

[56] Environment Agency (2016) Land contamination: technical guidance [online] Available at https://www.gov.uk/government/collections/land-contamination-technical-guidance [Accessed 12/02/2018].

[57] Planning Act 2008 S23(4)(a)-(b) and (5)(a)-(b) [online] Available at http://www.legislation.gov.uk/ukpga/2008/29/pdfs/ukpga_20080029_en.pdf [Accessed 08/02/2018].

[58] RiverOak (2017) Manston Airport Development Consent Order Preliminary Environmental Information Report Volumes 1 to 9 [online] Available at http://rsp.co.uk/documents-page/ [Accessed 08/02/2018]

[59] Civil Aviation Authority (2014) Licensing of Aerodromes: CAP168. Ed10 [online] Available at http://publicapps.caa.co.uk/docs/33/CAP%20168%20Licensing%20of%20Aerodromes.pdf Accessed 12/02/2018].

[60] Civil Aviation Authority (2014) Licensing of Aerodromes: CAP168. Ed10 [online] Available at http://publicapps.caa.co.uk/docs/33/CAP%20168%20Licensing%20of%20Aerodromes.pdf Accessed 12/02/2018].

[61] Control of Pollution Act 1974 [online] Available online at https://www.legislation.gov.uk/ukpga/1974/40 [Accessed 12/02/2018] 16/11/17].

[62] Civil Aviation Authority (2014) Licensing of Aerodromes: CAP168. Ed10 [online] Available at http://publicapps.caa.co.uk/docs/33/CAP%20168%20Licensing%20of%20Aerodromes.pdf Accessed 12/02/2018].

[63] CL:AIRE (2011)The Definition of Waste: Development Industry Code of Practice. Version 2 [online] Available at http://www.carbonaction2050.com/sites/carbonaction.ciobrebuild.io1dev.com/files/document-attachment/Definition%20of%20Waste.%20Development%20Industry%20Code%20of%20Practice.pdf [Accessed 12/02/2018].

[64] Kent County Council (2016) Mineral safeguarding maps: Minerals and Waste Local Plan 2013-2030 [online] Available online at https://www.kent.gov.uk/about-the-council/strategies-and-policies/environment-waste-and-planning-policies/planning-policies/minerals-and-waste-local-plan/minerals-and-waste-local-plan# [Accessed 12/02/2018].

[65] CL:AIRE (2011)The Definition of Waste: Development Industry Code of Practice. Version 2 [online] Available at http://www.carbonaction2050.com/sites/carbonaction.ciobrebuild.io1dev.com/files/document-

attachment/Definition%20of%20Waste.%20Development%20Industry%20Code%20of%20Practice.pdf [Accessed 12/02/2018].

[66] British Geological Society (2016) Geology of Britain Viewer [online] Available at http://mapapps.bgs.ac.uk/geologyofbritain/home.html [Accessed 12/02/2018]

[67] Environment Agency (2017) Groundwater mapping [online] Available at http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=634500.0&y=166500.0&topic=groundwater&ep=map&scale=9&location=Manston, Kent&lang=_e&layerGroups=default&distance=&textonly=off [Accessed 412/02/2018].

[68] Aquaterra: Lord of the Manor Constraints Investigation (Desk Study) (2007) pp. 42 Prepared for Southern Water.

[69] Environment Agency (2017) Catchment Data Explorer [online] Available at http://environment.data.gov.uk/catchment-planning/OperationalCatchment/3282/classification?item=106&status=all [Accessed 12/02/2018].

[70] Guidance for the Safe Development of Housing on Land Affected by Contamination R&D66 (2008) NHBC/ CIEH / Environment Agency.

[71] Guidance for the Safe Development of Housing on Land Affected by Contamination (2008) NHBC, Environment Agency, Chartered Institute of Environmental Health. Available online at http://www.nhbc.co.uk/NHBCpublications/LiteratureLibrary/Technical/filedownload,33595,en.pdf [Checked 15/11/17].

[72] NHBC, Environment Agency and Chartered Institute of Environmental Health (2008) Guidance for the Safe Development of Housing on Land Affected by Contamination [online] Available at http://www.nhbc.co.uk/NHBCpublications/LiteratureLibrary/Technical/filedownload,33595,en.pdf [Accessed 12/02/2018]

[73] Natural England (2017) MAGIC website [online] Available at http://www.natureonthemap.naturalengland.org.uk/home.htm [Accessed 12/02/2018].

[74] Envirocheck report dated 2016 (reference 82787389_1_1)

[75] Spitfire and Hurricane Memorial Museum website (2017) RAF Manston Spitfire & Hurricane Memorial Trust [online] Available at http://www.spitfiremuseum.org.uk/ [Accessed 12/02/2018].

[76] The Miliary Airfields of Britain – Southern England (2006) Ken Delve, Crowood. (ISBN 1-86126-729-0)

[77]Pyrene Mfg Co. / Google patents (1911) Process of extinguishing fires: US 1010870 [online] Available at https://www.google.com/patents/US1010870 [Accessed 12/02/2018].

[78] Envirocheck report dated 2016 (reference 82787389_1_1)

[79] RAF Manston (2017) Spitfire and Hurricane Memorial Museum, Manston, Kent [online] Available at http://www.spitfiremuseum.org.uk/rafmanston [Accessed 12/02/2018]

[80] AviaSolutions (2016) Commercial Viability of Manston [online] Available at https://www.thanet.gov.uk/media/3500741/Final-Report-for-TDC-Manston-Airport-Viability-Oct2017_2.pdf [Accessed 12/02/2018].

[81] Ministry of Agriculture Fisheries and Food. Post 1988 Agricultural Land Classification and www.magic.gov.uk

[82] Envirocheck report dated 2016 (reference 82787389_1_1)

[83] GIBB Environmental (1998) Land Quality Assessment Phase One: Desk Study Land Quality Statement. Project No. 10133 – Final report

[84]Idom Merebrook Ltd (2015) Geo-environmental Assessment, Jentex petroleum, Cliffsend, Kent, Jentex GEA-18996-15-134

[85] Idom Merebrook Ltd (2016) Geo-environmental Assessment Report, Jentex – Supplementary Assessment, Cliffsend, Kent, Jentex Group of Companies, GEA-18996B-16-144

[86] Jacobs (2010) F/TH/09/0637 | Erection of mast for primary and secondary radar installations with associate transmitter and receiver building, within compound enclosed by 2.9 metre fence and associated substation. Kent International Airport, Manston [online] Available at https://planning.thanet.gov.uk/online-applications/applicationDetails.do?activeTab=documents&keyVal=ZZZZMWQEBJ103 [Accessed 12/02/2018].

[87] Randall & Walsh Associates (RAW) (2007) Site Investigation Tank 2, Base Validation, Jentex, The Storage Installation, Canterbury Road West, Ramsgate, Kent, CT12 DU, Ref: 07R898 (2007).

[88] Pyrene Mfg Co. / Google patents (1911) Process of extinguishing fires: US 1010870 [online] Available at https://www.google.com/patents/US1010870 [Accessed 12/02/2018].

[89] GIBB Environmental (1998) Refer to Section 3.7 and Figures 1.1 to 1.4 of Appendix 10.1 and Land Quality Assessment Phase One: Desk Study Land Quality Statement. Project No. 10133 – Final report

[90] Control of Substances Hazardous to Health (COSHH) (2002) [online] Available at http://www.hse.gov.uk/nanotechnology/coshh.htm [Accessed 12/02/2018].

[91] The Management of Health and Safety at Work Regulations (1999) [online] Available at http://www.legislation.gov.uk/uksi/1999/3242/contents/made [Accessed 12

[92] Control of Substances Hazardous to Health (COSHH) (2002) [online] Available at http://www.hse.gov.uk/nanotechnology/coshh.htm [Accessed 12/02/2018].

[93]The Management of Health and Safety at Work Regulations (1999) [online] Available at http://www.legislation.gov.uk/uksi/1999/3242/contents/made [Accessed 12/02/2018].

[94] CIRIA (2009) Unexploded Ordnance (UXO) A Guide for the Construction Industry C681 [online] Available at https://www.ciria.org/ItemDetail?iProductcode=C681&Category=BOOK [Accessed 12/02/2018]

[95] Environment Agency (2001) Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention [online] Available at http://www.merseygateway.co.uk/publicinquirydocs/Core-docs/CD-256.pdf [Accessed 12/02/2018]

[96] Environment Agency (no date) Piling into Contaminated Sites [online] Available at http://webarchive.nationalarchives.gov.uk/20140329082414/http://cdn.environment-agency.gov.uk/scho0202bisw-e-e.pdf [Accessed 12/02/2018]

[97] DCLG (2017) Building Regulations [online] Available at https://www.gov.uk/government/policies/building-regulation [Accessed 12/02/2018].

[98] Control of Substances Hazardous to Health (COSHH) (2002) [online] Available at http://www.hse.gov.uk/nanotechnology/coshh.htm [Accessed 12/02/2018].

[99] The Management of Health and Safety at Work Regulations (1999) [online] Available at http://www.legislation.gov.uk/uksi/1999/3242/contents/made [Accessed 12/02/2018].

[100] CL:AIRE (2011)The Definition of Waste: Development Industry Code of Practice. Version 2 [online] Available at http://www.carbonaction2050.com/sites/carbonaction.ciobrebuild.io1dev.com/files/document-attachment/Definition%20of%20Waste.%20Development%20Industry%20Code%20of%20Practice.pdf [Accessed 12/02/2018].

[ci] Defra (2006) Circular 01/2006 Environmental Protection Act 1990: Part 2A Contaminated Land [online] Available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69309/pb12112-circular01-2006-060817.pdf [Accessed 12/02/2018].

[cii] Environment Agency (2016) Flood risk assessments: climate change allowances [online] Available at https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances [Accessed 12/02/2018].

[ciii] Unexploded ordnance (UXO): C681 (2009) CIRIA. London.

[civ] DCLG (2017) Building Regulations [online] Available at https://www.gov.uk/government/policies/building-regulation [Accessed 12/02/2018].

[cv] DCLG (2013) Approved Document C – Site preparation and resistance to contaminants and [online] Available at https://www.planningportal.co.uk/info/200135/approved_documents/65/part_c_-_site_preparation_and_resistance_to_contaminates_and_moisture [Accessed 12/02/2018].