CARLYLE LAND
LIMITED

Land south and east of Adastral Park

Suffolk

Environmental Statement Volume 1

March 2017

IEMA Transforming the world to sustainability

EIA Quality Mark

This Environmental Statement, and the Environmental Impact Assessment (EIA) carried out to identify the significant environmental effects of the proposed development, was undertaken in line with the EIA Quality Mark Commitments.

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CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

Volume 2A

Appendix A – Parameter Plans

Appendix B1 – Scoping Report
Appendix B2 – Scoping Opinion
Appendix B3 – Scoping Responses and Actions

Appendix C1 – Summary of Traffic Data
Appendix C2 - Verification and adjustment of modelled concentrations
Appendix C3 - Air Quality Assessment Levels

Appendix D1 – DBA
Appendix D2 – Heritage Receptor Map
Appendix D3 – Map Regression
Appendix D4 – Heritage Statement
Appendix D5 – Statutory Descriptions for Designated Heritage Assets

Appendix E1 – Ecological Assessment
Appendix E2 – sHRA

Appendix F – Flood Risk Assessment

Volume 2B

Appendix G1 - Geo-environmental Phase 1 Desk Study
Appendix G2 - Phase I Review & Phase II Strategic Assessment

Appendix H1 - Assessment Criteria (Landscape and Visual Sensitivity and Magnitude of Change)
Appendix H2 - Scoping Letter to Suffolk Coastal District Council (ref: 10317/R02)
Appendix H3 - Agreement of Scope and Methodology with Suffolk Coastal District Council
Appendix H4 - Photomontage Methodology
Appendix H5 - Local Landscape Character Area Assessment Sheets
Appendix H6 - Suffolk Coast and Heaths Area of Outstanding Natural Beauty (AONB): Natural Beauty and Special Qualities Indicators, November 2016
Appendix H7 - Natural Beauty Indicators
Appendix H8 - Landscape Value

Appendix I – Noise Appraisal

Appendix J – Transport Assessment

GLOSSARY

air quality standard	concentration of a pollutant, over a specified period, above which adverse effects on health and/or the environment may occur and which should not be exceeded
alternatives	different design, layout and technological possibilities considered during project development that have potential to fulfil the project objectives
ambient	of or relating to the immediate surroundings of something (e.g. ambient noise level)
ancient woodland	woodland that has existed continuously since at least AD 1600
Annex I project	see 'Schedule 1 project'
Annex II project	see 'Schedule 2 project'
appropriate assessment	process whereby projects, either alone or in combination, are considered to see if it can be ascertained that they will not adversely affect the integrity of a European site
assessment	process by which information about effects of a proposed plan, project or intervention is collected, assessed and used to inform decision making
baseline conditions	environment as it appears (or would appear) immediately prior to the implementation of the project together with any known or foreseeable future changes that will take place before completion of the project
baseline studies	work done to determine and describe the environmental conditions against which any future changes can be measured or predicted and assessed
biodiversity	variety of life forms; different plants, animals and microorganisms; the genes they contain; and the ecosystems they form
catchment	drainage/basin area within which precipitation drains into a river system and eventually into the sea
committed development	development projects that are either under construction or have valid planning permissions/consents
competent authority	authority responsible for determining the application for consent, permission, licence or other authorisation to proceed with a development
construction phase	period during which the building or assembling of infrastructure is undertaken
consultation	process by which those organisations or individuals with an interest in the area associated with the proposed scheme are identified and engaged as part of the EIA process
controlled waters	surface waters, ground waters and coastal waters to which UK pollution legislation applies
culvert	pipe or box-type conduit through which water is carried under a structure

cumulative impact	impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project A cumulative impact may arise as the result of (a) the combined impact of a number of different environmental topic-specific impacts from a single environmental impact assessment project on a single receptor/ resource or (b) the combined impact of a number of different projects within the vicinity (in combination with the environmental impact assessment project) on a single receptor/resource.
design event	event such as a rainstorm or flood of given magnitude and probability (usually derived from previous records)
discharge consent	statutory document issued by the Environment Agency setting limits and conditions on the discharge of an effluent into controlled waters
effect	term used to express the consequence of an impact (expressed as the 'significance of effect'), which is determined by correlating the magnitude of the impact with the importance (or sensitivity) of the receptor or resource in accordance with defined significance criteria. For example, land clearing during construction results in habitat loss (impact), the effect of which is the significance of the habitat loss on the ecological resource.
EIA Directive	used to refer to Directive 85/337/EEC as amended by Directive 97/11/EC and the Public Participation Directive 2003/35/EC. All amendments to the EIA Directive were codified subsequently in 2011 to form Directive 2011/92/EU.
EIA Regulations	collective term for the various statutory instruments through which the Directives on Environmental Assessment have been implemented in the UK
emission standard	maximum amount or concentration of a pollutant allowed to be emitted from a particular source
emissions inventory	collection of data relating to the characteristics of processes or activities that release pollutants into the atmosphere
enhancement	measure that is over and above what is required to mitigate the adverse effects of a project
environmental assessment	method and a process by which information about environmental effects is collected, assessed and used to inform decision-making. Assessment processes include strategic environmental assessment, assessment of implications on European sites, and environmental impact assessment.
environmental impact assessment	statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. Involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Directive, including the publication of an environmental statement
environmental information	information that must be taken into account by the decision maker (the competent authority) before granting any kind of authorisation in any case where the EIA process applies. It includes the environmental statement, including any further information, any representations made by any body required by the Regulations to be invited to make representations, and any representations duly made by any other person about the environmental effects of the development
environmental management plan	structured plan that outlines the mitigation, monitoring and management requirements arising from an environmental impact assessment

Environmental Statement	document produced in accordance with the EIA Directive (as transposed into UK law by the EIA Regulations) that reports the outcomes of the EIA process
European site	sites that make up the European ecological network (also known as Natura 2000 sites). These include sites of community importance (SCIs), special protection areas (SPAs) and potential SPAs (pSPAs), special areas of conservation (SACs) and candidate or possible SACs (cSACs or pSACs), and Ramsar sites.
evaluation	determination of the significance of effects. Evaluation involves making judgements as to the value of the receptor/resource that is being affected and the consequences of the effect on the receptor/resource based on the magnitude of the impact.
existing environment	see ‘baseline conditions’
Habitats Regulations	EC Council Directive 92/43/EEC, known as the Habitats Directive, was transposed in the UK by the Habitats Regulations 1994 (as amended), now consolidated in England and Wales by the Conservation of Habitats and Species Regulations 2010. The Regulations provide for the designation and protection of 'European sites', the protection of 'European protected species', and the adaptation of planning and other controls for the protection of European sites.
Habitats Regulations assessment	assessment of the impacts of implementing a plan or policy on a European site, the purpose being to consider the impacts of a project against conservation objectives of the site and to ascertain whether it would adversely affect the integrity of the site
impact	change that is caused by an action; for example, land clearing (action) during construction that results in habitat loss (impact)
integrated pollution prevention and control	environmental permitting system that aims to prevent, reduce and eliminate pollution at source established by EC Directive 96/61/EC on Integrated Pollution Prevention & Control (IPPC) and implemented by the Pollution Prevention and Control Regulations
invertebrates	animals without backbones
local planning authority	local authority or council that is empowered by law to exercise planning functions for a particular area of the United Kingdom (often the local borough or district council)
method statement	document that sets out intended working or survey practices
mitigation	measures intended to avoid, reduce and compensate adverse environmental effects
monitoring	continuing assessment of the performance of the project, including mitigation measures. This determines if effects occur as predicted or if operations remain within acceptable limits, and if mitigation measures are as effective as predicted.
non-statutory consultee	organisations and bodies that should be consulted on relevant planning applications
non-technical summary	information for the non-specialist reader to enable them to understand the main predicted environmental effects of the proposal without reference to the main Environmental Statement.
operation	functioning of a project on completion of construction
phase 1 habitat survey	Recognised methodology used for collating information on the habitat structure of a particular site.

photomontage	superimposing of an image onto a photograph to create a realistic representation of proposed or potential changes to a view
Planning Inspectorate	body responsible for handling national infrastructure planning under the Planning Act 2008, and processing planning and enforcement appeals
pollution	any increase of matter or energy to a level that is harmful to living organisms of their environment (when it becomes a pollutant)
programme	series of steps that have been identified by the applicant, or series of projects that are linked by dependency
project	One (or more) aspect of a programme or plan that has been identified by the applicant and usually involves a direct physical intervention
project objectives	objectives of the project, set by the applicant
proposed scheme	also known as the 'proposed development', a plan or project that the applicant or promoter seeks to implement
Ramsar	areas designated by the UK Government under the International Ramsar Convention (the Convention on Wetlands of International Importance)
receptor	defined individual environmental feature usually associated with population, fauna and flora with the potential to be affected by a project
resource	defined but generally collective environmental feature usually associated with soil, water, air, climatic factors, landscape, material assets, including the architectural and archaeological heritage that has potential to be affected by a project
roosting site (birds)	place where birds rest or sleep
roosting site (bats)	place where bats live (e.g. built structures and trees)
run-off	precipitation that flows as surface water from a site, catchment or region to the sea
Schedule 1 project	plans or projects listed in Annex I of the EIA Directive and Schedule 1 of the EIA Regulations
Schedule 2 project	plans or projects listed in Annex II of the EIA Directive and Schedule 2 of the EIA Regulations
scoping	process of identifying the issues to be addressed by the environmental impact assessment process. It is a method of ensuring that an assessment focuses on the important issues and avoids those that are considered not significant.
scoping opinion	opinion provided by a competent authority that indicates the issues an environmental impact assessment of a proposed development should consider
screening	formal process undertaken to determine whether it is necessary to carry out a statutory environmental impact assessment and publish an Environmental Statement in accordance with the EIA Regulations
semi-natural	habitat, ecosystem, community, vegetation type or landscape that has been modified by human activity but consists largely of native species and appears to have similar structure and functioning to a natural type
significance	see 'significance of effect'
significance of effect	measure of the importance or gravity of the environmental effect, defined by either generic significance criteria or criteria specific to the environmental topic

significant environmental effect	environmental effect considered material to the decision-making process
sites of special scientific interest	main national conservation site protection measure in Britain designated under the Wildlife and Countryside Act 1981
special area of conservation	international designation implemented under the Habitats Regulations for the protection of habitats and (non bird) species
special protection area	sites designated under EU Directive (79/409/EEC) for the conservation of wild birds
stakeholder	organisation or individual with a particular interest in the project
statutory consultee	organisations that the competent authority is required to consult by virtue of the EIA Regulations
study area	spatial area within which environmental effects are assessed (i.e. extending a distance from the project footprint in which significant environmental effects are anticipated to occur). This may vary between the topic areas.
threshold	specified level in grading effects (e.g. the order of significance)
visual amenity	value of a particular view or area in terms of what is seen
wildlife corridor	linear habitats/landscape features such as hedgerows that may increase connectivity by acting as routes between habitat patches
worst case	principle applied where environmental effects may vary (e.g. owing to seasonal variations) to ensure the most severe effect is assessed

ABBREVIATIONS

AA	appropriate assessment
AAP	Area action plan
AAEE	Aeroplane and Armament Experimental Establishment
ANG	Accessible Natural Greenspace
ALC	Agricultural Land Classification
AOD	above Ordnance Datum
AMAA	Ancient Monuments and Archaeological Areas Act
AONB	area of outstanding natural beauty
ANG	Accessible Natural Greenspace
ACEC	Aggressive Chemical Environment of Concrete
AQMA	air quality management area
BAP	biodiversity action plan
BAT	best available techniques
BCT	Bat Conservation Trust
bgl	below ground level
BGS	British Geological Survey
BOD	Biological Oxygen Demand
BS	British Standard
CA	competent authority
CBC	Common Bird Census
CABE	Commission for Architecture and Built Environment
CCoP	construction code of practice
CCG	Clinical Commissioning Group
CD	chart datum
CEA	cumulative effects assessment
CEMP	construction (or contract) environmental management plan
CHSR	Conservation of Habitats and Species Regulations
CIEEM	Chartered Institute of Ecology and Environmental Management
CLEA	Contaminated Land Exposure Level
CLVIA	cumulative landscape and visual impact assessment
COD	Chemical Oxygen Demand
COMAH	control of major accident hazards
CRTN	calculation of road traffic noise
CWS	County Wildlife Sites

DEFRA	Department for Environment, Food and Rural Affairs
DAS	Discretionary advice service
dB(A)	decibel (A-weighted), a unit of noise measurement
DBA	desk-based assessment
DCLG	Department for Communities and Local Government
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges
DTI	Department for Trade and Industry
EA	Environment Agency OR environmental appraisal
EC	European Commission
EcIA	ecological impact assessment
EH	English Heritage
EHO	environmental health officer
EIA	environmental impact assessment
EMMP	Ecological Mitigation and Management Plan
EPS	European protected species
ERP	Emergency Response Plan
ES	Environmental Statement
EU	European Union
EUBS	EU Biodiversity Strategy
FRA	flood risk assessment
FTE	Full time equivalent
GIS	geographic information system
GPS	global positioning system
GVA	Gross Value Added
HAP	habitat action plan
HAZID	hazard identification
HCA	Homes and Community Agency
HDV	heavy duty vehicle
HGGIS	Haven Gateway Green Infrastructure Study
HE	Highways England
HER	Heritage Environment Record
HGV	heavy goods vehicle
HIA	health impact assessment
HRA	Habitats Regulations assessment
HSE	Health and Safety Executive
IAIA	International Association for Impact Assessment

IEMA	Institute of Environmental Management and Assessment
IfA	Institute for Archaeologists
IMD	Index of Multiple Deprivation
IPPC	integrated pollution prevention and control
JNCC	Joint Nature Conservation Committee
km	kilometre
LCA	landscape character area
LCZ	landscape character zone
LAQM	local air quality management
LBAP	local biodiversity action plan
LDF	local development framework
LEA	Local education authority
LGV	light goods vehicle
LI	Landscape Institute
LIA	Local Impact Area
LOAEL	Lowest Observed Adverse Effect Level
LPA	local planning authority
LTP	local transport plan
LNR	Local nature reserve
LUP	land use planning
LVIA	landscape and visual impact assessment
MAFF	Ministry of Agriculture, Fisheries and Food
MfS	Manual for Streets
MAGIC	Multi-Agency Geographic Information for the Countryside
MMP	Materials Management Plan
NALEP	New Anglia Local Enterprise Partnership
NCA	National Character Area
NE	Natural England
NID	National Infrastructure Directorate
NIHHS	Notification of Installations Handling Hazardous Substances
NO_x	oxides of nitrogen
NOEL	No Observed Effect Level
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NPSE	Noise Policy Statement for England
NTS	non-technical summary
NVC	National Vegetation Classification

OS	Ordnance Survey
ONS	Office for National Statistics
PIAs	Personal Injury Road Accidents
PM_{10}	particulates
PPC	pollution prevention and control
PPG	planning policy guidance (now superseded by the NPPF) OR pollution prevention guidance
PPS	Planning Policy Statement (now superseded by the NPPF)
PRoW	Public Rights of Way
PPP	Pollution Prevention Plan
RAMS	Recreation Access Mitigation Strategy
RPG	regional planning guidance
RSPB	Royal Society for the Protection of Birds
RSS	regional spatial strategy
SAC	special area of conservation
SANG	Suitable Alternative Natural Greenspace
SBIS	Suffolk Biological Information Service
SCC	Suffolk County Council
SCDC	Suffolk Coastal District Council
SEP	Strategic Economic Plan
SHER	Suffolk Historic Environmental Record
SINC	site of importance for nature conservation
SM	scheduled monument
SOAEL	Significant Observed Adverse Effect Level
SoCI	statement of community involvement
SoS	Secretary of State
SOV	Single Occupancy Vehicle
SPA	special protection area
SPG	Supplementary Planning Guidance
SPD	supplementary planning documents
SPL	sound pressure levels
SPZ	source protection zone
SSSI	site of special scientific interest
SuDS	sustainable drainage system
SWMP	Site Waste Management Plan
TA	transport assessment
TCPA	Town and County Planning Act
TIA	traffic impact assessment

TMP	traffic management plan
TPO	tree preservation order
TMP	Traffic Management Plan
UK	United Kingdom
USAAF	United States Army Air Forces
UXO	Unexploded Ordnance
WCA	Wildlife and Countryside Act
WIA	Wider impact area
WDC	Waveney District Council
WEBS	Wetland Bird Survey
WFD	Water Framework Directive
WMP	Water Management Plan
ZTV	zone of theoretical visibility

1 INTRODUCTION

1.1 Background to Proposed Development

1.1.1 Carlyle Land Ltd and CEG (the Applicant) are seeking to develop land south and east of Adastral Park, near Martlesham, Ipswich, to provide a proposed urban extension of up to 2,000 dwellings and associated infrastructure.

1.1.2 The applicant is seeking to secure outline planning permission for the proposed scheme by way of a planning application under the Town & Country Planning Act 1990 submitted to Suffolk Coastal District Council (SCDC).

1.1.3 The site covers approximately 113.3ha. The majority of the site is being used for mineral extraction or has been restored following mineral extraction. The site lies to the east of Martlesham Heath and is separated from the existing residential area by the A12. The site is approximately 8.5km east of Ipswich city centre.

1.1.4 The development of 2,000 new homes on land to the south and east of Adastral Park is identified in 'Suffolk Coastal District Local Plan, Core Strategy and Development Management Policies, July 2013'.

The proposal includes:

- up to 2,000 dwellings:
- employment area of c0.6ha;
- primary local centre (comprising use classes A1, A2, A3, A4 A5, B1, C3, D1 and D2);
- secondary centre (comprising possible use classes A1, A3, A5 and D2);
- a school;
- safeguarded education land totalling 5.5ha and, as appropriate, provision of all through school comprising early years, primary and secondary facilities;
- green infrastructure including SANGs (25.1ha), sports ground (7.9ha) and allotments/community orchards (0.83ha);
- network of linked public footpaths and cycleways;
- new vehicle accesses onto A12, Ipswich Road and Gloster Road; and
- associated infrastructure including drainage and utility supplies.

1.2 Environmental Impact Assessment (EIA)

1.2.1 EIA is a process for identifying the likely consequences on the existing biological, physical and human environment arising from development progression.

1.2.2 The process is undertaken to ensure that the environmental effects of certain types of development proposal are fully investigated, understood and taken account of in the consenting and authorisation process.

Statutory Context

1.2.3 In June 1985 the Council of the European Economic Community determined that an EIA should be prepared by the promoters of certain types of development prior to consent being granted. The requirements for inclusion within EIA, and the process by which an EIA should be undertaken, were detailed accordingly within Council Directive 85/337/EEC (termed the 'EIA Directive').

1.2.4 Following amendments made to the EIA Directive in 1997, 2003 and 2009, Directive 2011/92/EU was published in 2011 by the European Commission to codify all changes. Directive 2014/52/EU, amending 2011/92/EU, has not yet been translated into UK law.

1.2.5 The Town and Country Planning (EIA) Regulations 2011 (hereafter 'the EIA Regulations') transpose the requirements of the EIA Directive into UK statute, and apply where planning consent is being sought for developments under the Town & Country Planning Act 1990.

1.2.6 Screening procedures exist within the EIA Regulations to assist determination of whether a development proposal qualifies for EIA.

1.2.7 In the case of the proposed scheme, the applicant has volunteered to complete an EIA given the scale and nature of the proposed scheme and its potential to generate significant environmental effects. A scoping report was prepared by RSK Environment Ltd and was submitted to Suffolk Coastal District Council on 15th December 2016. Suffolk Coastal sent their response on 14th March 2017 (dated 13th March 2017). A copy of the Scoping Opinion can be found in Appendix B2.

Environmental Statement

1.2.8 It is a requirement of the EIA Regulations that an Environmental Statement be prepared to describe the likely significant effects of a proposed development on the environment. An Environmental Statement is required to contain the information specified in Part 2 of Schedule 4 to the EIA Regulations and such of the relevant information in Part 1 of Schedule 4 as is reasonably required to assess the environmental effects of the development and which the applicant can, having regard in particular to current knowledge and methods of assessment, reasonably be required to compile.

1.2.9 This Environmental Statement accompanies the planning application and reports the formal process and outcomes of the EIA undertaken for the proposed scheme. Its purpose is to present the proposed scheme and its predicted environmental effects in a concise, objective and non-promotional manner in order to provide the local planning authority (LPA), Suffolk Coastal District Council, statutory consultees, interested bodies and the general public with sufficient information to assess its likely environmental effects.

1.3 Structure of Environmental Statement

1.3.1 The Environmental Statement is presented in 2 volumes:

- Volume 1: Environmental Statement; and
- Volume 2: Appendices (divided into two files; 2a and 2b).

1.3.2 A non-technical summary of the Environmental Statement has been prepared as a separate document, in accordance with the requirements of the EIA Regulations.

Volume 1

1.3.3 Volume 1 comprises 17 sections, which are structured in the following manner.

- **Section 1 Introduction** introduces the proposed scheme and explains the underlying objectives of the proposals, describes the statutory basis for the EIA, outlines the structure adopted in this Environmental Statement and identifies the team responsible for undertaking and reporting the EIA.
- **Section 2 Proposed Scheme** establishes the need for the proposed scheme; summarises the alternatives that have been considered in the development of a preferred design solution; provides a detailed description of the key design components and characteristics of the proposed scheme and associated land take; and outlines the planned timescales for construction and implementation.
- **Section 3 Consultation** summarises stakeholder consultation undertaken during the EIA and the development of the proposed scheme.
- **Section 4 Overview of Existing Environment** provides a description of the receiving environment in respect of existing landform, topography, settlement and transportation patterns, land use, hydrology and planning designations associated with land on, and in proximity to, where the proposed scheme will be located.
- **Section 5 Environmental Assessment Process** summarises the scoping process undertaken to establish the scope of the EIA, the adopted approach to the EIA and format of the individual technical assessments, and modifications made to the EIA scope that have arisen during the development and assessment of the proposed scheme.
- **Sections 6 to 14 Technical Assessments** report the findings of the detailed environmental assessments and the residual effects on the environment predicted to occur as a result of implementation of the proposed scheme.
- **Section 15 Cumulative Effects** identifies cumulative effects arising from the proposed scheme operating in combination with other consented and planned developments in the locality, and the interactions of predicted effects on environmental interests.
- **Section 16 Summary of Environmental Commitments** provides a table which summarises any mitigation suggested in the specialist chapters
- **Section 17 Draft Environmental Management Plan** outlines what should be included in the Construction Environmental Management Plan.

Volume 2

1.3.4 Volume 2 comprises technical appendices (referred to in Volume 1) containing detailed reports of the individual environmental assessments and other relevant supporting documentation.

1.4 EIA Team

1.4.1 The EIA and preparation of this Environmental Statement have been coordinated by RSK Environmental Ltd (RSK) on behalf of the Applicants.

1.4.2 The specialist environmental assessment and ES chapters have been prepared by the following companies:

- CODE Development Planners Ltd – Planning;
- Broadway Malyan – Architects;
- Orion Heritage – Archaeology;
- Montagu-Evans – Cultural Heritage;
- Southern Ecological Solutions (SES) – Ecology;
- Tyler Grange LLP – Landscape;
- RSK Environment Ltd – Socio-Economics; and
- Brookbanks Consulting Ltd – Transport, Flood Risk and Drainage, Ground Conditions, Noise, and Air Quality.

2 PROPOSED DEVELOPMENT

2.1 Need for the Scheme

2.1.1 Section 6 of the National Planning Policy Framework (NPPF) states that local authorities are required to significantly increase their supply of housing to meet the need for market and affordable housing in their area. Local authorities are also required to support sustainable development and assist in identifying and co-ordinating the provision of necessary infrastructure.

2.1.2 The need for the project is in direct response to SCDC's assessment of requirements for housing and sustainable development in the district. The 'Suffolk Coastal District Local Plan, Core Strategy and Development Management Policies', (SCDCS), were adopted in July 2013. Following extensive assessment, Policy SP20 identifies a requirement for 2000 new homes.

2.1.3 The early involvement of relevant partner organisations, members of the public and infrastructure providers as part of growth capacity testing has been an essential part of the process. They have assisted SCDC in the identification of site suitability and possible infrastructure requirements such as for education, healthcare, sewerage and highways.

2.2 Development Objectives

2.2.1 The primary aims of the Proposed Development are to assist in meeting the relevant objectives of the SCDCS, which are:

- **Objective 1 – sustainability** "To deliver sustainable communities through better integrated and sustainable patterns of land use, movement, activity and development."
- **Objective 2 – housing growth** "To meet the minimum locally identified housing needs of the district for the period 2010 to 2027, taking into account existing and future economic, environmental and social opportunities and constraints."
- **Objective 3 – new homes** "To provide for the full range of types and locations of new homes to meet the needs of existing and future residents of the district."
- **Objective 4 – economic development** "To support the growth and regeneration of the local economy and to build on those elements of its unique economic profile that are identified as being of sub-regional, regional and national significance."
- **Objective 8 – transport** "To enhance the transport network across the district."
- **Objective 9 – climate change** "To adapt to and mitigate against the potential effects of climate change and minimize the factors which contribute towards the problem."
- **Objective 11 – protecting and enhancing the physical environment** "To conserve and enhance the quality of the distinctive natural, historic and built environments including insuring that new development does not give rise to issues to coalescence."
- **Objective 12 – design** "To deliver high quality developments based on the principles of good, sustainable and inclusive design."

- **Objective 13 – accessibility** "To promote better access to, housing, employment, services and facilities for every member of the community."
- **Objective 14 – green infrastructure** "To encourage and enable the community to live and enjoy and healthy lifestyle; to promote urban cooling (e.g. shading from trees, canopies on buildings to cool down areas and buildings in urban settings) in major settlements as well as support biodiversity and geodiversity."
- **Objective 15 – physical and community infrastructure** "To ensure that, as a priority, adequate infrastructure such as transport, utilities or community facilities are provided at an appropriate time, in order to address current deficiencies and meet the needs of new development."

2.3 Consideration of Alternatives

2.3.1 The EIA Regulations do not require an applicant to consider alternatives (see paragraph 41 of the Planning Practice Guidance section on Environmental Impact Assessment ID: 4-041-20140306). However, where alternatives have been considered, paragraph 4 of Part 2 of Schedule 4 to the EIA Regulations requires the applicant to include in their Environmental Statement an outline of the main alternatives studied, and an indication of the main reasons for the choice, taking into account the environmental effects.

2.3.2 For the purpose of this application, alternative sites have not been considered. The site is described in the SCDCS as suitable and appropriate for the principle and scale of development as proposed. Alternative sites were considered by the Council in the Sustainability Appraisal that underpinned the SCDCS.

2.3.3 The development of the parameter plans and Illustrative Framework Masterplan for this application has considered numerous site layout alternatives through the evolution of the design. Initially, an Illustrative Framework Masterplan was prepared in liaison with SCDC, stakeholders and environmental specialists, and this was presented at the first two public consultation events.

2.3.4 Following the public consultation, numerous comments were taken on board in the redesign of the Illustrative Framework Masterplan. The comments were categorised into four areas:

- Design, Character, Place-making;
- Housing Types and Densities;
- Green Infrastructure; and
- Community Infrastructure.

2.3.5 Full details of these are presented in the Statement of Community Involvement (SCI) and the Design and Access Statement (DAS) which also accompany the planning application for the proposed development.

2.3.6 The redesigned Illustrative Framework Masterplan was presented at the next round of public consultation, and the comments received were again categorised into the four areas. Full details of how all the comments were addressed in the Illustrative Framework Masterplan can be found in the SCI and DAS.

2.4 Proposed Development

Development of Preferred Option

2.4.1 The applicant and design team have worked jointly with SCDC, relevant stakeholders and the local community to prepare an Illustrative Framework Masterplan and parameter plans which identify the most appropriate nature, scale and disposition of uses.

2.4.2 Meetings with council officers and other stakeholders refined and informed the proposals over a number of meetings before the formulation and submission of final proposals.

2.4.3 Four public consultation events were held; two in December 2016 and two in February 2017. Details of the presentations, the feedback received and how this has been included in the design of the proposals is presented in the Statement of Community Involvement (SCI) which also accompanies the planning application for the proposed development. In summary, engaging with the wider community at an early stage in the process has enabled the following feedback to be incorporated into the Illustrative Framework Masterplan design:

- low density development on the edges to ensure a gradual transition between built form and the wider countryside with additional green corridors and landscaping on eastern and southern edges;
- a focus on traditional housing rather than high rise;
- improvements to the bunds and new acoustic measures;
- provision of leisure space, a mixture of play areas, cycle tracks and trim trails;
- delivery of circular walks, dog walking facilities and providing better connectivity for cyclists and pedestrians;
- many of the suggestions for the lake area have been taken on board as part of the evolution of the Illustrative Framework Masterplan; and
- the nature of the facilities and siting of the local centre.

Construction Phase

2.4.4 Assuming that construction could start in 2018, it is expected that the development of up to 2000 houses would be complete by 2032.

2.4.5 One of the key mechanisms for environmental management during the construction stage is the Construction Environmental Management Plan (CEMP) and associated plans. More details can be found in Section 17, which considers in detail the requirements for a CEMP.

Operational Phase

2.4.6 The environmental management of the site once the site has been developed and is occupied will be largely dictated by legislation and relevant guidelines at the time of occupation.

2.4.7 Throughout the design of the proposed Illustrative Framework Masterplan, design standards and sustainability requirements have been incorporated, resulting in a proposed development that would meet all current environmental requirements.

2.4.8 More details can be found in Section 17, which considers the preparation of an Environmental Management Plan for the operation scheme.

Programme of Works

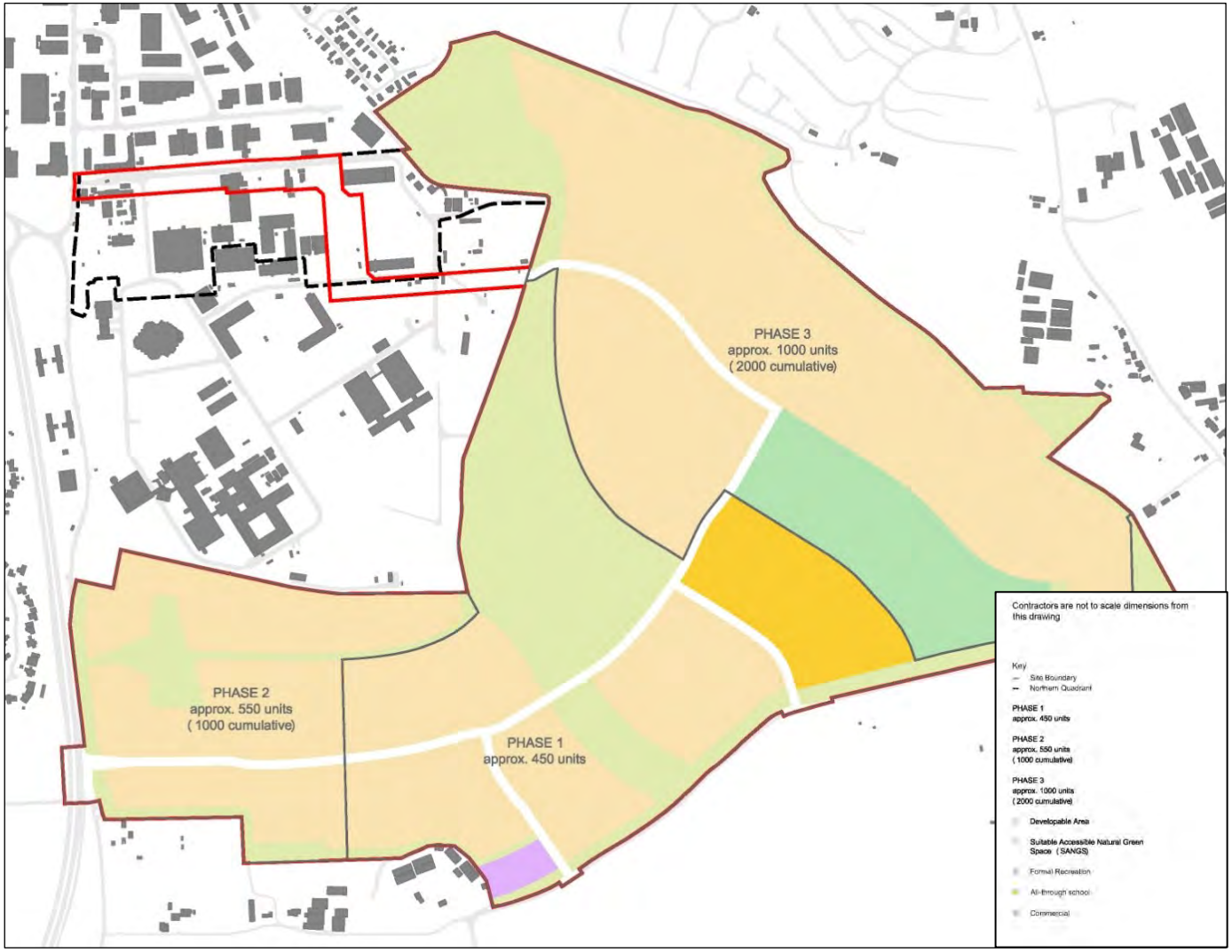
2.4.9 Development would take place in 3 main phases shown on Figure 2.1 Phasing Plan below.

2.4.10 It is expected that housing production would peak at 150 dwellings per year. The landscape and open space infrastructure will be implemented in conjunction with each phase for housing and employment.

2.4.11 The housing will delivered in three phases:

- Phase 1 – 450 units;
- Phase 2 – 550 units; and
- Phase 3 – 1000 units.

Figure 2.1: Phasing Plan



3 CONSULTATION

3.1 Overview

3.1.1 Consultation has been integral to the design and development of the proposed scheme, identification of existing environmental constraints and sensitivities, and identification and assessment of the likely environmental effects of the proposed scheme.

3.1.2 Consultation with statutory organisations, non-statutory organisations and the general public commenced in December 2016. Consultation has taken a number of forms, including;

- stakeholder liaison;
- public exhibitions and consultation events; and
- informal discussions.

3.1.3 A Statement of Community Involvement (SCI) has been prepared for inclusion in the planning application. This sets out who was consulted, the methodology for this consultation, feedback and how this has been taken into account in the revised Illustrative Framework Masterplan.

3.2 Stakeholder Liaison

3.2.1 Consultation with statutory consultees and other organisations has been undertaken throughout the EIA process to obtain environmental data, to discuss and agree the scope of individual environmental assessments and the adopted methods of assessment, and to develop appropriate environmental mitigation measures.

3.2.2 EIA topic-specific consultation is summarised in each chapter of this ES where relevant.

3.2.3 A scoping report was submitted to Suffolk Coastal District Council on 14th December 2016 and a copy of the scoping opinion is contained in Appendix B2.

3.3 Public Consultation Events

3.3.1 Four public consultation events were held; two in December 2016 and two in February 2017. The first, on Thursday 1st December 2016, was held at St Michael's Church Centre in Martlesham Heath and 184 people attended. The second was held at Waldringfield Village Hall in Waldringfield on 6th December 2016, and 207 people attended. A total of 47 feedback forms were submitted.

3.3.2 The second phase of consultation events took place on Monday 6th February 2017 at St Michael's Church Centre in Martlesham Heath, where 94 people attended, and Wednesday 8th February at Waldringfield Primary School, Woodbridge, where 49 people attended. A total of 49 consultation forms were returned either at the event, in the post or via the website.

3.3.3 Full details of these events and the feedback received is presented in the SCI which also accompanies the planning application for the proposed development.

3.4 Informal Discussions

3.4.1 Discussion was undertaken with affected parties and landowners during the development of the proposed scheme.

3.4.2 EIA topic-specific consultation is summarised in each chapter of this ES where relevant.

4 OVERVIEW OF EXISTING ENVIRONMENT

4.1 Location and History

4.1.1 The application site covers approximately 113.3ha. The majority of the site is used for mineral extraction or has been restored following mineral extraction. The site lies to the east of Martlesham Heath and is separated from the residential area by the A12. The site is approximately 8.5km east of Ipswich city centre.

4.1.2 The science and business park to the north and west of the site is BT's research campus. The campus includes buildings, car parks, private leisure facilities, landscape areas and woodland.

4.1.3 Parcels of land to the south of the site are currently used for agriculture. The remaining land is currently occupied by Brett Aggregates, and comprises several quarries, temporary site buildings and ponds.

4.2 Air Quality

4.2.1 Suffolk Coastal District Council (SCDC) has carried out detailed assessments of air quality in the area and as a result has declared two areas as AQMA due to potential exceedences of the AQS objectives for annual mean NO_2 concentrations. These are:

- Woodbridge Junction AQMA, which was declared in 2006 and covers 6 properties on the western side of the Throughfare / Melton Hill arm of Woodbridge Junction; and
- Stratford St Andrew AQMA which was declared in 2014 and covers 4 properties at Long Row, Main Road in Stratford St Andrew.

4.2.2 The closest is the Woodbridge Junction AQMA, which is located approximately 4.2km to the northeast of the Site.

4.3 Archaeology and Built Heritage

4.3.1 The site has been subject to a series of archaeological investigations in relation to the previous BT planning application on the site in 2009. These studies have established that there are two scheduled Bronze Age barrows within the site and with further barrows (scheduled and non-scheduled) within the wider area. The archaeological evaluation of the site in 2008 revealed that the site contains Iron Age settlement remains of local significance to the east of Spratts Plantation. The site also contains a WWII trench shelter which is considered to be of local significance. Large parts of the site have been subject to previous quarrying works which will have removed all archaeological remains within the area.

4.3.2 Archaeological evaluation has occurred across the majority of the site. The central part of the site is occupied by Waldringfield Quarry. Taking into consideration the historic quarrying, this suggests that small areas to the south-west and north-west of the main area have not been quarried or archaeologically investigated. Archaeological investigations adjacent to both of these areas, recorded negative archaeological results. Based on available evidence, the potential for significant remains in these areas is

considered low. The below ground remains resource is not considered likely to be of more than local significance in these areas.

4.4 Ecology

4.4.1 The application site is a varied area of land consisting of habitats of generally low ecological value such as arable land and quarry as well as areas of relatively higher ecological value, such as woodland, a lake and semi-natural grasslands.

4.5 Flood Risk and Drainage

4.5.1 The site lies entirely within Flood Zone 1. This area is defined as being at little or no flood risk at all, with a 1 in 1000 annual probability (0.1% chance) or less of flooding from rivers or the sea in any one year.

4.5.2 Assessment of other potential flooding mechanisms shows the land to have a low probability of flooding from overland flow, ground water and sewer flooding.

4.6 Ground Conditions

4.6.1 The underlying ground conditions are considered to be sensitive, as the Site is situated on sand bedrock geology which forms a Principal Aquifer and the superficial deposits of sand and gravel which form a Secondary A Aquifer. In terms of groundwater vulnerability the Site lies on a Minor Aquifer, with soils of High Leaching Potential.

4.7 Landscape

4.7.1 The site consists of different land uses and areas with distinct character. These include areas of agricultural land, gravel and sand extraction, quarry operations and associated infrastructure, as well as areas of restored landscape to include a large central water body.

4.7.2 The site lies to the immediate south of Adastral Park Innovation Centre. The A12 bounds the site to the west with the Suffolk Coast Area of Outstanding Natural Beauty (AONB) to the east.

4.7.3 The site landform has been altered due to the mineral extraction operations which have resulted in a landscape containing large man made features.

4.7.4 The site boundary contains mature tree belts and woodland to the east and southern boundaries. A large coniferous tree belt runs adjacent to the southern boundary and heavily screens the site from the wider landscape to the south. Mature woodland defines the majority of the northeastern boundary and is associated with existing development to include the Moon and Sixpence Caravan Park. This woodland heavily screens the site from the wider landscape to the north and north-east. These features along with other tree plantations and woodland located to the south and south west offer a level of containment and screening to the majority of the site in the local area.

4.7.5 The northern and western areas of the site are influenced by the urbanising effects of Adastral Park Innovation Centre, including the dominant structure of the BT building and associated tower and array of large satellite dishes to the western site boundary. The

dishes and BT tower are prominent features and focal points in the local landscape. The western site boundary with the A12 corridor is formed by a further large earth bund.

4.7.6 The site is crossed by two Public Rights of Way which run north-south from the southern boundary of Adastral Park to Ipswich Road. Further Public Rights of Way run around the periphery of the site and create a circular route that links up with Public Rights of Way within the wider landscape. At present the Public Rights of Way are separated from the site by the engineered bunds and planting. The bunds heavily screen the site for the majority of the site with elevated views possible from users of the bridleway which runs adjacent to the southern boundary.

4.7.7 The northern part of the site is bisected by the BT sound testing corridor which runs from the satellite dishes in a south easterly direction with a receiving tower located at the southern extent. The height of the tower results in it being visible from the peripheral boundary rights of way.

4.8 Noise

4.8.1 Existing noise levels around the site are principally influenced by road traffic on the A12 and are likely to be high both during the day and night-time periods. Noise from the operation of the site is not anticipated to lead to adverse effects with appropriate mitigation measures implemented within the design.

4.9 Transport

4.9.1 Adastral Park is located to the east of the A12 which provides a main route to Lowestoft and Great Yarmouth in the north. Adjacent to the site, the A12 is a dual carriageway road subject to a 70mph speed limit. Through discussions with SCC, the aspiration to reduce the speed limit has been identified.

4.9.2 The A12 continues to the south and connects to the A14. The A14 is a major international, national and regional route connection for Felixstowe to the M6 and M1.

4.9.3 The A12 to the north connects to the A1214 at Martlesham heath and provides access to the route towards Ipswich. Foxhall, to the south of Adastral Park provides an alternative route into Ipswich from the east.

4.9.4 At the present day, the development land does not have any significant traffic generators within the boundary. As such, there has been no material requirement for footway / cycleway provision on site or to access the site.

4.9.5 There is a public footpath which runs from the north of Martlesham Heath along Gloster Road and the western edge of the site, to Newbourne Road to the south of the Park.

4.9.6 The bus route 66 currently provides a high quality service to the existing park, which links Martlesham Heath-Grange Farm-Kesgrave - Ipswich. The bus service 173/174 (Woodbridge to Felixstowe) has just two services during peak hours. The rest of the buses also operate through Adastral Park.

4.9.7 The closest train station is located in Woodbridge. The stations provide excellent nodes for onward routes to Ipswich (having a journey time of circa 15 minutes) and Lowestoft (having a journey time of circa 1 hour 10 minutes).

4.10 Socio-economics

4.10.1 The site is located in the Martlesham Ward of SCDC, with an estimated population of 4,796. The district population is increasing, and has a significantly older than average population.

4.10.2 The Index of Multiple Deprivation is a qualitative measure of deprivation experienced by people living in an area. No area of SCDC falls within the 10% most multiple deprived areas of the country, however, two areas fall within the 11-20% most multiple deprived areas1.

4.10.3 At a district level key employment sectors include transport and logistics, Information and Communications Technology (ICT), energy generation, agriculture and food production and tourism[2]. Employment levels are above average, with 64% of the population economically active and employed, in comparison to the national average of 62.1%.

4.10.4 The nearest hospital is the Ipswich Hospital approximately 5.3km directly west of the site. In addition there are a number of health facilities in the local area.

4.10.5 AtLAS is the leisure and sport umbrella organisation for Adastral Park employees (current and previous), with an ongoing programme of activities, events, societies and clubs.

[1] http://www.healthysuffolk.org.uk/assets/JSNA/20150215-AMD-Infographics-Indices-of-Deprivation-2015-HR.pdf, accessed 17/11/16

[2] Suffolk Coastal District Council, 2013 Suffolk Coastal Local Plan Core Strategy

5 ENVIRONMENTAL ASSESSMENT PROCESS

5.1 Scoping

5.1.1 An underlying principle of the EIA process is that it should concentrate on environmental issues where effects associated with a development proposal have the potential to be significant.

5.1.2 Although it is not required by the EIA regulations, the proposed scheme was subject to a detailed scoping exercise on 15th December 2016, in order to determine issues that should be addressed in the EIA and the form individual assessments should take.

5.1.3 The scoping exercise involved a review of available documentation related to the form and status of the existing environment; consultation with statutory and non-statutory agencies and other environmental bodies with knowledge of the proposed development site and surrounding areas; preliminary desk-based and site-based appraisals and surveys; and knowledge of the potential environmental implications of comparable schemes (based on direct past project experience and other published experience and guidance).

5.1.4 The following considerations were factored into the scoping process:

- Air Quality;
- Archaeology and Built Heritage;
- Ecology;
- Flood Risk and Drainage;
- Ground Conditions and Contamination;
- Landscape and Visual Impact;
- Noise;
- Socio-Economics;
- Transport and Travel Planning; and
- Cumulative Impacts.

5.1.5 A tabular scoping matrix was developed to assist identification of potential environmental issues to be scoped into the EIA. This is presented in Appendix B3 of this Environmental Statement and takes the form of an initial evaluation of potential interactions between the key development stages of the project and the receptors and resources associated with the receiving human, natural and built environment. The findings are summarised in rating form, whereby a one-star rating is indicative of potential interactions of low significance and a three-star rating is indicative of potential interactions of high significance.

5.1.6 Scoping concluded that the following aspects were relevant for investigation in the EIA owing to the potential for significant environmental effects to arise:

- Air Quality;
- Archaeology;

- Cultural Heritage;
- Ecology;
- Flood Risk and Drainage;
- Ground Conditions and Contamination;
- Landscape and Visual Impact;
- Noise;
- Socio-Economics;
- Transport and Travel Planning; and
- Cumulative Impacts.

5.1.7 Scoping also concluded that the relationship and compliance of the proposed scheme to local, regional and national planning policy would be best established in a separate planning statement. Accordingly, the applicant has prepared a standalone planning statement that accompanies the planning application for the proposed scheme.

5.1.8 The outcomes of the scoping process were collated in a scoping report, which can be found in Appendix B1; this accompanied a formal request for a scoping opinion that was issued by the applicant to SCDC on 14th December 2016.

5.1.9 SCDC engaged the following parties as part of the scoping process and issued its scoping opinion dated 13th March to the applicant on 14th March 2017:

- Martlesham Parish Council;
- Brightwell, Foxhall and Purdis Farm Parish Council;
- Waldringfield Parish Council;
- Environment Agency;
- Natural England;
- SCC Spatial Planning, Archaeological Unit, Highways Department, Flooding Authority, Rights Of Way, Development Contributions Manager;
- Suffolk Wildlife Trust;
- Historic England;
- Suffolk Coasts And Heaths Project (AONB);
- Anglian Water;
- Ipswich Borough Council;
- SCDC Arboricultural and Landscape Manager;
- SCDC Conservation & Design;
- SCDC Environmental Protection;
- RSPB; and
- Highways England.

5.1.10 A copy of the scoping opinion is contained in Appendix B2.

5.1.11 The scope of the individual assessments has been reviewed regularly throughout the EIA process to take account of new published guidance and/or assessment methodologies, stakeholder feedback, new environmental data and ongoing scheme design changes.

5.1.12 Explanations of the methods of assessment adopted and the issues identified are provided in Sections 6 to 15 of this Environmental Statement, which detail the findings in relation to the various environmental aspects considered in the EIA.

5.2 EIA delivery

EIA Guidance

5.2.1 The EIA has been undertaken with regard to the following published best-practice guidance:

- *Guidelines for Environmental Impact Assessment*, published by IEMA (2004)
- *Guide to: Delivering Quality Development,* published by IEMA (2016)
- *Planning Practice Guidance, Environmental Impact Assessment,* published by Department for Communities and Local Government (2014)

5.2.2 A common approach has been adopted in the undertaking and reporting of individual environmental assessments.

Establishment of Baseline Environment

5.2.3 The EIA of scoped-in environmental aspects commenced with the identification and review of information relating to known, or the likely presence of, environmental receptors and resources within a defined study area in order to determine their relative value, importance and/or sensitivity towards change.

5.2.4 Environmental resources were defined as those environmental aspects that support and are essential to natural or human systems. These include areas or elements of population, ecosystems, watercourses, air and climatic factors, landscape, and material assets.

5.2.5 Environmental receptors were defined as people (i.e. occupiers of dwellings and users of recreational areas, places of employment and community facilities) and elements within the environment (e.g. flora and fauna) that rely on environmental resources.

5.2.6 Desk-based data sources comprised consultation responses; published literature; databases, records and schedules relating to environmental designations; national, regional and local policy documentation; historic and current mapping; aerial photography; and data gathered from previous environmental studies, such as the outline planning application for the regeneration of Adastral Park and the surrounding land, submitted by BT in 2009.

5.2.7 Site surveys were undertaken to verify and consolidate information gathered during the desk-based review, and to evaluate the relationships between specific environmental interests and their wider environmental value.

5.2.8 Study area extents vary in accordance with the environmental aspect being considered. For some topics, a study area has been defined as being relatively localised to the proposed scheme, while for others it has extended outward to capture the surrounding road network, distant communities, and environmentally sensitive areas. The definition of each study area has been informed by a review of the relationship between the proposed scheme and the receiving environment, the outcomes of scoping, and reference to thresholds stipulated in topic-specific EIA guidance.

Impact Prediction and Assessment

5.2.9 Impacts comprise identifiable changes to the baseline environment. These can be either beneficial (e.g. introduction of planting to screen visually detracting elements) or adverse (e.g. loss of an attractive environmental component), and can take the following forms:

- direct [primary] (e.g. loss of habitat to accommodate the proposed scheme)
- indirect [secondary] (e.g. pollution downstream arising from silt deposition during earthworks)
- short-term/temporary (e.g. dust generated during construction)
- medium-term (e.g. cutting back of planting which is subsequently allowed to regenerate)
- long-term/permanent (e.g. improvement in air quality)
- cumulative (e.g. incremental changes caused by other past, present or reasonably foreseeable actions together with those associated with the proposed scheme, or where a receptor or resource is subject to a combination of individual impacts such as air pollution, noise and visual impact associated with the proposed scheme in isolation).

5.2.10 Impact assessments have been both quantitative and qualitative in nature, and based on comparisons between the environmental conditions immediately prior to the assumed construction of the proposed scheme and the predicted environmental conditions resulting from its implementation.

5.2.11 Impacts have been defined in accordance with accepted terminology and standardised methodologies to predict the magnitude of impact (or change) resulting from the proposed scheme.

5.2.12 Assessments have been undertaken for the year of construction and in the year when the proposed scheme would become operational. Some environmental aspects have required further assessment beyond the operational year to take account of factors such as predicted traffic growth or activities associated with decommissioning of the proposed scheme.

Environmental Effects

5.2.13 Effects are defined as the consequence of impacts. They are formulated as a function of the receptor/resource value and sensitivity, and the predicted magnitude of impact.

5.2.14 Professional judgement, defined thresholds, established criteria and standards have been used to report the environmental effects of impacts, which can be referred to as either being prior to, or following establishment of, environmental mitigation.

Environmental Mitigation

5.2.15 Environmental mitigation measures have been developed to address potentially significant adverse environmental effects.

5.2.16 Mitigation can take the form of agreed measures incorporated into the evolving design of the proposed scheme (e.g. environmental treatments), standard measures (e.g. best practice construction management to control dust emissions) that are enforceable through planning conditions, and measures proposed in outline (e.g. off-site planting to

provide visual screening to nearby residential dwellings) that may require further development and formal agreement to ensure their implementation.

5.2.17 The principles adopted in the identification and development of environmental mitigation for the proposed scheme are avoidance (wherever possible), reduction (where avoidance cannot be achieved) and compensation (where reduction is unachievable or would not achieve the required level of mitigation).

Significance of Environmental Effects

5.2.18 The significance of an environmental effect has been established by way of reference to the importance/value of affected resources; the number and sensitivity of affected receptors; impact magnitude; duration, frequency and extent of effect; and the reversibility of effect.

5.2.19 The following generic significance criteria have been applied across the environmental aspects to ensure identified environmental effects are assessed in a comparable manner, except where such criteria are not applicable due to other prevailing topic-specific guidance (e.g. ecological impact assessment) and/or established standards and thresholds (e.g. EU limit values for air emissions).

Table 5.1: Generic Significance Criteria

Level of effect	Description
Major	Very large or large change in environmental or socio-economic conditions. These effects, both adverse and beneficial, are likely to be important considerations at a national to regional level because they contribute to achieving national / regional objectives, or are likely to result in exceedance of statutory objectives and/or breaches of legislation.
Moderate	Intermediate change in environmental or socio-economic conditions. These effects are likely to be important considerations at a regional and local level.
Minor	Small change in environmental or socio-economic conditions. These effects may be raised as local issues but are unlikely to be of importance in the decision making process.
Negligible	No discernible change in environmental or socio-economic conditions (i.e. variation within normal bounds or below measurable levels). An effect that is likely to have a negligible or neutral influence, irrespective of other effects.

5.2.20 Commonly only major effects, which are likely to be factors in deciding whether a development is acceptable, are significant effects. Significance assumes only incorporated and standard mitigation measures are in place, these being the measures for which delivery and implementation can be secured.

5.2.21 The competent authority determining the planning application considers the residual effects (i.e. the post-mitigation effects) as part of the decision-making process.

5.3 Assessment Reporting

5.3.1 Each individual assessment follows a comparable format to ensure consistency in reporting the existing environmental conditions and the potential effects on them arising from implementation of the proposed scheme.

- Introduction introduces the assessment topic under consideration;
- Scope and Methodology identifies and describes the scope of the assessment, the methods and criteria adopted, relevant guidance followed, and any assessment limitations, assumptions or difficulties encountered;
- Statutory and Planning Context outlines statutes, guidance, policies and plans relevant to the environmental interests forming the focus of the assessment;
- Existing Environment describes the features and characteristics associated with the baseline environment;
- Predicted Impacts reports the predicted impacts on the baseline environment during the construction, operational and decommissioning phases;
- Mitigation details all measures that have been incorporated into the design of the project and/or agreed as deliverable; and
- Summary of Effects summarises the nature and significance of residual environmental effects that are predicted to remain, post-implementation of mitigation measures.

5.4 Assumptions, Uncertainties and Limitations

5.4.1 The EIA was undertaken and the resulting ES has been compiled using the material made available to the EIA team by the client and members of their project team, together with other readily available and publicly accessible material including existing literature and studies, as well as personal communication with local experts. To the best of our knowledge, the information used as a basis for the assessment is accurate and up to date. The team is not aware of any limitations of the underlying information or of any constraints that would materially affect the evaluations.

5.4.2 We have also carried out our own site visits, surveys and investigations at or in the vicinity of the site to provide more information for the assessments and to fill data gaps. This has resulted in a more complete and up to date set of baseline data to use as the basis for the impact assessment. Although the data have been collected over a period of time, we are of the opinion that the data is relevant and valid at the time of reporting. It should be noted that the surveys and investigations are conducted on a sampling basis and this places a limit on the certainty of the data set.

5.4.3 This ES has been based on the best available information at the time of publication. However, further information may become available during the detailed design phase that will be used to inform the project if relevant.

5.4.4 Assumptions adopted in the evaluation of impacts are reported in each of the relevant sections. However, these assumptions are often implicit and rely on expert judgement. Any assumptions and known technical deficiencies have been documented.

5.4.5 The EIA has been undertaken during the initial design phase of the project and therefore some of the technical aspects of the construction and operation have yet to be determined. Where an alternative option could cause additional impacts, these are

discussed within the relevant sections. In addition, the EIA has taken a precautionary approach to adopt conservatism in the assumptions made and any scenarios assumed, so that a reasonable 'worst-case' scenario was assessed. Therefore, inherent uncertainties are accounted for and subsequent modifications to the project during the detailed design phase are less likely to fall outside of the assumed envelope of the assessment parameters.

6 AIR QUALITY

6.1 Introduction

6.1.1 This chapter presents the findings of an assessment of local air quality effects associated with the Proposed Development.

6.1.2 The Proposed Development may introduce the following air quality effects;

- During the construction phase, suspended and re-suspended fugitive dust emissions from demolition / construction activities and vehicular emissions from construction traffic, including re-suspended dust from HGV movements; and
- During the operational phase, vehicular emissions (primarily nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$) from increased traffic movements associated with the development.

6.1.3 The potential effects of the Proposed Development on local air quality during both construction and operational phases have been assessed. For both phases, the type, source and significance of potential effects are identified and the measures that should be employed to minimise these effects are described.

6.2 Assessment methodology and significance criteria

Scope of Assessment

6.2.1 The scope of the assessment has been determined in the following way:

- Consultation with the Environmental Health Officer (EHO) of Suffolk Coastal District Council (SCDC);
- Review of air quality data for the area surrounding the site and background pollutant maps; and
- Review of the traffic flow data, which has been used as an input to the air quality modelling assessment.

6.2.2 There is the potential for impacts on local air quality during both the construction and operational phases of the Proposed Development. During the construction phase, there is the potential for impacts to occur as a result of dust and PM_{10} emissions. Guidance provided by the Institute of Air Quality Management (IAQM) (Ref. 6.1) includes the following criteria for assessing the effects of construction dust:

- A sensitive 'human receptor' within 350m of the site boundary or within 50m of the route used by construction vehicles on public highways up to 500m from the site entrance; and /or
- A sensitive 'ecological receptor' within 50m of the site boundary or within 50m of the route used by construction vehicles on the public highway, up to 500m from the site entrance.

6.2.3 A residential estate is located to the northwest of the site and a caravan park to the northeast. An assessment of construction phase impacts of emissions of dust and particulate matter on human receptors has therefore been included in this assessment. There are no sensitive ecological sites within 50m of the site boundary. The

Waldringfield Pit SSSI is located within the site boundary, it should be noted however that this was declared due to geological features rather than ecological importance. An assessment of construction phase impacts on sensitive ecological habitats has therefore not been included in this assessment.

6.2.4 During the operation of the Proposed Development there is the potential for impacts on local air quality to occur as a result of emissions from road vehicle trips generated by the operation of the Development. Guidance provided by the IAQM & Environmental Protection UK (EPUK) (Ref. 6.2) provides a threshold criteria for establishing when significant impacts on local air quality may occur and when a detailed assessment of potential impacts is required. At locations outside an AQMA, a change in light duty vehicles (LDV) of more than 500 per day and / or a change in heavy duty vehicles (HDV) of more than 100 per day is considered to result in potentially significant impacts on air quality.

6.2.5 Data provided by the transport consultants indicates that the Proposed Development will result in an increase in traffic flows in excess of the threshold values. An assessment of impacts arising from vehicle emissions using the local roads has therefore been included in the assessment. The impacts are considered at sensitive human and ecological receptors within the vicinity of the roads likely to be affected by the Proposed Development. Consideration has also been given to the suitability of the site for its proposed use.

6.2.6 Details of the assessment methodology and the specific issues considered are provided below.

Construction Phase Methodology

6.2.7 To assess the potential impacts associated with dust and PM_{10} releases during the construction phase and to determine any necessary mitigation measures, an assessment based on the latest guidance from the IAQM (Ref 6.1) has been undertaken.

6.2.8 This approach divides construction activities into the following dust emission sources:

- demolition;
- earthworks;
- construction; and
- trackout.

6.2.9 The risk of dust effects (low, medium or high) is determined by the scale (magnitude) and nature of the works and the proximity of sensitive human and ecological receptors.

6.2.10 The significance of the dust effects is based on professional judgement, taking into account the sensitivity of receptors and existing air quality.

Dust Emission Magnitude

6.2.11 The magnitude of the dust impacts for each source is classified as Small, Medium or Large depending on the scale of the proposed works.

Table 6.1 Dust Emission Magnitude Criteria

6.2.12 Summarises the IAQM criteria that may be used to determine the magnitude of the dust emission. These criteria are used in combination with site specific information and professional judgement.

Table 6.1 Dust Emission Magnitude Criteria

Source	Large	Medium	Small
Demolition	• Total building volume >50,000m^3 • Potentially dusty material (e.g. concrete) • On-site crushing and screening • Demolition activities >20m above ground level.	• Total building volume 20,000 - 50,000m^3 • Potentially dusty material • Demolition activities 10 - 20m above ground level.	• Total building volume <20,000m^3 • Construction material with low potential for dust release • Demolition activities <10m above ground level • Demolition during wetter months
Earthworks	• Total site area >10,000m^2 • Potentially dusty soil type (e.g. clay) • >10 heavy earth moving vehicles active at any one time • Formation of bunds >8m in height • Total material moved >100,000 tonnes	• Total site area 2,500 -10,000m^2 • Moderately dusty soil type (e.g. silt) • 5 - 10 heavy earth moving vehicles active at any one time • Formation of bunds 4 - 8m in height • Total material moved 20,000 - 100,000 tonnes	• Total site area <2,500m^2 • Soil type with large grain size (e.g. sand) • <5 heavy earth moving vehicles active at any one time • Formation of bunds <4m in height • Total material moved <20,000 tonnes • Earthworks during wetter months
Construction	• Total building volume >100,000m^3 • On-site concrete batching • Sandblasting	• Total building volume 25,000 - 100,000m^3 • Potentially dusty construction material (e.g. concrete) • On-site concrete batching	• Total building volume <25,000m^3 • Material with low potential for dust release (e.g. metal cladding or timber)
Trackout	• >50 HGV movements in any one day (a) • Potentially dusty surface material (e.g. high clay content) • Unpaved road	• 10 - 50 HGV movements in any one day (a) • Moderately dusty surface material (e.g. silt) • Unpaved road length 50 - 100m	• <10 HGV movements in any one day (a) • Surface material with low potential for dust release • Unpaved road length <50m

	length >100m		
(a) HGV movements refer to outward trips (leaving the site) by vehicles of over 3.5 tonnes.			

Receptor Sensitivity

6.2.13 The sensitivity of a receptor is classified as high, medium or low. Table 6.1 presents the criteria provided by the IAQM guidance for defining the sensitivity of a receptor.

Table 6.2 Factors defining the Sensitivity of a Receptor

Sensitivity	Human (health)	Human (dust soiling)
High	• Locations where members of the public are exposed over a time period relevant to the air quality objectives for PM_{10} (a) • Examples include residential dwellings, hospitals, schools and residential care homes.	• Regular exposure • High level of amenity expected. • Appearance, aesthetics or value of the property would be affected by dust soiling. • Examples include residential dwellings, museums, medium and long-term car parks and car showrooms.
Medium	• Locations where workers are exposed over a time period relevant to the air quality objectives for PM_{10} (a) • Examples include office and shop workers (b)	• Short-term exposure • Moderate level of amenity expected • Possible diminished appearance or aesthetics of property due to dust soiling • Examples include parks and places of work
Low	• Transient human exposure • Examples include public footpaths, playing fields, parks and shopping streets	• Transient exposure • Enjoyment of amenity not expected. • Appearance and aesthetics of property unaffected • Examples include playing fields, farmland (c), footpaths, short-term car parks and roads
(a) In the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day. (b) Does not include workers exposure to PM_{10} as protection is covered by Health and Safety at Work legislation. (c) Except commercially sensitive horticulture.		

6.2.14 The sensitivity of a receptor will also depend on a number of additional factors including any history of dust generating activities in the area, likely cumulative dust impacts from nearby construction-sites, any pre-existing screening such as trees or buildings and the likely duration of the impacts. In addition, the influence of the prevailing wind direction and local topography may be of relevance when determining the sensitivity of a receptor.

Area Sensitivity

6.2.15 The sensitivity of the area to dust soiling and health impacts is dependent on the number of receptors within each sensitivity class and their distance from the source. In addition, human health impacts are dependent on the existing PM_{10} concentrations in the area.

6.2.16 Table 6.3 and Table 6.4 summarise the criteria for determining the overall sensitivity of the area to dust soiling and health impacts respectively.

Table 6.3 Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the source (a)			
		<20m	<50m	<100m	<350m
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

(a) For trackout, the distance is measured from the side of roads used by construction traffic. Beyond 50m, the impact is negligible.

Table 6.4 Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} ($\mu g/m^3$)	Number of Receptors	Distance from the source (a)				
			<20m	<50m	<100m	<200m	<350m
High	> 32	> 100	High	High	High	Medium	Low
		10 - 100	High	High	Medium	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	28 - 32	> 100	High	High	Medium	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	24 - 28	> 100	High	Medium	Low	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	< 24	> 100	Medium	Low	Low	Low	Low

		10 - 100	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Medium	**>32 µg/m^3**	**> 10**	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	28-32 µg/m^3	**> 10**	Medium	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	<28 µg/m^3	**-**	Low	Low	Low	Low	Low
Low	**-**	**>1**	Low	Low	Low	Low	Low
(a) For trackout, the distance is measured from the side of roads used by construction traffic. Beyond 50m, the impact is negligible.							

6.2.17 For each dust emission source (demolition, construction, earthworks and trackout), the worst-case area sensitivity is used in combination with the dust emission magnitude to determine the risk of dust impacts.

Risk of Dust Impacts

6.2.18 The risk of dust impacts prior to mitigation for each emission source is presented in Table 6.5, Table 6.6 and Table 6.7.

Table 6.5 Risk of Dust Impacts – Demolition

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table 6.6 Risk of Dust Impacts – Earthworks and Construction

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table 6.7 Risk of Dust Impacts – Trackout

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

Construction Traffic

6.2.19 Construction traffic will contribute to existing traffic levels on the surrounding road network. The greatest potential for impacts on air quality from traffic associated with this phase of the Proposed Development will be in the areas immediately adjacent to the principal means of access for construction traffic.

6.2.20 Information is not currently available regarding the numbers of vehicles associated with construction. However, considering the high proportion of HGVs currently using the A12, the impact of the construction vehicles would be relatively minor. As such, the flows are not predicted to be significant.

Operational Phase Methodology

6.2.21 Air quality at the site has been predicted using the ADMS Roads dispersion model (Version 4.0.1, December 2015). This is a commercially available dispersion model and has been widely validated for this type of assessment and used extensively in the Air Quality Review and Assessment process.

6.2.22 The model uses detailed information regarding traffic flows on the local road network and local meteorological conditions to predict pollution concentrations at specific locations selected by the user. Meteorological data from Wattisham Meteorological Station for the year 2015 has been used for the assessment.

6.2.23 The model has been used to predict road specific concentrations of oxides of nitrogen (NO_x) and Particulate Matter (PM_{10} and $PM_{2.5}$) at selected receptors in the vicinity of the surrounding road network and within the Development itself. The predicted concentrations of NO_x have been converted to NO_2 using the NO_x to NO_2 calculator available on the Defra air quality website (Ref. 6.3).

6.2.24 Traffic data for road links affected by the Development Site has been provided by the Transport Consultants.

6.2.25 A summary of the traffic data used in the assessment can be found in Appendix C1. The data includes details of annual average daily traffic flows (AADT), vehicle speeds and percentage Heavy Duty Vehicles (HDV) for the assessment years considered. Low traffic speeds have been assigned to appropriate road links to account for congestion and queuing vehicles.

6.2.26 The following scenarios have been included in the assessment:

- 2015 – baseline traffic (for verification purposes);

- 2027 – baseline traffic (hereafter referred to as 'without development' scenario); and
- 2027 – baseline and development traffic (hereafter referred to as 'with development' scenario).

6.2.27 The emission factors released by Defra in July 2016, provided in the emissions factor toolkit EFT2016_7.0 have been used to predict traffic related emissions in 2015 and 2027. It should be noted that since the modelling was completed, the proposed opening year has been established to be the year 2032 rather than 2027. It is considered that the results of the modelling for the year 2027 will be a reasonable indication of the results for the year 2032.

6.2.28 To predict local air quality, traffic emissions predicted by the model must be added to local background concentrations. Background concentrations of NO_x, NO_2, PM_{10} and $PM_{2.5}$ have been taken from the 2013 Defra background maps (issued July 2016). The maps provide an estimate of background concentrations between 2013 and 2030. The data used for the modelling assessment are set out in Table 6.13.

6.2.29 Background concentrations for 2015 have been used to predict concentrations in 2027 assuming no change in future years. This is considered to represent a worst-case prediction of future concentrations.

6.2.30 To determine the performance of the model at a local level, a comparison of modelled results with the results of monitoring carried out within the study area was undertaken. This process aims to minimise modelling uncertainty and systematic error by correcting the modelled results by an adjustment factor to gain greater confidence in the final results. This process was undertaken using the methodology outlined in Chapter 7, Section 4 of LAQM.TG (16). Full details of the model verification process are presented in Appendix C2.

6.2.31 An overall verification factor of 1.94 was determined which indicates that the model is underpredicting compared to the monitored concentrations in this area. The modelled NO_x concentrations were adjusted using this factor prior to conversion to NO_2 using the NO_x to NO_2 calculation tool available on Defra's website.

6.2.32 Local roadside monitoring data were not available for concentrations of PM_{10} and $PM_{2.5}$. Modelled PM_{10} and $PM_{2.5}$ concentrations have therefore been adjusted by the verification factor obtained for NO_x, which is consistent with the guidance provided in LAQM.TG(16).

6.2.33 LAQM.TG(16) does not provide a method for the conversion of annual mean NO_2 concentrations to 1-hour mean NO_2 concentrations. However, research (Ref. 6.4) has concluded that exceedances of the 1-hour mean objective are generally unlikely to occur where annual mean concentrations do not exceed 60 $\mu g/m^3$. Care has been taken to ensure that locations where the 1-hour mean objective is relevant are included in the assessment.

6.2.34 A quantitative assessment of air quality at and around the Proposed Development site has been completed against the Air Quality Strategy objectives set out in Appendix C3 for NO_2, PM_{10} and $PM_{2.5}$. A quantitative assessment was also undertaken in assessing the results of the modelling for NO_x concentrations against the relevant critical level outlined in the Air Quality Strategy for the protection of ecological habitats.

6.2.35 Guidance provided in the Design Manual for Roads and Bridges Volume 11, Section 3, Part 1: Air Quality (Ref. 6.5) recommends that an assessment of nitrogen deposition is completed for SACs, SPAs, SSSIs and Ramsar sites. An assessment of nitrogen deposition has therefore been completed for the Sinks Valley Kesgrave SSSI (receptor E1). The nitrogen deposition rate was calculated using typical deposition velocities as recommended in the relevant guidance (Ref. 6.6). The calculated nitrogen deposition rates were compared with relevant critical loads for the protection of sensitive ecosystems and vegetation also set out in Appendix C3.

Significance Criteria

Construction Phase

6.2.36 The IAQM assessment methodology recommends that significance criteria are only assigned to the identified risk of dust impacts occurring from a construction activity following the application of appropriate mitigation measures. For almost all construction activities, the application of effective mitigation should prevent any significant effects occurring to sensitive receptors and therefore the residual effects will normally be negligible.

Operational Phase

6.2.37 The significance of the predicted impacts is determined in accordance with the EPUK/ IAQM planning guidance, in combination with the professional judgement. The guidance recommends that the impact at individual receptors is described by expressing the magnitude of incremental change in pollution concentration as a proportion of the relevant Air Quality Assessment Level (AQAL) and examining this change in the context of the new total concentration and its relationship with the assessment criterion as summarised in Table 6.8.

Table 6.8 Impact Descriptors for Individual Receptors

Long Term Average Concentration at Receptor in Assessment Years	% Change in concentration relative to AQAL (a)			
	1	2-5	5-10	>10
75% or less of AQAL	Negligible	Negligible	Slight adverse	Moderate adverse
76-94% of AQAL	Negligible	Slight adverse	Moderate adverse	Moderate adverse
95-102% of AQAL	Slight adverse	Moderate adverse	Moderate adverse	Substantial adverse
103-109% of AQAL	Moderate adverse	Moderate adverse	Substantial adverse	Substantial adverse
110% or more of AQAL	Moderate adverse	Substantial adverse	Substantial adverse	Substantial adverse
(a) A change in concentration of less than 0.5% of the AQAL is considered insignificant, however changes between 0.5% and 1% are rounded up to 1%.				

6.2.38 The EPUK/IAQM guidance notes that the criteria in Table 6.8 should be used to describe impacts at individual receptors and should be considered as a starting point to make a judgement on significance of effects, as other influences may need to be accounted for. The EPUK/IAQM guidance states that the assessment of overall significance should be based on professional judgement, taking into account several factors, including:

- The existing and future air quality in the absence of the development;
- The extent of current and future population exposure to the impacts; and
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

6.2.39 In order to determine whether the impacts of the change in NO_x concentrations at ecological habitats are significant, the EA guidance criteria have been used. These are outlined in Table 6.9 below.

Table 6.9 Significance Criteria for Ecological Sites

Ecological Habitats	Stage One	Stage Two
SPAs, SACs, Ramsar sites or SSSIs	The impact is considered insignificant if • Short term Process Contribution (PC) < 10% short term critical level; and • Long term PC < 1% long term critical level	The impact is considered to be insignificant if • Long term PC >1% and PEC <70% of the long term critical level.
Local Nature Sites (ancient woodlands, local wildlife sites, national and local nature reserves)	The impact is considered to be insignificant if: • Short term PC <100% short term critical level; and • Long term PC < 100% long term critical level	

6.2.40 There are no criteria for determining whether the impacts of nitrogen deposition are significant. The significance has therefore been determined using professional judgement.

Sensitive Receptors

6.2.41 LAQM.TG(16) describes in detail typical locations where consideration should be given to pollutants defined in the Regulations. Generally, the guidance suggests that all locations 'where members of the public are regularly present' should be considered. At such locations, members of the public will be exposed to pollution over the time that they are present, and the most suitable averaging period of the pollutant needs to be used for assessment purposes.

6.2.42 For instance, on a footpath, where exposure will be transient (for the duration of passage along that path) comparison with short-term standard (i.e. 15-minute mean or 1-hour mean) may be relevant. In a school, or adjacent to a private dwelling, however; where exposure may be for longer periods, comparison with long-term (such as 24-hour mean or annual mean) standards may be most appropriate. In general terms, concentrations associated with long-term standards are lower than short-term standards owing to the chronic health effects associated with exposure to low level pollution for longer periods of time.

6.2.43 To assess the impact of traffic generated by the Proposed Development pollutant concentrations have been predicted at 29 existing sensitive receptors including 23 residential properties, two schools, two short term receptors and two sensitive ecological habitats close to the roads affected by traffic generated by the Proposed Development. Five locations within the Proposed Development itself were also included. Details of these sensitive receptors are presented in Table 6.10 and the locations are illustrated in Figure 6.1.

6.2.44 The modelling assessment also predicted concentrations at four locations within the Proposed Development itself.

Table 6.10 Location of Sensitive Receptors

ID	Receptor	Type	Easting	Northing
R1	Property on Martlesham Road	Residential	624146.9	247380.6
R2	The Firs, off Main Street	Residential	624303.4	246332.2
R3	1 Crown Close	Residential	624886.6	246621.1
R4	The Red House	Residential	625191.6	247149.3
R5	Cody Cottage	Residential	624279.8	246131.5
R6	90 Manor Road	Residential	624562.4	245711.7
R7	36 Burgess Place	Residential	624653.8	245334.1
R8	16 Coopers Road	Residential	624707.6	245036.3
R9	34 Lancaster Drive	Residential	624778.9	244649.2
R10	1 Aerodrome Cottage	Residential	624896.0	244096.0
R11	1 Lewis Cottage	Residential	624001.9	243091.7
R12	349 Main Road	Residential	623753	246075.8
R13	245 Main Road	Residential	623017.4	245923.2
R14	Kesgrave High School	Residential	622533.4	245893.6
R15	77 Main Street	Residential	621419.8	245690.8
R16	45 Main Street	Residential	620481	245413.5
R17	71 Main Street	Residential	619478.4	245217
R18	921 Woodbridge Road	Residential	618866.6	245029.9
R19	437 Woodbridge Road	Residential	618008.8	245160
R20	198 Woodbridge Road	Residential	617289.8	244821.7
R21	Heath Primary School	Residential	621767.5	245475.5
R22	120 Bell Road	Residential	621801.6	244988.4
R23	2 Nursery Cottages	Residential	623242	244181.4
R24	785 Foxhall Road	Residential	620668.1	243848.9
R25	670 Foxhall Road	Residential	619861.2	243909.5
ST1	Kesgrave High School Playing Fields	Residential	622072.7	245859
ST2	Rushmere Golf Course	Residential	620067.6	245272
E1	Sinks Valley Kesgrave SSSI	Ecological	622678	246030
E2	Mill Stream LNR	Ecological	621013	244034
D1	Proposed Development (West)	Proposed	624849	244506
D2	Proposed Development (South)	Proposed	625576	244242
D3	Proposed Development (East)	Proposed	626440	244733
D4	Proposed Development (North)	Proposed	625526	245540
D5	Proposed Development (Centre)	Proposed	625820	244858

Figure 6.1 Location of Receptors Considered within ADMS Model

6.3 Consultation undertaken

6.3.1 Consultation was undertaken with the Environmental Health Officer of SCDC to confirm the scope of assessment. The following comments were made:

Table 6.11 Summary of Consultation with EHO of SCDC

Date	Comments
Email received 2nd March 2017 from the EHO of SCDC	The traffic data used in the air quality modelling should be approved and accepted by the Highways Authority, Suffolk County Council. It was requested that the following impacts should be included in the assessment: • The impact of construction; • The impact of the development on AQMAs; and • Any nearby sources of pollution that may affect the development.

6.4 Legislation, Planning Policy and Guidance

Legislation

The European Directive on Ambient Air and Cleaner Air for Europe

6.4.1 European Directive 2008/50/EC (Ref. 6.7) of the European Parliament and of the Council of 21st May 2008, sets legally-binding Europe-wide limit values for the protection of public health and sensitive habitats. The Directive streamlines the European Union's air quality legislation by replacing four of the five existing Air Quality Directives within a single, integrated instrument.

6.4.2 The pollutants included are sulphur dioxide (SO_2), NO_2, $PM_{10,}$ $PM_{2.5}$, lead (Pb), carbon monoxide (CO), benzene (C_6H_6), ozone (O_3), polycyclic aromatic hydrocarbons (PAHs), cadmium (Cd), arsenic (As), nickel (Ni) and mercury (Hg).

Air Quality Strategy for England, Scotland, Wales & Northern Ireland

6.4.3 The Government's policy on air quality within the UK is set out in the Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland (AQS) published in July 2007 (Ref. 6.8), pursuant to the requirements of Part IV of the Environment Act 1995. The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK. The AQS is designed to be an evolving process that is monitored and regularly reviewed.

6.4.4 The AQS sets standards and objectives for ten main air pollutants to protect health, vegetation and ecosystems. These are C_6H_6, 1,3-butadiene ($C3H_6$), CO, Pb, NO_2, PM_{10}, $PM_{2.5}$, SO_2, O_3 and PAHs.

6.4.5 The air quality standards are long-term benchmarks for ambient pollutant concentrations which represent negligible or zero risk to health, based on medical and scientific evidence reviewed by the Expert Panel on Air Quality Standards (EPAQS) and

the World Health Organisation (WHO). These are general concentration limits, above which sensitive members of the public (e.g. children, the elderly and the unwell) might experience adverse health effects.

6.4.6 The air quality objectives are medium-term policy based targets set by the Government which take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e. a limited number of permitted exceedances of the standard over a given period.

6.4.7 For some pollutants, there is both a long-term (annual mean) standard and a short-term standard. In the case of NO_2, the short-term standard is for a 1-hour averaging period, whereas for PM_{10} it is for a 24-hour averaging period. These periods reflect the varying impacts on health of differing exposures to pollutants (e.g. temporary exposure on the pavement adjacent to a busy road, compared with the exposure of residential properties adjacent to a road).

6.4.8 The AQS also contains a framework for considering the effects of a finer group of particles known as '$PM_{2.5}$'. Local Authorities are required to work towards reducing emissions / concentrations of $PM_{2.5}$, but there is currently no statutory objective incorporated into UK law at this time.

6.4.9 The AQS objective levels relevant to this assessment are set presented in Appendix C3.

Air Quality (England) Regulations

6.4.10 Many of the objectives in the AQS were made statutory in England through the Air Quality (England) Regulations 2000 (Ref 6.9) and the Air Quality (England) (Amendment) Regulations 2002 (the Regulations) (Ref 6.10) for the purpose of Local Air Quality Management (LAQM).

6.4.11 The Air Quality Standards Regulations 2010 (Ref 6.11) came into force on the 10th June 2010 and have adopted into UK law the limit values required by EU Directive 2008/50/EC. These regulations prescribe the 'relevant period' (referred to in Part I2V of the Environment Act 1995) that local authorities must consider in their review of the future quality of air within their area. The regulations also set out the air quality objectives to be achieved by the end of the 'relevant period'.

6.4.12 Ozone is not included in the Regulations as, due to its transboundary nature, mitigation measures must be implemented at a national level rather than at a local authority level.

Local Air Quality Management (LAQM)

6.4.13 Part IV of the Environment Act 1995 also requires local authorities to periodically review and assess the quality of air within their administrative area. The Reviews have to consider the present and future air quality and whether any air quality objectives prescribed in Regulations are being achieved or are likely to be achieved in the future.

6.4.14 Where any of the prescribed air quality objectives are not likely to be achieved, the authority concerned must designate that part an Air Quality Management Area (AQMA).

6.4.15 For each AQMA, the local authority has a duty to draw up an Air Quality Action Plan (AQAP) setting out the measures the authority intends to introduce to deliver

improvements in local air quality in pursuit of the air quality objectives. Local authorities are not statutorily obliged to meet the objectives, but they must show that they are working towards them.

6.4.16 The Department of Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities in their Review and Assessment work (Ref. 6.12). This guidance, referred to in this chapter as LAQM.TG(16), has been used where appropriate in the assessment.

Planning Policy

National Planning Policy Framework

6.4.17 The National Planning Policy Framework (NPPF) (Ref. 6.13) sets out the Government's planning policies for England and how these are expected to be applied.

6.4.18 At the heart of the NPPF is a presumption in favour of sustainable development. It requires Local Plans to be consistent with the principles and policies set out in the Framework with the objective of contributing to the achievement of sustainable development.

6.4.19 Current planning law requires that applications for planning permission must be determined in accordance with the relevant development plan. The NPPF should be taken into account in the preparation of development plans and the policies set out within the Framework are a material consideration in planning decisions.

6.4.20 The NPPF identifies 12 core planning principles that should underpin both plan-making and decision-taking, including a requirement for planning to *'contribute to conserving and enhancing the natural environment and reducing pollution'*.

6.4.21 Under Policy 11: Conserving and Enhancing the Natural Environment, paragraph 109 states that '*the planning system should contribute to and enhance the natural and local environment by preventing both new and existing* developments *from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution'*.

6.4.22 In dealing specifically with air quality, paragraph 124 of the Framework states that *'planning policies should* sustain *compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan'*.

Suffolk Coastal Local Plan Core Strategy 2013

6.4.23 The Suffolk Coastal Core Strategy (Ref 6.14) is the central part of the local plan which will guide development across the District until 2027:

6.4.24 Development Management Policy DM23 – Residential Amenity, states:

'When considering the impact of new development on residential amenity, the Council will have regard to the following

- *light spillage, air quality and other forms of pollution*

Development will be acceptable where it would not cause an unacceptable loss of amenity to adjoining or future occupiers of the development'.

Control of Dust and Particulates associated with Construction

6.4.25 Section 79 of the Environmental Protection Act (1990) provides the following definitions of statutory nuisance relevant to dust and particles:

- 'Any dust or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance', and
- 'any accumulation or deposit which is prejudicial to health or a nuisance'.

6.4.26 Following this, Section 80 states that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.

6.4.27 In the context of the proposed development, the main potential for nuisance of this nature will arise during the construction phase – potential sources being the clearance, earthworks, construction and landscaping processes.

6.4.28 There are no statutory limit values for dust deposition above which 'nuisance' is deemed to exist – 'nuisance' is a subjective concept and its perception is highly dependent upon the existing conditions and the change which has occurred. However, research has been undertaken by a number of parties to determine community responses to such impacts and correlate these to dust deposition rates.

EPUK & IAQM Land Use Planning and Development Control

6.4.29 Environmental Protection UK (EPUK) & Institute of Air Quality Management (IAQM) published the Land Use Planning and Development Control Air Quality guidance in May 2015 (Ref. 6.2) to provide guidance on the assessment of air quality in relation to planning proposals and ensure that air quality is adequately considered within the planning control process.

6.4.30 The main focus of the guidance is to ensure all developments apply good practice principles to ensure emissions and exposure are kept to a minimum. It also sets out criteria for identifying when a more detailed assessment of operational impacts is required, guidance on undertaking detailed assessments and criteria for assigning the significance of any identified impacts.

6.4.31 This guidance has been used within this assessment.

Assessment of Dust from Demolition and Construction

6.4.32 The IAQM published guidance in 2014 on the assessment of emissions from demolition and construction activities (Ref. 6.1). The guidance sets out an approach to identifying the risk of impacts occurring at nearby sensitive receptors from dust generated during the construction process and sets out recommended mitigation measures based on the identified risk.

6.4.33 This guidance has been used within this assessment.

6.5 Existing environment

Suffolk Coastal District Council Review and Assessment of Air Quality

6.5.1 Suffolk Coastal District Council (SCDC) has carried out detailed assessments of air quality (Ref. 6.15) in the area and as a result has declared two areas as AQMA due to potential exceedences of the AQS objectives for annual mean NO_2 concentrations. These are:

- Woodbridge Junction AQMA, which was declared in 2006 and covers 6 properties on the western side of the Throughfare / Melton Hill arm of Woodbridge Junction; and
- Stratford St Andrew AQMA which was declared in 2014 and covers 4 properties at Long Row, Main Road in Stratford St Andrew.

6.5.2 The closest is the Woodbridge Junction AQMA, which is located approximately 4.2km to the northeast of the site.

Automatic Local Monitoring Data

6.5.3 SCDC operates one automatic monitoring site, which is a kerbside monitoring site located within the Woodbridge Junction AQMA. Due to the distance and setting of the monitoring site, it is considered that pollutant concentrations measured at this location would not be a suitable estimate of the concentrations likely to be experienced at the site.

Non-Automatic Monitoring

6.5.4 NO_2 diffusion tube monitoring is also carried out at a number of locations in the district. Three diffusion tubes are located in the vicinity of the site, they are all at roadside locations. Bias adjusted data from these monitoring sites are presented in Table 6.12 below. Monitoring has also been undertaken at an urban background site in Woodbridge. Although more distant from the site, it is set back from the major roads and therefore provides an indication of likely background concentrations in the area. Bias adjusted data from this monitoring site is also provided in Table 6.12 below.

Table 6.12 NO_2 concentrations recorded at the nearest Diffusion Tube Monitoring Locations

Monitoring Site	Type	2011	2012	2013	2014	2015
MRT 1	Roadside	24	21	21	22	24
MRT 2	Roadside	-	-	-	16	-
KSG 9	Roadside	34	31	28	29	28
WBG 3	Urban Background	16	15	14	13	12

6.5.5 There have been no exceedences of the AQS objective level for annual mean NO_2 concentrations at the nearby or background monitoring sites over the five year period studied. Therefore, it is likely that the existing concentrations within the site are currently below the AQS objective level for annual mean NO_2 concentrations.

Defra Background Maps

6.5.6 Additional information on background concentrations in the vicinity of the site have been obtained from the Defra background pollutant maps. The 2013 Defra background maps provide estimated concentrations for the years 2013 to 2030. For the purposes of this assessment 2015 background concentrations have been used. The average pollutant concentrations from the grid squares representing the assessment area have been extracted from the maps which include the development site and road links included in the modelling assessment. The background concentrations are presented in Table 6.13 below.

Table 6.13 Estimated Annual Mean Background Concentrations from Defra Maps (µg/m3)

Grid Reference	Relevant Receptors	NO_x	NO_2	PM_{10}	$PM_{2.5}$
624500, 247500	R1	17.2	12.5	16.8	11.6
625500, 247500	R4	15.6	11.4	16.2	11.1
623500, 246500	R12	15.9	11.6	15.3	10.8
624500, 246500	R2, R3, R5	18.3	13.2	15.9	11.3
618500, 245500	R18, R19	21.6	15.3	16.1	11.6
619500, 245500	R17	21.1	14.9	16.0	11.4
620500, 245500	R16, ST2	17.3	12.5	15.8	11.2
621500, 245500	R15, R21	17.1	12.4	15.7	11.2
622500, 245500	R14, ST1	17.0	12.3	15.9	11.0
623500, 245500	R13	16.0	11.6	16.0	11.2
624500, 245500	R6, R7, R8	19.7	14.1	15.9	11.3
625500, 245500	D4	15.1	11.0	15.5	11.0
617500, 244500	R20	23.6	16.5	16.6	12.0
621500, 244500	R22	15.7	11.4	15.5	11.0
622500, 244500		14.9	10.9	16.2	11.3
623500, 244500	R23	15.5	11.3	15.8	11.1
624500, 244500	R9, R10, D1	17.5	12.7	16.7	11.6
625500, 244500	D2, D5	14.6	10.7	16.0	11.2
626500, 244500	D3	13.5	9.9	16.3	11.2
619500, 243500	R25	20.2	14.4	15.6	11.3
620500, 243500	R24	17.2	12.4	14.9	10.8
624500, 243500	R11	19.0	13.6	16.9	11.6

6.6 Predicted impacts

Construction Phase Effects

Area Sensitivity

6.6.1 The Proposed Development Site is currently occupied by a mix of uses. In the north there is currently a science and business park, woodlands, ponds and grassland. The central area is currently occupied by a quarry and sand and gravel extraction operations. The remaining site is currently occupied by agricultural land.

6.6.2 The assessment of dust impacts is dependent on the proximity of the most sensitive receptors to the site boundary. A summary of the receptor and area sensitivity to health and dust soiling impacts is presented in Table 6.14.

Table 6.14 Sensitivity of Receptors and the Local Area to Dust Impacts

Receptor	Distance from Site Boundary (m)	Approx Number of Receptors	Sensitivity to Health Impacts (a)		Sensitivity to Dust Soiling Impacts	
			Receptor	Area	Receptor	Area
Residential Properties	<20 m	5-10	High	Low	High	Medium
	<50 m	15-20	High	Low	High	Medium
Overall Sensitivity of the Area			**Low**		**Medium**	
(a) Estimated background PM_{10} concentration is 16						

6.6.3 Construction traffic will access the site via the A12. The site is large, therefore receptors within 500m along the A12 from the site access are considered to determine the sensitivity of the area to effects from track-out. There are between 40 and 50 sensitive human receptors within 50m of the road within 500m from the site entrance therefore the sensitivity of the area to effects from track-out is considered to be medium for dust and low for human health effects.

6.6.4 The precise behaviour of the dust, its residence time in the atmosphere, and the distance it may travel before being deposited will depend upon a number of factors. These include wind direction and strength, local topography and the presence of intervening structures (buildings, etc.) that may intercept dust before it reaches sensitive locations. Furthermore, dust would be naturally suppressed by rainfall.

6.6.5 The prevailing wind is from the southwest, therefore receptors to the northeast of the Development Site are the most likely to experience dust impacts from the development. The area to the northeast of the site is predominantly open fields and a caravan park.

Dust Emission Magnitude

6.6.6 Dust emissions during the demolition phase will depend on the type of material within the buildings to be demolished and the demolition activities undertaken on-site. As the site is large and there are a lot of buildings (approximately 90 within the science and business park), the magnitude of dust emissions for the demolition phase is considered to be large.

6.6.7 Earthworks will primarily involve excavating material, haulage, tipping and stockpiling. This may also involve levelling of the site and landscaping. The area of the site is approximately 113.3ha. During earthworks there is likely to be more than 10 heavy duty vehicles on-site at any given time and materials are likely to be stored in bunds greater than 8m in height. The magnitude of the dust emission for the earthworks phase is therefore considered to be large.

6.6.8 Dust emissions during construction will depend on the scale of the works, method of construction, construction materials and duration of build. The completed development will have a volume of greater than 100,000m^3 and the main construction material would involve the use of concrete, known to be a dusty material. Based on the overall size of the development the dust emission magnitude is considered to be large.

6.6.9 Factors influencing the degree of trackout and associated magnitude of effect include vehicle size, vehicle speed, vehicle numbers, geology and duration. Construction traffic will access the site via the A12. The number of HGV movements (leaving the site) is not currently known but is likely to be greater than 50 per day during peak periods, therefore dust emission magnitude due to trackout is considered to be large.

Dust Risk Effects

6.6.10 A summary of the potential risk of dust impacts, based on the low overall sensitivity of the area to human health and ecological effects and high overall sensitivity to dust soiling impacts, is presented in Table 6.15Table 6.15.

Table 6.15 Risk of Dust Impacts Prior to Mitigation

Source	Impact Magnitude	Human Health Risk	Dust Soiling Risk
Demolition	Large	Medium	High
Earthworks	Large	Low	Medium
Construction	Large	Low	Medium
Trackout	Large	Low	Medium

Operation Phase Effects

Predicted NO_2 Concentrations

6.6.11 Annual mean NO_2 concentrations, predicted at the identified receptor locations are presented in Table 6.16 below.

Table 6.16 Predicted Annual Mean NO_2 Concentrations (µg/m^3)

Receptor	2027		Development Impact (as a % of the AQO)	Impact Significance
	Without Development	With Development		
R1	13.9	14.0	0.2	Negligible
R2	15.2	15.3	0.0	Negligible

R3	14.3	14.2	-0.2	Negligible
R4	12.4	12.3	-0.2	Negligible
R5	14.9	15.0	0.1	Negligible
R6	17.2	17.3	0.2	Negligible
R7	16.8	16.9	0.2	Negligible
R8	16.4	16.5	0.1	Negligible
R9	15.9	16.0	0.2	Negligible
R10	14.2	14.4	0.3	Negligible
R11	15.7	15.7	0.1	Negligible
R12	12.7	12.8	0.3	Negligible
R13	12.5	12.6	0.3	Negligible
R14	13.4	13.5	0.3	Negligible
R15	14.4	14.6	0.6	Negligible
R16	13.7	13.8	0.4	Negligible
R17	15.9	16.0	0.3	Negligible
R18	18.5	18.6	0.0	Negligible
R19	17.6	17.7	0.0	Negligible
R20	19.7	19.7	0.0	Negligible
R21	12.9	13.0	0.4	Negligible
R22	11.9	12.1	0.4	Negligible
R23	12.6	12.7	0.2	Negligible
R24	14.0	14.0	0.0	Negligible
R25	16.0	16.0	0.0	Negligible
ST1	13.7	13.9	0.4	-
ST2	13.2	13.2	0.2	-
D1	-	19.1	0.4	-
D2	-	12.2	1.9	-
D3	-	10.4	0.4	-
D4	-	11.3	0.0	-
D5	-	11.0	0.1	-

6.6.12 The results of the modelling indicate that in the opening year of 2027, the AQS objective level for annual mean NO_2 concentrations will be met at all of the receptor locations included within the assessment.

6.6.13 The greatest increase as a result of emissions from the traffic generated by the Proposed Development is 0.25µg/m^3 which equates to 0.6% of the AQAL. According to the IAQM & EPUK significance criteria set out in Table 6.8, the effect of the Proposed Development on local air quality with regard to annual mean NO_2 concentrations is considered to be negligible.

6.6.14 The predicted annual mean NO_2 concentrations are all below 60µg/m^3, therefore it is considered likely that the AQS objective level for hourly mean NO_2 concentrations will also be met. Therefore, the impact of the Proposed Development with regard to hourly mean NO_2 concentrations is also considered to be negligible.

6.6.15 Within the site itself (receptors D1 to D5) annual mean NO_2 concentrations are predicted to fall well below the relevant AQAL. It is also expected that the hourly mean objective level within the site will be met. The impact with regards to new exposure is therefore also considered to be negligible.

Predicted PM_{10} Concentrations

6.6.16 Predicted annual mean PM_{10} concentrations at the identified receptor locations are presented below in Table 6.17.

Table 6.17 Predicted Annual Mean PM_{10} Concentrations (µg/m^3)

Receptor	2027		Development Impact (as a % of the AQO)	Impact Significance
	Without Development	With Development		
R1	17.4	17.5	0.1	Negligible
R2	16.9	16.9	0.0	Negligible
R3	16.4	16.4	-0.1	Negligible
R4	16.6	16.6	-0.1	Negligible
R5	16.8	16.8	0.1	Negligible
R6	17.4	17.4	0.1	Negligible
R7	17.3	17.3	0.1	Negligible
R8	17.0	17.1	0.1	Negligible
R9	18.3	18.3	0.1	Negligible
R10	17.5	17.5	0.2	Negligible
R11	17.9	17.9	0.1	Negligible
R12	15.8	15.9	0.2	Negligible
R13	16.4	16.5	0.1	Negligible
R14	16.4	16.4	0.2	Negligible
R15	16.7	16.8	0.3	Negligible
R16	16.4	16.5	0.2	Negligible

R17	16.5	16.5	0.1	Negligible
R18	17.6	17.6	0.0	Negligible
R19	17.2	17.2	0.0	Negligible
R20	18.1	18.1	0.0	Negligible
R21	15.9	15.9	0.2	Negligible
R22	15.7	15.7	0.2	Negligible
R23	16.4	16.4	0.1	Negligible
R24	15.7	15.7	0.0	Negligible
R25	16.4	16.4	0.0	Negligible
ST1	16.5	16.6	0.2	-
ST2	16.1	16.2	0.1	-
D1	19.8	19.9	0.2	-
D2	16.4	16.8	1.0	-
D3	16.4	16.4	0.2	-
D4	15.7	15.7	0.0	-
D5	16.1	16.2	0.1	-

6.6.17 The results of the modelling indicate that predicted annual mean PM_{10} concentrations are well below (less than 75%) the AQS objective level of 40 µg/m^3 at all the selected receptors both with and without the Proposed Development operational.

6.6.18 Traffic associated with the Proposed Development is predicted to result in a maximum increase in the annual mean PM_{10} concentration of 0.13µg/m^3 which equates to 0.3% of the AQAL. In accordance with the IAQM & EPUK significance criteria as set out in Table 6.8, the effect on local air quality with regards to this pollutant is considered to be negligible.

6.6.19 LAQM.TG(16) provides a relationship between predicted annual mean concentrations and the likely number of exceedances of the short-term (24-hour mean) PM_{10} objective of 50 µg/m^3 (N), where:

$$N = -18.5 + 0.00145 \times \text{annual mean}^3 + (206/\text{annual mean}).$$

6.6.20 The objective allows 35 exceedances per year, which is equivalent to an annual mean of 32 µg/m^3.

6.6.21 Based on the above approach, the maximum number of days where PM_{10} concentrations are predicted to exceed 50µg/m^3 is 2 days with a change of less than one day as a result of the operation of the Development. The impact on 24 hour PM_{10} concentrations is therefore also considered to be negligible.

6.6.22 Within the site itself, annual mean and 24hour mean PM_{10} concentrations are predicted to fall well below the relevant AQAL. The effect with regards to new exposure is therefore also considered to be negligible.

Predicted $PM_{2.5}$ Concentrations

6.6.23 Predicted annual mean $PM_{2.5}$ concentrations at the identified receptor locations are presented in .

6.6.24 Table 6.18 below.

Table 6.18 Predicted Annual Mean $PM_{2.5}$ Concentrations (µg/m3)

Receptor	2027		Development Impact (as a % of the AQO)	Impact Significance
	Without Development	With Development		
R1	11.9	12.0	0.1	Negligible
R2	11.8	11.8	0.0	Negligible
R3	11.6	11.5	-0.1	Negligible
R4	11.4	11.4	-0.1	Negligible
R5	11.7	11.8	0.1	Negligible
R6	12.1	12.1	0.1	Negligible
R7	12.0	12.1	0.1	Negligible
R8	11.9	11.9	0.1	Negligible
R9	12.5	12.5	0.1	Negligible
R10	12.0	12.0	0.2	Negligible
R11	12.2	12.2	0.1	Negligible
R12	11.1	11.2	0.1	Negligible
R13	11.5	11.5	0.1	Negligible
R14	11.3	11.4	0.1	Negligible
R15	11.7	11.8	0.3	Negligible
R16	11.6	11.6	0.2	Negligible
R17	11.7	11.7	0.1	Negligible
R18	12.4	12.4	0.0	Negligible
R19	12.2	12.2	0.0	Negligible
R20	12.9	12.9	0.0	Negligible
R21	11.3	11.3	0.1	Negligible
R22	11.1	11.1	0.1	Negligible
R23	11.4	11.4	0.1	Negligible
R24	11.2	11.2	0.0	Negligible
R25	11.7	11.7	0.0	Negligible

ST1	11.4	11.5	0.2	-
ST2	11.4	11.4	0.1	-
D1	13.3	13.3	0.2	-
D2	11.4	11.6	0.8	-
D3	11.3	11.3	0.2	-
D4	11.0	11.0	0.0	-
D5	11.2	11.2	0.1	-

6.6.25 The results of the modelling assessment indicate that predicted annual mean $PM_{2.5}$ concentrations are well below (less than 75% of) the AQAL as the selected receptor locations both with and without the Proposed Development.

6.6.26 The Proposed Development is predicted to increase $PM_{2.5}$ concentrations by a maximum of 0.07µm^3 which equates to 0.3% of the AQAL. In accordance with the IAQM & EPUK significance criteria as set out in Table 6.8, the effect on local air quality with regards to this pollutant is considered to be negligible.

6.6.27 Within the site itself, annual mean $PM_{2.5}$ concentrations are predicted to fall below the relevant AQAL. The effect with regards to new exposure is therefore also considered to be negligible.

Airborne NOx Concentrations

6.6.28 An assessment of concentrations of NO_x at the nearby sensitive ecological sites has also been included; the results are presented in Table 6.19 below.

Table 6.19 Predicted Annual Mean NO_x Concentrations (µg/m^3)

Receptor	2027		Development Impact (as a % of the Critical Level)	Impact Significance
	Without Development	With Development		
E1	15.5	15.6	0.26	Insignificant
E2	16.4	16.4	0.05	Insignificant

6.6.29 The additional emissions arising from road traffic generated by the Proposed Development results in a relatively small change in predicted NOx concentrations at the ecological receptors.

6.6.30 At the SSSI (receptor E1), the change in concentrations of NOx is 0.26% of the Critical Level. Guidance provided by the EA suggests that an impact on such an ecological site can be considered to be insignificant if the change is less than 1% of the Critical Level. It should be noted that the receptor included in the model is at a worst-case location with regards to its proximity to the road and that the majority of the SSSI is located at a greater distance from the road where the impact will be reduced. The impact on the SSSI is therefore considered to be insignificant.

6.6.31 At the LNR, the guidance suggests that an impact would be insignificant if the change in NOx concentrations are less than 100% of the Critical Level. Therefore, at this location the impact is also considered to be insignificant.

Nitrogen Deposition

6.6.32 An assessment of nitrogen deposition at the SSSI as a result of the additional emissions from road vehicles generated by the operation of the Proposed Development has also been undertaken. The results of the assessment indicate that the additional road vehicles result in an increase in the nitrogen deposition rate of 0.01kg/ha/yr at the worst case location within the SSSI. This represents less than 0.1% of the relevant worst case Critical Load. The impact of the increase in the nitrogen deposition rate as a result of the emissions from the additional traffic generated by the Proposed Development is therefore considered to be insignificant.

6.7 Mitigation and Residual Effects

Mitigation

Construction Phase

6.7.1 The control of dust emissions from construction-site activities relies upon management provision and mitigation techniques to reduce emissions of dust and limit dispersion. Where dust emission controls have been used effectively, large-scale operations have been successfully undertaken without impacts to nearby properties.

6.7.2 A high risk of dust soiling impacts and a medium risk of human health (PM_{10}) effects is predicted at adjacent receptors during construction of the Proposed Development. Appropriate mitigation measures for the site have been identified following the IAQM guidance and based on the risk effects presented in Table 6.15. It is recommended that the 'highly recommended' measures set out below are incorporated into a Dust Management Plan (DMP) and approved by SCDC prior to commencement of any work on-site:

- develop and implement a stakeholder communications plan that includes community engagement before work commences on-site;
- display the name and contact details of the person accountable for air quality and dust issues on the site boundary (i.e. the environment manager/engineer or site manager);
- display the head or regional office contact information on the site boundary;
- record all dust and air quality complaints, identify cause, take appropriate measures to reduce emissions in a timely manner and record the measures taken;
- make the complaints log available to the local authority when asked;
- record any exceptional incidents that cause dust and/or air emissions, either on- or off- site and the action taken to resolve the situation in the log book;
- Hold regular liaison meetings with other high risk construction-sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised;

- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of the site boundary, with cleaning to be provided if necessary;
- carry out regular site inspections to monitor compliance with the DMP, record inspection results and make inspection log available to SCDC when asked;
- increase frequency of site inspection by the person accountable for air quality and dust issues on-site when activities with a high potential to produce dust are being carried out and during prolonged periods of dry or windy conditions;
- agree dust deposition, dust flux or real-time PM_{10} continuous monitoring locations with the LA. Where possible commence baseline monitoring at least three months before work commences on-site or, if it is a large site, before work on a phase commences;
- plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible;
- erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles;
- fully enclose site or specific operations where there is a high potential for dust production and the activities are being undertaken for an extensive period;
- avoid site runoff of water or mud;
- keep site fencing, barriers and scaffolding clean using wet methods;
- remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on-site. If being re-used on-site, cover as detailed below;
- cover, seed or fence stockpiles to prevent wind whipping;
- ensure all vehicles switch off engines when stationary - no idling vehicles;
- avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable;
- impose and signpost a maximum speed limit of 15mph on surfaces and 10mph on un-surfaces haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate);
- produce a construction logistic plan to manage the sustainable delivery of goods and materials;
- implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking and car-sharing);
- only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction e.g. suitable local exhaust ventilation systems;
- ensure an adequate water supply on-site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- use enclosed chutes and conveyors and covered skips;
- minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate;

- ensure equipment is readily available on-site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods;
- avoid bonfires and burning of waste materials;
- soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust);
- ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground;
- avoid explosive blasting, using appropriate manual or mechanical alternatives;
- bag and remove any biological debris or damp down such material before demolition;
- re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable;
- use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable;
- only remove the cover in small areas during work and not all at once;
- avoid scabbing (roughening of concrete surfaces) if possible;
- ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place;
- ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery;
- use water-assisted dust sweepers on the access and local roads, to remove, as necessary, any material tracked out of the site;
- avoid dry sweeping of large areas;
- ensure vehicles entering and leaving the site are covered to prevent the escape of materials during transport;
- inspect on-site haul routes for integrity and instigate necessary repairs to the surfaces as soon as reasonably practicable;
- record all inspections of haul routes and any subsequent action in a site log book;
- install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned;
- implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud);
- ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit; and
- access gates to be located at least 10m from receptors where possible.

6.7.3 In addition to the 'recommended' measures, the IAQM guidance also sets out a number of 'desirable' measures which should also be considered for inclusion within the DMP. These are also set out below.

- for smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.

Operational Phase

6.7.4 Concentrations of NO_2, PM_{10} and $PM_{2.5}$ predicted at all of the receptors included in the assessment are below the relevant AQS objective levels and the impact on local air quality is predicted to be *negligible*. The concentrations predicted within the Development Site are also well below (less than 75%) of the relevant AQS objective levels. The effect on the sensitive ecological sites in terms of airborne NO_x concentrations and nitrogen deposition rates is considered to be insignificant. Therefore, no mitigation measures are considered necessary.

Residual Effects

Construction Phase

6.7.5 Following implementation of the measures recommended for inclusion within the DMP the impact of emissions during construction of the Proposed Development would be negligible.

Operational Phase

6.7.6 The effect of traffic associated with the Proposed Development on concentrations of NO_2, PM_{10} and $PM_{2.5}$ is predicted to be negligible and the effect on concentrations of airbourne NO_x and nitrogen deposition rates within the sensitive ecological sites is predicted to be insignificant. Residual effects are therefore also considered to be negligible / insignificant.

6.8 Summary of effects

6.8.1 An air quality impact assessment has been undertaken to assess both construction and operational effects associated with the Proposed Development.

6.8.2 An assessment of the potential effects during the construction phase identified that releases of dust and particulate matter are likely to occur during site activities. Through good site practice and the implementation of suitable mitigation measures, the effect of dust and particulate matter releases may be effectively mitigated and the resultant effects are considered to be negligible.

6.8.3 ADMS Roads dispersion modelling has been carried out to assess the operational effects associated with the Proposed Development. The results of the modelling indicate that concentrations of relevant pollutants (NO_2, PM_{10} and $PM_{2.5}$) will meet the relevant AQS objective levels at nearby sensitive receptors and within the site itself. The significance of the effects of the emissions arising from traffic associated with the operation of the Proposed Development is considered to be negligible.

6.8.4 The results of the modelling also indicate that the significance of the effects of the additional emissions arising from traffic associated with the operation of the Proposed Development on airborne NO_x and nitrogen deposition rates at the relevant sensitive ecological habitats is considered to be insignificant.

6.8.5 It is therefore considered that air quality does not pose any constraints to the development of the site as proposed.

6.9 References

Ref 6.1: Institute of Air Quality Management (2014); 'Guidance on the assessment of dust from demolition and construction version 1.1'.

Ref 6.2: Environmental Planning UK & Institute of Air Quality Management. Land-use Planning and Development Control: Planning for Air Quality, January 2017

Ref 6.3: http://uk-air.defra.gov.uk

Ref 6.4: D. Laxen and B Marner (2003) Analysis of the relationship between 1-hour and annual mean nitrogen dioxide at UK roadside and kerbside monitoring sites.

Ref 6.5: Highways Agency, Transport Scotland, Welsh Assembly Government, The Department for Regional Development Northern Ireland. Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1: Air Quality

Ref 6.6: Habitats Directive AQTAG06. Technical guidance on detailed modelling approach for an appropriate assessment for emissions to air.

Ref 6.7: Air Quality Directive 2008/50/EC

Ref 6.8: The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (2007)

Ref 6.9: The Air Quality (England) Regulations 2000 - Statutory Instrument 2000 No.928

Ref 6.10: The Air Quality (England) (Amendment) Regulations 2002 - Statutory Instrument 2002 No.3043

Ref 6.11: The Air Quality Standards Regulations 2010 – Statutory Instrument 2010 No. 1001

Ref 6.12: Department for Environment, Food and Rural Affairs (Defra), (2009): Part IV The Environment Act 1995 Local Air Quality Management Review and Assessment Technical Guidance LAQM.TG(16).

Ref 6.13: Communities and Local Government: *National Planning Policy Framework* (March 2012)

Ref 6.14: Suffolk Coastal District Local Plan. Core Strategy & Development Management Policies. Development Management Plan July 2013

Ref 6.15: Suffolk Coastal District Council Updating and Screening Assessment 2015

7 ARCHAEOLOGY AND BUILT HERITAGE

7.1 Introduction

7.1.1 This chapter of the Environmental Statement (ES) has been prepared by Montagu Evans LLP and Orion Heritage, and provides an assessment of potential direct and indirect effects of the Proposed Development on the historic environment, including built heritage and archaeological receptors.

7.1.2 The historic environment includes a wide range of features resulting from human intervention in the landscape, varying in scope from buried archaeological remains to late 20th century industrial and military structures. It can be divided into the following two categories:

- *Archaeology* which comprises Scheduled Monument (SMs) and non-designated archaeological heritage assets; and
- *Built Heritage* which comprises listed buildings (all grades), non-designated buildings of heritage interest, registered parks and gardens (all grades, conservation areas, historic battlefields and World Heritage Sites.

7.1.3 The salient consideration is as follows:

- Whether the Proposed Development will preserve the setting and heritage value of Two Bowl Barrows in Spratt's Plantation (Scheduled Monument), Bowl Barrow and Pill Box 450m north west of Sheep Drift Farm (Scheduled Monument) and other designated and non-designated built heritage receptors whose setting includes the Application-site, including a number of the WWII defensive structures within the site.

7.1.4 This chapter also assesses the likely significant effects of the construction and operational phases of the Proposed Development in terms of below ground archaeology. It incorporates the results of an archaeological desk based assessment prepared by Orion Heritage (Appendix D1).

7.1.5 The chapter sets out the methodology, a summary of the baseline conditions and an assessment of the likely significant effects of the Proposed Development on above and below ground heritage receptors.

7.1.6 Montagu Evans and Orion Heritage have worked closely with the design team to incorporate mitigation within the design of the Proposed Development, having conducted site visits to consider and revise the final development proposals as appropriate.

7.2 Scope and methodology

7.2.1 The following section explains the methodology used for both the assessment of baseline conditions and the effect of the Proposed Development on above ground heritage receptors.

7.2.2 This method is the product of legislation, policy and best practice guidance as set out below. In particular the methodology relates to the National Planning Policy Framework

(NPPF) and *Historic England's Historic Environment Good Practice Advice in Planning Note 2: Managing Significance* (GPA2) and *Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets* (2015) (GPA3).

Study Area

7.2.3 Site observations and a desk-based review of OS maps and relevant heritage receptors have been used to determine the study area. The study area has been informed by building locations and heights, topography and townscape features, and an understanding of the scale of the Proposed Development.

7.2.4 The study area incorporates all heritage assets within 1km from the site boundary, including listed buildings, conservation areas, World Heritage Sites, scheduled monuments, registered parks and gardens and non-designated built heritage assets identified during the assessment.

7.2.5 Additionally, heritage assets situated more than 1km from the site have been included where they have been identified by Historic England and Waldringfield Parish Council as potentially sensitive to the development. These include the Church of St Mary (Grade II*), Church of All Saints (Grade II*), and Sutton Hoo (SM).

7.2.6 The Study Area and the method for its identification is considered reasonable and proportionate to the scale, nature and context of the Proposed Development.

Site Visit

7.2.7 Montagu Evans undertook site surveys during November 2016 and February 2017 to further understand the setting of the site and the surrounding heritage receptors within their landscape context and to assess the potential impact of the Proposed Development.

Assessment Process Framework

7.2.8 The term 'heritage receptor' is used within this assessment to refer to heritage assets as defined in Annex 2 of the NPPF.

7.2.9 When referring to "significance" in heritage terms (as set out in Annex 2 of the NPPF), the term 'heritage value' has been adopted in order to avoid confusion with the term "significance" as used in a conventional Environmental Impact Assessment (EIA) sense.

7.2.10 Value is assessed against the criteria contained in Table 7.1. The assessment of heritage value is graded exceptional, high, medium, low or very low. Grade I and II* buildings are of "exceptional" and "particularly important" interest; therefore these are generally afforded a higher heritage value. This differentiation is best summarised by the drafting of paragraph 128 of the NPPF, which states that the "level of detail (to describe the significance of heritage assets) should be proportionate to the assets' importance"; thus, a grading is appropriate. We have given due and proportionate regard to all heritage receptors assessed.

7.2.11 Although the assessment is distinct from any other discipline, there is a degree of interaction with the Landscape and Visual Impact Assessment (LVIA) at Chapter 11. The LVIA also refers to built heritage receptors that are included within this assessment and are referred to where relevant.

7.2.12 The overarching assessment framework follows a staged process, which is set out below. This process is consistent with best practice guidance.

First, the heritage value of each heritage receptor is assessed as part of the baseline assessment (Table 7.1).

Table 7.1 Heritage Sensitivity

Heritage Receptor Value		
Value	**Criteria**	**Examples**
Exceptional	Building/site/area of international significance.	Likely to be World Heritage Sites, Areas of Natural Beauty and National Parks. Often listed Buildings Grade I and II* and their settings, Scheduled Monuments of international significance, registered Historic Parks and Gardens Grade I and II* and their settings.
High	Building/site/area of national significance.	Building/ site/ area of national significance. The receptor has high importance by virtue of its overall high evidential, historic, aesthetic and communal value. Example: May be Listed Buildings Grade I and II* and their settings, Scheduled Monuments of greater national significance, registered Historic Parks and Gardens Grade I and II* and their settings.
Medium	Building/site/area of national significance.	Buildings/ Sites/ Areas of national and/ or regional significance, or local assets of particular significance. The receptor has medium importance by virtue of its overall medium evidential, historic, aesthetic and communal value. Example: Often Listed Buildings Grade II and their settings, Conservation Areas and their settings, Scheduled Monuments of lesser but still of national significance, and registered Historic Parks and Gardens Grade II and their settings, non-designated archaeological sites of demonstrable regional importance
Low	Buildings/sites/areas of national and/or regional significance, or local assets of particular significance.	Buildings/ sites/ areas with some evidence of significance but in an incoherent or eroded form, of local interest and generally with no statutory protection. May be Conservation Areas and their settings, non-designated heritage assets, including parks, buildings and archaeological sites of local interest, archaeological sites whose significance is limited by poor preservation and poor survival of contextual associations

Very Low	Buildings/sites/areas with some evidence of significance but in an incoherent or eroded form of local interest and generally with no statutory protection.	Often buildings of local interest and dispersed elements of townscape merit. Assets may be so badly damaged that too little remains to justify inclusion into a higher grade.

7.2.13 Where a proposal may affect the surroundings in which the receptor is experienced, a qualitative assessment is made of whether, how and to what degree setting contributes to heritage value of the receptor. This is informed by the check-list of potential attributes of a setting, as outlined in Historic England's Good Practice Advice Note 3: The Setting of Heritage Assets.

7.2.14 Setting is defined in the NPPF 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. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral."

7.2.15 To identify the sensitivity of a heritage receptor to the Proposed Development, the baseline value must be calibrated by its sensitivity to change. In this context, sensitivity is the ability of the receptor to accommodate proposals without undue consequences for the maintenance of the baseline situation, and/or the achievement of planning policies. This assessment is reached through consideration of the specific nature of the proposals in relation to the value of the receptor. It is a qualitative judgment recorded in a verbal scale (e.g. High, medium or low), and is supported by a narrative linked to evidence from the baseline study.

7.2.16 Negligible sensitivity is not used for heritage receptors as this would equate to a feature/building with no heritage value. In such a circumstance, such a feature/building would not be regarded as a heritage receptor.

7.2.17 Accordingly, the appraisal is discursive, enabling a full analysis and an explanation of supporting judgments and reasoning.

Table 7.2 Matrix used to identify effects

Magnitude	Sensitivity				
	Very Low	**Low**	**Medium**	**High**	**Exceptional**
Negligible	Negligible / Neutral	Negligible / Neutral	Negligible / Neutral	Negligible / Neutral	Negligible / Neutral
Low	Minor	Minor	Minor / Medium	Minor / Medium	Medium / Major
Medium	Minor / Medium	Minor / Medium	Minor / Medium	Medium	Medium / Major
High	Medium	Medium	Medium / Major	Major	Major

7.2.18 Following the identification of baseline conditions, the effect of the Proposed Development on each of the identified receptors will be then considered and a judgment formed as to the duration, extent and magnitude of effect. We have examined the impacts during construction and operational phases. In general terms, the constructional phase in relation to cultural heritage is temporary, and attracts less weight.

7.2.19 The baseline assessment may conclude that some effects on receptors are unlikely to be significant and therefore do not need to be considered further. Where applicable, these receptors are identified at the assessment stage of this chapter.

7.2.20 A professional judgment is made of the magnitude of likely effect using criteria at Table 3. Magnitude of effect is determined by the size or scale, geographical extent or duration and reversibility of the effect. Magnitude considers whether development:

- Conforms with the pattern, scale, mass, grain and historic features of the receptor;
- Creates a loss or restoration of key features of the receptor;
- Contributes to the identified receptor character; and
- Accords with national, regional and local planning policy and guidelines.

Table 7.3 Assessment of Magnitude

Magnitude of Change	Description
High	Considerable change to the value of the receptor. The proposals are a new component, ranging from a notable change in receptor characteristics over an extensive area to intensive change over a more limited area. The proposals would be very noticeable. Loss of or major alteration to key elements/ features/ characteristics of the baseline The duration of this effect may be permanent and non-reversible.
Medium	A clearly discernible change to the value of the receptor. The proposals are dissimilar to a main component of the receptor but similar to other components. The proposals would be readily noticeable. Partial loss of or alteration to one or more key elements/ features/ characteristics of the baseline. The duration of this effect may be semi-permanent and partially reversible. Partial loss or alteration of the significance of a below ground heritage receptor. These effects, if adverse, while important at a local scale, are not likely to be key decision making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource.

Low	Slight change to the value of the receptor. The proposals are similar to a main component of the receptor but dissimilar to other components. The proposals would not be readily noticeable. Minor loss of or alteration to one or more key elements/ features/ characteristics of the baseline. The duration of this effect may be temporary and reversible. Slight loss of the heritage value of a heritage receptor. This can include the removal of fabric that forms part of the heritage receptor, but that is not integral to its special interest (e.g. the demolition of later extensions/ additions of little intrinsic value). Level of harm perceivable, but insubstantial relative to the overall interest of the heritage receptor. These effects may be raised as local issues but are unlikely to be of importance in the decision making process.
Negligible	Barely discernible change to the value of the receptor. Very minor loss of or alteration to one or more key elements/ features/ characteristics of the baseline.
Nil	No change to the value of the receptor.

7.2.21 Following their identification, effects have been classified on the basis of their nature and duration as follows:

- **Temporary:** Effects that persist for a limited period only (due, for example, to particular activities taking place for a short period of time). These necessarily attract less weight in impact terms, in relation to heritage, whose values persist over a very long period;
- **Permanent:** Effects that arise from an irreversible change to the baseline environment (e.g. alterations to built fabric) or which will persist for the foreseeable future (e.g. noise from regular or continuous operations or activities);
- **Direct:** Effects that arise from the effect of activities that form an integral part of the scheme (e.g. construction of a new building);
- **Indirect:** Effects that arise from the effect of activities that do not explicitly form part of the scheme;
- **Secondary:** Effects that arise as a consequence of an initial effect of the scheme (e.g. induced employment elsewhere);
- **Cumulative:** Effects that can arise from a combination of different effects at a specific location or the interaction of different effects over different periods of time. Cumulative effects are referred to in more detail in Chapter 2.
- The impacts could potentially be adverse, negligible or beneficial. In relation to this assessment, medium and major adverse effects are considered to be **significant** and therefore material considerations.

Assessment of Likely Effects

7.2.22 Likely significant effects are determined through combining judgments of sensitivity and magnitude, using a matrix.

7.2.23 Combining respective sensitivity and magnitude provides an indication of likely significant effects, however, professional judgment is also required in their determination. Qualitative assessment will be used to describe and elucidate the judgments. This is necessary because the methodology outlined in Table 7.4 is not a strict qualitative process and some of these considerations will depend on expert judgments. Accordingly, there is an emphasis on narrative text through this chapter.

Table 7.4 Significance of Effect

Nature of Receptor Likely to be Affected (Sensitivity)				
Nature of the Effect Likely to Occur to the Receptor		Low	Medium	High
	Nil	None	None	None
	Negligible	Negligible/ Neutral	Negligible/ Neutral	Negligible/ Neutral
	Minor	Minor	Minor/ Medium	Minor/ Medium
	Medium	Minor/ Medium	Medium	Medium/ Major
	Major	Medium	Medium/ Major	Major

7.2.24 Within the judgement of likely significant effects there is a distinction between levels of significance and direction of effect, expressed as a 'word-scale'.

7.2.25 Justification for the direction of effects (beneficial, adverse or neutral / negligible) is discussed within the qualitative assessment text. Ratings of significance are independent of 'acceptability' of the scheme as a whole, which is a judgement above and beyond that of significance. Acceptability is about the overall balance of benefits and harm from the proposals as viewed or weighted by national policy and development plan policies.

7.2.26 Major effects are generally considered 'significant' in the context of the EIA Regulations.

7.2.27 It will also be seen that any noticeable effect on a highly valued receptor automatically generates a minor adverse impact. For that reason the chapter concludes with further analysis of these effects.

Table 7.5 Assessment of likely significant effects

Likely Significant Effects	
Major Beneficial	The scheme would be in keeping with and would provide a major improvement to or reinforce the value of the receptor
Medium Beneficial	The scheme would be in keeping with and would provide a noticeable improvement to or reinforce the value of the receptor

Minor Beneficial	The scheme would be in keeping with and would provide a slight improvement to or reinforce the value of the receptor
Neutral	The degree of effect would be neither beneficial nor adverse
Nil	The scheme would have no effect on the value of the receptor
Negligible	The scheme would be barely perceptible or would be in keeping with and would maintain the value of the receptor
Minor Adverse	The scheme would have a minor negative effect to the value of the receptor
Medium Adverse	The scheme would cause a noticeable deterioration in the value of the receptor
Major Adverse	The scheme would cause a major deterioration in the value of the receptor

7.2.28 The report also considers the direct, indirect and secondary, cumulative, short, medium and long-term, permanent and temporary effects of the Proposed Development .

7.2.29 Broadly, short to medium-term effects are considered to be those associated with the demolition and construction phase and long-term effects are those associated with the completed and occupied Proposed Development .

7.2.30 ‘Local’, ‘district’ or ‘national’ scale is relative to the spatial scale of the effects.

7.2.31 Direct effects may cause a physical change (e.g. alteration, extension or demolition) to the receptor as a consequence of construction or operation.

7.2.32 Indirect effects arise from the effect of activities that do not explicitly form part of the scheme. They may occur as a consequence of construction or operation of the development scheme, but may have an effect some distance from the development. Assessment of impacts on heritage setting refers to perceptible visual and aural (noise) effects that can be appreciated at a given time.

7.2.33 Secondary impacts are a consequence of construction or operation of the development, and can result in physical loss or changes to a receptor beyond the development footprint. For example, construction of related infrastructure such as roads or power lines that are required to support the development. Facilitated impacts should also be considered which may be further actions (including by third parties) which are made possible or facilitated by the development.

7.2.34 Finally, measures proposed to prevent, reduce or where possible offset any significant adverse effects have been identified and developed as part of the design process and are identified within the report. Where relevant, the final assessment considers the impact after incorporated mitigation.

Assumptions and Limitations

7.2.35 It is anticipated that the construction phase will take place over a period of approximately 15 years.

7.2.36 A Construction Environmental Management Plan (CEMP) is envisaged to mitigate potential adverse environmental effects during the construction phase.

7.3 Consultation undertaken

7.3.1 We have consulted with conservation and design officers at Suffolk Coastal District Council, Historic England and Suffolk County Council as part of the iterative design process.

7.3.2 The design of the indicative masterplan in the south-west of the site was revised in response to feedback from these heritage consultees to provide a larger buffer around the Scheduled barrow (asset 4) and to create a public space connecting the Scheduled Monument and non-designated WWII structures which are being retained in this area (assets 14 and 17).

7.3.3 Historic England also recommended that trees growing in the Scheduled barrows (asset 8) in Spratt's Plantation be felled to prevent them damaging the monument if they are blown over in high winds. It is proposed to identify the trees and the methodology for removing them via planning condition. The felling of the trees will require Scheduled Monument Consent.

7.3.4 Consultation with Suffolk County Council regarding the results of the previous evaluation works, the potential impacts of the Proposed Development and the scope of archaeological mitigation works has been undertaken.

7.4 Statutory and planning context

7.4.1 The following section sets out the planning policy context for the site and for the context of the assessment process.

Legislative Framework

Planning (Listed Buildings and Conservation Areas) Act 1990

7.4.2 The relevant legislation in this case includes section 66 (1) of the 1990 Act: Section 66 (1) of the Act requires a local planning authority, when considering whether to grant planning permission for a development that affects a listed building or its setting, *"to have special regard to the desirability of preserving the building or its setting or any features of architectural or historic interest that it possesses".* Preservation in this context means 'to cause no harm'. Therefore, it is possible for development to have an effect on setting, even a material one, but for that effect to be either neutral or beneficial.

7.4.3 This provision is applicable because the Proposed Development has the potential to affect the setting and therefore special interest of listed buildings and scheduled monuments identified within this assessment.

7.4.4 Section 72(1) of the same Act does not apply as the proposed Application-site is not within a conservation area and the provision does not apply to setting.

Ancient Monuments and Archaeological Areas Act (1979)

7.4.5 Legislation relating to the investigation, preservation and recording of archaeology and scheduled ancient monuments is contained in the Ancient Monuments and Archaeological Areas Act (1979). The AMAA Act contains no statutory provision on the setting of a Scheduled Monument which is equivalent to the section 66 (1) provision just cited in relation to the 1990 act. There is, however, local and national policy seeking the avoidance of harm to monuments and remains of equivalent value.

Relevant case law

7.4.6 In preparing our assessment, we are mindful of the considerable weight attached to the preservation or enhancement of the setting of heritage assets, which was recently clarified by the Court of Appeal judgment in Barnwell Manor Wind Energy vs. East Northamptonshire et al [2014] EWCA Civ 137. The Court ruled that there is a "*strong presumption*" against granting planning permission for development which would cause harm to heritage assets precisely because the desirability of preserving the special interest is of "*considerable importance and weight".* The corollary of this is that development that enhances the experience or appreciation of designated heritage assets is a matter of considerable importance and weight in the planning balance.

7.4.7 We are also mindful of two Court of Appeal judgments.

- Jones vs. Mordue [2015] confirmed that, generally, if a decision maker applies his or herself to the considerations at paragraphs 132 to 134 of the National Planning Policy Framework ("NPPF"), then (absent some contrary indication) s/he has discharged the statutory duties at Sections 66 and 72 of the 1990 Act.
- Palmer v Herefordshire Council [2016] ECWA Civ 1061 in which the Court of Appeal confirmed that where proposed development would affect a listed building or its settings in different ways, some positive and some negative, the decision maker may legitimately conclude that although each of the effects has an impact, taken together there is no overall adverse affect on the listed building or its setting.

Development Plan

7.4.8 Section 38(6) of the Planning and Compulsory Purchase Act 2004 stipulates that where in making any determination under the Planning Acts, regard is to be had to the development plan, and the determination must be made in accordance with that plan unless material considerations indicate otherwise. The statutory development plan, so far as material for present purposes, comprises:

- Suffolk Coastal District Local Plan Core Strategy & Development Management Policies (2013);
- Suffolk Coastal Local Plan remaining Saved Policies (2013); and
- Suffolk Minerals Site Specific Allocations (DPD) (2009).

Suffolk Coastal District Local Plan Core Strategy and Development Management Policies (2013)

7.4.9 The Suffolk Coastal District Core Strategy and Development Management Policies set out the vision and strategy for development in the district until 2027. It was adopted by Suffolk Coastal District Council in 2013. The Core Strategy highlights the importance of the Historic Environment but does not contain any Policy solely relating to this issue.

7.4.10 Policy SP15 (Landscape and Townscape) primarily concerns landscape character but includes provision for the protection of towns and villages of heritage value:

"Many of the towns and villages in the district are of distinctive historical and architectural value, as well as landscape value and character, and the Council will seek to enhance and preserve these attributes and the quality of life in the generality of urban areas."

Suffolk Coastal Local Plan Saved Policies incorporating First and Second Alterations (2013)

7.4.11 The Saved Policies of the Suffolk Coastal Local Plan continue to form part of the development plan until replacement by policies in other development plan documents. The following saved policies are of relevance to this assessment.

7.4.12 Policy AP1 (Conservation Areas- Control of Development and Enhancement) relates to development in Conservation Areas and their settings. It states that:

"To protect the character of the Conservation Areas, as shown on the Proposals Map, and to ensure that new buildings, alterations or other development preserve or enhance them, the District Council will, in the control of development within, or affecting, each Conservation Area, pay special attention to the following matters:

(i) The building materials used, to ensure that they are consistent with the general character of the respective area;

(ii) the form, scale, design and detailing of new buildings, alterations to existing buildings, and the space around buildings (including landscape schemes, roads and fencing), which should be in harmony with and relate satisfactorily to, their surroundings;

(iii) other development, including street furniture, road, footpath and other surfaces, lighting and advertisement displays, should be in keeping with the respective Conservation Area; wherever practicable, electricity, telephone and other cable systems should be placed underground, or in suitably concealed locations;

(iv) natural features, including trees, should be preserved wherever possible; schemes of landscaping and tree planting will normally be required;

(v) Supplementary planning guidance;

(vi) The traffic implications arising from the Proposed Development .

The District Council will normally seek the submission of detailed plans and drawings of Proposed Development instead of granting planning permission in outline form.

As resources permit, the District Council will support and formulate proposals for the enhancement of Conservation Areas."

7.4.13 Policy AP4 (Parks and Gardens of Historic or Landscape Interest) states:

"*The District Council will encourage the preservation and/ or enhancement of parks and gardens of historic and landscape interest and their surroundings. Planning permission for any Proposed Development will not be granted if it would have a materially adverse impact on their character, features or immediate setting."*

7.4.14 The local plan does not contain any specific policies that relate to listed buildings or scheduled monuments.

Suffolk Minerals Site Specific Allocations (DPD) (2009)

7.4.15 The principal purpose of the document is to outline twelve sites in order to meet the identified need for sand and gravel until 2021.

7.4.16 Sites 1A and 2A refer to Waldringfield Quarry, which form part of the Application-site. Part 1.6 of the overview states that:

"The site is potentially part of a wider area that has been indicated in the Suffolk Coastal LDF Core Strategy as being the preferred location for strategic housing growth. This has still to be the subject of Examination. If it were to be allocated then the landowner, British Telecom, would need to remove the existing field testing facilities and phased development would need to follow phased minerals extraction."

7.4.17 Part 2 refers to environmental safeguards, and states that:

"Prior archaeological investigation would be required. The area contains cropmarks, Scheduled Monuments and known prehistoric sites. Working and restoration would need to be managed to minimise the adverse impact on the setting of the scheduled burial mounds".

7.4.18 Part 3 addresses Buffer Protection Areas. Part 3.3 states that:

"In order to protect the integrity of the Scheduled Monument on the north-west boundary, a stand-off margin would be required on that boundary".

Material Considerations

National Planning Policy Framework (NPPF) 2012

7.4.19 Overall, the objectives of Section 12 of the NPPF can be summarised as seeking the:

- Delivery of sustainable development
- Understanding the wider social, cultural, economic and environmental benefits brought by the conservation of the historic environment;
- Conservation of England's heritage assets in a manner appropriate to their significance, and
- Recognition of the contribution that heritage assets make to our knowledge and understanding of the past.

7.4.20 Section 12 of the NPPF recognises that intelligently managed change may sometimes be necessary if heritage assets are to be maintained for the long term.

7.4.21 Government policy on Planning and the Historic Environment is provided in paragraphs 126-141 of the NPPF. Under this guidance, the listed buildings, scheduled monuments and conservation area discussed in this chapter are 'designated heritage assets'.

7.4.22 *Heritage Assets* are defined in Annex 2 as: A building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest. Heritage asset includes designated heritage assets and assets identified by the local planning authority (including local listing).

7.4.23 *Archaeological Interest* is defined as a heritage asset which holds or potentially could hold evidence of past human activity worthy of expert investigation at some point. Heritage assets with archaeological interest are the primary source of evidence about the substance and evolution of places, and of the people and cultures that made them.

7.4.24 *Designated Heritage Assets* comprise: World Heritage Sites, Scheduled Monuments, Listed Buildings, Protected Wreck Sites, Registered Park and Gardens, Registered Battlefields and Conservation Areas.

7.4.25 *Significance* is defined as: The value of a heritage asset to this and future generations because of its heritage interest. This interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting.

7.4.26 NPPF Paragraph 128 requires applicants to describe the significance of any heritage assets affected by a proposal, including any contribution made by their setting. An assessment of the heritage value of the heritage receptors affected by the application proposals is set out in this chapter.

7.4.27 Paragraph 132 states that when considering the impact of a Proposed Development on the significance of a designated heritage asset, great weight should be given to the asset's conservation. The more important the asset, the greater the weight should be.

7.4.28 Paragraphs 133-134 need to be read together and applied in cases where development would cause harm to the special interest of a heritage asset, distinguishing degrees of harm and providing related threshold tests for the planning decision maker. We mention these provisions here for the sake of completeness because our assessment concludes that there is no harm to heritage assets arising from these proposals.

7.4.29 Paragraph 135 relates to non-designated heritage assets, and states:

"*The effect of an application on the significance of a non-designated heritage asset should be taken into account in determining the application. In weighing applications that affect directly or indirectly non-designated heritage assets, a balanced judgment will be required having regard to the scale of any harm or loss and the significance of the heritage asset."*

7.4.30 Paragraph 137 states that Local Planning Authorities should look for new development within the setting of heritage assets which will enhance or better reveal their significance. Proposals which seek to better reveal the significance of the asset should be treated favourably.

7.4.31 Paragraph 139 addresses non-designated archaeology. It states:

"Non-designated heritage assets of archaeological interest that are demonstrably of equal significance to scheduled monuments, should be considered subject to the policies for designated heritage assets."

Planning Practice Guidance (First published 2014) ("PPG")

7.4.32 The Planning Practice Guidance (PPG) was published as a web-based resource on 27th March 2014 supporting the National Planning Policy Framework (NPPF) (2012).

7.4.33 The publication contains guidance on decision-taking with regard to historic environment matters. Paragraph 3 states that:

"Conservation is an active process of maintenance and managing change. It requires a flexible and thoughtful approach to get the best out of assets as diverse as listed buildings in everyday use to as yet undiscovered, undesignated buried remains of archaeological interest.

In the case of buildings, generally the risks of neglect and decay of heritage assets are best addressed through ensuring that they remain in active use that is consistent with their conservation. Ensuring such heritage assets remain used and valued is likely to require sympathetic changes to be made from time to time. In the case of archaeological sites, many have no active use, and so for those kinds of sites, periodic changes may not be necessary.

Where changes are proposed, the National Planning Policy Framework sets out a clear framework for both plan-making and decision taking to ensure that heritage assets are conserved, and where appropriate enhanced, in a manner that is consistent with their significance and thereby achieving sustainable development."

Paragraph: 003 Reference ID: 18a-003-20140306

7.4.34 In relation to the historic environment, paragraph 18a-001 states that:

"Protecting and enhancing the historic environment is an important component of the National Planning Policy Framework's drive to achieve sustainable development (as defined in Paragraphs 6-10). The appropriate conservation of heritage assets forms one of the 'Core Planning Principles'."

7.4.35 The PPG provides guidance on how to minimise harm to the significance of a heritage asset:
"A clear understanding of the significance of a heritage asset and its setting is necessary to develop proposals which avoid or minimise harm. Early appraisals, a conservation plan or targeted specialist investigation can help to identify constraints and opportunities arising from the asset at an early stage. Such studies can reveal alternative development options, for example more sensitive designs or different orientations, that will deliver public benefits in a more sustainable and appropriate way."

Paragraph: 020 Reference ID: 18a-020-20140306

7.4.36 Guidance relating to non-designated heritage assets is included at Paragraph 39. This states that:

"Local planning authorities may identify non-designated heritage assets. These are buildings, monuments, sites, places, areas or landscapes identified as having a degree of significance meriting consideration in planning decisions but which are not formally

designated heritage assets. In some areas, local authorities identify some non-designated heritage assets as 'locally listed'.

A substantial majority of buildings have little or no heritage significance and thus do not constitute heritage assets. Only a minority have enough heritage interest for their significance to be a material consideration in the planning process."

Paragraph: 039 Reference ID: 18a-039-20140306

7.4.37 Further guidance is provided by the PPG on the nature of public benefits. These may follow from developments and can be anything that delivers economic, social or environmental progress as described in the NPPF (paragraph 7).

7.4.38 Such benefits should be of a nature of scale to be of benefit to the public at large and should not just be a private benefit. However, benefits do not always have to be visible or accessible to the public in order to be genuine public benefits. Benefits become relevant countervailing considerations if there is a finding of harm; if there is no finding of harm, then benefits to heritage interests attract particular weight in their own right.

Historic England Good Practice Advice in Planning Note 1: The Historic Environment in Local Plans (2015)

7.4.39 The Historic Environment in Local Plans (GPA1) was published by Historic England on 25th March 2015. The purpose of GPA1 is to provide information on good practice to assist local authorities, planning and other consultants, owners, applicants and other interested parties in implementing historic environment policy in the NPPF and the related guidance given in the PPG. We have had regard to its approach in preparing this assessment.

Historic Environment Good Practice Advice in Planning Note 2: Managing Significance in Decision–Taking in the Historic Environment (2015)

7.4.40 Managing Significance in Decision-Taking in the Historic Environment (GPA2) was published by Historic England on 27th March 2015. The purpose of GPA2 is to provide information on good practice to assist local authorities, planning and other consultants, owners, applicants and other interested parties in implementing historic environment policy in the NPPF and the related guidance given in the PPG.

7.4.41 It outlines a 6 stage process to the assembly and analysis of relevant information relating to heritage assets potentially affected by a Proposed Development .

- Understand the significance of the affected assets;
- Understand the impact of the proposal on that significance;
- Avoid, minimise and mitigate impact in a way that meets the objectives of the NPPF;
- Look for opportunities to better reveal or enhance significance
- Justify any harmful impacts in terms of the sustainable development objective of conserving significance and the need for change;
- Offset negative impacts on aspects of significance by enhancing others through recording, disseminating and archiving archaeological and historical interest of the important elements of the heritage assets affected.

7.4.42 We have had regard to its approach in preparing this assessment.

Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets (2015)

7.4.43 The Setting of Heritage Assets (GPA3) was published by Historic England on 25 March 2015. The guidance supersedes and replaces in full the October 2011 Historic England guidance The Setting of Heritage Assets.

7.4.44 GPA3 advocates a five step approach to analysis of the setting of heritage assets:

- Identify which heritage assets and their settings are affected;
- Assess whether, how and to what degree these settings make a contribution to the significance of the heritage asset(s);
- Assess the effects the Proposed Development , whether beneficial or harmful, on that significance;
- Explore the way to maximise enhancement and avoid or minimise harm;
- Make and document the decision and monitor outcomes.

7.4.45 This approach, if not the precise stages, corresponds to EIA practice.

7.4.46 The guidance makes clear that the setting of a heritage receptor is not an asset in its own right, nor a heritage designation. The importance of setting lies in the degree to which it enables us to appreciate what is significant about an asset. Thus, the important question to ask in any setting assessment is whether, if a development is completed, the status of the asset will in any way be materially diminished in our estimation.

7.4.47 Furthermore, any such assessment must consider the impact of proposals on the asset as a whole, mindful of the fact that an asset's setting can be quite extension. This is essential to ensure the assessment is proportional, in line with the Framework and general planning and EIA practice.

7.4.48 Change is not in itself harmful in setting, even significant change. And furthermore, harm to setting does not in itself equate to harm to the significant of an asset. This is why the statutory provision refers to the 'desirability' of preserving a listed building's setting. This formulation is not an absolute requirement and clearly allows for changes which do harm setting to be acceptable mindful of the overall value of the asset or receptor.

Section 106 Developers Guide to Infrastructure Contributions in Suffolk. Topic Paper 2: Archaeology (May 2012)

7.4.49 East Suffolk has published an archaeological supplementary planning guidance document as part of 'Section 106 Developers Guide to Infrastructure Contributions in Suffolk', which states that:

"1.1 A high density of archaeological remains survives in Suffolk and the preservation of those remains is a material consideration in the granting of planning consent. Developers should, therefore, discuss the potential impact of their Proposed Development on archaeological remains prior to submission of planning applications and applicants may be required to undertake an appropriate evaluation before their application is determined.

1.2 Usually, sites with heritage assets can be developed provided that the remains are adequately recorded prior to development and that recording work can be secured by planning conditions. Where planning conditions are not appropriate, obligations will

be used to secure the protection and/or investigation of archaeological remains in advance of development. For example, it may be appropriate to secure an area containing significant remains so that it is protected in perpetuity and incorporated into the design of the scheme. The best way to safeguard an archaeological site is for it to be preserved in situ and positively managed. Excavation is very much a second best option as although knowledge can be increased through this process, the site is destroyed. For sites of lesser importance, a planning obligation may require the investigation, recording and excavation of any archaeological features and finds.

1.3 There may also be occasions where planning obligations should be used to secure the conservation and storage in perpetuity of archaeological finds recovered and/or the interpretation of the results of archaeological investigation through publication, touring exhibition or display. Therefore contributions to existing museums or other buildings and facilities or to new buildings or facilities to enable museum storage or display might also be appropriate.

1.4 It is the responsibility of the developer to pay for any and all archaeological work required. This will include any fieldwork, the analysis of findings after fieldwork, conservation of objects where appropriate, report writing and publication, museum archiving, and any educational material required to explain the site or findings to the public. The Archaeological Service can provide a list of archaeological organisations available to carry out work in Suffolk. The scope of any work that needs to be done should be agreed in advance with the Archaeological Service."

Criteria for the identification of non-designated heritage assets that are buildings

7.4.50 Suffolk Coastal District Council has adopted supplementary guidance on 'Criteria for the Identification of Non-Designated Heritage Assets That Are Buildings' to provide technical guidance to support Core Strategy Policy SP15 (Landscape and Townscape). The guidance provides a framework for identifying non-designated heritage assets. The criteria are based on the guidance provided in Historic England's Conservation Principles (2008) and Good Practice Guide for Local Heritage Listing (2012), and assess buildings based on their Archaeological, Architectural, Artistic and/or Historic interest.

7.5 Existing environment

7.5.1 The site encompasses part of Adastral Park, which contains BT's research laboratories and offices of associated businesses. Waldringfield Quarry, a sand and gravel quarry, to the south and east of Adastral Park covers the majority of the site, with an area of woodland to the north-west and some agricultural pasture in the south-west.

7.5.2 The rationale for the 1km study area is described in paragraphs 7.2.3-7.2.5 above.

7.5.3 The heritage assets within the study area are labelled on the Heritage Asset Map at Appendix D2. Where referred to below, the number of the asset on the map has been given in brackets to enable clear identification.

7.5.4 There are two Scheduled Monuments within the boundary of the Application-site, including:

- Two Bowl Barrows in Spratt's Plantation (8); and
- Bowl Barrow and Pill Box 450m north west of Sheep Drift Farm (4).

7.5.5 The following designated heritage assets are located outside the Application-site, within 1km of the site boundary:

- Church of St John the Baptist (Grade II*) (1);
- Howe's Farmhouse (Grade II) (2);
- Thatch Cottage (Grade II) (3);
- Bowl Barrow 155m east of Sheep Drift Farm (5), adjacent to the site to the south;
- Bowl Barrow 180m ENE of Sheep Drift Farm (6), adjacent to the site to the south;
- Bowl Barrow on Waldringfield Heath, 150m south of Heath Farm (SAM) (7).
- Bowl Barrow in Birch Grove, Martlesham Heath (SAM) (9);
- Bowl Barrow in Lancaster Drive, Martlesham Heath (SAM) (10);
- Pole Hill Bowl Barrow (SAM) (11); and
- Two Bowl Barrows 312m south west of Dobbs Corner (SAM) (12).

7.5.6 There are no World Heritage Sites, conservation areas or registered parks and gardens within the study area (1km from Site boundary).

7.5.7 There are a number of Second World War pillboxes and gunposts within the study area, which include the pill box on top of a barrow, which is covered by the scheduling. Non-designated heritage assets have been identified in the study area where there may be the potential for an impact as a result of the Proposed Development , using professional judgment, desktop and site surveys, and applying the criteria in the Suffolk Coastal guidance on the identification of non-designated heritage assets.

7.5.8 The non-designated heritage assets that have been identified in the study where there may be potential for an impact comprise:

- Brick Military Buildings (13);
- Eight sided brick built base to radio mast (14);
- Brick barrack blocks and war memorial (15);
- Romney Hut (16);
- Type 23 Pillbox with gun emplacement and underground shelter (17);
- Possible light anti-aircraft machine gun post (18); and
- Type B Aeroplane Shed (19).

7.5.9 Further heritage assets have been identified beyond the 1km study area by Historic England in comments on BT's previous application for the site (C/09/1725) and Waldringfield Parish Council in their comments on the Scoping Report for this ES as having the potential to experience a change to their setting. Their location is indicated on a second Heritage Asset Map at Appendix D2. These are:

- Church of St Mary, Martlesham (Grade II*) (1);
- Church of All Saints, Waldringfield (Grade II*) (2);
- Martlesham Hall (Grade II) (3);
- The Old Rectory (Grade II) (4); and
- Prehistoric settlement and group of barrows (including site of ship burial) at Sutton Hoo (Scheduled Monument) (5).

7.5.10 Previous archaeological evaluation across the majority of the site (SCCAS 2009a) identified an area in the north of the site with positive archaeological results. This area

has been subject to an on-going archaeological watching brief associated with Waldringfield Quarry (Suffolk Archaeology 2017). An Early Bronze Age pit containing a collared urn, an undated enclosure, a small cluster of prehistoric pits and a possible medieval building have been recorded (Suffolk Archaeology 2017). Approximately half this area has not been archaeologically monitored

7.5.11 The watching brief (Suffolk Archaeology 2017) in the south of the site recorded little archaeology due to high levels of truncation. The non-designated WWII structures in this area have been subject to building recording.

Historical Overview

7.5.12 This section sets out an overview of the history of the site and surrounding area, and has been informed by historical research and secondary sources, including:

- Victoria County History: Suffolk, Volume II (1907); and
- Suffolk (1991); Pevsner & Radcliffe;
- Beyond the Grave (2007); Last et al; and
- Martlesham Heath (1975); G. Kinsey.

7.5.13 The site is situated in an area of flat land, in close proximity to the River Deben to the east, and Ipswich to the west. There are a number of historic villages in close proximity, including Martlesham Heath, Brightwell Heath and Waldringfield. BT's Adastral park research centre is situated adjacent to the site to the north east.

7.5.14 There is evidence of settlement in the area dating from early prehistory. A high number of barrows in the environs of Brightwell, Foxhall and Waldringfield form above ground evidence of this early habitation. These will have formed a dominant feature in an open, flat landscape, which remained largely undeveloped through early history.

7.5.15 The bowl barrows in the area are of a type predominantly dating to the early Bronze Age (2200-1500 BC). Bowl barrows typically comprise a rounded earthen mound with a surrounding ditch and occasional outer bank, and range from 5-50m in diameter, and up to 4m high.

7.5.16 There are a number of form variations, and many examples of barrows have undergone multiple phases of development and use, sometimes including secondary burials within the mound or ditch, or as 'satellite burials' in the vicinity.

7.5.17 The site is in close proximity to Sutton Hoo, which is evidence of Anglo-Saxon habitation of the area. The wider area of Suffolk was part of the Anglo-Saxon kingdom of Mercia.

7.5.18 The site lies within the ancient Parish of Martlesham, to the north, and the Parish of Brightwell, to the south. Both parishes are within Carlesford Hundred, and both are recorded as having manors in the Doomsday survey of 1086.

7.5.19 Martlesham manor was held in 1316 by Richard Brewse and in 1328 by Sir John de Verdon with whom it remained until 1391 when it passed to Sir Imbert Noon. The Noon family held the manor until the early 17th century when it passed to William Goodwin. In 1758 it came to Anne, daughter of John Goodwin and wife of George Doughty and by 1840 was held by Frederic Goodwin Doughty.

7.5.20 The town of Ipswich is situated to the west of the site. The town and the surrounding settlements in the environs of the site are indicated on Bowen and Hinton's map of 1750

at Appendix D3, Figure 1. This indicates the boundaries of the hundreds in Sussex; Martlesham was located in the Carlesford Hundred.

7.5.21 In 1836, the Eastern Counties Railway was founded to link London with Ipswich, and extend north to Norwich and Yarmouth. In 1846, this was extended north east to Bury, and in 1851, services began to run on the Great Eastern Railway between Ipswich and Norwich. The railway line can be seen on the 1884-1885 OS Map at Appendix D3 Figure 2, traversing Martlesham to the north of the site.

7.5.22 Late 19th century Ordnance Survey mapping (Appendix D1 Figure 9) illustrates the entire study site as heathland, with Swale Plantation in the centre of the site, within which Swale Cottage is located. Swale Cottage is no longer recorded in the 1928 Ordnance Survey (Appendix D1 Figure 10) by which point the site formed part of RAF Martlesham Heath.

7.5.23 The site is visible on the 1896 OS Map (Appendix D3 Figure 3), where it is shown as an area of heathland and open fields, indicated as “Martlesham Heath”, “Brightwell Heath” and “Waldringfield Heath”. The barrows which characterised the local landscape are indicated as tumuli. The character of the wider landscape remained largely unchanged through the late 19th and early 20th centuries, as indicated in the maps of 1902 and 1925 at Figures 4 and 5 of Appendix D3.

7.5.24 From 1917, the site became used for RAF Martlesham Heath, first used as ‘The Aeroplane Experimental Unit, Royal Flying Corps’. It was used for testing aircraft types and equipment which would later be used in the Second World War.

7.5.25 RAF Martlesham Heath (SHER MSF22020) was used in both World Wars and post-war to 1963. The airfield was initially opened in 1917 as the base for the Aeroplane Experimental Unit. In 1922 a fire damaged part of the technical buildings and the airfield was subsequently enlarged to become the Aeroplane and Armament Experimental Establishment (AAEE).

7.5.26 During the Second World War, RAF Martlesham Heath was used for No. 11 Group FAR, Fighter Command, and was later used by the United States Army Air Forces (USAAF) Eighth Air Force, whose arrival saw considerable development at the airfield, including the construction of new runways. These, and other features can be seen on the 1943 German Target Map photograph at Figure 6 of Appendix D3. Structures associated with this wartime use are still in evidence, including barrack blocks and a subsequent memorial to the USAAF.

7.5.27 These include a number of fortifications and pillboxes (indicated on the Heritage Receptor Map at Appendix D2), developed following the establishment of the Directorate of Fortifications and Works (FW3) in 1940. FW3 created a number of basic designs for pillboxes, some of which included gun emplacements and anti-aircraft fortifications. Airfields were sites of strategic importance which were vulnerable not only to attack from above, but also to potential air invasion attempts. Therefore, as seen at the site (Appendix D3, Figure 6), pillboxes were established in positions with excellent visibility, oriented towards the runway to enable defence against landing enemy aircraft.

7.5.28 Other structures associated with Second World War airfields include barrack blocks, Nissen Huts (or more unusually Romney Huts), and aeroplane sheds. These were spread out, so as not to present a single target for aerial bomb attacks. A non-scaled plan of the airfield and its associated structures is provided at Appendix D3, Figure 7.

7.5.29 The site reverted to the RAF after the war, and was extended in 1955 (Appendix D3, Figure 8). A Helicopter Search and Rescue Squadron was established at the airfield in 1958, though the facility was finally closed by the Air Ministry in 1963.

7.5.30 By the mid-20th century much of the surrounding heath had been turned to arable (Appendix D1, Figure 11). Quarrying started on the heath in the 1950s in the central part of the site (Appendix D1, Figure 12).

7.5.31 In 1975, the Post Office Research Station at Dollis Hill was relocated to a site at Martlesham Heath, known as Adastral Park (Appendix D3, Figure 9). This was used to carry out research into postal services and telecommunications, focussing on the latter since the 1980s privatisation of British Telecom (BT). The name Adastral Park is derived from the Royal Airforce Motto *per ardua ad astra*, through adversity to the stars.

7.5.32 Adastral Park is located on the south-eastern third of the former RAF Martlesham Heath runway. It now houses electronic research laboratories and has been heavily redeveloped over the last few years, slowly erasing any remnants of the former airfield (Appendix D1, Figure 13).

7.5.33 The site of the former runway became used for the testing of radio equipment owing to the expanse of flat, open land offered.

7.5.34 Development encroached gradually eastwards during the 20th century, to conjoin Martlesham with settlements at Martlesham Heath, and Kesgrave, which links these new developments to Ipswich (Appendix D3, Figure 10).

7.5.35 Permission to quarry land at the site was granted to Brett Aggregates in September 2011 (C10/1441). This now characterises the land to the east of the Application-site.

Archaeology Baseline

7.5.36 A desk based assessment of the site and the surrounding area has been undertaken (Appendix D1).

Prehistoric

7.5.37 The study site lies in a well-documented archaeological landscape with prehistoric finds and features forming the bulk of the recorded Suffolk Historic Environment Record (SHER) search result.

7.5.38 No evidence of early occupation is recorded within the study site. However, artefact scatter of early prehistoric flint has been recorded at a number of sites within the study area, some of which can be securely dated to the Palaeolithic (SHER MSF399) and Neolithic (SHER MSF3638, MSF3755, MSF3963, MSF3965).

7.5.39 A total of 27 SHER entries relate to sites of round barrows within the study area, of which nine are scheduled (SHER 21259, 21260, 21261, 21262, 21264, 21268, 21269 and 21270).

7.5.40 The site contains two scheduled areas: two bowl barrows in Spratt's Plantation in the north of the study site (SHER 21268; Figure 2, NHLE 1008731), and bowl barrow and pill box 450m north-west of Sheep Drift Farm (SHER 21267; Figure 2, NHLE 1008730). Two further scheduled monuments lie adjacent and partially enclosed by the study site boundary: bowl barrow 155m east of Sheep Drift Farm (SHER 21261; Figure 2, NHLE 1008688) and bowl barrow and pill box 450m north west of Sheep Drift Farm (SHER 21260, NHLE 1008730). These lie more than 50m south of the study site boundary and

associated sub-surface remains are unlikely to extend within the study site. The setting of these receptors is analysed in detail below.

7.5.41 The majority of the site has been archaeologically investigated with positive results in the northern part of the site (see Area D and G; Figure 5). This included the identification of a late Neolithic or Early Bronze Age pit in Area G. This may be contemporary with the collection of scheduled barrows within Spratt's Plantation (SHER 21266).

7.5.42 This area also revealed a small amount of Iron Age / Romano-British features (SHER MSF24346). The late prehistoric features comprised a series of ditches interpreted as field boundaries and the occasional pit and postholes. These may relate to a possible ring ditch to the north of the study site, recorded as a crop mark on aerial photographs (SHER MSF15173). The 2008 evaluation concludes that it is unlikely that these remains were related to settlement or domestic occupation as there was little evidence for structures, datable material or charred cereal remains.

Roman

7.5.43 The SHER records a total of 14 entries relating to Romano-British finds or features, two of which fall within the site boundary. The first relates to two shards of Roman rim recovered in the south-east corner of Spratt's Plantation (SHER MSF3609). The second relates to Iron Age/Romano-British features identified during archaeological investigations in the north of the site (see Appendix D1, Figure 5, Area D and G). The late prehistoric to Romano-British features comprised a series of ditches interpreted as field boundaries and the occasional pit and postholes. These are interpreted as agricultural field systems rather than being indicative of settlement.

7.5.44 The majority of the SHER entries from the wider study area relate to residual findspots. An evaluation at Land west of Church Cottages (SHER MSF27181), c. 400m to the south of the study site, has identified numerous pits and ditches of Iron Age and Roman date.

Early Medieval

7.5.45 There are no early medieval remains recorded within the study site. A total of ten sites are recorded within the wider study area. These comprise a number of Anglo-Saxon barrows (SHER MSF3615, MSF3745) and artefact scatters across a number of locations (SHER MSF9520, MSF20241, MSF20244).

7.5.46 Part of the remit of the 2008 evaluation was to test the area around the scheduled prehistoric barrow 450m north west of Sheep Drift Farm (SHER 21267) for associated early medieval activity; none was identified (SCCAS 2009a).

Medieval

7.5.47 No medieval finds or features are recorded within the study site. The SHER records a total of 22 finds or features of medieval date within the study area.

Post Medieval

7.5.48 The SHER records a total of 32 heritage assets of post medieval / modern date within the study area. The study site falls partially within the 20th-century airfield (SHER MSF22020), and a number of SHER entries within the study site relate to associated built heritage features. This includes field boundaries and footpaths in the eastern edge

of the heath (SHER 17775). Three WWII pill boxes (SHER 22553 and 26362, 25705), a light anti-aircraft machine gunpost (SHER 22554) and a Generator House (SHER 25707) are recorded within Grainger, in the south-west of the study site. The WWII built features have been subject to archaeological building recording by SCCAS in 2009 and 2012. One of the pill boxes (SHER MSX22553) is built into an earthwork which has been archaeological investigated to confirm its modern date (SCCAS 2009a).

Summary of archaeological potential and statement of significance

7.5.49 Archaeological evaluation has occurred across the majority of the site (Appendix D1 Figure 5). The central part of the site is occupied by Waldringfield Quarry. Taking into consideration the historic quarrying (Appendix D1 Figure 12), this suggests that small areas to the south-west and north-west of the main area have not been quarried or archaeologically investigated. Archaeological investigations adjacent to both of these areas, SHER ESF24626 and SHER ESF19886, recorded negative archaeological results. Based on available evidence, the potential for significant remains in these areas is considered low. The below ground remains resource is not considered likely to be of more than local significance in these areas.

Above Ground Heritage Receptors within the Application-site

Two Bowl barrows in Spratt's Plantation

Figure 7.1 and 7.2 Scheduled barrows within Spratt's Plantation

7.5.50 The two bowl barrows in Spratt's Plantation were designated as a Scheduled Ancient Monument in 1960. They are located in the north west of the Application-site, as indicated at Appendix D2 (asset 8).

7.5.51 The barrows are funerary monuments dating from the Late Neolithic period to the Late Bronze Age. They do not include any built form above ground, though the earthworks mounds are visible protrusions. The heritage value of the barrows is derived primarily from their archaeological interest as well-preserved examples of pre-historic burial mounds.

7.5.52 Heritage Value: **High**

Contribution of setting to heritage value

7.5.53 The setting of the Scheduled Barrows is principally defined by the dense area of woodland known as Spratt's Plantation. The surrounding vegetation obscures the barrows within the landscape, in spite of the predominantly flat topography of the surrounding area.

7.5.54 The barrows have group value with the other barrows located within the site and wider area, due to their shared age and function. They serve as evidence of early settlement in this part of Suffolk.

7.5.55 The dense vegetation detracts from the appreciation of the barrows' special interest, and is a negative feature in their setting.

Bowl Barrow and Pill Box 450m north west of Sheep Drift Farm

Figures 7.3 and 7.4 The Scheduled barrow surmounted by a pill box

7.5.56 The barrow and Pill Box were first designated as a Scheduled Ancient Monument in 1960. The barrow is situated within the Application-site, as indicated at Appendix D2 (asset 4).

7.5.57 The barrow forms a funerary monument which dates from between the Late Neolithic period to the Late Bronze Age. It forms an earthen mound, surviving to a height of approximately 1.7m, and known at its construction to have covered an area approximately 17m in diameter, though much of this has been lost.

7.5.58 The pillbox forms a hexagonal structure in brick and concrete, consistent with a Type 22 Pillbox, a design issued by FW3 following their establishment in 1940. It is situated on top of the mound, with the remains of a gun emplacement and slit trenches with brick retaining walls. Visibility and therefore legibility of the barrow, trenches and gun emplacement are obscured by thick vegetation at ground level.

7.5.59 The monument was archaeologically investigated in 2008 by SCCAS. This included the excavation of a doughnut-shaped area approximately 0.305ha around the round barrow (not damaging the mound itself). No evidence for 'satellite' cremations or Anglo-Saxon burials was identified during stripping around the monument, nor prehistoric finds or features recorded within the surrounding area. As such sub-surface remains of national importance associated with this scheduled monument are not anticipated to be impacted by the development.

7.5.60 The investigation showed that the mound survives to a height of approximately 0.9m beneath the floor of the pill box, although even in areas that have been substantially levelled, parts of the base of the mound and underlying soils remain intact

7.5.61 The barrow has archaeological interest as an example of a pre-historic burial mound, whilst the pill box and gun emplacement have some historical and architectural value as good surviving examples of Second World War fortifications. However, pillboxes of this type are not rare, and this example does not retain any internal fixtures or additional details of interest.

7.5.62 The barrow also has group value with the other barrows in the locality, which together provide evidence of prehistoric settlement in the area, and of burial practices.

7.5.63 Heritage Value: **High**

Contribution of setting to heritage value

7.5.64 The setting of the monument is formed of an open, grassed space in the immediate environs of the barrow, which extends to include the areas to the east which are in active quarrying use. The contribution of this space to the heritage value of the barrow and pillbox is very limited, due to the use of land to the east for quarrying.

7.5.65 The flat topography within the site enables some intervisibility between the Pill Box and other Second World War fortifications, which contributes to the legibility of the wartime land use, however the overgrown vegetation surrounding the monument and non-designated heritage receptors detracts from the appreciation of the group value of the Second World War fortifications, which by their nature would have occupied prominent positions in the landscape, and have been legible as a group.

7.5.66 To the north is the BT Research Laboratory at Adastral Park, which includes some substantial 7 storey buildings and the taller Pegasus Tower, which unattractive features

which dominate views towards the monument from the south and detracts from the appreciation of their heritage value as remnants of an earlier landscape. Traffic noise from the A12 immediately to the west also detracts from appreciation of the monument.

7.5.67 There is no intervisibility with other identified barrows, though the high concentration of burial mounds in the wider surrounding area contributes to the wider setting and understanding of the archaeological interest of the monument and its role in the Bronze Age landscape.

Heritage Receptors Beyond the site Boundary

Church of St John the Baptist (Grade II*)

7.5.68 The Church of St John the Baptist was designated in 1966, and is situated approximately 860m south west of the Application-site, as indicated at Appendix D2 (asset 1).

7.5.69 The church was originally medieval in construction, with several surviving windows dating to 1300, some with Y-tracery. The materials used in the medieval building were plastered flint rubble with limestone dressings. There is an early 14th century south doorway, and to the interior, a 14th century limestone font with an octagonal bowl and traceried facets.

7.5.70 The church underwent alteration beginning circa 1656 for Thomas Essington of Brightwell Hall, which was situated to the south east of the church. The bell in the tower is inscribed “for Brighwell [sic] of Suffolk, February 5th 1657”. This took place under the Protectorship of Oliver Cromwell (1599-1658), and represents a bold development for religious architecture during this period of Puritan rule. The Church contains carved memorials to two of Essington’s children, who died whilst works were ongoing. Brightwell Hall was later demolished in 1755.

7.5.71 The Church has historic and architectural interest as a good surviving example of a medieval parish church, and the later Commonwealth alterations contribute to this due to the political and religious context in which they were undertaken. It retains its historic function within the local, rural community.

7.5.72 Heritage value: **High**

Figure 7.5 Church of St John the Baptist

Contribution of setting to heritage value

7.5.73 The church is set within its open churchyard, bounded by coniferous trees which filter views of the surrounding landscape. The wider setting of the church is arable in character, with open fields interspersed with surviving historic heathland in the surrounding area. There are areas of mature trees interposing the Church and the Application-site.

7.5.74 The church is set on higher ground above the road to Brightwell, and accessed by a lane. Its intact rural setting provides a sympathetic, secluded setting to the listed building, reflective of its original, historic setting, and therefore makes a modest contribution to its special interest.

Howe's Farmhouse

Figure 7.6: Howe's Farmhouse

7.5.75 Howe's Farmhouse was designated Grade II in July 1983, and is situated approximately 870m north east of the Application-site, as indicated at Appendix D2 (asset 2).

7.5.76 The receptor is a 17th century farmhouse, which is timber framed and plastered with a plain tiled roof. The farmhouse is set over two storeys, with varied fenestration and a hexagonal brick axial chimney stack.

7.5.77 The farmhouse has undergone later alterations, including the addition of a brick porch in the 20th century.

7.5.78 The heritage value of the receptor is derived from its architectural and historic interest as a good example of a 17th century farmhouse, and it is still set amidst a working farm, in close proximity to agricultural buildings. It is of architectural interest as an example of the local vernacular.

7.5.79 Heritage value: **High**

Contribution of setting to heritage value

7.5.80 The wider setting is predominantly rural, with mature vegetation and trees. The intact rural setting makes a modest contribution to the significance of the listed farmhouse.

7.5.81 There is no intervisibility with Application-site so it is scoped out of further assessment.

Thatch Cottage

Figure 7.7 Thatch Cottage

7.5.82 Thatch Cottage was designated Grade II in 1983, and is situated 1140m north east of the Application-site, as indicated at Appendix D2 (asset 3).

7.5.83 The receptor is an early 19th century cottage, constructed in colour washed brick with a thatched roof. The building has an entrance at the rear doorway to the left hand side, with a pitched canopy on brackets and wood shingles with a plain boarded door and scattered fenestration to the rear consisting predominantly of 20th century casements.

7.5.84 The cottage has architectural and historic interest as an early 19th century thatched dwelling, and forms a demonstrable part of earlier settlement in the area.

Heritage Value: **Medium**

Contribution of setting to heritage value

7.5.85 It is set within a private, gated garden space, bordered by mature vegetation, which makes a modest contribution to the significance of the listed cottage.

7.5.86 There is no intervisibility with the site so it is scoped out of further assessment.

Bowl Barrow 155m east of Sheep Drift Farm

7.5.87 The bowl barrow 155m east of Sheep Drift Farm was designated as a Scheduled Ancient Monument in 1960, and is situated approximately 70m south of the Application-site, as indicated at Appendix D2 (asset 5).

7.5.88 The barrow forms a funerary monument dating to between the Late Neolithic and Late Bronze Age, visible as a mound which reaches 2m in height at its highest point, and covering 20m in diameter. It is probable that the mound was surrounded by a ditch, which may survive as a below ground feature. The barrow lies more than 50m south of the study site boundary and associated sub-surface remains are unlikely to extend within the study site.

7.5.89 The location of the barrow adjacent to that 180m ENE of Sheep Drift Farm (asset 6) enhances the heritage value of both receptors, which also form part of a larger group of burial mounds within the wider Martlesham Heath area. This concentration of barrows makes a positive contribution to the understanding of these monuments as part of a wider settlement of site of importance during the Bronze Age. This therefore enhances their archaeological interest.

7.5.90 Heritage Value: **High**

Contribution of setting to heritage value

7.5.91 The barrow is situated within a private garden, bounded by an earth bund which separates it from a gravel area which is now in use for car parking and small businesses in demountable type accommodation.

7.5.92 The setting of the barrow is enclosed, with established vegetation, in close proximity to a dwelling house. The setting does not contribute meaningfully to the heritage value of the receptor.

Bowl Barrow 180m ENE of Sheep Drift Farm

7.5.93 The bowl barrow 180m ENE of Sheep Drift Farm was designated as a Scheduled Ancient Monument in 1960, and is situated approximately 70m south of the Application-site, as indicated at Appendix D2 (asset 6).

7.5.94 The barrow forms a funerary monument dating to between the Late Neolithic and Late Bronze Age periods, constructed as a mound, possibly with an encircling ditch, though no above ground evidence of this survives and it may form a buried feature. The barrow lies more than 50m south of the study site boundary and associated sub-surface remains are unlikely to extend within the study site.

7.5.95 The monument is visible as a mound standing to 2m in height, and encircling an area 20m in diameter.

7.5.96 The barrow has suffered some damage as a result of falling trees, though this has not diminished the survival or special interest of the monument. Its heritage value results predominantly from its survival as a prehistoric burial mound, which gives the barrow considerable archaeological interest through its potential to provide evidence of Bronze Age settlement in the area.

7.5.97 The barrow is situated adjacent to another barrow, that 155m east of Sheep Drift Farm (asset 5). Their close proximity enhances the heritage value of both receptors, which also form part of a larger group of burial mounds within the wider Martlesham Heath area. This concentration of barrows makes a positive contribution to the understanding of these monuments as part of a wider settlement of site of importance during the Bronze Age. This therefore enhances their archaeological interest.

7.5.98 Heritage Value: **High**

Contribution of setting to heritage value

7.5.99 The barrow is situated within a private garden, bounded by an earth bund which separated it from a gravel area which is now in use for car parking and small businesses in demountable type accommodation.

7.5.100 The setting of the barrow is therefore enclosed, with established vegetation, in close proximity to a dwelling house. This setting does not contribute meaningfully to the heritage value of the receptor.

Bowl Barrow on Waldringfield Heath, 150m south of Heath Farm

Figure 7.8 Sandy soil indicating the Bowl Barrow on Waldringfield Heath

7.5.101 The bowl barrow on Waldringfield Heath was designated as a Scheduled Ancient Monument in 1960, and is situated approximately 75m east of the site, as indicated at Appendix D2 (asset 7).

7.5.102 The barrow forms a funerary monument dating to between the Late Neolithic and Late Bronze Age periods, constructed as an earthen mound encircled by a ditch. The scheduling description says the barrow is visible as a low mound, forming a light coloured sandy patch in the plough soil.

7.5.103 The barrow was originally approx. 14m in diameter, but has been spread by ploughing to a diameter of approximately 25m, and is recorded as now reaching a height of approximately 0.25m.

7.5.104 The surrounding ditch, which was the source of earth used in the construction in the barrow, has been infilled, but remains as a buried feature beneath the ploughsoil.

7.5.105 During Montagu Evans' site survey in November 2016, it appeared that the surface height of the mound had been further decreased by ploughing, and was no longer

visible as an above ground feature, which has reduced its significance. However, it retains its archaeological value due to the probability of good survival of below ground material, and its position within a concentration of barrows within the local area, which contribute to the understanding of these monuments as part of a wider settlement of site of importance during the Bronze Age.

7.5.106 Heritage Value: **Medium**

Contribution of setting to heritage value

7.5.107 The approach to assessment of the setting of buried archaeological remains is outlined in Historic England's GPA3. Whilst it is not visible as an above ground feature, the wider setting of the barrow within an area with good survival of similar barrows contributes positively to its setting, although there is no intervisibility between these monuments due to interposing vegetation and topography. The barrow has an open, rural setting within a field currently in use as arable farmland.

7.5.108 The BT Pegasus Tower at Adastral Park is visible in the distance to the west, forming an unsympathetic landmark in the setting of the barrow.

7.5.109 As the surrounding landscape does not allow for visibility with the other barrows in the area, and the agrarian setting does not relate to the special interest of the barrow, the setting of the barrow as a below ground feature does not meaningfully contribute to the special interest of the monument.

Bowl Barrow in Birch Grove, Martlesham Heath

7.5.110 The bowl barrow in Birch Grove was designated as a Scheduled Ancient Monument in 1960. It is situated approximately 290m west of the Application-site, as indication in Appendix D2 (asset 9).

7.5.111 The barrow forms a funerary monument dating to between the Late Neolithic and Late Bronze Age periods, constructed as an earthen mound encircled by a ditch. The mound is believed to have stood to a height of 0.5-0.8m, and covered an area of 8.5m in diameter, though it has become obscured as a result of the dumping of soil on and around it, and is consequently obscured from view.

7.5.112 The surrounding ditch has been largely infilled, but remains visible as a slight depression in the ground to the south of the mound.

7.5.113 The barrow has archaeological interest as an example of a pre-historic burial mound, and forms one of a number of such monuments within the Martlesham Heath area. The value of the receptor is enhanced by this group value, which contributes to the understanding of Bronze Age settlement in the area.

7.5.114 Heritage Value: **High**

Contribution of setting to heritage value

7.5.115 The barrow is set within a 20th century housing development, and believed to be in a private garden, not visible from public roads. Consequently, it was not possible to carry out a visible assessment of the setting of the monument. Given its context it is unlikely that the setting makes a meaningful contribution to its significance.

7.5.116 There will be no intervisibility with the Application-site, which is screened by interposing development, so the asset is scoped out of further assessment.

Bowl Barrow in Lancaster Drive, Martlesham Heath

7.5.117 The bowl barrow in Lancaster Drive was designated as a Scheduled Ancient Monument in 1960. It is situated approximately 200m west of the Application-site, as indicated at Appendix D2 (asset 10).

7.5.118 The barrow is a funerary monument dating to between the Late Neolithic and Late Bronze Age periods, constructed as an earthen mound, and encircled by a buried ditch. It has a diameter of 24m and stood in 1982 to a height of 1.08m at its highest point.

7.5.119 The mound has been spread on its southern side as a result of ploughing activity, and consequently reduced to a height of approximately 0.4m, and above ground evidence of the surrounding ditch been limited as a result of infilling, though the ditch survives as a below ground feature approximately 3m wide. It is situated to the immediate south of a 20th century housing development.

7.5.120 The barrow has archaeological interest as an example of a pre-historic burial mound, and is one of four recorded within a distance of 300m, among a larger group in the surrounding Martlesham Heath area. The value of the receptor is augmented by this group value, which contributes to the understanding of Bronze Age settlement in the area.

7.5.121 Heritage Value: **High**

Contribution of setting to heritage value

7.5.122 The barrow is set at the southern extent of a 20th century housing development, and is believed to be in a private garden, not visible from public roads, and therefore it was not possible to undertake a survey of the setting of the monument. Given its context it is unlikely that the setting makes a meaningful contribution to its significance.

7.5.123 To the south of the monument is a large field in agricultural use, which is bounded to the north and east by dense, established hedges which filter views across the wider landscape. The topography in the surrounding area is predominantly flat, which allows for some wider views across the landscape.

Pole Hill Bowl Barrow

7.5.124 Pole Hill Bowl Barrow was designated as a Scheduled Ancient Monument in April 1953. It is situated approximately 1200m south west of the Application-site, as indicated at Appendix D2 (asset 11).

7.5.125 The barrow forms a funerary monument dating to between the Late Neolithic and Late Bronze Age periods, constructed as an earthen mound.

7.5.126 Pole Hill Bowl Barrow was intersected by a wartime trench, though evidence regarding its construction and use was believed to have survived within the monument.

7.5.127 The barrow has archaeological interest as an example of a pre-historic burial mound, and forms part of a large group of pre-historic burial mounds in the Martlesham,

Brightwell and Foxhall area. The value of the receptor is increased by this group value, which contributes to the understanding of Bronze Age settlement in the area.

7.5.128 Heritage Value: **High**

Figure 7.9 Pole Hill Bowl Barrow

Contribution of setting to heritage value

7.5.129 The barrow has an open, rural setting within an arable field alongside Foxhall Road. The surrounding landscape is predominantly flat, which allows for wide-ranging views in all directions. These are interrupted only by mature trees, which line field boundaries in the surrounding area and provide variation in the landscape. The setting contributes positively to the appreciation of the monument, which forms a visible protrusion in the landscape.

Two Bowl Barrows 312m south west of Dobbs Corner

7.5.130 The two bowl barrows 312m south west of Dobbs Corner were designated as a Scheduled Ancient Monument in February 1979, and are located approximately 1200m west of the Application-site, as indicated at Appendix D2 (asset 12).

7.5.131 The barrows form funerary monuments dating to between the Late Neolithic and Late Bronze Age periods, and exist as earthen mounds. A trench, probably dating to the Second World War, has been dug into one barrow, though this has not caused considerable disturbance to the earthwork.

7.5.132 The two barrows south west of Dobbs Corner are situated within a small cemetery which included four other barrows, and have group value with other barrows in the area of Brightwell, Foxhall and Martlesham.

7.5.133 The barrows have archaeological interest as good examples of pre-historic burial mounds, and as evidence of Bronze Age settlement in the area. The value of the receptors is increased by their group value with other barrows in the locality.

7.5.134 Heritage Value: **High**

Contribution of setting to heritage value

7.5.135 The setting of the Scheduled Barrows is principally defined by the dense area of woodland to the east and west of Dobbs Lane. The surrounding vegetation obscures the barrows within the landscape, in spite of the predominantly flat topography of the surrounding area. To the west of the barrows is a large modern residential development, which makes a neutral contribution to the setting of the barrows.

7.5.136 The barrows have group value with the other barrows located within the site and wider area, due to their shared age and function. They serve as evidence of early settlement in this part of Suffolk.

7.5.137 The dense vegetation detracts from the appreciation of the barrows' special interest, and is a negative feature in their setting.

7.5.138 There will be no intervisibility with the Application-site, which is screened by interposing development, so the asset is scoped out of further assessment.

Church of St Mary, Martlesham

Figure 7.10 Church of St Mary, Martlesham

7.5.139 The Church of St Mary was designated Grade II* in 1966, and is situated approximately 1650m north east of the Application-site, as indicated at Appendix D2 (asset 1).

7.5.140 The Church has a 14th century tower and nave, and a 15th century west tower. The chancel and east end of the church were rebuilt in the 19th century. To the interior, the nave has a heptagonal roof dating to circa 1900 with the original hammer beam roof reused in the rebuilt chancel. The font dates to the 14th century.

7.5.141 The church has historical and architectural interest due to its age, and survival as a good example of a medieval church, albeit one which has undergone alteration. The retention of aspects such as the original hammer beam roof contribute to this.

7.5.142 Heritage Value: **High**

Contribution of setting to heritage value

7.5.143 The primary setting of the church is within its churchyard, which forms an open space with assorted tombstones and memorials. The church has a quiet, enclosed setting contained by established trees and vegetation, which limit the visibility of the wider landscape.

7.5.144 The special interest of the church is derived primarily from its intrinsic fabric, and therefore the wider setting makes a limited contribution to its heritage value, or appreciation.

7.5.145 There will be no intervisibility with the site, which is screened by the landform, so the asset is scoped out of further assessment.

Church of All Saints

Figure 7.11 Church of All Saints, Waldringfield

7.5.146 The Church of All Saints in Waldringfield was designated Grade II* in 1966, and is situated approximately 1700m south east of the Application-site, as indicated at Appendix D2 (asset 2).

7.5.147 The receptor is a parish church, comprising a 14th century nave and chancel and a 16th century tower, which were restored during the 19th century. It is constructed in a mixture of rubble and flint with a septaria cement stucco finish, and red brick, some with dark diapering.

7.5.148 The tower has a heptagonal turret with a plaintile roof and restored perpendicular style west window. The interior of the church was entirely restored, with a surviving 16th century octagonal font.

7.5.149 The church has historical and architectural value due to the age and survival of its tower, nave and chancel. The heptagonal stair in the tower is noted as being of particular interest.

7.5.150 Heritage Value: **High**

Contribution of setting to heritage value

7.5.151 The church has a quiet, rural setting, characterised by mature trees and hedges. The immediate setting of the church is within its churchyard, which forms an open green space with mature trees and tombstones, and contributes positively to the appreciation of its heritage value. There is no intervisibility or setting relationship with the Application-site, and therefore the church is scoped out of further assessment.

Martlesham Hall

7.5.152 Martlesham Hall was designated Grade II in 1983, and is located approximately 1650m north east of the Application-site, as indicated at Appendix D2 (asset 3).

7.5.153 The receptor is an early 19th century house, rebuilt around an earlier timber framed core which had burned down. It is built in Tudor Style red brick, with plain tile roofs and four hexagonal chimney stacks in a cluster.

7.5.154 The hall has an modified 'E' plan, with an asymmetrically placed porch to the north elevation, and an entrance doorway surmounted by a coat of arms. There is a moulded brick three sided oriel window to the east wing, with sash windows and glazing bars.

7.5.155 The hall has historical and architectural interest as a well-preserved example of a brick house dating to the 19th century, with some original details surviving. It contributes to the earlier townscape in the area.

7.5.156 Heritage Value: **Medium**

Contribution of setting to heritage value

7.5.157 Martlesham Hall is situated in close proximity to Martlesham Creek to the west, which forms an open waterway in a rural setting. The Hall has a quiet, rural setting within a private garden. Its wider setting is composed of arable farmland with tree planting delineating field boundaries. There is very little visibility over the wider landscape.

7.5.158 The Hall is primarily of interest for its architectural quality and age, and therefore the wider landscape does not make a meaningful contribution to the heritage value of the receptor.

7.5.159 There will be no intervisibility with the Application-site, which is screened by the landform, so the asset is scoped out of further assessment.

The Old Rectory

7.5.160 The Old Rectory was designated Grade II in 1983, and is situated approximately 1650 north east of the Application-site, as indicated at Appendix D2 (asset 4).

7.5.161 The Old Rectory has historical and architectural interest as a well-preserved example of a brick dwelling house dating to the early 19th century, and has group value with St Mary's Church, which is situated adjacent to the south.

7.5.162 Heritage Value: **High**

Contribution of setting to heritage value

7.5.163 The Old Rectory is situated in close proximity to Martlesham Creek to the west, which forms an open waterway in a rural setting. It is adjacent to St Mary's Church, and the quiet open space of the Churchyard comprises its setting to the south. Its wider setting is composed of arable farmland with tree planting delineating field boundaries. There is very little visibility over the wider landscape.

7.5.164 The special interest of the rectory is derived primarily from its intrinsic fabric and its association with St Mary's Church adjacent, and therefore the wider setting only makes a limited contribution to its heritage value, or appreciation.

7.5.165 There will be no intervisibility with the Application-site, which is screened by the landform, so the asset is scoped out of further assessment.

Prehistoric Settlement and group of barrows (including site of ship burial) at Sutton Hoo

Figure 7.12 Prominent barrows at Sutton Hoo

Figure 7.13 The view towards the Church of St Mary the Virgin, Woodbridge, from part of the Sutton Hoo monument

7.5.166 Sutton Hoo was designated as a Scheduled Ancient Monument in 1939, and is situated approximately 5000m north east of the Application-site, as indicated at Appendix D2 (asset 5).

7.5.167 The monument forms the site of two 6th-7th century cemeteries, one of which contained an undisturbed ship burial and associated Anglo-Saxon artefacts of exceptional historical and archaeological interest. Historians believe this may have been the burial site of the royal Wuffingas dynasty of East Anglia.

7.5.168 The site includes the burial site of a 27 metre long ship, housing a burial chamber containing a range of artefacts including jewellery and a helmet, now on display at the British Museum. The ship burial at Sutton Hoo is one of the most important Anglo-Saxon archaeological discoveries to date.

7.5.169 One of the cemeteries at the site contains approximately 20 earthen burial mounds which are visible from the opposite bank of the river Deben. The burial mounds at the second cemetery, approximately 500m upstream of the first, had been flattened by agricultural activity.

7.5.170 There is some evidence that some of the burial mounds at the site were excavated by Tudor grave robbers, though formal excavation of the site was sponsored by Edith Pretty, who owned the site, from 1938.

7.5.171 The mounds today appear as visible protrusions in the landscape, though are believed to have been much larger when first constructed, rising to a height of approx. 5 metres.

7.5.172 The site has been in the care of the National Trust since the 1990s, and now houses an Exhibition Centre with associated visitor facilities and car parking.

7.5.173 Sutton Hoo possesses exceptional archaeological value due to the evidence it provides about the Anglo-Saxon period, and some areas of the site remain deliberately unexcavated, awaiting future advancement in the use of technology in interpreting archaeological sites.

7.5.174 There is no group value with the Scheduled barrows within the site given their considerable difference in age, other than as evidence of early settlement in this part of Suffolk.

7.5.175 Heritage Value: **Exceptional**

Contribution of setting to heritage value

7.5.176 Sutton Hoo lies on an elevated promontory to the east of the river Deben, within the Suffolk Coast and Heaths AONB.

7.5.177 The National Trust guidebook suggests that this location was chosen for the burial site for its elevated topography, which would have made the mounds visible from long distances. Therefore, it is probable that there were planned views towards Sutton Hoo from the surrounding landscape and from the river.

7.5.178 The character of the surrounding land has altered considerably, including the development of coniferous tree plantations and other tree belts, considerable development visible across the river at Woodbridge, and a pig farm to the south, which has curved metal pigstys and outdoor space for the livestock. The pig farm and coniferous tree plantation in the immediate setting of the monument detract from its appreciation.

7.5.179 The wider setting of the monument is open and predominantly rural in character. Tree belts and areas of woodland characterise the local landscape, and interpose views to the south east and north west.

7.5.180 Views to the west take in development at Woodbridge, on the opposing side of the river Deben, with the tower of the Church of St Mary the Virgin (Grade I) in the centre of Woodbridge forming an attractive landmark in the distance. Views towards Woodbridge are filtered by tree belts, which become more dense to the south west, where Top Hat Wood occludes views to the west of the burial ground. The open character and woodland makes a positive contribution to the setting and appreciation of the burial mounds.

7.5.181 The character and appearance of the Scheduled Monument is not perceptible from the roads near the Application-site, from which it is separated by considerable open land and the River Deben, and there are no long views which allow an appreciation of the Monument's form. There is no intervisibility between the site and the scheduled monument, so the site does not contribute to the setting of Sutton Hoo. There is no potential for an effect from the Proposed Development so Sutton Hoo is scoped out of further assessment.

Non- designated Heritage Assets within the Application-site

Eight sided brick built base for radio tower

Figure 7.14 Historic image of the radio tower surrounded by the octagonal brick base (photograph copyright Joyce Milliard)

7.5.182 This structure is situated in the south west of the Application-site, as indicated at Appendix D2 (asset 14).

7.5.183 The eight sided structure is likely to have been a fortified brick wall which would have surrounded a wooden radio tower, which has since been demolished. The wall is in a poor state of repair and in need of conservation, and is obscured by extensive vegetation.

7.5.184 The structure is of some limited historic and architectural interest as a surviving element of the Second World War development at the former Martlesham Heath Airfield. It is identified as a non-designated heritage asset in accordance with Suffolk Coastal guidance (2015), owing to its group value with other Second World War structures and association with the locally important Martlesham Heath Airfield.

7.5.185 Heritage value: **Low**

Figure 7.15 The octagonal brick base today

Type 23 Pillbox associated with gun emplacement and underground shelter

7.5.186 This WWII Pillbox is a non-designated heritage asset, situated in the north-west of the Application-site, as indicated at Appendix D2 (asset 17).

7.5.187 It is a Type 23 Pillbox, forming a regular, rectangular structure consisting of a square pillbox and an open annexe which would have housed the mounting for a light anti-aircraft machine gun. Pillboxes were developed as fortifications following the establishment of FW3 in 1940.

7.5.188 The receptor has been partially buried by later infill, and is obscured by vegetation. It is therefore not possible to survey the interior of the pillbox.

7.5.189 The pillbox has some historical value as a surviving structure providing evidence of the Second World War use of the site, and architectural value as a surviving Type 23 Pillbox.

7.5.190 There are believed to be approximately 6,500 pillboxes surviving nationally. Historic England's Listing Selection Guide on Military buildings identifies the characteristics of more significant pill boxes, including those that date from WW1, those with strong ties to other defensive structures such as tank traps, of rare type, with a built form of interest, with group value with other historic items such as forts or bridges, where disguised as a civilian building or where fittings survive. This pill box has none of these characteristics so we conclude it is only of local interest and of low heritage value, which has been identified as a non-designated heritage asset in accordance with Suffolk Coastal guidance (2015), owing to its group value with other Second World War structures and association with the locally important Martlesham Heath Airfield.

7.5.191 Heritage value: **Low**

Figure 7.16 The Type 23 Pillbox

Possible Light Anti-Aircraft Machine gun post

7.5.192 The gun post is situated to the west of the site, in close proximity to the north west of the Scheduled barrow and pillbox, as indicated at Appendix D2 (asset 18). It is identified in the Historic Environment Record (HER), and considered here as an upstanding non-designated heritage receptor.

7.5.193 The post is situated on an earthwork of circa 17 metres in diameter, though this has been eroded and damaged, including by a large rabbit warren. The Suffolk HER description states that "*It is possible that the earthwork was constructed specifically to house the gunpost but numerous archaeological features do appear to have been used in this manner. Such defences were built within the perimeter of Martlesham Heath airbase to provide protection against potential invading forces."*

7.5.194 The post has some historical value due to its function as part of the fortifications at RAF Martlesham Heath. It is identified as a non-designated heritage asset in accordance with Suffolk Coastal guidance (2015), owing to its group value with other Second World War structures and association with the locally important Airfield.

Heritage value: **Low**

Figure 7.17 The remains of the possible gun post

Contribution of setting to heritage value of non-designated heritage receptors within the Application-site

7.5.195 The immediate setting of the non-designated heritage receptors within the site is formed of an open space, which extends to the east include the areas in active quarrying use, which form a negative feature in the landscape.

7.5.196 The flat topography within the site enables intervisibility between Second World War fortifications, which contribute to the understanding of the Second World War airfield, though this is limited by the extensive vegetation which obscures views of the receptors.

7.5.197 Additionally, the extent of ferns and vegetation in some areas of the site limits the visibility of the receptors, and detracts from the appreciation and legibility of their historic and architectural value.

7.5.198 The dominant landmark in the setting of the receptors is the BT Pegasus Tower and adjoining offices at Adastral Park, which commands attention in the landscape as the largest structure in the surrounding area, and is a negative feature in the setting of the receptors. Traffic noise from the A12 also detracts from appreciation of the WWII structures.

Non-designated Heritage Assets beyond the site boundary

Romney Hut

Figure 7.18 Romney Hut

7.5.199 The Romney Hut is not a designated heritage asset. It is situated approximately 120m to the south of the Application-site, as indicated at Appendix D2 (asset 16).

7.5.200 These were used as an alternative to brick buildings, similarly to Nissen Huts. Romney Huts differ in that they have a tubular steel frame with a central entrance.

7.5.201 These were used predominantly for storage and workshops, and are present at some airfields associated with the USAAF, where they were sometimes used as hangars.

7.5.202 The exact design of huts of this type was variable and could be adapted to requirements and locations, but the type was developed due to a need for economical construction and easy, quick assembly. It is probable that this particular Romney Hut was associated with RAF Martlesham Heath.

7.5.203 The hut has low historical value, as it is not rare, and is a utilitarian structure with low architectural interest. It is identified as a non-designated heritage asset in accordance with Suffolk Coastal guidance (2015), owing to its group value with other Second World War structures and association with the locally important Martlesham Heath Airfield.

7.5.204 Heritage value: **Low**

Contribution of setting to heritage value

7.5.205 The Romney Hut is situated along a lane currently in use for agricultural vehicles, and adjacent to part of the site. The setting has changed since the Hut was part of RAF Martlesham Heath, and does contribute to the special interest of the receptor.

Brick built military structure

7.5.206 These brick buildings are situated approximately 450m to the west of the site, as indicated at Appendix D2 (asset 13). They are believed to be former RAF accommodation associated with the wartime airfield. They are identified as non-designated heritage assets in accordance with the guidance issued by Suffolk Coastal District Council.

7.5.207 The buildings have west-facing frontages. That to the north has a central recess and L-shaped wing to the rear. They have some limited historical and architectural interest due to their association with the military airfield, for which they may have provided officer accommodation or ancillary buildings. It is identified as a non-designated heritage asset in accordance with Suffolk Coastal guidance (2015), owing to the integrity of its exterior and association with the locally important Martlesham Heath Airfield.

7.5.208 Heritage value: **Low**

Contribution of setting to heritage value

7.5.209 The structures are situated within Adastral Park, which consists primarily of later 20th century development. This setting makes no meaningful contribution to the appreciation of the historic buildings.

Brick barrack blocks and war memorial

7.5.210 These receptors are situated approximately 270m north west of the Application-site, as indicated at Appendix D2 (asset 15).

7.5.211 The War Memorial consists of three stone pillars, the middle of which is inscribed “USA 1930-1945”, situated on a raised, rectangular grassed mound. The pillars were erected in three stages; first in 1946, honouring the USAAF, later in the 1990s, and finally in 2007, commemorating 90 years since the establishment of the airfield. It is built on the area of the former parade ground, which has subsequently been used as a car park.

7.5.212 The barrack blocks appear to conform to a type established at Halton Park, built under the Home Defence Scheme. These have square faced central sections flanked by barrack wings to each side. A rear annexe accommodated WC, drying and other facilities, so the buildings are T-shaped in plan form. This remained a principal style of barrack construction until 1932.

7.5.213 The memorial has historical significance due to its association with the military history of the site.

7.5.214 The barracks are similar to an established type established at Halton Park, which contributes to their historical and architectural interest as military architecture conforming to a standard type. They are identified as a non-designated heritage asset in accordance with Suffolk Coastal guidance (2015), owing to their representativeness of this style of barracks, and their association with the locally important Martlesham Heath Airfield. The memorial has additional social and communal value, as part of the local collective memory.

7.5.215 Heritage value: **Low**

Figure 7.19 and 7.20 Brick Barrack Blocks and War Memorial

Type B Aeroplane Shed

7.5.216 This aeroplane shed forms a prototype known as 'Goliath', built in 1929 with six sliding doors to each end and a office accommodation to the side walls. The prototype arose from a need for larger hangars to accommodate the increasing size of aircraft, specifically bombers. It is situated approximately 520m to the north east of the Application-site, as indicated at Appendix D2 (asset 19).

7.5.217 Stylistically, the Type B Shed conforms to the same form as the Type A Shed, which was designed in 1924 with end openings, spanning 38ft 4 inches with steel framed roof girders. The walls were constructed in reinforced concrete, with offices and workshops constructed along the sides.

7.5.218 Following the construction of the Type B prototype at Martlesham Heath, two further examples of the Type B shed were constructed in 1934 at Pembroke Dock, and another at Rhu.

7.5.219 The Aeroplane Shed is identified as a non-designated heritage receptor in accordance with Suffolk Coastal guidance (2015) for its association with Martlesham Heath airfield and its representativeness of this particular style of aeroplane shed.

7.5.220 Heritage Value: Low

Contribution of setting to heritage value of Barrack Blocks and War Memorial, and Type B Aeroplane Shed

7.5.221 The barrack blocks and memorial are set together within the retail park adjacent to Adastral Park. The area between the blocks is currently in use as a car park, with a small grassed mound retained as the immediate site of the memorial.

7.5.222 The Aeroplane Shed is situated to the north of the barracks, set amongst light industrial units, with a large car park to the east.

7.5.223 There is no intervisibility with the contemporaneous fortifications situated on the site and in the surrounding area. The commercial setting within the Industrial Park makes a negative contribution to their setting, and limits the appreciation of their historic value.

7.5.224 There will be no intervisibility with the Application-site, which is screened by interposing development, so the assets are scoped out of further assessment.

Table 7.6 Summary of Heritage Baseline

Name	Grade	Study Area / Map Reference	Heritage Value	Further Assessment Required
Listed Buildings with location on Heritage Asset Map				
Church of St John the Baptist	II*	1	High	Yes
Howe's Farmhouse	II	2	Medium	No
Thatch Cottage	II	3	Medium	No
Scheduled Monuments with location on Heritage Asset Map				
Bowl barrow and Pill Box 450m north west of Sheep Drift Farm	SM	4	High	Yes
Bowl Barrow 155m east of Sheep Drift Farm	SM	5	High	Yes
Bowl Barrow 180m ENE of Sheep Drift Farm	SM	6	High	Yes
Bowl Barrow on Waldringfield Heath, 150m south of Heath Farm	SM	7	Medium	Yes
Two Bowl Barrows in Spratt's Plantation	SM	8	High	Yes
Bowl Barrow in Birch Grove, Martlesham Heath	SM	9	High	No
Bowl Barrow in Lancaster Drive, Martlesham Heath	SM	10	High	No
Pole Hill Bowl Barrow	SM	11	High	Yes
Two Bowl Barrows 312m south west of Dobbs Corner	SM	12	High	No

Non-Designated Heritage Assets with location on Heritage Asset Map				
Brick Built Military Structure	N/A	13	Low	No
Eight sided brick built base to radio mast	N/A	14	Low	Yes
Brick barrack blocks and war memorial	N/A	15	Low	Yes
Romney Hut	N/A	16	Low	Yes
Type 23 Pillbox associated with gun emplacement and underground shelter	N/A	17	Low	Yes
Possible Light Anti-Aircraft Machine Gun Post	N/A	18	Low	Yes
Type B Aeroplane Shed	N/A	19	Low	No
Designated Heritage Assets beyond study area boundary, with location on Heritage Asset Map II				
Church of St Mary Martlesham	II*	1	High	No
Martlesham Hall	II	2	Medium	No
The Old Rectory	II	3	Medium	No
Prehistoric Settlement and group of Barrows (including ship burial) at Sutton Hoo	SM	4	Exceptional	No
Church of All Saints, Waldringfield	II*	5	High	No
Church of All Saints, Waldringfield	II*	5	High	No

7.5.225 In summary, the following heritage receptors have been scoped out of further assessment:

- Howe's Farmhouse (Grade II);
- Thatch Cottage (Grade II);
- Bowl Barrow in Birch Grove, Martlesham Heath (SM);
- Bowl Barrow in Lancaster Drive, Martlesham Heath (SM);
- Two Bowl Barrows 312m South West of Dobbs Corner (SM);
- Brick (non-designated);
- Church of St Mary, Martlesham (Grade II*);
- Martlesham Hall (Grade II);
- The Old Rectory (Grade II);
- Sutton Hoo (scheduled monument); and
- Church of All Saints, Waldringfield (Grade II*).

7.6 Predicted impacts

Construction

Construction Impact on Non-Designated Archaeology

7.6.1 Previous archaeological evaluation across the majority of the site identified an area in the north of the site with positive archaeological results. This area has been subject to an on-going archaeological watching brief associated with Waldringfield Quarry. An Early Bronze Age pit containing a collared urn, an undated enclosure, a small cluster of prehistoric pits and a possible medieval building have been recorded. Approximately half this area has not been archaeologically monitored. The watching brief in the south of the site recorded little archaeology due to high levels of truncation. The archaeological resource in this area is considered of local significance, or low sensitivity (see Table 7.3). The planned ground works in this area results in the medium loss of information content and a medium magnitude of physical effect. These changes would therefore result in effects of minor levels (in line with Table 7.4), which are not significant.

7.6.2 The assessment has identified two small areas within Waldringfield Quarry which do not appear to have been quarried or archaeologically evaluated. Based on the negative results for archaeological investigations adjacent to these areas, the potential for significant remains is considered low, as potential below ground remains in these areas are not considered likely to be of more than local significance.

7.6.3 No physical alterations to the scheduled monuments within or adjacent to the study site is planned. Consequently, there will be no physical impacts on any scheduled monuments.

Construction Impact on Cultural Heritage

7.6.4 In this assessment, construction effects, being temporary, are generally treated as less significant. This approach is consonant with established best practice. Heritage values, being enduring, are accepted to be capable of sustaining temporary intrusions without loss of intrinsic value. Conditions on any consent would of course be applied to minimise any disruption to amenity, including visual amenity, more generally.

7.6.5 The construction effects of the Proposed Development relate to the construction period which is anticipated to span approximately 15 years. The effects are likely to arise from large items of machinery, hoardings, the structures under construction and various operations.

7.6.6 The demolition and construction period is short to medium-term, defined within the context of the ES. The Proposed Development incorporates construction and management mitigation measures for avoiding and reducing environmental effects during the phase.

7.6.7 The Scheduled Monument in the south-west of the site (asset 4) and the non-designated heritage assets that are being retained in this area (assets 14 and 17) will be protected with individual hoardings. The hoardings around the Scheduled Monument will be at least 10m from the base of the barrow. This is to protect the heritage assets from potential damage during construction works. It is not necessary to add hoardings

around the Scheduled Monument in Spratt's Plantation as the woodland there is being retained which provides natural protection from damage during construction.

7.6.8 The wider Site will be enclosed with hoardings. The effect of site hoardings will be localised, although cranes may be seen over a greater distance. The visual effect of these works is, however, far more limited geographically than the full study area and is tempered by their temporary nature.

7.6.9 In conjunction, the phase will result in increased noise, vibration, dust and traffic in the surrounding area. The Transport Assessment (which forms part of the application submission) will refer to construction traffic effects.

7.6.10 These effects are the necessary first steps in the regeneration of the site and will be removed following completion. In heritage assessment generally, construction effects, being short to medium-term, are generally treated as less significant and long-term conservation is of paramount importance in making any judgement.

7.6.11 Mindful of the above it is considered that the demolition and construction effects on above ground heritage are minor adverse and indirect at a local level, with minor adverse to negligible indirect effect over medium to long distances.

Operation

Operational Impact on Archaeology

7.6.12 All impacts on non-designated archaeological heritage assets will result from the construction stage of the Proposed Development and suitable mitigation proposals in relation to this impact are set out below. Once these mitigation measures have been implemented ahead of construction, archaeological features within the site will have been fully excavated and recorded. Consequently, following the implementation of the proposed mitigation proposals, there will be a negligible impact from the operational phase of the project on non-designated archaeological heritage assets.

Operational Impact on Cultural Heritage

7.6.13 At the operational phase the Proposed Development incorporates primary mitigation measures that have been embedded into the project design.

7.6.14 The primary mitigation measures include the design response to possible effects identified through the iterative design process, which seek to avoid significant adverse effects through careful planning, siting, access, layout and scale of buildings, as explained in the Design & Access Statement.

Two Bowl Barrows in Spratt's Plantation

7.6.15 The Two Bowl Barrows in Spratt's Plantation are situated within the Application-site, and will experience direct effects on their setting as a result of the Proposed Development .

7.6.16 The barrows are earthworks funerary monuments which form visible protrusions in the landscape. Due to the flat local topography, it is possible that there was intentional visibility between the receptors and other barrows in the local area, though these have been occluded by later development and established tree belts.

7.6.17 The legibility of the historic relationship between the barrows in Spratt's Plantation and others within the site and wider local area has been further eroded by the dense ground

cover in Spratt's Plantation, which obscure the barrows from view, and detracts from the appreciation of their historic and archaeological interest.

7.6.18 The masterplan retains the woodland at Spratt's plantation within an area of Suitable Alternative Natural Greenspace (SANGS) along the western Site boundary, which will preserve the present character of the barrows' immediate setting and allow their appreciation as a prehistoric landscape feature.

7.6.19 Additionally, the proposals will clear the dumped garden waste from the mounds, enhancing their visibility, and improving the understanding of the barrows and their relationship with other prehistoric monuments in the locality. This will be an enhancement to the setting of the barrows.

7.6.20 In response to pre-application feedback from Historic England it is proposed to fell the trees that are growing on the monument to prevent potential damage if they are blown over by high winds. It is anticipated that the identification of these trees and the methodology for felling them will be dealt with under a planning condition, but is likely to involve leaving the roots to decay rather than being dug out. The work will require a separate application for Scheduled Monument Consent. The removal of the trees will enhance the viewer's ability to understand and appreciate the significance of the barrows.

7.6.21 In response to pre-application feedback from Suffolk Coastal DC it is proposed to install low timber fences around the barrows to prevent mountain biking and other similar activities from eroding the monument. These will be outside the scheduled area so will not require Scheduled Monument Consent.

7.6.22 Development within the wider site will have an urbanising effect on the wider setting of the barrows. However the surrounding land has undergone a number of uses and developments, including the 20th century use as Martlesham Heath Airfield, the development of the BT Research Centre at Adastral Park to the immediate north, and quarrying across the site, which have altered the landscape from its 'original' character, and changed the setting of the barrows over time.

7.6.23 The magnitude of the effect is medium, resulting in a **medium beneficial** effect. The effect will be **significant**, **direct**, **national** and **long term**.

Bowl Barrow and Pill Box 450m north west of Sheep Drift Farm

7.6.24 The barrow and pill box are situated within the site, and therefore will experience direct effects on their setting as a result of the Proposed Development .

7.6.25 The shape and extent of the barrow has been obscured by overgrown vegetation, which detracts from the appreciation of the monument. The proposals include the removal of vegetation, which will allow for an appreciation of the extent and form of the prehistoric bowl barrow. This will vastly improve the visibility of the barrow as a defined structure which contrasts with the surrounding flat topography, and will enhance appreciation of its heritage value.

7.6.26 The masterplan shows that the built form will be set back at least 15 metres from the monument and significantly more to the east. This open space will also encompass the non-designated octagonal brick radio base (asset 14) and the Type 23 Pillbox (asset 17). The retention of all three of the Second World War fortifications within an open space will allow them to be read together as a group, enhance public appreciation of

their heritage value and provide the opportunity for interpretation of the site's Second World War history.

7.6.27 The provision of public footpaths through the landscaped parkland will improve the public accessibility of the monument.

7.6.28 Additionally, the Proposals include the provision of interpretation presenting the history and significance of the monument and its context. It is anticipated that the content and form of interpretation will be agreed under condition but is likely to include interpretation boards. Together, this will facilitate better public understanding of the designated receptor, and other Monuments in the vicinity. This is therefore of considerable public benefit.

7.6.29 In response to pre-application feedback from Suffolk Coastal DC it is proposed to install low timber fences around the barrows to prevent mountain biking and other similar activities from eroding the monument. The fences will be outside the scheduled area so will not require Scheduled Monument Consent.

7.6.30 With regard to the Pill Box surmounting the barrow, the proposals include the adaptive re-use of the structure as a bat hibernation roost. To facilitate this, loopholes in the monument would be closed using rough wood, and a padlocked door would prevent unauthorised access to the interior of the monument, thus preventing antisocial activity and squatting. Scheduled Monument Consent will be required for these works.

7.6.31 Converting the monument to a bat roost would provide the receptor with a functional use to ensure its maintenance and survival into the future, which would not cause harm to the monument. This re-use of Pill Boxes has previously been successful in Lee Valley Park.

7.6.32 The Building Heights Parameter Plan indicates that this open space around the receptors will be set amongst an area of development of 3 storeys (14m in height), with some landmark buildings of four storeys (16m in height) in key locations. The masterplan orientates the new dwellings to create private views from properties towards the heritage receptors, to further enhance appreciation of the assets.

7.6.33 Development within the site will have an urbanising effect on the setting of the Monument. However, the surrounding land has undergone a number of developments and adaptations including the 20th century use as Martlesham Heath Airfield, the development of the BT Research Centre at Adastral Park to the north, the A12 and quarrying across the site, which have altered the landscape from its 'original' character, changed the setting of the barrows over time, and detract from their setting.

7.6.34 The quarrying use is a negative feature in the setting of the Scheduled Monument, and therefore the sympathetic redevelopment of the site will improve the setting of the Monument.

7.6.35 The Proposed Development will partially occlude views towards the Pegasus Tower and 7 storey block in Adastral Park, which will enhance the setting of the scheduled monument. The magnitude of change is considered to be medium, leading to a **medium beneficial** effect. The effect will be **significant**, **direct**, **national** and **long term**.

Church of St John the Baptist

7.6.36 As outlined in Section 7.5, there is no historic relationship between the land at the site and the Church of St John the Baptist, and the site makes no contribution to appreciation of its heritage value. The character of the land immediately surrounding the Church will not be changed as a result of the Proposed Development , preserving its rural, secluded setting.

7.6.37 The site is not visible from the Church. There may be some very limited visibility from the northern boundary of the churchyard (with the church behind the viewer) to the land beyond Ipswich Road and Sheep Drift Farm, with views occluded by a substantial tree belt between the farm and Newbourne Road.

7.6.38 Views between the site and the churchyard are distant, and filtered by the mature tree and conifer field boundaries that characterise the local landscape. There is some intervisibility with upper parts of the 200ft BT Pegasus Tower, though this is distant and does not have a meaningful effect on the setting of the church.

7.6.39 Overall, views to and from the listed building have the potential to experience only a negligible amount of change, which would not impinge upon the appreciation of the heritage value the medieval parish church. The magnitude of effect would be negligible, resulting in a **negligible** effect.

Bowl Barrow 155m east of Sheep Drift Farm and Bowl Barrow 180m ENE of Sheep Drift Farm

7.6.40 The barrows are situated within a private garden which is surrounded by an earth bund. Their proximity to one another characterises the immediate context, and demonstrates the strong associative, historical relationship between the barrows.

7.6.41 This enclosed setting will not be altered as part of the Proposed Development, and the surrounding earth bund interposes the barrows and the Application-site, and will not be removed as part of the Proposed Development.

7.6.42 From ground level, there is very limited visibility to the land beyond the bund, which includes the site to the north. However, the Proposed Development and the barrows will be visible from the top of the bund.

7.6.43 These views are experienced in the context of Brightwell Barns, a complex of wooden office and commercial accommodation, with areas of hard standing used as a car park. This interposes the receptors and the site.

7.6.44 The historical association between the barrows within the site and these barrows will be preserved through the retention of the barrows at the site within areas of designated open space (discussed in further detail elsewhere).

7.6.45 The magnitude of change is considered to be negligible, leading to a **negligible effect**. The effect will be **direct**, **national** and **long term**.

Bowl Barrow on Waldringfield Heath, 150m south of Heath Farm

7.6.46 The setting of the barrow is open and agrarian in character, and does not meaningfully contribute to its heritage value. Whilst the barrow retains its archaeological interest below ground, the mound has been eroded by ploughing, and the monument is now flat.

7.6.47 At its closest extent, the barrow is approximately 75m east of the Application-site, though the area closest to the asset is to be retained as open space, which will preserve the open character of receptor's immediate setting.

7.6.48 The eastern boundary of the site will accommodate buildings of up to two storeys (11 metres) in height, with building heights stepped up towards the middle of the site.

7.6.49 The change in character of the land at the site would bring about an urbanising influence in the setting of the barrow to the west. That change would not, however, be a new influence, as modern development forms part of the context of the barrow to the north and along Newbourne Road, and Adastral Park, including the BT Pegasus tower, are highly visible landmarks to the west.

7.6.50 Although the Proposed Development would be noticeable in the setting of the scheduled monument, it would not change the value of the receptor, nor indeed affect the ability to appreciate its heritage value, which is more obscure since the barrow has been ploughed out. The magnitude of change is considered to be negligible, leading to a **negligible effect**. The effect will be **direct, national** and **long term**.

Pole Hill Bowl Barrow

7.6.51 The setting of the barrow is largely open in character, with extensive views across the surrounding landscape.

7.6.52 The barrow is a funerary monument which forms a visible protrusion within an arable field. Due to the topography of the local area, it is possible that there was intentional visibility between the barrows in the locality, including those within the Application-site. However, these views have been occluded by interposing development and extensive treed boundaries, and there is now no visibility between the barrow at Pole Hill and those scheduled monuments within the site.

7.6.53 The experience of the receptor is defined by its contrast with the surrounding landscape, which is open and arable in character. As a visible protrusion within a predominantly flat landscape, the barrow is a noticeable feature, particularly in views from the adjacent Foxhall Road.

7.6.54 The open setting of the receptor means that there are wide-ranging views in all directions, which are predominantly rural in character with some built development visible within the wider setting of the receptor.

7.6.55 Views towards the site take in filtered views of Adastral Park, including the Pegasus Tower, which forms a landmark in the distance of some views to the north east. These views are interposed by established tree belts along field boundaries, which are a key feature of the local landscape.

7.6.56 There is some potential for distant visibility of the Proposed Development from the receptor, and in views north east from Foxhall Road which include the barrow, although the proposals would not be readily noticeable. However, the immediate setting of receptor is rural and open in all directions, with urban development to the north and east visible in distant views. The view towards the site is filtered by interposing tree boundaries. The experience of the barrow in its open setting will not change, and hence the special interest of the monument will be preserved.

7.6.57 The Proposed Development would result in a barely discernible change to the value of the receptor, so a negligible magnitude of effect, resulting in a **negligible effect**. The effect will be **direct, national** and **long term**.

Martlesham Heath Airfield non-designated heritage receptors

Eight sided brick built base for radio tower

7.6.58 The eight sided structure is associated with the Second World War development at the airfield, forming a protective wall surrounding a now-lost radio tower.

7.6.59 The Proposed Development includes the retention of the wall in situ, and the removal of obscuring vegetation to better facilitate its appreciation as part of the site's Second World War history.

7.6.60 Additionally, the masterplan includes the provision of an area of open space, incorporating the brick base, the Scheduled Monument which includes a Second World War pillbox on a barrow (asset 4), and the Type 23 Pillbox with gun emplacement and underground shelter (asset 17). The open space incorporating these three receptors will reinforce their group value and will be publicly accessible to will enhance public appreciation of the heritage value of the assets. This appreciation will be further enhanced by the interpretation of the Second World War fortifications as part of the airfield fortifications. It is anticipated that the interpretation strategy will be agreed under planning condition but is likely to include interpretation boards.

7.6.61 The masterplan indicates that built form will be set back from the receptor to the east and south, with the open space retained to the north and west.

7.6.62 Development will necessarily have an urbanising effect on the setting of the non-designated receptor. However, the landscape in the surrounding area is no longer representative of the Second World War Airfield, with developments in the setting of the monument including the BT Research Centre at Adastral Park to the north and the A12 to the west, which have altered the landscape from its 'original' character, changed the setting of the receptor, and detract from its setting.

7.6.63 The Design & Access Statement defines the framework for the treatment of this asset, which includes restoration of the brickwork, providing a cover to stop people climbing inside the structure, ornamental planting around the perimeter with public benches. The proposals constitute a major enhancement to the heritage value of the structure.

7.6.64 The magnitude of the effect will be major, resulting in a **medium beneficial effect**. The effect will be **significant, direct, local** and **long term**.

Type 23 Pillbox associated with gun emplacement and underground shelter

7.6.65 The Pillbox is presently obscured by extensive vegetation, and later infill has eroded the legibility of the form of the receptor. The original relationship with the RAF runways is no longer readily apparent. The Proposals involve clearing the receptor of vegetation, and creating an area of landscaped open space in its immediate setting.

7.6.66 This area of open space will also comprise the designated Bowl Barrow and Pillbox (asset 4), and the eight sided brick built base to radio mast (asset 14). This will improve the opportunity to appreciate the group value of the Second World War receptors, and the history of Martlesham Heath Airfield.

7.6.67 The scale of Proposed Development in this area is up to three storeys with some landmark buildings of four storeys in key locations, which will have an urbanising effect on the setting of the pill box. It will also partially occlude views of Pegasus Tower and the other large scale unattractive development at Adastral Park and screen the asset from the A12, which will enhance its setting.

7.6.68 The proposals include the adaptive re-use of the pill box as a bat hibernation roost. To facilitate this, loopholes in the monument would be closed using rough wood, and a padlocked door would prevent unauthorised access to the interior of the pill box, thus preventing antisocial activity and squatting.

7.6.69 Converting the pill box to a bat roost would provide the receptor with a functional use to ensure its maintenance and survival into the future, which would not cause harm to the pill box. This re-use of pill boxes has previously been successful in Lee Valley Park.

7.6.70 The magnitude of the effect will be medium, resulting in a **minor beneficial effect**. The effect will be **direct, local** and **long term**.

Possible light anti-aircraft machine gun post

7.6.71 The proposals include the removal of the receptor, which is in poor condition, with metal protrusions presenting a safety hazard.

7.6.72 Naturally, the removal of the receptor will result in the total loss of its heritage value, however, this value is, in any case, low as the receptor is poorly preserved, and not of any particular architectural quality.

7.6.73 The effect of the loss of the light anti-aircraft gun post could be partly mitigated by recording prior to its removal. The record should then be kept by the Suffolk Historic Environment Record.

7.6.74 This will result in a major magnitude of change, resulting in a **minor adverse effect**. The effect will be **direct, local** and **long term**.

Romney Hut

7.6.75 The immediate setting of the Romney Hut comprises a rural lane close to Sheep Drift Farm, which is predominantly used by agricultural and associated vehicles. There are mature trees interposing the hut and the Application-site, which also prevent any intervisibility between the hut and contemporaneous wartime receptors within the site and locality.

7.6.76 From ground level there is very limited, if any visibility to the land beyond the immediate surrounds of the hut, with views occluded by mature trees.

7.6.77 Whilst the immediate setting of the hut is predominantly rural, this does not contribute meaningfully to the setting of the receptor, which has been separated from contemporaneous airfield structures by subsequent development at Sheep Drift Farm and with the planting of hedges.

7.6.78 To the north, there is the potential for views of the Proposed Development from the receptor, in an area indicated on the Parameter Plan 2: Building Heights Plan as Height Zone 3- capable of accommodating buildings of up to three storeys (14m in height) with some buildings of up to four storeys (16 metres in height) in key locations.

7.6.79 Whilst the Proposed Development would change the character of the land to the north of the Romney Hut, this land does not presently contribute to the heritage value of the receptor.

7.6.80 The change would be noticeable from the receptor, but would make a barely discernible change to the heritage value of the receptor. The magnitude of the effect is negligible, resulting in a **negligible effect**. The effect will be **direct, local** and **long term**.

Brick barrack blocks and war memorial, and Type B Aeroplane Shed

7.6.81 The brick barrack blocks and war memorial, and the Type B Aeroplane Shed are associated with Martlesham Heath Airfield, and form non-designated heritage receptors beyond the site boundary.

7.6.82 At their closest extent, the receptors are separated from the site by a road through Barrack Square, and the BT development at Adastral Park, which is surrounded by wire fencing and a tree boundary.

7.6.83 This area of the site is designated in the proposed masterplan as suitable for buildings of up to 3 storeys (14.0m). This is lower than the BT buildings at Adastral Park, which are adjacent to the north of this area.

7.6.84 There is the potential for some partial, filtered views of the Proposed Development from the receptors, though these views would be experienced in the context of the adjacent Adastral Park development.

7.6.85 Additionally, the setting of the barracks and aeroplane shed already consists of modern development within the retail park. Therefore, the Proposed Development will not alter the character of the receptors' setting.

7.6.86 The historical relationship between the site and the barracks and aeroplane shed will be preserved through the retention of features associated with Martlesham Heath Airfield within the Application-site, which are to be preserved within buffer zones which allow for their appreciation.

7.6.87 Therefore, the barrack blocks and aeroplane shed will likely experience a negligible magnitude of change, resulting in a **negligible effect**. The effect will be **direct, local** and **long term**.

7.7 Mitigation

Archaeology

7.7.1 The following section outlines mitigation measures not incorporated into the design of the Proposed Development assessed and specifies additional measures proposed to reduce impacts.

7.7.2 The archaeological potential of the site has been assessed through archaeological evaluation which has identified two areas in the north of the site with positive archaeological results. A series of ditches and the occasional pit and posthole were identified in 'Area D'. Finds analysis has shown that the remains were of late Iron Age to early Roman date, with a very small element of late Neolithic or Early Bronze Age remains in 'Area G'. This area has been subject to an on-going archaeological

watching brief associated with Waldringfield Quarry. An Early Bronze Age pit containing a collared urn, an undated enclosure, a small cluster of prehistoric pits and a possible medieval building have been recorded.

7.7.3 There are two small areas within Waldringfield Quarry which do not appear to have been quarried or archaeologically evaluated to date. Based on the negative results for archaeological investigations adjacent to these areas, the potential for significant remains is considered low. A programme of archaeological works (watching brief) will be undertaken. The detail of the programme will be agreed with Suffolk County Council.

7.7.4 Sub-surface remains of national importance associated with the two scheduled areas within the study site are not anticipated to be impacted by the development. As such, the assessment has not identified any designated assets which will be negatively impacted by development, and no further mitigation measures are necessary.

Cultural Heritage

7.7.5 The primary mitigation measures incorporated into the Proposed Development include the design response to possible effects identified in the iterative design process, which seek to avoid significant adverse effects through careful planning, siting, access, layout and the scale of buildings.

7.7.6 The mitigation measures are described in the previous section on operational effects. In summary these include:

- A well-considered masterplan that respects the setting of heritage assets, including the creation of a large public open space around the scheduled monument and retained WWII structures to enhance their public appreciation and group value. This includes a buffer of a minimum of 15 metres from the scheduled monument to built form, and considerably more to the east.
- The clearing of vegetation and rotting leaves from the scheduled barrows to enhance public appreciation of their heritage value.
- The felling of trees growing on the barrows in Spratt's Plantation to prevent potential damage from trees uprooted by high winds.
- The installation of low timber fences around the barrows to prevent erosion by mountain bikes and similar activities.
- An interpretation strategy for the barrows and WWII structures to enhance public appreciation of their heritage value.
- The conversion of pillboxes to bat roosts to secure a meaningful use for the buildings.
- The restoration of the octagonal brick WWII structure and its incorporation into the landscape strategy including ornamental planting and benches.

7.8 Summary of effects

Residual Effects

Archaeology

7.8.1 Following the implementation of the proposed mitigation above, there will be a residual minor beneficial effect due to the research undertaken on non-designated archaeological heritage assets within the site and the contribution to the understanding of the heritage of the area.

Table 7.7 Summary of Residual Effects

Receptor(s)	Likely Significant Effect	Design/Mitigation Measure	Residual Effect
Construction			
Non-Designated Heritage Assets	Minor adverse	A programme of archaeological investigation and publication will be implemented. The scope of these works will be agreed with Suffolk County Council.	Minor beneficial due to the research undertaken on the archaeology of the site and the contribution to the understanding of the heritage of the area.
Designated Heritage Assets	No Impact	None	Negligible
Operational			
Non-Designated Heritage Assets	No Impact	None	Negligible

Cultural Heritage

7.8.2 Predicted effects (i.e. in the absence of mitigation) have been identified throughout the iterative pre-application process. Due to embedded mitigation, predicted effects are not considered as part of this assessment.

7.8.3 Residual effects (i.e. those which remain after mitigation) of the operational phase as set out in the previous section. Where appropriate, we identify specific design measures that mitigate impact within the discussion of operational effects.

Table 7.8 Summary of Residual Effects

Receptor	Heritage Value	Magnitude of Change	Significance of Effect
Two bowl barrows in Spratt's Plantation	High	Medium	Medium Beneficial

Bowl Barrow and Pill Box 450m north west of Sheep Drift Farm	High	Medium	Medium Beneficial
Church of St John the Baptist	High	Negligible	Negligible
Bowl Barrow 155m east of Sheep Drift Farm	High	Negligible	Negligible
Bowl Barrow 180m ENE of Sheep Drift Farm	High	Negligible	Negligible
Bowl Barrow on Waldringfield Heath, 150m south of Heath Farm	High	Negligible	Negligible
Pole Hill Bowl Barrow	High	Negligible	Negligible
Eight Sided Brick Built Base to Radio Mast	Low	Major	Medium Beneficial
Type 23 Pill Box associated with gun emplacement and underground shelter	Low	Medium	Minor Beneficial
Possible light anti-aircraft machine gun post	Low	Major	Minor Adverse
Romney Hut	Low	Negligible	Negligible
Brick barrack blocks and war memorial	Low	Negligible	Negligible
Type B Aeroplane Shed	Low	Negligible	Negligible

8 ECOLOGY

8.1 Introduction

8.1.1 The purpose of this Chapter is to assess the likely significant effects of the Proposed Development within the site on ecology and nature conservation. The assessment focuses on features of ecological significance within the zone of influence of the site, including statutory and non-statutory designated sites, and protected, or otherwise notable, habitats and species.

8.2 Scope and methodology

8.2.1 The ecological baseline assessment has adopted a phased approach. An initial Phase 1 Habitat Survey of the site was completed in 2016 by Southern Ecological Solutions Ltd (SES) to map the habitats and identify the key ecological features. This provided the basis to determine the range of further more specialist Phase 2 ecological surveys, principally for protected and notable species that were completed over the course of 2016 and early 2017 by SES (2017). The Phase 1 Habitat and Phase 2 Ecology Assessment, including full details of all survey and assessment methods and results is provided in Appendix E1.

8.2.2 In parallel, and drawing upon the results of ecological surveys mentioned above a 'shadow' Habitats Regulations Assessment (sHRA) was also carried out by Baker Consultants Ltd (2017). The purpose of the sHRA was to provide the Competent Authority with the information it may require to assist in their assessment of the potential impacts upon European sites (Special Protection Areas, Special Areas of Conservation and Ramsar sites) within the vicinity of the Proposed Development.

8.2.3 The Phase 1 habitat and Phase 2 ecology assessment is summarised below and is used as a basis to evaluate the site features, assess effects of the Proposed Development on features and, where necessary, identify mitigation and enhancement measures.

Phase 1 Desktop Study

8.2.4 A biodiversity data search was undertaken and data on protected and notable species and statutory and non-statutory designated sites were obtained from Suffolk Biological Information Service (SBIS) and encompassed a 2km radius from the site's boundaries.

8.2.5 A search was also conducted using the MAGIC online spatial planning resource for European designated sites within 10km and nationally designated sites within 5km of the site.

Phase 1 Field Survey

8.2.6 The field survey, undertaken in 2016, comprised of an Extended Phase 1 habitat survey (JNCC, 2010) of the site. This was a standard survey method for obtaining baseline ecological information.

8.2.7 The dominant and readily identifiable higher plant species identified in each of the various habitat parcels were recorded and their abundances were assessed on the DAFOR scale as follows:

- D Dominant;
- A Abundant;
- F Frequent;
- O Occasional; and
- R Rare.

8.2.8 These scores represented the abundance within the habitat type on the site and did not reflect national or regional abundances. Plant species nomenclature followed Stace (2010).

8.2.9 Incidental records of protected and notable fauna were also made during the survey and the habitats identified were evaluated for their potential to support protected species and other species of conservation concern.

Phase 2 Surveys

8.2.10 Several Phase 2 surveys were carried out at the site, including:

- Bats – Roosting (including Emergence) and Activity;
- Great Crested Newts;
- Otter and Watervole;
- Botanical Surveys;
- Birds – Breeding and Wintering;
- Badgers;
- Invertebrates;
- Reptiles; and
- Small and medium-sized notable mammals

8.2.11 The surveys undertaken followed published guidance which enabled an assessment of presence / likely absence and/or importance on a geographic scale. Table 8.1 below summarises the methods used. Full methods can be found in Appendix E1.

Table 8.1 Summary of Survey Methods

Ecological Feature	Methods
Habitats	Extended phase 1 habitat survey completed in April, May and June 2016 following JNCC guidelines (2010).
Bats – Activity	All survey design followed current Bat Conservation Trust Guidance (BCT) (Collins, 2016). **Activity** One survey a month was undertaken along two transects between May and October 2016 – 25th May 2016, 29th June 2016, 11th July 2016, 3rd August 2016, 12th and 13th September 2016 (dusk and dawn) and 17th October 2016. **Automated** Four static detectors - SM2+ and Anabat Express - were deployed each month for a minimum of 5 consecutive nights to record bat activity at various locations within the site.

Ecological Feature	Methods
	Static detectors have not been deployed within the working parts of the quarry for health and safety purposes.
Bats – Roosts	**Tree Scoping Survey / Aerial Inspections** A full tree inspection survey was undertaken by a trained and qualified tree climbing and aerial rescue (NPTC level 2 certification) team, after trees to be inspected were identified during a scoping survey on 1st, 5th and 6th July 2016. The features of each tree were inspected at close range by using a powerful torch, an angled mirror and an endoscope to look into deep cracks and crevices. A final valuation based on the ground inspection and climbing inspections was given to each tree and marked on a digital map. **Building Inspections** External building inspections were undertaken on 24th August 2016. All buildings on the site including quarry workshops, offices, pillboxes etc. were checked externally. Internal building inspections were carried out on buildings with roosting potential/roosts by a class licence holder on 3rd November 2016. **Emergence Surveys** Trees identified as having moderate or high potential for roosting bats and buildings identified as having low, moderate or high potentials for roosting bats were subject to emergence surveys. Equipment used included either a BatBox Duet and Edirol or an EM3+ both recorded in WAV files and analysed on BatSound 4.2 where necessary. **Hibernation Surveys** Hibernation surveys were undertaken on those trees / buildings with hibernation potential or where bat roosts were found through internal inspections of buildings and crevices in trees as well as static detector recordings where appropriate.
GCN and amphibians	A single eDNA survey visit on 27th June 2016 of each of the ponds on-site was undertaken following best practice guidance as described by Biggs *et al*. (2014). Evidence of other amphibians was observed during other protected species surveys.
Otter and Watervole	A walkover of the fishing lake on-site was undertaken on 27th June 2016 and 28th October 2016 to establish the use of the site by Otter and Watervole. Desk top records from SBIS were observed and gathering of local knowledge was undertaken.
Plants	Two field visits were undertaken on 5th and 13th July to assess grassland habitats. Botanical nomenclature follows *New Flora of the British Isles* by Clive Stace (3rd edition, 2010).
Birds - Breeding	Survey followed the standard Common Bird Census (CBC) methodology (Gilbert *et al*., 1998) but was modified from ten to three survey visits through May – June 2016.
Birds - Migrant and Wintering	Survey has followed generic wintering bird monitoring methods given in Gilbert *et al.* (1998). The site was visited three times through the wintering/migrant period November 2016 - February 2017 17th November, 26th January, & 24th February. Two trail cameras (Little Acorns) were deployed between the first and second survey visits along the permanent grassland of the BT testing arena to check for its use by wintering waterfowl.

Ecological Feature	Methods
Badger	Application-site survey undertaken in Oct/Nov 2016 and January/February 2017 when vegetation is less dense. Survey followed standard guidelines for classifying badger setts (Harris *et al.*, 1989) and categorising entrance holes (Natural England, 2009). Vegetation clearance and installation of trail cameras (Bushnell Trophy Cam) was undertaken to aid the survey.
Invertebrates	Five survey visits on 6th June, 4th July, 26th July, 12th August and 27th September 2016. Surveys followed Invertebrate Species-habitat Information System of Natural England (ISIS) protocols (Drake *et al*, 2007).
Reptiles	A seven visit presence and likely absence survey undertaken during 'suitable' days for reptile activity throughout Aug-Sep following best practice (Froglife, 1999; Gent & Gibson, 2003).
Small Mammals	Records, observations and / or field signs were collected during survey visits for other protected species including dawn and dusk Application-site visits.

Assessment of Significance

8.2.12 The Chartered Institute of Ecology and Environmental Management's (CIEEM) Guidelines for Ecological Assessment in the United Kingdom (2016) have been adopted and informed by species specific assessment guidelines, if available for individual ecological features.

8.2.13 The CIEEM guidance states that it is best to use the geographical scale (i.e. International, National, Regional, see below) at which a feature (i.e. a habitat, species or other ecological features) may or may not be important.

8.2.14 The following geographical scale categories has been used for the assessment:

- International (Europe);
- National (UK);
- Regional (East Anglia);
- County (Suffolk);
- District (Suffolk Coastal);
- Local (Woodbridge etc.), and;
- Site (the site).

8.2.15 In order to identify the geographical scale at which a feature is important, the CIEEM guidance recommends that legal protection be considered separately from ecological importance, and suggest that it is better to use professional judgement when making such assessments. In terms of impact assessment, it is stated in the CIEEM guidance to consider all features which might be impacted upon significantly, again working within a geographical scale.

8.2.16 The starting point for an ecological impact assessment is to determine which ecological features within the site and/or zone of influence are of sufficient value to be included in the assessment and vulnerable to significant effects arising from the Proposed Development.

8.2.17 Having identified the activities likely to cause significant effects, it is then necessary to describe the resultant changes and to assess the impact on valued ecological features.

Additionally, it is important to consider the likelihood that a change/activity will occur as predicted and also the degree of confidence in the assessment of the impact on ecological structure and function.

8.2.18 When describing changes/activities and impacts on ecosystem structure and function, the CIEEM guidance recommend that reference should be made to the following parameters:

- Positive or negative;
- Extent;
- Magnitude;
- Duration;
- Timing/frequency and
- Reversibility.

8.2.19 Impacts have been assessed using the Mitigation Hierarchy, which forms the Key Principles of Ecological Impact Assessment (EcIA):

- Avoidance – seeking options to avoid harm to ecological features
- Mitigation – seeking options to avoid or minimise adverse effects
- Compensation – offsetting adverse effects through appropriate compensatory measures
- Enhancements – Seek to provide net benefits for biodiversity

8.2.20 Avoidance was undertaken during the design stage, to avoid areas of relatively high ecological value. As such, the impacts have been assessed based on the current indicative Illustrative Framework Masterplan (Reference no. 08 Revision G).

Integrity

8.2.21 A particular definition of site integrity is provided for European designated sites in the Government circular: biodiversity and geological conservation – statutory obligations and their impact within the planning system (2005), as follows:

> *"The integrity of a site is 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."*

8.2.22 A European site/ecosystem that achieves this level of coherence is often referred to as being in a favourable condition.

8.2.23 A Nationally Designated Site can be considered favourable when all the component designated features are favourable (Natural England, undated), and this is considered an appropriate assessment for the remaining designated sites.

Conservation Status

8.2.24 It is recommended by CIEEM that the concept of conservation status is used to determine whether an effect is likely to be ecologically significant.

8.2.25 For species, conservation status is determined by the sum of influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within a given geographical area.

8.2.26 Conservation status may be evaluated for any defined study area at any defined level of ecological value. The extent of the area used in the assessment will relate to the geographical level at which the feature is considered important.

Determining Ecologically Significant Effects

8.2.27 An ecologically significant effect is defined as an effect (negative or positive) on the integrity of a defined designated site or ecosystem and/or the conservation status of habitats or species within a given geographical area.

8.2.28 The importance of any feature that will be significantly affected is then used to identify the geographical scale at which the impact is significant. This value relates directly to the consequences, in terms of legislation, policy and/or development control at the appropriate level. So, a significant negative effect on a feature's importance at one level would be likely to trigger related planning policies and, if permissible at all, generate the need for development control mechanisms, such as planning conditions or legal obligations, as described in those policies.

8.2.29 If an effect is found not to be significant at the level at which the resource or feature has been valued, it may be significant at a more local level.

8.2.30 Significant effects on features of ecological importance will be mitigated (or compensated for) in accordance with guidance derived from policies applied at the scale relevant to the value of the feature or resource.

8.2.31 The scale is derived from the interaction of the feature sensitivity and magnitude of impact.

8.3 Consultation undertaken

8.3.1 Consultation with Natural England was undertaken with regard to impacts on designated sites through their discretionary advice service (DAS).

8.3.2 Suffolk Wildlife Trust was consulted with regard to the scope of assessments required and Heathland creation and management.

8.3.3 Suffolk Coastal District Council were contacted and a scoping opinion was sought.

Wildlife Legislation

8.3.4 There are a number of protected sites and species relevant to this assessment which are protected under various legislation and subsequent policy as shown in Table 8.2. The highest level of protection is listed first.

8.3.5 The two principal sources of wildlife legislation are the Conservation of Habitats and Species Regulations 2010 (CHSR) that deals principally with internationally important sites and species, and the Wildlife and Countryside Act (WCA) 1981 that deals principally with nationally important sites and species.

Table 8.2 Legislation and Policy Protecting Designated Sites and Protected Species

Legislation / Policy	Designated Sites	Protected Species / Habitats
Conservation of Habitats and Species Regulations 2010 (based on EU directives)	Special Areas of Conservation (SACs) and Special Protection Areas (SPAs)	Annex IV species such as: Otter, Hazel Dormouse, Great Crested Newt and Bats
Government policy to apply the same level of protection as to European sites (NPPF, para 118)	Wetlands of global importance (Ramsar sites)	-
Wildlife and Countryside Act 1981	Sites of Special Scientific Interest	Common Reptiles, Water Voles, White Clawed Crayfish and all wild birds
National Parks and Access to the Countryside Act, 1949, Section 21	Local Nature Reserves	-
Protection of Badgers Act 1992	-	Badgers
Hedgerow Regulations 1997	-	Hedgerows
Planning Policy	County Wildlife Sites (CWSs) / Local Wildlife Sites (LoWS)	UK Biodiversity Action Plan (BAP) species and Habitats (HAP) / Natural Environment and Rural Communities Act (NERC, 2006) species / habitats of principle importance, Local BAP.

8.3.6 Species listed under Schedule 2 of the CHSR 2010 are the European Protected Species (EPS). Together with provisions in the WCA 1981, the EPS are protected from the following criminal offences. It is an offence to:

- Deliberately capture, injure or kill any wild animal of an EPS;
- Deliberately disturb wild animals of any EPS, in particular any disturbance which is likely to impair their ability:
  - to survive, to breed or reproduce, to rear or nurture their young; or
  - in the case of animals of a hibernating or migratory species, to hibernate or migrate; or
  - to affect significantly the local distribution of the species to which they belong;
- Intentionally or recklessly:

- Disturb any EPS whilst it is occupying a structure or place which it uses for shelter or protection; or
- Obstruct access to any structure or place which any EPS uses for shelter or protection

- Damage or destroy any structure or place which any wild animal of an EPS uses for shelter or protection;
- Deliberately take or destroy the eggs of an EPS;
- Possess or transport any part of a EPS; and/or
- Sell, offer or expose for sale, or possess or transport for the purpose of sale, any live or dead EPS, or any part of, or anything derived from an EPS; all wild birds are protected from intentional killing, injuring or taking under the WCA (1981).

8.3.7 Certain species of wild bird listed on Schedule 1 of the WCA 1981 are further protected from intentional or reckless disturbance at their nest sites whilst building a nest or in, on or near a nest containing eggs or young. A further offence is the intentional taking or destroying of an egg of any wild bird.

8.3.8 Under the Hedgerows Regulations 1997, hedgerows growing in, or adjacent to, any common land, protected land, or land used for agriculture, forestry or the breeding or keeping of horses, ponies or donkeys are protected from removal if; the hedgerow has a continuous length of, or exceeding, 20 metres; or it has a continuous length of less than 20 metres and, at each end, meets (whether by intersection or junction) another hedgerow.

8.3.9 In addition, certain hedgerows receive additional protection from removal as “Important Hedgerows”.

8.3.10 Japanese Knotweed *Fallopia japonica,* along with a number of other introduced and invasive species*,* is listed under Schedule 9 of the WCA 1981 making it an offence to plant or otherwise cause Japanese Knotweed to grow / spread into the wild. Japanese knotweed is also classed as controlled waste under the Environment Protection Act 1990.

National Policy

8.3.11 The National Planning Policy Framework (NPPF) sets out the government’s planning policies for England and is a material consideration in the context of planning decisions and in the making of local and neighbourhood plans, as required by planning law (Department for Communities and Local Government, 2012).

8.3.12 The NPPF Chapter 11, paragraph 109 outlines what the planning system should do to contribute to, and enhance the natural and local environment by:

- Protecting and enhancing valued landscapes, geological conservation interests and soils;
- Recognising the wider benefits of ecosystem services;
- 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 establishing coherent ecological networks that are more resilient to current and future pressures;
- 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

- remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

8.3.13 The UK Government's commitment to the conservation and enhancement of biological diversity was outlined in the United Kingdom Biodiversity Action Plan (UK BAP). It listed habitats and species that were of conservation concern and set national priorities and targets for the protection and enhancement of these resources. The UK BAP has been superceded by the Natural Environment and Rural Communities Act (NERC Act, 2006); however the UK BAP is still referred to for priority habitats and species.

8.3.14 The UK Post-2010 Biodiversity Framework succeeded the UK BAP and the subsequent adoption of the Ecosystems Approach. This was as a result of a change in strategic thinking following the publication of the Convention on Biological Diversity's Strategic Plan for Biodiversity 2011-2020', and its 20 'Aichi Biodiversity Targets' in 2010, as well as the launch of the new EU Biodiversity Strategy (EUBS) in May 2011. The UK Post-2010 Biodiversity Framework demonstrates how the work of the four countries in the UK should contribute to achieving the Aichi Biodiversity Targets, and identifies the activities required to complement the country biodiversity strategies in achieving these targets. See Table 8.3 for summary.

Table 8.3 Ecological National Planning Policy

National Policy	Key Provisions
National Planning Policy Framework	*Chapter 11: Conserving and Enhancing the Natural Environment, paragraphs 109-125. Specifically, 109, 117, 118, 119 and 125.* *109* – The planning system should contribute to and enhance the natural and local environment by: • protecting and enhancing valued landscapes, geological conservation interests and soils; • recognising the wider benefits of ecosystem services; • 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; • 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 • remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate. 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;

National Policy	Key Provisions

	• 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;
	• where Nature Improvement Areas are identified in Local Plans, consider specifying the types of development that may be appropriate in these Areas.
	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;
	• development proposals where the primary objective is to conserve or enhance biodiversity should be permitted;
	• 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;
	  ○ 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.
	119 – The presumption in favour of sustainable development (paragraph 14) does not apply where development requiring appropriate assessment under the Birds or Habitats Directives is being considered, planned or determined.
	125 – By encouraging good design, planning policies and

National Policy	Key Provisions
	decisions should limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

Local Policy

8.3.15 Local Planning Policy is formed from the Suffolk Coastal District Local Plan: Core Strategy & Development Management Policies (Suffolk Coastal District Council, 2013a), the site Allocations and Area Specific Development Policy Document (Suffolk Coastal District Council, 2017a), Felixstowe Peninsula Area Action Plan Development Plan Document (Suffolk Coastal District Council, 2017b) and the Suffolk Coastal Local Plan: remaining 'Saved Policies' (Suffolk Coastal District Council, 2017c). See Table 8.4 for summary.

Table 8.4 Ecological Local Planning Policy

Local Policy	Key Provisions
Suffolk Coastal District Local Plan: Core Strategy & Development Management Policies	
SP12 – Climate Change	The District Council will contribute towards the mitigation of the effects of new development on climate change by: • Ensuring development minimises the use of natural resources by utilising recycled materials where appropriate, minimises greenhouse gas emissions, incorporates energy efficiency, encourages the use of public transport, helps to reduce waste and minimises the risk of pollution; • Encouraging and promoting schemes which create renewable energy where consistent with the need to safeguard residential amenity, the environment and the landscape; • Minimising the risk of flooding and ensuring appropriate management of land within flood plains; and • Improving the process of estuary and coastal management, incorporating and integrating social, recreational, economic, physical and environmental issues and actions
SP14 - Biodiversity and Geodiversity	Biodiversity (and geodiversity) will be protected and enhanced using a framework based on a network of: • designated sites; • wildlife corridors and links; • rivers, estuaries and coast; • identified habitats and geodiversity features; • landscape character areas and • protected species. The Suffolk BAP will be implemented. The strategy will also contribute to county targets through restoration, creation and on-going management of new priority habitats as identified in those documents.
SP15 – Landscape and Townscape	The policy of the Council will be to protect and enhance the various landscape character areas within the district either through opportunities linked to development or through other strategies.

Local Policy	Key Provisions
	In addition to the protected landscape of the AONB, the valleys and tributaries of the Rivers Alde, Blyth, Deben, Fynn, Hundred, Mill, Minsmere, Ore, Orwell and Yox, and the designated Parks and Gardens of Historic or Landscape Interest are considered to be particularly significant. Many of the towns and villages in the district are of distinctive historical and architectural value, as well as landscape value and character, and the Council will seek to enhance and preserve these attributes and the quality of life in the generality of urban areas. This strategy will extend to towns and villages where sites, gaps, gardens and spaces that make an important contribution to a particular location in their undeveloped form will be identified and protected where known; or more generally avoided where development in these locations would lead to coalescence. The location of such sites will be designated through the site Allocations and Area Specific Policies, Area Action Plan or Neighbourhood Development Plan Document. Until then those sites currently allocated under "saved" Policy AP28 in the Suffolk Coastal Local Plan (incorporating 1st and 2nd Alterations) will continue to be protected.
SP20 – Eastern Ipswich Plan Area (EIPA)	On land to the south and east of Adastral Park strategic open space in the form of a country park or similar will be required to mitigate the impacts of this development on-site and on the wider area.
DM27- Biodiversity and Geodiversity	All development proposals should: • protect the biodiversity value of land and buildings and minimise fragmentation of habitats; • Maximise opportunities for restoration, enhancement and connection of natural habitats; and • Incorporate beneficial biodiversity conservation features where appropriate. Development proposals that would cause a direct or indirect adverse effect (alone or combined with other plans or projects) to the integrity of internationally and nationally designated environmental sites or other designated areas, priority habitats or protected/priority species will not be permitted unless: • prevention, mitigation and, where appropriate, compensation measures are provided such that net impacts are reduced to a level below which the impacts no longer outweigh the benefits of the development*; or • with regard to internationally designated sites that the exceptional requirements of Reg. 62 of the Conservation of Habitats and Species Regulations 2010 relating to the absence of alternative solutions and Imperative Reasons of Overriding Public Interest have been met. Improved site management and increased public access to sites will be encouraged where appropriate. *Footnote: *If the result of the Appropriate Assessment is that part of the Core Strategy cannot be delivered without adverse impacts on a European site which cannot be appropriately mitigated then planning permission will only be granted for a level and location of development for which it can be concluded that there will be no adverse impact on the integrity of the site even if this level is below that indicated in the Core*

Local Policy	Key Provisions
	Strategy.
Site Allocations and Area Specific Development Policy Document	
SSP1 - New Housing Delivery 2015 - 2027	In order to meet at least the minimum Core Strategy housing delivery for the plan area over the period 2010 -2027, new housing delivery should be provided in accordance with…. The BT Adastral Park planning application (current application reference C/09/0555) is expected to provide for up to 2,000 homes in accordance with Core Strategy Policy SP20 Eastern Ipswich Plan Area.
SP2 – Housing Numbers and New Development	The Core Strategy will make provision for at least 7,900 new homes across the district in the period 2010 to 2027. New homes identified by means of specific allocations will be phased at a rate commensurate with the provision of any necessary new and improved infrastructure provision. For those areas where nature conservation issues are screened as important, phasing will also need to accord with agreed mitigation.

8.4 Existing environment

8.4.1 SES Ltd have undertaken a Phase 1 Habitat Survey following JNCC guidelines (2010) and a variety of Phase 2 ecology surveys over the 2016 / 2017 period (SES, 2017, see Appendix E1). Land to the south and east of Adastral Park (the site) is a varied area of land consisting of habitats of generally low ecological value such as arable land and quarry as well as areas of relatively higher ecological value, such as woodland, a lake and semi-natural grasslands. The site is situated to the east of Ipswich, between Waldringfield, Martlesham and Martlesham Heath. A summary is described below, with full details found in Appendix E1.

European Designated Sites

8.4.2 There are 3 sites of European importance within 10km of the Proposed Development: Deben Estuary Special Protection Area (SPA) and Ramsar, Sandlings SPA and Stour and Orwell Estuaries SPA and Ramsar, see Table 8.5a.

Table 8.5a European designated sites within 10km of the Proposed Development, listed in order of distance from site

Name and Site Designation	Distance	Direction from Site	Designated features
Deben Estuary SPA and Ramsar	1.5	NE	The SPA is designated for wintering avocet and dark-bellied Brent goose. The Ramsar site is designated for internationally important levels of dark-bellied Brent goose.
Sandlings SPA	4.9	W	The SPA is designated for Nightjar and Woodlark.

Name and Site Designation	Distance	Direction from Site	Designated features
Stour and Orwell Estuaries SPA and Ramsar	6.2	SW	The SPA is designated for golden plover. And Migratory species: Dark-bellied brent goose, shelduck, ringed plover, grey plover, dunlin, black-tailed godwit, redshank and turnstone. The Ramsar is designated for its wintering assemblage and species/populations occurring at levels of international importance.

8.4.3 The three European designated sites within 10km of the site are assessed as being of **International** importance.

UK Designated Sites

8.4.4 There are 14 Sites of Special Scientific Interest (SSSI) within 5km of the boundaries of the site. There is one SSSI within the site boundary, however this is designated for its geological, rather than biological interest, and as such is not discussed further within this assessment. A further three of the SSSI are also designated for their geological rather than biological interest and again are not discussed further within this assessment.

8.4.5 Of the remaining ten SSSIs Ipswich, Heaths SSSI is the closest at approximately 800m from Site. The SSSI comprises Martlesham Heath and Purdis Heath and is designated as a remnant of a former extensive tract of heathland. The site contains areas of heather heath and acid grassland, of which Martlesham Heath contains the last colony of the silver studded blue butterfly *Plebejus argus* in East Anglia.

8.4.6 In addition, there are three Local Nature Reserves (LNRs) within 5km of the site. The closest of which is Mill Stream LNR which is situated 3.7km west of Site, designated for its pond, wet carr and woodland habitat, with known water vole presence.

8.4.7 A summary table of the UK statutory sites is given below in Table 8.5b.

Table 8.5 b SSSIs and LNRs within 5km of the site, listed in order of distance from site with SSSIs listed first followed by LNRs

Name and Site Designation	Distance	Direction from Site	Designated features
Waldringfield Pit SSSI	0	N/A	Waldringfield Pit is a geological SSSI important for a sequence of Middle Pleistocene deposits.
Ipswich Heaths SSSI	0.8	W	Martlesham and Purdis Heaths are the best remnants of a formerly extensive tract of heathland, containing substantial areas of heather heath and acid grassland, together with stands of bracken and gorse scrub. These communities grade into one another to form a mosaic of habitats of particular value for butterflies. Martlesham Heath is notable for supporting the largest colony of the silver-studded blue butterfly in East Anglia, as well as a number of other species.

Name and Site Designation	Distance	Direction from Site	Designated features
Newbourn Springs SSSI	0.9	S	Active management has led to the maintenance of a rich and varied flora and the subsequent diversity of habitats attracts good populations of breeding and migratory birds, including nightingales, goldcrests, warblers and woodpeckers. Butterflies including the green hairstreak and white letter hairstreak are regular visitors.
Deben Estuary SSSI	1.5	NE	Deben Estuary is important for its populations of overwintering waders and wildfowl and also for its extensive and diverse saltmarsh communities. Several estuarine plants and invertebrates with a nationally restricted distribution are also present.
Sinks Valley, Kesgrave SSSI	2	NW	Site is designated for diversity of habitats located in an uninterrupted sequence, consisting of open water, fringing swamp, spring-fed fen and wet grassland, wet alder woodland, dry acid grassland, heathland and oak woodland.
Ferry Cliff, Sutton SSSI	3.6	NE	Geological SSSI.
Ramsholt Cliff SSSI	3.7	SE	Geological SSSI.
Rockhall Wood Pit SSSI	3.8	E	Geological SSSI.
Nacton Meadows SSSI	4.2	SW	Nacton Meadows are of special interest for their areas of fen-meadow, of a type that is very scarce in Suffolk, being mainly found in the western parts of Britain. In Suffolk, there is a total area of approximately 55 ha of this vegetation type remaining in only five other sites that are of a similar quality to Nacton Meadows. In addition, this site supports a relatively species-rich version of the vegetation community type compared to the other sites in the County.
Riverside House Meadow Hasketon SSSI	4.8	N	Riverside House Meadow is a floristically rich unimproved meadow. The number of such traditionally managed herb-rich meadows has been greatly reduced in recent decades and remain under threat from changes in agricultural practice. The site supports a typically high number of grasses and herbs. Dominating species include meadow foxtail, crested dog's tail and Yorkshire Fog.
Sutton and Hollesley Heaths SSSI	4.9	W	Sutton and Hollesley Heaths form one of the largest remaining fragments of the once extensive Sandlings heaths of the Suffolk coast. They consist of characteristic dry acidic grass and heather-dominated heathland with

Name and Site Designation	Distance	Direction from Site	Designated features
			much scrub, bracken and self-sown pine and birch. The site has a subsidiary ornithological interest and forms a regular winter roost for Hen Harrier. Long-eared Owls breed together with a variety of other heathland species.
Bixley Heath SSSI	5	W	Bixley Heath is important for its heathland which occurs here in association with a scarce swamp vegetation. The presence of these two habitat types within a single site is a particularly rare feature in the Suffolk Sandlings.
Sandlings Forest SSSI	5.2	NE	This site is notified for its coniferous woodland which supports internationally important populations of woodlark and nightjar.
Crag Pit, Sutton SSSI	5.3	E	Site contains a well-established colony of the nationally rare annual plant, Small Alison – first recorded in 1967 and only occurs in one other locality in Britain. The site also contains 2 nationally uncommon species.
Mill Stream LNR	3.7	W	Designated due to area of wet carr, ponds and woodland with confirmed presence of water voles.
Sandlings LNR	4.3	N	Designated due to habitats including acid grassland, scrub, and wildflower meadow. 22 species of butterfly including the white-letter hairstreak have been recorded, along with 70 species of bird.
Bixley Heath LNR	5	W	Mixed aged heather and acid grassland, woodland, scrub, sedge and reed beds and scarce swamp vegetation.

8.4.8 The ten biological SSSIs within 5km of the site are assessed as being of **National** importance.

8.4.9 The three LNRs within 5km of the site are assessed as being of **County** importance.

Non-statutory Designated Sites

8.4.10 There are 14 County Wildlife Sites (CWS) within 2km of the site's boundaries (Table 8.5c). The closest is adjacent to the north-west corner of the site, and is designated for its rabbit grazed acid grassland habitat which supports common lizards *Zootoca vivipara*.

Table 8.5c Non-statutory Designated Sites within 2km of Site

Site Name	Distance and Direction from Application-site	Description
Martlesham Soakaway Acid Grassland	Adjacent to north-west corner	High quality acid grassland maintained by rabbit grazing. Site supports common lizards.
Martlesham Heath Wood	180m west	Woodland with amenity and wildlife value. Including Birch woodland (<40yrs old), oak and Scot's pine with bracken understorey. Gorse thickets and heathland remnants.

Old Rotary Camping Ground	240m north	An area of tall herb dominated by bracken encroaching on heavily rabbit grazed acid grassland and a wetter meadow area. The whole is bounded by a thorn hedge with a few oak and dead elm, and beyond this lies a pine/birch woodland with areas of heather. Each habitat is of botanical interest.
Brightwell Grazing Meadows	500m south	Herb rich, cattle grazed meadows of considerable botanical interest adjoin both sides of the River Mill.
The Mill River	700m south	The watercourse flows through a diverse landscape ranging from alder carr, flower-rich grazing meadows, improved pasture and poplar plantation. Springs feed the Mill River from both sides and the river is unusual in Suffolk in having a natural flow unimpeded by weirs and dams. A number of areas which border the Mill River have also been identified as County Wildlife Sites. The Mill River has good water quality and therefore supports a wide variety of aquatic wildlife.
Martlesham Common	1km north-west	Remnant of the Suffolk Sandlings heathlands. Patches of diverse acid grassland flora interspersed with large areas of Bracken and Gorse. Important for its population of silver-studded blue butterflies.
Valley Farm Meadow	1km south-west	A small area of wet grassland, situated adjacent to the River Mill between the A12 embankment and Valley Farm (now derelict). The site supports a good diversity of wet meadow species. Of particular interest is a thriving population of southern marsh orchid.
Martlesham Plantation Acid Grassland	1.1km north	Small area of acid grassland, remnant of the once extensive Martlesham Heath.
Lumber Wood	1.2km north-east	Ancient Woodland of mature sycamore, some of which is coppiced, and sweet chestnut.
Kyson Meadows, Sluice Wood & Martlesham Creek Reed	1.3km north	Cattle grazed unimproved pastures and reedbeds used by breeding, migrating and wintering water birds as well as a large number of toads. The plant community is also of conservation value. The area is used as a late Autumn roost for up to 1000 swallows and sand martins. Sluice wood is an important breeding habitat for amphibians and shows a long woodland history.
Bloomfields Farm Meadow	1.5km north	Wide diversity of wetland plants, meadow also supports large colonies of heath spotted orchid and southern marsh orchids.
Osier Bed and Martlesham Plantation	1.7km north-west	Two meadows and former osier bed adjacent Butlers Brook. Some noteworthy plants, e.g. Twayblade, Southern Marsh Orchid, Opposite-leaved Golden Saxifrage. Springs on-site form boggy flushes. Meadows still support a diverse plan community.
Kesgrave Wood /	1.9km north-west	Kesgrave Wood (covered by a Tree

Sinks Valley		Preservation Order) is an early 19th century plantation which has subsequently been considerably augmented by natural regeneration. The central part appears to have been set out as a park and a number of parkland trees of considerable age can be identified. A number of very old pollard oaks fringe the road on the southern edge of the wood. Noctule bats have been recorded on this site. The woodland supports a comprehensive range of birds. The valley supports areas of acid grassland, heathland, alder woodland and scrub, which together with Kesgrave Wood, form an important mosaic of semi- natural habitat along the valley.
Newbourne Springs Meadows	2km south	A series of unimproved meadows are situated adjacent to the east bank of Newbourne Springs. Some of the meadows are managed by one annual cut. As a consequence they support a herb-rich community characteristic of wet meadows. The reed-fringed dykes and stream support good numbers of reed and sedge warblers.

8.4.11 The fourteen CWS within 2km of the site are assessed as being of **County** importance.

Habitats

8.4.12 There are nineteen different habitat types found within the site and on the site's boundaries. The site is a varied area of land consisting of habitats of generally low ecological value such as arable land, offices, warehouses and a working sand and gravel quarry as well as areas of relatively higher ecological value, such as woodland, water bodies, semi-natural grasslands and scrub. The phase 1 habitat map can be found in Appendix E1. A description of each habitat type is provided below.

Standing Water

8.4.13 The ponds on and around the site are highly variable in physical nature. The 3 quarry ponds are heavily silted due to their use in the quarry works. There is no emergent or marginal vegetation present at any of them. The large fishing lake has mixed ecological value due to the presence of mature trees and scrub around the margins providing biodiversity value, but with large populations of big fish (stocked for anglers as part of a private fishing lake) which are generally a negative biodiversity feature due to heavy predation on amphibians, native fish, invertebrates etc. as well as disruption to the physical environment (e.g. increased turbidity, reduced shelf stability).

Semi-natural Broadleaved Woodland

8.4.14 This habitat covers approximately 4ha of the site and is positioned in the north of the site. It consists of mainly an English Oak *Quercus robur* and Sweet Chestnut *Castanea sativa* canopy, with a generally sparse understorey, although Bramble *Rubus fructicosus agg.* and Bracken *Pteridium aquilinum* are locally dominant.

Mixed Plantation Woodland

8.4.15 Mixed plantation woodland borders the southern boundary, providing a tree screen for the quarry. Species are generally semi-mature, consisting of Silver Birch *Betula pendula*, Scots Pine *Pinus sylvestris*, Hawthorn *Crataegus monogyna*, Elder *Sambucus*

nigra and English Oak. Little undergrowth in most areas but with dense bramble scrub in others.

Coniferous Plantation Woodland

8.4.16 Coniferous plantation woodland borders the southern boundary, providing a tree screen for the quarry and consists mostly of Scot's Pine.

Dense Scrub

8.4.17 Dense scrub is present around the site in various extents, species predominantly include Gorse *Ulex europaeus* and Bramble.

Scattered Scrub

8.4.18 Scattered scrub is present throughout some of the grasslands and again consists of gorse but predominantly bramble.

Scattered Trees

8.4.19 A number of trees are scattered around the site, particularly around the site's boundaries and fishing lake boundaries. A cluster of trees is present on the northern edge of the lake, which are mostly semi-mature and consist of English Oak, Silver Birch and Crack Willow *Salix fragilis*. Species around the outside of the lake consist of a mature Weeping Willow *Salix x chrysocoma* as well as Crack Willow *Salix fragilis* and Field Maple *Acer campestre*. A line of young English Oak are present along the long-range test site (a thin strip of mown semi-improved grassland running south-east to north-west, south of the broad-leaved woodland which is used for testing BT equipment). Around the site's eastern boundary, linking with the woodland, are a number of semi-mature / early mature English Oak, Scots Pine, Holly *Ilex aquifolium* and Scot's Pine.

Semi-improved Grassland

8.4.20 These areas consist of a grass-dominated sward, with broad-leaved herbaceous species including a number of rare and / or notable plant species. These areas are classified as semi-improved grassland with patches of both acid and chalk characteristics. No clear NVC community type could be determined due to the highly variable nature of the grasslands, many of which are recently colonised grasslands following quarry or arable farming works. Several of the grasslands are species-rich and could be considered diverse e.g. the grassland field with the fishing lake, the small grassland field south of this and the large grassland to the south of the quarry which also encompasses a smaller area of ephemeral / short perennial habitat which can also be classed as a UK BAP habitat 'Open Mosaic Habitat on Previously Developed Land' (see ephemeral / short perennial paragraph below). Other areas are much less diverse, including the long-range test-site Notable plant species at the time of survey included: common cudweed *Filago vulgaris,* smooth cat's ear *Hypochaeris glabra*, field pepperwort *Lepidium campestre,* corn mint *Mentha arvensis,* dittander *Lepidium latifolium*; hound's tongue *Cynoglossum officinale* and annual beard-grass *Polypogon monspeliensis*.

Bracken

8.4.21 Large patches of Bracken are present along the north boundary abutting the Adastral Park industrial area as well as around the mechanic's workshop, south of the lake.

Arable

8.4.22 Large arable fields are present in the east and west of the site. The fields have narrow to no field boundaries.

Amenity Grassland

8.4.23 Amenity grassland is present off-site in neighbouring gardens and industrial areas.

Bare Ground

8.4.24 Hard-standing paths and roads are present around the site as bare earth dirt tracks or hardcore roads. In addition, there are patches of bare earth present around the site, i.e. along newly created bunds and spoil piles.

Buildings

8.4.25 Several buildings are present around the site, there are two working buildings within the quarry in the form of a pre-fab office and a large workshop. Along the long range test site is a brick built three storey testing tower with a central staircase and single rooms on each floor, with a small pre-fab office semi-attached. There are two pillboxes within the arable field in the west of the site and a number of industrial units within the northern quadrant of the Adastral Business Park.

Caravan Park

8.4.26 Several off-site caravan parks are present to the east of the site, with typical amenity grassland, hard-standing and caravans.

Quarry

8.4.27 Large areas of sand and gravel quarry are present in the middle of the site, including working areas with heavy machinery and vehicles in constant use (during daytime hours), as well as areas which have fallen out of use.

Spoil Heap

8.4.28 A small area of rubble and litter is present at the entrance to the arable field in the west of the site.

Earth Bank

8.4.29 An earth bund is present marking out the boundaries of the quarried areas on the site. In some places this remains bare earth whereas in other more established bunds, this has become vegetated.

Dry Ditch

8.4.30 A dry ditch is present along the western boundary of the large grassland field with the lake. The ditch marks the boundary between the grassland field and public footpath.

Short Perennial / Ephemeral

8.4.31 There are two short perennial / ephemeral fields on the site. One of these is presumed to be an arable field which has been left fallow and has since been colonised by common weeds, grasses and herbaceous species indicative of disturbed, nutrient enriched soils e.g. Common Nettle *Urtica dioica*, Nodding Thistle *Carduus nutans,* Common Fiddleneck *Amsinckia micrantha*, Common Mallow *Malva sylvestris* etc. Two non-native species are also present: Canadian Fleabane *Conyza Canadensis* and Green Alkanet *Pentaglottis sempervirens*.

8.4.32 The second field is a former quarry which has since been filled and left to re-colonise. With the presence of bare ground and ephemeral species this field could be considered a UK BAP habitat 'Open Mosaic Habitat on Previously Developed Land'. Many Poppy *Papaver* species are present here, including Common *P. rhoeas*, Opium *P. somniferum* and Californian *Eschscholzia californica*.

Assessment of Importance

8.4.33 Taking into account the 19 different habitat types on the site (as detailed above), there are five of these which are notable habitats of ecological value:

- Lowland Mixed Deciduous Woodland;
- Plantation Woodland;
- Semi-Improved Grasslands;
- Open Mosaic Habitat on Previously Developed Land; and
- Standing Water.

Woodland

8.4.34 The broadleaved woodland in the north of the site is a UK BAP / NERC Act habitat of principal importance, although it is not considered particularly diverse and is considered a poor representation of this habitat type. As such, there is ample scope for enhancement and it is valued as **Local / District** importance.

8.4.35 The plantation woodlands along the southern boundary of the site are not classed as a UK BAP / NERC Act habitat of principal importance but are considered a habitat of **Local** importance.

Semi-improved Grasslands

8.4.36 Several of the grasslands on the site are species-rich containing several rare / notable species including: Common Cudweed listed as 'Near Threatened' on the IUCN Red List; Nationally Scarce and Vulnerable Smooth Cat's Ear, which is locally frequent at dry sites in Suffolk (Suffolk Biodiversity Information Service); Field Pepperwort 'Near Threatened' in England; Corn Mint listed as in decline and 'Near Threatened' in England; the Nationally Scarce plant Dittander; Hound's Tongue, also listed as 'Near Threatened' in Great Britain; and Annual Beard-grass, listed as 'Nationally Scarce' and Rare in Suffolk. However, no clear community type could be determined. These areas are considered to be of **District** importance.

Open Mosaic Habitat on Previously Developed Land

8.4.37 There is one field on the site considered to fall under the UK BAP / NERC Act priority habitat type 'Open Mosaic Habitat on Previously Developed Land', (the small field marked as Ephemeral / Short Perennial on the phase 1 map, south of the quarry, see Appendix E1), due to its mosaic of bare ground, ephemeral habitat, grass and scrub. This area is considered a poor representation of this habitat type due to the presence of several non-native species. This field is considered to be of **District** importance.

Standing Water

8.4.38 The quarry ponds on the site have virtually no ecological value due to the high magnitude of disturbance present here, as well as the lack of natural features and

heavy siltation and are considered of no ecological importance. They also do not qualify as a UK BAP / NERC Act habitat of principle importance 'Ponds'.

8.4.39 The fishing lake on the site is a UK BAP / NERC Act habitat of principal importance 'Ponds' and has more ecological value due to the presence of natural habitats around the margins of the lake, as well as vegetation within the lake. Nonetheless the fishing lake on the site is not considered a high-quality example of this habitat type, largely due to the presence of abundant fish and human disturbance. The lake is considered to be of **Local/Site** importance.

Other Habitats

8.4.40 The fourteen other habitat types found within the site boundaries are shown on the Phase 1 Habitat Map and full descriptions of each can be found in Appendix E1.

8.4.41 All the other habitats on-site (dense scrub, scattered scrub, scattered trees, bracken, arable, amenity grassland, bare ground, buildings, caravan park, quarry, spoil heap, earth banks and dry ditch) are considered important on a **Local/Site** scale.

Plants

8.4.42 Species identified within the site as protected, rare, or otherwise notable species include: Common Cudweed, Smooth Cat's Ear, Field Pepperwort, Corn Mint, Dittander, Hound's Tongue and Annual Beard-grass. Smooth Cat's-ear and Dittander both have a stronghold in Suffolk and are thus not considered rare for the locality.

8.4.43 Japanese Knotweed *Fallopia japonica*, a highly invasive non-native invasive species listed on Schedule 9 of the WCA Act 1981, is present at the site in several locations as identified in Appendix E1.

8.4.44 The notable plants and plant composition on the site (see Appendix E1) are considered to be of **Local / District** importance.

Bats – Activity

8.4.45 A total of ten species were recorded during the activity surveys, with pipistrelles being the most common species observed. In addition, the rare barbastelle *Barbastella barbastellus* was recorded in the broad-leaved woodland in the north of the site, along the east and southern boundaries and through the middle of the site, through the grassland field with the fishing lake. In addition, there have been multiple records/observations of Myotis species, big bats (i.e. Leisler's *Nyctalus leisleri*, Noctule *N. noctula* and Serotine *Eptesicus serotinus*) and brown long-eared *Plecotus auritus (a Suffolk BAP species)*. Survey results showed a seasonal trend, with July and September showing the highest numbers of passes, and July also showing the highest species diversity. Common and Soprano pipistrelles were the most frequently recorded species (the latter being a Suffolk BAP species), with relatively high numbers of Myotis species also observed, particularly in June. Noctules were also recorded in relatively high numbers. The east transect had almost twice as many bat passes as the west transect overall.

8.4.46 The static surveys recorded a relatively high number of bat passes, particularly in June and July. The highest numbers of passes were recorded by common and soprano pipistrelles, as well as Noctule bats.

8.4.47 Areas of relatively high activity on the site included the large fishing lake, the south boundary of the site, the boundary following the public footpath along the east boundary and boundary with the woodland in the north, as well as the broad-leaved woodland itself in the north of the site. Noctules were recorded in high numbers around the large fishing lake, the woodland in the north and the two open fields of ephemeral short perennial habitat in the south of the site. The rare barbastelle was recorded in relatively low numbers commuting / foraging along the east boundary (following the public footpath), the boundary with the industrial site, the woodland in the north of the site, the southern boundary, the grassland / scrub matrix field in the south of the site and the edge of the ephemeral short perennial habitat in the south of the site (See Appendix E1).

8.4.48 The broadleaved woodland, southern and eastern boundaries and the central lake area displayed relatively high foraging and commuting activity and species diversity. These habitats can be considered to be of **County** importance for the foraging and commuting bat assemblage utilizing these areas.

8.4.49 The remaining habitats, such as the quarry, arable field are considered to be of **Site** importance only.

Bats – Roosting

8.4.50 Seven trees and two buildings were assessed as having roosting potential and were subject to emergence surveys. Roosts were found in one of the trees, located along Ipswich Road, outside the site. This tree (T41), contained at least six common pipistrelles as well as a potential barbastelle roost. The building on the long range test site within the site (building E) contained a pipistrelle roost and the building (building 6) in the north quadrant outside the site (within the Adastral Park business centre) contains an occasional day roost for common pipistrelle bats.

8.4.51 The building on the long-range test site (building E), Tree 41 and the pillboxes were assessed as having hibernation potential and as such were subject to hibernation surveys. The pillboxes are considered sub-optimal for hibernating bats at present but could be enhanced. Tree 41 was inspected for hibernating bats using an endoscope with no evidence found. However, this is not considered conclusive due to the complexity of the crevices meaning a full inspection was not possible. Static detectors were then deployed on the tree as further survey from 23rd January 2017 – 26th January 2017 with no bat calls heard and no roosts found. It is thus, considered unlikely that Tree 41 is used for hibernating, due to its unlikely stable temperatures (situated on a roadside rather than within a woodland which would help stabilise the micro-climate) required by hibernating bats (BCT, 2015). Building E on the long-range test site contained a pipistrelle bat in one of the crevices in the brickwork in November, signalling potential for hibernation. However, the second and third survey visits in January and February 2017 showed no hibernating bats. It is therefore considered Building E is not currently used for hibernating but is a transitional roost. It should be noted that given the suitability of the building for hibernation and the presence of day roosting bats during summer and November, the building may have been or may be in the future used for hibernation.

8.4.52 Two buildings with feeding perches were found within the working quarry area; Building H and Building I. Both of which showed no signs or potential for day or hibernating

roosts, but which both showed feeding remains (butterfly wings), likely for Brown Long-eared bats which have been recorded on-site.

8.4.53 The pipistrelle day roosts / transitional roosts on-site/adjacent site (Building E on the long-range test site, Building 6 in the northern quadrant of the BT industrial area, Tree 41 and feeding perches within the quarry buildings) are considered to be of **Local / District** importance.

8.4.54 The potential barbastelle roost (Tree 41) is considered to be of **County** importance.

Great Crested Newt

8.4.55 Previous surveys on the site have not detected GCN presence (Environ UK, 2009).

8.4.56 The eDNA survey showed negative results for GCN in all of the ponds on the site. Great Crested Newts are considered likely absent from the site and thus they are not discussed further within this assessment.

8.4.57 A small population of common toads (peak count of 2) were observed whilst undertaking the reptile surveys, near to the broad-leaved woodland in the north of the site and along the eastern boundary. It is likely the toads have dispersed from Kyson Meadows, Sluice Wood & Martlesham Creek Reed CWS 1.3km north of site, where a large population is known, to find hibernating habitat. Although the 2008 surveys found common toads within two of the ponds on the site (both quarry ponds) and one within the Adastral Park business complex (Environ UK, 2009), it is considered unlikely they are still using the ponds on the site due to their diminished wildlife value since 2008 rendering them unsuitable for amphibians.

8.4.58 The site is assessed as being of **site** importance for Common Toads for hibernating only.

Otter and Water Vole

8.4.59 There were no field signs (latrines, footprints, burrows, feeding stations, runways in the vegetation etc.) for water vole on any of the waterbodies on the site. As such it is considered that Water Voles are likely absent from the site.

8.4.60 In addition, there were no spraints, footprints, holts, mammal runs into the water etc. for Otter at any of the waterbodies on the site. Nonetheless, local knowledge and the desk study both indicate that Otter can use the site, however given the absence of field signs this is thought restricted to occasional use only, and Otter are not considered to use the fishing lake as a main foraging resource. In addition, no holts were found to be present on the site.

8.4.61 It is considered that water voles are likely absent from the site and that Otters are only using the fishing lake, which provides a limited, occasional foraging opportunity. As such the fishing lake is considered to be of **Site** importance.

Birds – Breeding

8.4.62 A total of 43 species were recorded during the breeding bird surveys. This included a total of 34 breeding species and nine non-breeding species. The latter were either foraging or roosting on the site and included gulls, waders and raptors.

8.4.63 There were 10 notable species recorded on the site on account of them being listed as Birds of Conservation Concern (BoCC) (Eaton et al. 2015) as shown in Appendix E1:

four on the BoCC red-list and five on the amber-list. Hobby *Falco subbuteo*, a green-listed bird, was also considered notable due to its listing as a Schedule 1 species. Furthermore, six further species are considered notable on account of being listed as UK and Suffolk BAP species.

8.4.64 A sand martin *Riparia riparia* bank was located within an area of disused sand quarry adjacent to the large central fishing lake. This bank had approximately 35 occupied breeding holes in summer. During the winter surveys, this nesting bank was found to have been removed during the course of routine quarrying operations. It was noted that the quarrying of the area to the west has created large temporary areas of sand cliff suitable for nesting sand martins.

8.4.65 The breeding bird community was not rich in species given the size of the site(113.3Ha) with between 25-49 breeding species. The breeding bird community is hence regarded as being of **District** importance based on the criteria of Fuller (1980).

8.4.66 The scrub habitats with breeding shelduck and nightingale are assessed as being of **District** importance, whilst the remainder of the site is of **Local** importance.

8.4.67 In addition, notable species on the site include:

- Nightingales –The four territories recorded on the site constitute a population of **District** importance.
- Cuckoo – Single record on-site evaluated as being of **Local** importance.
- Shelduck – The three recorded pairs on-site are considered to be of **Local** importance.
- Skylark – The five territories on-site are considered to be of **Local** importance.

Birds – Wintering and Migratory

8.4.68 An assemblage of 39 bird species have been recorded during the surveys to date, including automated camera surveys (see Appendix E1). Thirty-five were considered to be using the site whilst the other four were simply flying over. Some records were from the northern woodland, central lake area and grassland to the north or boundary shelter belts which will be retained intact and are classified as being outside the development footprint. Seventeen are notable species on account of being on the list of BoCC, of which nine are red-listed and eight amber-listed (see Appendix E1), of which dunnock, reed bunting, lapwing, linnet, song thrush and skylark are also UK and Suffolk BAP species. None of the species recorded are considered uncommon or rare at any geographical scale, with their amber-listed and UK BAP species status due to widespread declines across their large UK geographic range. They are still widespread in the region, and the reasons for their declines are not considered to be driven by development impacts.

8.4.69 The most notable species from the survey were the presence of seven teal on the settling ponds, a foraging woodcock on the grassland strip and the following (with maximum peak count quoted) on the stubble and abandoned former arable/grassland fields and associated scrub within the Proposed Development area of the site: 36 skylark; 18 fieldfare; 17 meadow pipit; 16 song thrush, 11 dunnock and 25 linnet. These species are known to be distributed across almost the whole County (Balmer et al. 2013) away from urban areas, where there is suitable arable and grassland farmland, scrub and other foraging habitat.

8.4.70 The assemblage of 39 bird species recorded using the site to date are all common and widespread both locally and nationally, despite there being a relatively large number of red and amber-listed species and UK and Suffolk BAP species present. Given this, the wintering bird assemblage on the site is considered to be of **Local** importance.

8.4.71 In addition, notable species on-site are assessed as **Local** importance, and include:

- Skylark;
- Fieldfare;
- Meadow pipit;
- Linnet;
- Song thrush;
- Dunnock;
- Teal; and
- Woodcock.

Badger

8.4.72 At present, there is one active likely subsidiary sett present [redacted] (Sett C), and three likely outliers in current use [redacted] (Setts A and B) and [redacted] (Sett E). All other entrances on the site (Setts D and F) are considered likely outliers but did not show signs of current use by badgers.

8.4.73 All badger setts recorded on the site had a low number of entrances and generally a moderate level of activity (small spoil heaps, few well-worn paths leading to entrances etc.) which indicated that there was no main sett within the site and that these were more likely to be subsidiary or outlier setts, consistent with the 2007 badger survey (Environ UK, 2009). The site has abundant sett building habitat, however it is considered any sett habitat on the site is generally transient due to the high levels of disturbance on-site and regular landscape changes from the quarry works.

8.4.74 In addition, the site is utilized by low numbers of badgers foraging and dispersing within discrete areas of the site, consistent with the 2007 badger survey (Environ UK, 2009), to include the disused areas of quarry, arable field margins and eastern / southern boundaries. The frequency of latrines along the eastern boundary likely represents the single badger groups territory boundary in this area.

8.4.75 It is considered that the outlier / subsidiary setts on the site are utilised by a minimum of two and maximum of four badgers with no breeding setts on the site. The field signs on the site indicate foraging and dispersal use by a single badger social group, who are currently utilising the likely outlier setts [redacted] (Setts A and B) and [redacted] (Sett E) and likely subsidiary sett [redacted] (Sett C). The main sett is thought to be present within [redacted] or within [redacted], although this could not be confirmed due to access restrictions. The site is therefore evaluated as being of **Site** importance for its Badger population.

Invertebrates

8.4.76 Across the open grassland areas of the site there is a variety of habitat conditions, including extensive areas of open vegetation with bare substrates and sparse swards and also more established grassland. There are also areas of sloping ground, most notably along a large earth bank to the north of the site and small banks and bunds

elsewhere; however, within many of the vegetation blocks the topography is relatively flat and uniform, with post-extraction 'flattening' of the ground rather than leaving mounds and heaps extensively across the site.

8.4.77 Seven sampling stations were surveyed five times and an additional 12 subject to a rapid survey on a single date. A total of 258 species were recorded. The main sampling stations variously covered areas of open habitat, including ephemeral and grassland vegetation of various types; the minor sampling stations likewise mainly covered open vegetation but also included the parcel of deciduous woodland.

8.4.78 The ecological profile of the species across the site is presented in Table 8.6. Of particular note is the 'Favourable' condition of the Broad Assemblage Type (BAT) of 'unshaded early successional mosaic' with a score of 208 (relative to a threshold of 160, albeit with a substantial survey effort). The two BATs associated with grassland (F1 and F2) comprise 87% of species assigned to BATs, with the other species being woodland associated or mainly vagrant wetland hoverflies such as the *Eristalis* and *Helophilus* species (Diptera: Syrphidae), but also a limited number of more sedentary species associated with humid habitats, such as the spider *Oedothorax gibbosus* (Araneae: Linyphiidae).

8.4.79 The more specialist species – those with a Specific Assemblage Type Association (SAT) – are again mainly associated with open habitats, with two species on either scrub or mature heathland vegetation and two on dead wood:

- The species of 'open short sward' comprise a diverse assemblage of species seemingly associated with the warm microclimate as with the brown argus *Aricia agestis* (Lepidoptera: Lycaenidae) or possibly the physical conditions of the soil, as with the click beetle *Agrypnus murinus* (Coleoptera: Elateridae) whose larvae feed on plant roots;
- The species associated with 'bare sand and chalk' again associated with the physical conditions of the soil, for burrowing as with the burrowing wasp *Mellinus arvensis* (Hymeoptera: Spehecidae) or the sparse ruderal vegetation, as with the seed-eating ground beetle *Harpalus anxius* (Coleoptera: Carabidae);
- The single species of 'scrub edge' was the robberfly *Dioctria baumhaueri* (Diptera: Asilidae), with a soil-dwelling larva and adults as sit-and-wait predators on foliage;
- The species of 'mature heath and dry scrub mosaic' is the spider *Dictyna latens* (Araneae: Dictynidae), restricted to well established low vegetation where it creates a web; and
- The species of 'bark and sapwood decay' comprise a beetle whose larvae are predatory under bark but found widely on flowers *Malachius bipustulatus* (Coleoptera: Malachidae), and the bee *Hylaeus cornutus* (Hymenoptea: Colletidae) which nests in dead wood and plant stems while foraging widely into flower-rich open areas.

Table 8.6 Number of species in the Broad and Specific Assemblage Types recorded from the field surveys

Assemblage code	Assemblage Name	Number of Species	Condition
Broad Assemblage Type			
F1	Unshaded early successional mosaic	76	Favourable

Assemblage code	Assemblage Name	Number of Species	Condition
F2	Grassland & scrub matrix	79	-
A1	Arboreal canopy	10	-
W3	Permanent wet mire	11	-
A2	Wood decay	4	-
F3	Shaded field & ground layer	2	-
Specific Assemblage Type			
F112	Open short sward	19	-
F111	Bare sand & chalk	8	-
F212	Scrub edge	1	-
F222	Mature heath and dry scrub mosaic	1	-
A212	Bark & sapwood decay	2	-

Invertebrate Species of Conservation Concern

8.4.80 Fourteen species of conservation concern were recorded (Appendix E1), comprising:

- Four widespread Species of Principal Importance;
- One Species of Principal Importance with Red Data Book status;
- Three additional Red Data Book species; and
- Five Nationally Scarce species.

8.4.81 The species of conservation concern are mostly associated with grassland types with the exception of two which are associated with dead plant stems and scrub.

Assessment of Importance

8.4.82 Against the Colin Plant criteria (2006) the presence of (likely) viable populations of Red Data Book species would probably justify an evaluation of national; however, these species are of moderately widespread occurrence in south-east England and East Anglia and likely to co-occur with other Red Data Book species on 'several' other sites nationally. The numbers of Nationally Scarce species falls below the threshold of ten for a site of Regional importance. When considered more subjectively against semi-natural heathland sites nationally the site is not considered to be of similar quality to those recognised as being of national importance, as in Breckland and the south of England (such as Surrey and Dorset). Likewise, there are substantially fewer rare and scarce species when compared to nationally important former aggregate and brownfield sites. At the East Anglian regional scale the site is likewise not of as high a quality as heathland sites with likely similar assemblages, such as sites in the Norfolk and Suffolk Breckland heaths, heathlands of North Norfolk and Suffolk Sandlings, or several brownfield sites in the Thames Gateway.

8.4.83 On balance, therefore, based on the relatively widespread occurrence of the Red Data Book species recorded, the relatively low numbers of Nationally Scarce species and the lower quality of the site compared to other sites in East Anglia, the discrete patches of open grassland areas and peripheral scrub areas of the site are assessed as being of **County** importance.

Reptiles

8.4.84 There is a small population of common lizards (peak count of 4 adults, see Appendix E1), utilising the grassland boundaries of the fields in the west of the site and the grassland field to the south of the fishing lake on the site. A small population of grass snakes *Natrix natrix* (peak count of 1) are also utilising the site, observed in the broad-leaved woodland to the north of the site. Whilst grass snakes were only observed in the broad-leaved woodland, as a highly mobile species they are considered likely to also use suitable areas of grassland habitats and bare ground on the site. The finding of a small population of common lizards is consistent with the 2007/2008 reptile survey (Environ UK, 2009).

8.4.85 The site is assessed as being of **Local** importance for common reptile species, common lizard and grass snakes which are using the grassland field boundaries in the west of the site, the grass and scrub field south of the fishing lake and the broad-leaved woodland.

Small and Medium-sized Mammals

8.4.86 No UK or Suffolk BAP/NERC Act 2006 small or medium-sized mammals or their field signs were observed while on the site in 2016 / 2017. However, a single hedgehog was observed during a bat survey in August 2008 (Environ UK, 2009). It is predicted that the European Hedgehog *Erinaceous europaeus* likely still utilises the site in low numbers.

8.4.87 There were no records of small or medium-sized mammals on the site and no field signs observed. The habitats were assessed as having potential to support European hedgehog only. European hedgehog as a feature within the site is assessed being of **Site** importance.

Summary

8.4.88 **Table 8.7 Summary Evaluation of Site Features**

No.	Feature	Summary Description	Importance
1	SAC/SPA/Ramsar	Deben Estuary SPA and Ramsar* Sandlings SPA* Stour and Orwell Estuaries SPA and Ramsar*	International
2a	SSSI	Ipswich Heaths SSSI* Newbourn Springs SSSI* Deben Estuary SSSI* Sinks Valley, Kesgrave SSSI* Nacton Meadows SSSI* Riverside House Meadow Hasketon SSSI* Sutton and Hollesley Heaths SSSI* Bixley Heath SSSI* Sandlings Forest SSSI* Crag Pit, Sutton SSSI*	National
2b	LNR	Mill Stream LNR*	County

No.	Feature	Summary Description	Importance
		Sandlings LNR* Bixley Heath LNR*	
3	CWS	A total of fourteen CWS: (Martlesham Soakaway Acid Grassland; Martlesham Heath Wood; Old Rotary Camping Ground; Brightwell Grazing Meadows; The Mill River; Martlesham Common; Valley Farm Meadow; Martlesham Plantation Acid Grassland; Lumber Wood; Kyson Meadows, Sluice Wood and Martlesham Creek Reed; Bloomfields Farm Meadow; Osier Bed and Martlesham Plantation; Kesgrave Woods/Sinks Valley; and Newbourne Springs Meadows)	County
4	UK BAP Priority Habitats	Broadleaved woodland Open Mosaic Habitat on Previously Developed Land Open Water (Fishing Lake)	Local / District District Site / Local
5	Other habitats	Semi-improved grassland Plantation woodland (mixed and coniferous), Scrub, Open Water (Quarry ponds), Other	District Site / Local
6	Rare and Notable Plants	Loss of habitat for seven species of rare and / or notable plants	Local / District
7	Bats - Roosting	Possible barbastelle roost (Tree 41) Three roosting sites for pipistrelles (including potential past/future hibernation roosts/current transitional roost) and two buildings with feeding perches	County Local / District
	Bats - Foraging	The bat assemblage utilising the broadleaved woodland, southern and eastern boundaries and central lake area The bat assemblage utilising the remaining habitats e.g. quarry and arable fields	County Site
8	Amphibians	Terrestrial habitat along northern boundary for common toad	Site
9	Otter	Limited foraging at fishing lake	Site
10	Birds	Breeeding assemblage and Breeding nightingale (scrub habitats) Other breeding species (including shelduck, skylark and cuckoo) and non scrub habitats Wintering assemblage (including eight notable species)	District Local Local
11	Badger	Foraging and commuting habitats present, as well as subsidiary/outlier setts on-site and sett building habitat for one social group.	Site
12	Invertebrates	Four widespread Species of Principal Importance; one Species of Principal Importance with Red Data Book	County

No.	Feature	Summary Description	Importance
		status; three additional Red Data Book species; and five Nationally Scarce species using discrete patches of open grassland and scrub habitats	
13	Reptiles	Common reptile species (Common Lizard and Grass Snake) present in low numbers	Local
14	Small and Medium-sized Mammals	Suitable habitats for European hedgehog	Site

* Refer to relevant table for citation

8.5 Predicted Impacts without Mitigation

Development Footprint

8.5.1 The Proposed Development will comprise up to 2000 residential dwellings with community facilities, associated highways, landscaping, open space and Suitable Alternative Natural Greenspace (SANGS). The developable area within the site, including formal greenspace, covers approximately 93ha of the site , with a residual 25ha for use as biodiversity areas and/or informal green space provision (see Appendix E1).

8.5.2 Avoidance of impacts was initially undertaken during the design stage, to avoid areas of relatively high ecological value, as informed by the ecological assessment (Phase 1 and Phase 2 surveys, SES, 2017). As such, the impacts have been assessed based on the current Illustrative Framework Masterplan (Reference no. 08 Revision G) without mitigation.

European Statutory Designated Sites

Construction

8.5.3 The sHRA (Baker Consultants Ltd, 2017) has assessed the potential impacts of the Proposed Development upon European sites located within 10km of the Proposed Development. The Proposed Development does not give rise to any direct loss of land within any of the European sites and therefore the assessment concentrated on the likelihood of any indirect effects. The sHRA has concluded that, there is no likely significant effect upon any European sites either alone or in combination with other plans or projects in the construction phase. Pollution in terms of air quality has been scoped out as all designated sites are over 200m from the site, and no roads within this are 'affected' by the development in accordance with the Design Manual for Roads and Bridges (DMRB) HA 207/07.

Table 8.8a Construction impacts on nearby European Designated Sites

Site	Geographical Importance	Impact	Impact Significance
Deben Estuary SPA and Ramsar	International	None	n/a

Sandlings SPA	International	None	n/a
Stour and Orwell Estuaries SPA and Ramsar	International	None	n/a

Operation

8.5.4 The sHRA considered that the only impact pathway that could result in likely significant effects (before taking into account any mitigation) was the potential for increased recreation pressure. Pollution in terms of air quality has been scoped out as all designated sites are over 200m from the site, and no roads within this are 'affected' by the development in accordance with the Design Manual for Roads and Bridges (DMRB) HA 207/07. This impact is considered to result in a likely **moderate negative impact**.

Table 8.8b Operation impacts on nearby European Designated Sites

Site	Geographical Importance	Impact	Impact Significance
Deben Estuary SPA and Ramsar	International	Recreation – Potential increase recreation pressure resulting in disturbance to citation bird species.	Moderate negative
Sandlings SPA	International	Recreation – Potential increase recreation pressure resulting in disturbance to citation bird species.	Moderate negative
Stour and Orwell Estuaries SPA and Ramsar	International	Recreation – Potential increase recreation pressure resulting in disturbance to citation bird species.	Moderate negative

UK Statutory Designated Sites

Construction

8.5.5 Without mitigation there is risk of a **minor negative impact** on nearby SSSIs (0.9km from Site) and LNRs (4.3km from Site) from construction disturbance. This is a significant impact at the National and County level (respectively) in accordance with CIEEM guidelines (CIEEM, 2016). Pollution in terms of air quality has been scoped out as all designated sites are over 200m from the site, and no roads within this are 'affected' by the development in accordance with the Design Manual for Roads and Bridges (DMRB) HA 207/07. Confidence in this assessment is high based on a comprehensive review of impacts.

Table 8.9a Construction impacts on nearby UK Statutory Designated Sites

Site	Geographical Importance	Impact	Impact Significance
Ipswich Heaths SSSI	National	Disturbance – Site is designated for its vascular plants and silver-studded blue butterfly of national importance, of which the site is not considered to	Negligible

Site	Geographical Importance	Impact	Impact Significance
		contribute/support. Pollution – The designated site is located c.800m west of the site, where impacts from dust can be excluded (over 50m from designated site), as set by current guidance (Holman, 2014). In addition, pollution from chemicals is considered highly unlikely due to the distances involved.	Negligible
Newbourn Springs SSSI	National	Disturbance – Site is designated for its rich and varied flora of national importance, attracting breeding and migratory birds as well as butterflies. At 900m south of site it is considered possible the birds associated with woodland and scrub (most notably nightingales) on the site also utilise the designated site. Pollution – The designated site is located c.900m south of the site, where impacts from dust can be excluded (over 50m from designated site), as set by current guidance (Holman, 2014). In addition, pollution from chemicals is considered highly unlikely due to the distances involved.	Minor negative Negligible
Deben Estuary SSSI	National	Disturbance – Site is designated for its saltmarsh communities of birds, plants and invertebrates. The site is not considered to support habitats that could contribute to these populations and is c.1.5km from site. Pollution – The designated site is located c.1.5km north-east of the site, where impacts from dust can be excluded (over 50m from designated site), as set by current guidance (Holman, 2014). In addition, pollution from chemicals is considered highly unlikely due to the distances involved.	Negligible Negligible
Sinks Valley, Kesgrave SSSI	National	Disturbance – Site is designated for its habitats of national importance. The site is considered too far (c2km) from site to contribute/support these habitat types. Pollution – The designated site is located c.2km north-west of the site, where	Negligible Negligible

Site	Geographical Importance	Impact	Impact Significance
		impacts from dust can be excluded (over 50m from designated site), as set by current guidance (Holman, 2014). In addition, pollution from chemicals is considered highly unlikely due to the distances involved.	
Nacton Meadows SSSI	National	Disturbance – Site is designated for its fen-meadow habitat of national importance. The site is considered too far (c4.2km) from site to contribute/support/impact these habitat types. Pollution – The designated site is located c.4.2km south-west of the site, where impacts from dust can be excluded (over 50m from designated site), as set by current guidance (Holman, 2014). In addition, pollution from chemicals is considered highly unlikely due to the distances involved.	Negligible Negligible
Riverside House Meadow Hasketon SSSI	National	Disturbance – Site is designated for its floristically-rich unimproved meadow habitat of national importance. The site is considered too far (c4.8km) from site to contribute/support/impact these habitat types. Pollution – The designated site is located c.4.8km north of the site, where impacts from dust can be excluded (over 50m from designated site), as set by current guidance (Holman, 2014). In addition, pollution from chemicals is considered highly unlikely due to the distances involved.	Negligible Negligible
Sutton and Hollesley Heaths SSSI	National	Disturbance – Site is designated for its heathland habitat of national importance. The site is considered too far (c4.9km) from site to contribute/support/impact these habitat types. Pollution – The designated site is located c.4.9km north of the site, where impacts from dust can be excluded (over 50m from designated site), as set by current guidance (Holman, 2014). In addition, pollution from chemicals is considered highly unlikely due to the distances	Negligible Negligible

Site	Geographical Importance	Impact	Impact Significance
		involved.	
Bixley Heath SSSI	National	Disturbance – Site is designated for its heathland and swamp habitats of national importance. The site is considered too far (c.5km) from site to contribute/support/impact these habitat types. Pollution – The designated site is located c.5km west of the site, where impacts from dust can be excluded (over 50m from designated site), as set by current guidance (Holman, 2014). In addition, pollution from chemicals is considered highly unlikely due to the distances involved.	Negligible Negligible
Sandlings Forest SSSI	National	Disturbance – Site is designated for its coniferous woodland habitat supporting nightjar and woodlark of national importance. The site is considered too far (c5.2km) from site to contribute/support/impact these habitat types or bird communities. Pollution – The designated site is located c.5.2km north-east of the site, where impacts from dust can be excluded (over 50m from designated site), as set by current guidance (Holman, 2014). In addition, pollution from chemicals is considered highly unlikely due to the distances involved.	Negligible Negligible
Crag Pit, Sutton SSSI	National	Disturbance – Site is designated for supporting a rare annual plant and 2 uncommon species of national importance. The site is considered too far (c5.3km) from site to contribute/support/impact these plants. Pollution – The designated site is located c.5.3km east of the site, where impacts from dust can be excluded (over 50m from designated site), as set by current guidance (Holman, 2014). In addition, pollution from chemicals is considered highly unlikely due to the distances involved.	Negligible Negligible
Mill Stream LNR	County	Mill Stream LNR is designated for habitats of County importance and is	Negligible

Site	Geographical Importance	Impact	Impact Significance
		located approximately 3.7km to the west. It is considered that this site is therefore at a distance where habitats present will be outside the zone of influence from any construction activities.	
Sandlings LNR	County	Sandlings LNR is designated for habitats of County importance as well as butterflies and birds. At 4.3km north of site it is considered habitats present will be outside the zone of influence from construction activities. It is possible that the birds associated with woodland and scrub habitats (e.g. nightingales) on this LNR could utilise the site, although the distances involved likely reduce any extensive/significant use.	Negligible Minor negative
Bixley Heath LNR	County	Bixley Heath LNR is designated for habitats of County importance and is located approximately 5km to the west of the site. It is considered that this site is therefore at a distance where habitats present will be outside the zone of influence from any construction activities.	Negligible

Operation

8.5.6 Without mitigation there is likely a **neutral impact** on nearby SSSIs and LNRs from operational disturbance. Pollution in terms of air quality has been scoped out as all designated sites are over 200m from the site, and no roads within this are 'affected' by the development in accordance with the Design Manual for Roads and Bridges (DMRB) HA 207/07. Confidence in this assessment is high based on a comprehensive review of impacts.

Table 8.9b Operational impacts on nearby UK Statutory Designated Sites.

Site	Geographical Importance	Impact	Impact Significance
Ipswich Heaths SSSI	National	Recreation – Dedicated as Open Access land under Countryside Rights of Way Act 2000. Visitor and habitat management of Martlesham Heath already well developed by Martlesham Heath SSSI Ltd and Martlesham Conservation Group.	None
Newbourn Springs SSSI	National	Recreation – Narrow linear nature reserve of predominantly wet woodland and fen. Public access confined to	Neutral

Site	Geographical Importance	Impact	Impact Significance
		single waymarked access route, boardwalk in places. Interpretation and car park already provided.	
Deben Estuary SSSI	National	Recreation – Some estuary paths now inaccessible due to erosion, other more sustainable walking routes promoted instead. No legitimate cycle access to shore. Local watersports moorings controlled by Deben Fairways committees.	Neutral
Sinks Valley, Kesgrave SSSI	National	Recreation – Public access confined to one public footpath across site.	Neutral
Nacton Meadows SSSI	National	Recreation – Public access confined to one public footpath across site.	Neutral
Riverside House Meadow Hasketon SSSI	National	Recreation – No public access.	None
Sutton and Hollesley Heaths SSSI	National	Recreation – Dedicated as Open Access land under Countryside Rights of Way Act 2000. Includes network of waymarked paths and cycle tracks, already well managed for visitors.	Neutral
Bixley Heath SSSI	National	Recreation – Dedicated as Open Access land under Countryside Rights of Way Act 2000.	Neutral
Sandlings Forest SSSI	National	Recreation – Dedicated as Open Access land under Countryside Rights of Way Act 2000. Includes network of waymarked paths and cycle tracks, already well managed for visitors.	Neutral
Crag Pit, Sutton SSSI	National	Recreation – Dedicated as Open Access land under Countryside Rights of Way Act 2000, already well managed for visitors.	Neutral
Mill Stream LNR	County	Recreation – Visitor management already in place, with paths, boardwalks and interpretation.	Neutral
Sandlings LNR	County	Recreation – Dedicated as Open Access land under Countryside Rights of Way Act 2000. Includes network of waymarked paths and cycle tracks, already well managed for visitors.	Neutral

Site	Geographical Importance	Impact	Impact Significance
Bixley Heath LNR	County	Recreation – Dedicated as Open Access land under Countryside Rights of Way Act 2000.	Neutral

Non-statutory Designated Sites

Construction

8.5.7 Without mitigation, construction impacts to the adjacent Martlesham Soakaway Acid Grassland CWS may include physical (e.g. trampling) and chemical (e.g. spills) damage from construction workers / traffic as the area is not currently fenced off from the site.

8.5.8 Furthermore, this CWS holds a population of common lizards which are considered further in the reptile section. Pollution impacts (dust and chemical) are possible on any identified CWS within 50m of the site (Holman, 2014) during the construction process.

8.5.9 Overall the impacts are assessed as having a **moderate negative** impact at the County level.

8.5.10 There are no predicted construction impacts on any of the remaining thirteen CWSs due to the distance from site (>180m from site).

Operation

8.5.11 Operational impacts to the adjacent Martlesham Soakaway Acid Grassland CWS include increased recreational pressure and pressure on the reptile population (see reptile section for more detail). Recreational pressure on the remaining CWS has also been included in Table 8.10. All impacts are assessed as being of County importance.

Table 8.10 Operational Impacts on CWS

Site	Distance from Site	Impact (recreational impact)	Impact significance
Martlesham Soakaway Acid Grassland	Adjacent north-west boundary	No public access at present, potential future access without mitigation.	Moderate negative
Martlesham Heath Wood	180m west	Access confined to well established network of paths. Woodland self-contained within existing residential area with no direct access from land to the south and east of Adastral Park site.	Neutral
Old Rotary Camping Ground	240m north	No public access.	None
Brightwell Grazing Meadows	500m south	Access limited to small number of defined public rights of way.	Neutral
The Mill River	700m south	Access limited to small number of defined public rights of way.	Neutral

Martlesham Common	1km north-west	Dedicated as Open Access land under Countryside Rights of Way Act 2000. Already accessible and well used, including route of promoted Martlesham Circular Walk and Sandlings Walk.	Neutral
Valley Farm Meadow	1km south-west	Access limited to single public footpath along edge.	Neutral
Martlesham Plantation Acid Grassland	1.1km north	No public access.	None
Lumber Wood	1.2km north-east	Public footpaths along outside edge, but wood fenced off and no public access.	None
Kyson Meadows, Sluice Wood & Martlesham Creek Reed	1.3km north	Access limited to clear and well-used public footpaths, already waymarked as routes of promoted Martlesham Circular Walk and Sandlings Walk.	Neutral
Bloomfields Farm Meadow	1.5km north	No public access.	None
Osier Bed and Martlesham Plantation	1.7km north-west	Access limited to defined public footpath along edge. No direct access from the site.	Neutral
Kesgrave Wood / Sinks Valley	1.9km north-west	Access limited to single public footpath along outer edge. No further public access to woodland.	Neutral
Newbourne Springs Meadows	2km south	No public access.	None

8.5.12 Overall the impacts are assessed as having a **moderate negative** impact at the County level on the neighbouring CWS (Martlesham Soakaway Acid Grassland), and a **neutral** impact on all other CWSs.

Habitats

Construction

8.5.13 Construction of the Proposed Development will lead to the loss of a range of habitats (all of the arable, quarry and quarry ponds as well as the majority of the semi-improved grassland habitat) and the losses are estimated in Table 8.11 below. Impacts are assessed as minor when the percentage loss is between 10% and 20%, moderate when between 21% and 60% and major when 61% or greater for those habitats that provide nature conservation interest:

Table 8.11 Approximate habitat losses from development footprint

Habitat	Habitat Area (ha)*	Area under Development Footprint (ha)*	% loss	Significance of negative impact
UK BAP Habitats				
Semi-natural Broadleaved	4.01	0	0	None

Habitat	Habitat Area (ha)*	Area under Development Footprint (ha)*	% loss	Significance of negative impact
UK BAP Habitats				
Woodland				
Open Mosaic Habitat on Previously Developed Land	1.63	1.63	100	Major / District
Open standing water (to include Fishing Lake only)	1.8	0	0	None
Other Habitats				
Dense Scrub	4.66	3	64	Major / Site
Scattered Trees	0.65	0.15	23	Moderate / Site
Mixed Plantation Woodland	0.7	0	0	None
Coniferous Plantation Woodland	0.67	0	0	None
Quarry Ponds	1.8	1.8	100	Major / Site
Semi-improved Neutral Grassland	28.05	23.21	83	Major / District
Buildings	0.4	0.4	100	Major / Site
Short perennial / ephemeral	6.15	6.15	100	Major / Site
Arable	18.2	18.2	100	Major / Site

* Measurements from satellite images and mapping software have been used to provide the above estimates.

8.5.14 The impacts considered likely to be significant are the loss of 1.63ha of Open Habitat Mosaic on Previously Developed Land and 23.21ha of semi-improved neutral grassland. The loss of these two habitats on the site without mitigation is considered to be **major negative**.

8.5.15 Although the majority of the other habitat losses on the site are total, these losses are not considered likely to be significant due to their ubiquity in the surrounding landscape, loss of small amounts and/or lack of quality of the habitat on the site.

8.5.16 Retained habitats (woodlands and fishing lake) on the site also have the potential to be negatively impacted by the Proposed Development during the construction phase, for example through dust and pollution events. These impacts are considered to be **moderate negative**.

Operation

8.5.17 Retained habitats (woodlands and fishing lake) on the site have the potential to be negatively impacted by the Proposed Development during the operational phase through lighting/increased human activity. These impacts are considered **moderate negative**.

Rare and Notable Plants

Construction

8.5.18 The following species are considered and confidence in all the assessments is high:

- Smooth Cat's-Ear and Dittander – these species are mostly lost under the development footprint although some remain in retained open space and thus may not be altogether lost. This impact is assessed as a **minor negative** impact at the Local level.
- Common Cudweed, Field Pepperwort, Corn Mint, Annual Beard-Grass and Hound's Tongue – these species are mostly lost under the development footprint although some remain in retained open space and thus may not be altogether lost. This impact is assessed as a **minor negative** impact at the District level.

8.5.19 There is potential for retained species to be trampled by construction workers or construction traffic, and/or negatively impacted through pollution events (dust/chemical). These impacts are assessed as **minor negative** at the Local / District level.

Operation

8.5.20 Retained, translocated and re-established plants could be damaged through trampling and picking during the operational phase. Assessed as **minor negative** at the Local / District level.

Invasive Species

8.5.21 The Japanese Knotweed present on-site may be spread to other areas and potentially into ecologically valuable habitats without mitigation. This would constitute an offence under the Wildlife and Countryside Act 1981.

Bats

Construction

8.5.22 Although unlikely (due to construction working hours), there is potential for the possible Barbastelle day roost (Tree 41) to be temporarily impacted through construction lighting. The timing of the temporary disturbance would have varying effects on this species, with hibernation and breeding times considered to have a **major negative** effect and **minor negative** effect outside of these times. Without mitigation and a Natural England European Protected Species (EPS) License the temporary loss of this roost may constitute an offence under the Conservation of Habitats and Species Regulations 2010 or the Wildlife and Countryside Act 1981. As such, a **minor** - **major negative** impact on the potential roosting barbastelle is considered likely at the County level without suitable mitigation depending on the time of year of disturbance.

8.5.23 There are three pipistrelle bat day roosts on the site, one within the building on the long-range test site (building E) which is also a transitional roost and could also provide future hibernating habitat, one within the tree to the south of the site (Tree 41 which also contains the possible barbastelle roost, see above), along Ipswich Road and another within the building adjacent to the northern access road of the site (Building 6). In addition, there are two feeding perches within the quarry buildings (Buildings H and I). All except for the tree roost (Tree 41) are due to be lost through demolition of the buildings, see above paragraph for impacts on Tree 41. The loss of the 3 day roosts

on-site is considered to have a **moderate negative** impact at a Local / District scale, as the roosts hold low numbers of a relatively common bat species.

8.5.24 The loss of the two feeding perches will cause a **minor negative** effect on a Site scale due to the common and widespread species likely to be utilising these (Brown Long-eared) and the ubiquity in the surrounding landscape.

8.5.25 Destruction of these roosts without mitigation and a Natural England EPS License would potentially kill / injure a bat during the demolition process and constitute an offence under the Conservation of Habitats and Species Regulations 2010 or the Wildlife and Countryside Act 1981 causing a **major negative** impact at a Local / District scale.

8.5.26 Although not in current use by hibernating bats, there is potential for bats to utilise Tree 41 and/or the building within the long-range test site (Building E) for hibernating prior to construction commencing. The loss of these potential hibernating roosts would be considered a **moderate negative** impact on hibernating bats at a Local / District level if the species found are common e.g. pipistrelles; and County if the species found are rare e.g. Barbastelle, due to the rarity of hibernating sites.

8.5.27 A foraging/commuting link between the woodland to the north of the site, and that to the south is present on the site via the southern Application-site boundary, the eastern boundary and also through the middle of the site, via the fishing lake and grasslands. The Proposed Development will alter this corridor through lessening the amount of habitat available and could temporarily light up a currently dark corridor reducing suitability for the rarer species using it (Stone, 2013). The proposals will not however, altogether sever this foraging/commuting link. As such potential foraging habitat loss and fragmentation of commuting links (through reduction of habitat and increased lighting) is considered to convey a **moderate negative** effect at a County level of importance without mitigation.

8.5.28 Loss of the remaining habitats (arable fields, quarry, quarry ponds etc.) would result in a **minor negative** impact on the foraging and commuting assemblage at the site level.

Operation

8.5.29 There is potential for the possible Barbastelle day roost to be permanently impacted through increased lighting on Tree 41 along Ipswich Road. This would be considered to have a **major negative** effect as increased lighting would likely disturb the roost to an extent that it is no longer utilized by this rare species. Without mitigation and a Natural England EPS License the loss of this roost would constitute an offence under the Conservation of Habitats and Species Regulations 2010 or the Wildlife and Countryside Act 1981. As such, a **major negative** impact on the potential roosting barbastelle is considered likely at the County level without suitable mitigation.

8.5.30 A foraging/commuting link between the woodland to the north of the site, and that to the south is present on the site via the southern Application-site boundary, the eastern boundary and also through the middle of the site, via the fishing lake and grasslands. The Proposed Development may alter this corridor through lighting a currently dark corridor, reducing suitability for the rarer species using it (Stone, 2013). The proposals will not however, altogether sever this foraging/commuting link due to the open space availability. As such potential foraging habitat loss and fragmentation of commuting links

(through increased lighting) is considered to convey a **moderate negative** effect at a County level of importance without mitigation.

8.5.31 It is considered that lighting within the development will affect bats during the operational phases, assessed as **major negative** at the County level.

Otter

Construction

8.5.32 The Proposed Development will retain the Otter foraging resource but access here is likely to be restricted due to the loss of the quarry ponds which may have aided dispersal. It is likely that Otter will cease using the fishing lake once construction around the fishing lake and grass and scrub field to the south has started. The loss of this potential feeding resource is considered **minor negative** at a Site level.

Operation

8.5.33 The Proposed Development will retain the Otter foraging resource but access here is likely to be restricted due to large blocks of housing which will fragment the landscape. It is likely that Otter will cease using the fishing lake during the operational phase. The loss of this potential feeding resource is considered **minor negative** at a Site level.

Amphibians

Construction

8.5.34 The Proposed Development will not impact on common toad breeding habitat.

8.5.35 Terrestrial habitats along the north and eastern boundaries of the site will have no habitat loss impacts, but may result in killing / injury of common toads, assessed as **moderate negative** at Site level.

Operation

8.5.36 There will be no fragmentation impacts due to retention of suitable habitat. No other impacts are predicted.

Breeding Birds

Construction

8.5.37 The Proposed Development footprint is currently within and adjacent to the breeding territories of several red-list/UK BAP and amber-listed species (e.g. nightingale, shelduck and linnet), and the loss of the scrub habitats without mitigation is considered to be **minor negative** and significant for those species through construction disturbance and habitat loss. Losses of grasslands with skylark, are also assessed as **minor negative**. Other losses are assessed as Negligible.

Operation

8.5.38 The Proposed Development footprint is currently within and adjacent to the breeding territories of several red-list/UK BAP and amber-listed species (e.g. nightingale, shelduck and linnet) and disturbance impacts during operation of the development without mitigation is considered to be **minor negative** and significant for those species.

8.5.39 Other disturbance impacts upon the wider assemblage are assessed as Negligible.

Wintering Birds

Construction

8.5.40 The Proposed Development is currently within and adjacent to habitat for a number of wintering birds including the red and amber-listed and UK BAP species (skylark, linnet, meadow pipit, dunnock, fieldfare and song thrush), particularly across the grassland and arable farmland habitats and associated scrub and ruderal vegetation. The loss of habitat and associated disturbance for these species (grassland and arable) without mitigation is considered to potentially result in a **minor negative** impact on these wintering species in the Local context.

8.5.41 As the wintering bird assemblage is considered to be of value in a Local context only, and as some of the key areas such as the main waterbody, the scrub/grassland northwest of this, and woodland are being retained, the impact on birds using the woodland, waterbodies and grassland is considered to be **negligible**.

Operation

8.5.42 Disturbance impacts during the operational phase of development to notable wintering bird species are considered to potentially result in a **minor negative** impact over the long term for notable species mentioned above at the Local level.

Badgers

Construction

8.5.43 The three outlier setts in current use (Setts A, B and E) will be damaged or destroyed by the development. The majority of the disused holes will also be lost to development. This represents a **moderate negative** impact at the site level.

8.5.44 In addition, there would be a loss of approximately 25% of foraging / sett building / dispersal habitat for example the scrubby north bank by the quarry ponds, southern grass field and arable field margins. This represents a **minor negative** impact at the site level.

8.5.45 During construction phases, there is a risk of killing or injuring badgers through earthworks and road traffic accidents. This represents a **major negative** impact at the site level.

8.5.46 Impacts are overall assessed as being **major negative** at the site level.

Operation

8.5.47 During operational phases, there is a risk of killing or injuring badgers through increased road traffic accidents. This represents a **major negative** impact at the site level.

8.5.48 There is also potential for the development on the site to fragment the landscape for badgers (including connectivity from the main sett potentially [redacted] to the subsidiary sett (Sett C) [redacted]), in particular from lighting and road traffic. This represents a **major negative** impact at the site level.

8.5.49 Impacts are overall assessed as being **major negative** at the site level.

Invertebrates

Construction

8.5.50 The sparsely vegetated areas of open grassland support the main invertebrate interest on the site, in terms of the overall numbers of species, most specialists and species of conservation concern. The impacts of the scheme will be detrimental to invertebrates, from direct losses of habitat within development footprints. The effects are assessed as **major negative** at the **County** level. This is therefore considered significant.

Operation

8.5.51 The impacts of the scheme during operation will be detrimental to invertebrates, from the cessation of the periodic disturbance associated with aggregate operations, resulting in ranker grass swards and scrub and loss of open sward grassland. The effects are assessed as **major negative** at the County level. This is therefore considered significant.

Reptiles

Construction

8.5.52 A small population of common lizards were recorded on the site along with a small population of grass snakes. In addition, the neighbouring Martlesham Soakaway Acid Grassland CWS also contains a population of common lizards. All other species of reptiles are considered to be absent from the site. The reptiles are mostly located within the mixed grass and scrub field, south of the fishing lake. The field will be partially lost to development. In addition, reptiles are located within the grassland field margin in the west of the site (near to the Martlesham Soakaway Acid Grassland CWS) and the broad-leaved woodland in the north of the site. Approximately 40% of grassland habitats used by reptiles will be lost to development, the woodland will be retained. A **moderate negative** effect at the Local level is predicted.

8.5.53 During the construction phase, there is also a risk of killing and / or injuring reptile species which would constitute an offence under the WCA 1981. A **major negative** effect at the Local level is predicted.

8.5.54 In addition, there will be temporary fragmentation of the reptile populations within the site, as well as adjacent to the site i.e. the neighbouring Martlesham Soakaway Acid Grassland CWS. A **minor negative** effect (temporary) at the Local level is predicted.

8.5.55 Overall a **moderate negative** effect is predicted.

Operation

8.5.56 Operational impacts may include increased mortality and disturbance from residents and their pets, although predation from cats is not considered significant as reptiles are only known to contribute a small proportion of their diet (Woods *et al*, 2003).

8.5.57 Habitats if not managed may also decline in their suitability through scrub encroachment and woodland regeneration. The retained / created habitats may also become isolated from other suitable habitats by roads and unsuitable habitats.

8.5.58 Impacts of disturbance, isolation and decline in habitat suitability over time are assessed as **moderate negative** at a Local level.

Small and Medium-sized Mammals

Construction

8.5.59 The loss of habitats suitable for European hedgehog from construction impacts are assessed as **moderate negative** effects at a Site level of importance.

8.5.60 There is a risk of killing / injury of hedgehogs during vegetation clearance, impacts are assessed as **major negative** at a Site level of importance.

Operation

8.5.61 Operational impacts for hedgehogs are considered **major negative** at a Site level of importance through increased predation by dogs, increases in road traffic accidents and recreational disturbance. Although gardens will provide ideal foraging habitats for hedgehog, if access is restricted they are likely to become isolated through fragmentation.

Summary of Impacts without Mitigation

Table 8.12a Summary of Construction Impacts without Mitigation Arising from the Development of the site

No.	Receptor	Predicted Impact	Level/Predicted Negative Impact	Confidence in Prediction
1	European Sites	No likely significant effect on: Deben Estuary SPA and Ramsar Sandlings SPA Stour and Orwell Estuaries SPA and Ramsar	Negligible	High
2	SSSI & LNR	Disturbance to majority of sites considered highly unlikely due to reason for designation is immobile plants / habitats 800m or more from the site, species which are not present on-site or site's whose species utilise different habitats to those on the site (Ipswich Heaths SSSI, Sinks Valley Kesgrave SSSI, Nacton Meadows SSSI, Riverside House Meadow Hasketon SSSI, Sutton and Hollesley Heaths SSSI, Bixley Heath SSSI and LNR, Sandlings Forest SSSI, Crag Pit Sutton SSSI, Mill Stream LNR and Sandlings LNR). Disturbance to Newbourn Springs SSSI and Dandlings LNR possible in terms of breeding and migratory nightingales as less than 1km from site and may utilise habitats on the designated sites. No pollution impacts as all sites more than 50m (Holman, 2014) from Application-site.	Negligible Minor negative / National Negligible	High

No.	Receptor	Predicted Impact	Level/Predicted Negative Impact	Confidence in Prediction
3	CWS	Adjacent CWS (Martlesham Soakaway Acid Grassland CWS) could be negatively impacted through pollution, physical / chemical damage for the habitats and reptiles present. For impacts on reptiles (see reptile section) The remaining thirteen CWS are unlikely to be impacted by pollution, physical or chemical damage due to the distances involved (>180m)	County / Moderate negative Negligible	High
4a	UK BAP Priority Habitats	Loss of 1.63ha of Open Mosaic Habitat on Previously Developed Land Pollution (dust, chemical etc.)	District / Major negative Up to District / Moderate negative	High
4b	Other habitats	Loss of 23.21ha of Semi-improved neutral grassland Loss of other habitat Pollution (dust, chemical etc.) on retained habitats	District / Major negative Site / Major negative Up to Local / Moderate Negative	High
5a	Rare and Notable Plants	Loss / damage to Smooth Cat's-Ear and Dittander	Local / Minor negative	High
5b	Rare and Notable Plants	Loss / damage to Common Cudweed, Field Pepperwort, Corn Mint, Annual Beard-Grass and Hound's Tongue	Up to District / Minor negative	High
6a	Bats - Roosting	Temporary loss of possible barbastelle roost Loss of three roosting sites for pipistrelles (including potential future hibernation roosts) and two buildings with feeding perches Construction disturbance (i.e. light, killing / injury during demolition)	County / Up to Major negative Up to District / Up to Moderate negative Up to County / Major negative	High
6b	Bats – Foraging / Commuting	Loss / disturbance (including light pollution) to the bat assemblage utilising the broadleaved woodland, southern and eastern boundaries and central lake area (temporary) Loss / disturbance to the bat assemblage utilising the remaining habitats e.g. quarry and arable fields	Up to County / Moderate negative Site / Minor negative	High
7	Otter	Fragmentation to potential feeding resource	Site / Minor negative	High

No.	Receptor	Predicted Impact	Level/Predicted Negative Impact	Confidence in Prediction
8	Amphibians	Killing / injury of common toads during construction	Site / Moderate negative	High
9	Birds	Breeding nightingale and linnet (scrub habitats) Other breeding species (including shelduck, linnet and cuckoo) Wintering assemblage (Skylark, linnet, dunnock, meadow pipit, fieldfare and song thrush)	District / Minor negative Local / Minor negative Local / Minor negative	High
10	Badger	Loss / disturbance of outlier setts and sett building habitat Loss and/or fragmentation of foraging and commuting habitat for one badger social group Killing / injury of badgers	Site / Major negative	High
11	Invertebrates	Loss of sparsely vegetated open grassland to development footprints	County / Major negative	High
12	Reptiles	Loss of foraging, dispersal and shelter habitat. Risk of killing / injury Temporary fragmentation	Local / Moderate negative	High
13	Small and Medium-Sized Mammals	Construction impacts on European hedgehogs to include killing / injury, temporary fragmentation and habitat loss	Local / Up to Major negative	High

Table 8.12b Summary of Operation Impacts without Mitigation Arising from the Development of the site

No.	Receptor	Predicted Impact	Level/Predicted Negative Impact	Confidence in Prediction
1	European Sites	Likely significant effect from recreational pressure: Deben Estuary SPA and Ramsar Sandlings SPA Stour and Orwell Estuaries SPA and Ramsar	Moderate negative	High
2	SSSI	The ten SSSIs and 3 LNRs are considered unlikely to be impacted by recreational pressure due to the distances involved (>800m), established visitor management already in place and/or no public access to the site.	Negligible	High

No.	Receptor	Predicted Impact	Level/Predicted Negative Impact	Confidence in Prediction
3	CWS	Adjacent CWS (Martlesham Soakaway Acid Grassland CWS) could be negatively impacted through increased recreational pressure and physical damage to the habitats and reptiles present (for impacts on reptiles, see reptile section) The remaining thirteen CWS are unlikely to be impacted by recreational pressure due to the distances involved (>180m), established visitor management already in place or no public access to the site	County / Moderate negative Negligible	High
4a	UK BAP Priority Habitats	Increased lighting/activity on retained habitats	Up to District / Moderate negative	High
4b	Other habitats	Increased lighting/activity on retained habitats	Up to Local / Moderate Negative	High
5a	Rare and Notable Plants	Loss or damage (i.e. through trampling/picking during operational stage) to Smooth Cat's-Ear and Dittander	Local / Minor negative	High
5b	Rare and Notable Plants	Loss or damage (i.e. through trampling/picking during operational stage) to Common Cudweed, Field Pepperwort, Corn Mint, Annual Beard-Grass and Hound's Tongue	District / Minor negative	High
6a	Bats - Roosting	Operational disturbance (i.e. light pollution)	Up to County / Major negative	High
6b	Bats – Foraging / Commuting	Disturbance to (including light pollution) the bat assemblage utilising the broadleaved woodland, southern and eastern boundaries and central lake area (permanent) Disturbance to the bat assemblage utilising the remaining habitats e.g. quarry and arable fields Permanent disturbance during operational stage	Up to County / Moderate negative Site / Minor negative Up to County / Major negative	High
7	Otter	Fragmentation to potential feeding resource	Site / Minor negative	High
8	Birds	Breeding nightingale and linnet (scrub habitats) Other breeding species (skylark, cuckoo and linnet) Wintering assemblage (Skylark, linnet,	District / Minor negative Local / Minor negative Local / Minor negative	High

No.	Receptor	Predicted Impact	Level/Predicted Negative Impact	Confidence in Prediction
		dunnock, meadow pipit, fieldfare and song thrush)		
9	Badger	Disturbance of outlier setts and sett building habitat Fragmentation of foraging and commuting habitat for one social group including death / injury from road traffic accidents.	Site / Major negative Site / Major negative	High
10	Invertebrates	Loss of sparsely vegetated open grassland through cessation of disturbance resulting in succession to ranker grass sward and scrub	County / Major negative	High
11	Reptiles	Disturbance from new residents / pets Permanent fragmentation	Local / Moderate negative	High
12	Small and Medium-Sized Mammals	Operational impacts on hedgehogs to include killing / injury (road traffic accidents) and fragmentation i.e. into gardens.	Local / Up to Major negative	High

8.6 Mitigation, Enhancement and Residual Impacts

8.6.1 Mitigation will be provided through a network of 25.1ha of SANGS (approximately 22% of the site) that will be created, retained and/or enhanced around the site (see Table 8.14 below and Landscape chapter 11), to include heathland creation, wildflower meadow creation, areas of sparsely vegetated ground, enhanced management of the scrub and woodland habitats for wildlife and marginal planting around the retained fishing lake to enhance the lake for wildlife. See Appendix E1 for mitigation plan.

European Statutory Designated Sites

Construction

8.6.2 There are no construction impacts predicted, thus no mitigation is proposed.

Operation

8.6.3 Provision of 25.1ha of SANGS and proposed financial contribution to fund off-site mitigation measures through the emerging Recreation Access Mitigation Strategy (RAMS) will provide sufficient mitigation for the additional amount of increases in recreational pressure predicted from this development.

8.6.4 The SANGS will include the creation of new habitats around the retained central fishing lake and will include the creation of heathland, woodlands and grasslands. The SANGS is designed to be high quality greenspace that will attract people who wish to walk in the countryside. The SANGS will include areas for dogs to be let off the lead and circular walks of various lengths suitable for dog walking. The central lake area will be remodelled to provide an attractive location for more intensive use (picnicking, access to the water's edge, informal play areas) that is close to the local centre.

8.6.5 In addition it is also proposed that off-site mitigation of potential recreational impacts will be funded through the emerging RAMS which will ensure that any residual recreational impacts from people travelling to the surrounding European sites will be effectively mitigated. The residual effect will therefore be neutral.

8.6.6 **Table 8.13a Summary of operational impacts/mitigation on nearby European sites**

Site	Pre-mitigation Impact	Proposed Mitigation	Residual Impact
Deben Estuary SPA and Ramsar	Moderate negative	Provision of 25.1ha of high quality SANGS space. Funding of off-site mitigation through emerging RAMS.	Negligible
Sandlings SPA	Moderate negative	Provision of 25.1ha of high quality SANGS space. Funding of off-site mitigation through emerging RAMS.	Negligible
Stour and Orwell Estuaries SPA and Ramsar	Moderate negative	Provision of 25.1ha of high quality SANGS space. Funding of off-site mitigation through emerging RAMS.	Negligible

UK Statutory Designated Sites

Construction

8.6.7 Table 8.13b provides mitigation, enhancement and residual impacts for UK statutory designated sites within 5km of site for construction impacts.

Table 8.13b Construction impacts/mitigation on nearby UK Statutory Designated Sites

Site	Pre-mitigation Impact	Proposed Mitigation	Residual Impact
Ipswich	Negligible	No impacts on the SSSI are anticipated	Negligible

Heaths SSSI		during the construction phase and therefore no mitigation has been offered.	
Newbourn Springs SSSI	Minor negative Negligible	Disturbance – Temporary and permanent loss of habitats on the site which could be used by breeding & migratory nightingales from the SSSI will be mitigated through creation and enhancement of retained habitats on-site in step with development to provide habitats of higher quality for nightingales in the short-term, in line with policy SP2. Pollution- No impacts on the SSSI are anticipated during the construction phase with regard to pollution and therefore no mitigation has been offered.	Negligible Negligible
Deben Estuary SSSI	Negligible	No impacts on the SSSI are anticipated during the construction phase and therefore no mitigation has been offered.	Negligible
Sinks Valley, Kesgrave SSSI	Negligible	No impacts on the SSSI are anticipated during the construction phase and therefore no mitigation has been offered.	Negligible
Nacton Meadows SSSI	Negligible	No impacts on the SSSI are anticipated during the construction phase and therefore no mitigation has been offered.	Negligible
Riverside House Meadow Hasketon SSSI	Negligible	No impacts on the SSSI are anticipated during the construction phase and therefore no mitigation has been offered.	Negligible
Sutton and Hollesley Heaths SSSI	Negligible	No impacts on the SSSI are anticipated during the construction phase and therefore no mitigation has been offered.	Negligible
Bixley Heath SSSI	Negligible	No impacts on the SSSI are anticipated during the construction phase and therefore no mitigation has been offered.	Negligible
Sandlings Forest SSSI	Negligible	No impacts on the SSSI are anticipated during the construction phase and therefore no mitigation has been offered.	Negligible
Crag Pit, Sutton SSSI	Negligible	No impacts on the SSSI are anticipated during the construction phase and therefore no mitigation has been offered.	Negligible
Mill Stream LNR	Negligible	No impacts on the LNR is anticipated during the construction phase and therefore no mitigation has been offered.	Negligible
Sandlings LNR	Minor negative	Disturbance – Temporary and permanent loss of habitats on the site which could be used by breeding & migratory nightingales from the LNR will be mitigated through	Negligible

		creation and enhancement of retained habitats on-site in step with development to provide habitats of higher quality for nightingales in the short-term, in line with policy SP2. Pollution- No impacts on the SSSI are anticipated during the construction phase with regard to pollution and therefore no mitigation has been offered.	
Bixley Heath LNR	Negligible	No impacts on the LNR is anticipated during the construction phase and therefore no mitigation has been offered.	Negligible

Operation

8.6.8 Table 8.13c shows mitigation, enhancement and residual impacts on statutory designated sites within 5km of the site for operational impacts.

Table 8.13c Operational impacts on nearby UK Statutory Designated Sites

Site	Pre-mitigation Impact	Proposed Mitigation	Residual Effect
Ipswich Heaths SSSI	None	No impacts on the SSSI are anticipated during the operational phase and therefore no mitigation has been offered.	None
Newbourn Springs SSSI	Neutral	No impacts on the SSSI are anticipated during the operational phase and therefore no mitigation has been offered.	None
Deben Estuary SSSI	Neutral	No impacts on the SSSI are anticipated during the operational phase and therefore no mitigation has been offered.	None
Sinks Valley, Kesgrave SSSI	Neutral	No impacts on the SSSI are anticipated during the operational phase and therefore no mitigation has been offered.	None
Nacton Meadows SSSI	Neutral	No impacts on the SSSI are anticipated during the operational phase and therefore no mitigation has been offered.	None
Riverside House Meadow Hasketon SSSI	None	No impacts on the SSSI are anticipated during the operational phase and therefore no mitigation has been offered.	None
Sutton and Hollesley Heaths SSSI	Neutral	No impacts on the SSSI are anticipated during the operational phase and therefore no mitigation has been offered.	None
Bixley Heath SSSI	Neutral	No impacts on the SSSI are anticipated during the operational phase and therefore no mitigation has been offered.	None
Sandlings	Neutral	No impacts on the SSSI are anticipated	None

Forest SSSI		during the operational phase and therefore no mitigation has been offered.	
Crag Pit, Sutton SSSI	Neutral	No impacts on the SSSI are anticipated during the operational phase and therefore no mitigation has been offered.	None
Mill Stream LNR	Neutral	No impacts on the LNR are anticipated during the operational phase and therefore no mitigation has been offered.	None
Sandlings LNR	Neutral	No impacts on the LNR are anticipated during the operational phase and therefore no mitigation has been offered.	None
Bixley Heath LNR	Neutral	No impacts on the LNR are anticipated during the operational phase and therefore no mitigation has been offered.	None

8.6.9 There are no likely impacts on statutory designated sites during the operational phase and thus no mitigation is proposed.

Non-statutory Designated Sites

Construction

Martlesham Soakaway Acid Grassland

8.6.10 The potential for the neighbouring CWS (Martlesham Soakaway Acid Grassland) to be adversely affected by physical and chemical damage can be mitigated by erecting Heras fencing around the boundaries of the site to ensure site workers / construction traffic do(es) not transverse this inconspicuous boundary.

8.6.11 To mitigate for the impacts from pollution (e.g. dust and chemical spillage) a Construction Environmental Management Plan (CEMP) will be produced and adhered to on-site, to reduce the risk of pollution events on the surrounding CWS. This is likely to include requirement of chemicals to be stored away from this boundary to ensure there is no spillage onto the CWS.

8.6.12 To mitigate impacts upon the reptile population within the Martlesham Soakaway Acid Grassland CWS, reptile exclusion fencing will be erected around the construction zone in this area to exclude individuals from the construction zone. See reptile section for more detail.

Remaining CWSs

8.6.13 There are no impacts on the remaining CWS, thus no mitigation is required.

Operation

Martlesham Soakaway Acid Grassland

8.6.14 Public access is not permitted on the CWS at present, however there are no physical barriers to people accessing the CWS for recreation. To prevent impacts from damage (i.e. trampling, picking and / or fouling from dogs / cats), a fence will be erected around the designated site with signage for no public access. An interpretation board may also be pertinent in preventing trespassing.

8.6.15 Impacts to the reptile population within the Martlesham Soakaway Acid Grassland CWS are detailed in the reptile section, but will include connectivity measures to reduce fragmentation and habitat enhancements on the development site.

8.6.16 Given the recommended mitigation measures and CEMP, the residual effect is assessed as **neutral.**

Remaining CWSs

8.6.17 There are no impacts on the remaining CWS, thus no mitigation is required.

Habitats

Construction

8.6.18 A total of approximately 24.84ha of significant habitat loss is expected (1.63ha of Open Habitat Mosaic on Previously Developed Land and 23.21ha of semi-improved grassland). Mitigation will be provided through a network of 25.1ha of SANGS (approximately 22% of the site) that will be created, retained and/or enhanced around the site (see Table 8.14 below and Landscape chapter 11), to include heathland creation, wildflower meadow creation, areas of sparsely vegetated ground, enhanced management of the scrub and woodland habitats for wildlife and marginal planting around the retained fishing lake to enhance the lake for wildlife. See Appendix E1 for mitigation plan.

Table 8.14 SANGS summary, refer to Mitigation Plan (Appendix E1) for Locations

Green space area	Description	Treatment
North green space	Broad-leaved woodland (area 1)	To be enhanced through sensitive ongoing management Ad hoc removal of Sycamore which can otherwise become invasive Low level lighting scheme Planting native trees Increasing the diversity of the understorey including opening up of rides and walkways to encourage shade tolerant wildflower species to establish
Central green space	Fishing lake, retained scrub and some retained grassland as well as heathland creation and marginal vegetation around the lake (areas 3, 4 and 6)	Creation and sensitive ongoing management of heathland Creation of wildflower meadow; Creation of neutral/acid grassland Creation of areas of sparsely vegetated early successional grassland Provision of low disturbance zone Low level lighting scheme A marginal wetland habitat will be incorporated around the margins of the lake Re-inforced scrub and tree planting around north

Green space area	Description	Treatment
		margins of lake for badgers and nightingales Scrub to be managed on rotation to encourage structural diversity Bare ground, grassland and scrub sensitively managed for reptiles, invertebrates etc
The Valley	Grass and scrub field south of the fishing lake (area 7)	Creation of neutral/acid grassland Creation of areas of sparsely vegetated early successional grassland Low level lighting scheme Bare ground, grassland and scrub sensitively managed for reptiles, invertebrates etc
South and East buffer	Semi-improved grassland buffer along the east boundary (area 2 and 9) and plantation woodland along the south boundary (area 8)	Provision of increased species and structural diversity through: sowing of a wildflower mix and managing in a low intensity manner to provide gradation in structure; Low level lighting scheme Creation of wildflower meadow Native species planting to reinforce the boundary habitats for small mammals to utilise Management to maintain connectivity through and around the development site
West green space	Currently arable / quarry where a green corridor will be created (area 5)	Planting of a native species-rich hedgerow along the new footpath Low level lighting scheme Enhancement of pillboxes for bats

8.6.19 The loss of the UK BAP habitat Open Mosaic Habitat on Previously Developed Land will be total. However, areas of sparsely vegetated early successional grassland will be created and maintained throughout the network of SANGS. Creation of heathland will provide a habitat of higher ecological priority and provide significant enhancements for biodiversity.

8.6.20 The loss of part of the semi-improved grassland will be directly mitigated for through the provision of wildflower meadow and neutral/acid grassland creation throughout the network of SANGS and around the heathland mosaic.

8.6.21 Additional mitigation for the loss of these habitats includes enhancement of the scrub, lake and woodlands for wildlife, as well as provision of a low disturbance zone in the heathland.

8.6.22 The creation of habitats and enhancements to retained habitats will be guided by an Ecological Mitigation and Management Plan (EMMP) see Table 8.14 for treatments.

8.6.23 The construction phase of the development has the potential to negatively impact the retained habitats through pollution events, for example dust, noise, chemical and light pollution. Mitigation will include storage of chemicals away from retained habitats and sensitive lighting (see bat section for detail) and be guided by the production of a CEMP (see Chapter 6) with compliance ensuring the retained habitats are protected during the construction phase.

Operation

8.6.24 An EMMP will be produced to ensure the maintenance of value and condition of the created, retained and enhanced habitats on the site.

8.6.25 In addition, a low-level lighting scheme will be implemented across the site, particularly within / around the created, retained and enhanced habitats, to maintain the biodiversity value on-site (see bat section for more detail).

8.6.26 To mitigate for increased human activity, a low disturbance zone around part of the fishing lake, new wildflower meadow and heathland will be created through native thorny species planting and path creation drawing activity away from sensitive areas. Interpretation boards around the SANGS areas will inform new residents of the importance of the habitats helping to prevent damage during the operational phase.

8.6.27 Given the mitigation measures and the recommended management plan there would be an overall increase in habitat quality, despite a loss in extent, with enhancements to associated notable species such as bats, birds and reptiles. The residual effect is therefore assessed as **neutral.**

Rare and Notable Plants

Construction

8.6.28 The largest field on the site which contains four of the seven notable or rare species on-site (Common Cudweed, Smooth Cat's-ear, Field Pepperwort and Corn Mint), will be largely retained and enhanced for biodiversity through creation of heathland.

8.6.29 In addition, one of the fields containing Dittander will also be partially retained.

8.6.30 As such, it is only Hound's Tongue and Annual Beard-grass whose current extent will be lost (Area 4, see Appendix E1) under the development footprint.

8.6.31 To ensure the species of concern are able to re-establish on the site, prior to construction, individual plants of these species should be identified by a suitably qualified ecologist and as many of the plants as possible be translocated to a suitable area which is to be unaffected by construction of the Proposed Development, for example, the heathland area or green links forming part of the SANGS network on the site. Habitat will be recreated or retained in step with development for all seven rare and notable species on-site with appropriate mitigation and management, in line with policy SP2.

8.6.32 Mitigation during the construction phase for trampling / damage will include the protection of the retained and enhanced areas of grassland and bare ground habitats within/around the heathland area and other greenspace areas via fencing and will be detailed within the CEMP.

Operation

8.6.33 Targeted management of the newly created or retained habitat areas will provide optimal habitat for these species allowing them to persist on the site post-development, guided by an EMMP.

8.6.34 The management of discrete areas within the SANGS network will aim to replicate habitats of value for the notable plants present on the site. Many of the species require slightly acidic, sandy or gravelly substrates, which can be re-created within the open areas of the site. Hound's Tongue requires a slightly more calcareous soil on gravelly

substrates which could be replicated elsewhere on the site, for example in the small grassland field to the south of the fishing lake. Existing soil substrates in these areas will be used, with imported top soil avoided. In addition, interpretation boards around the SANGS areas will inform the new residents of the importance of these species and prevent picking / trampling damage during the operational phase.

8.6.35 The residual effect is assessed as **neutral**.

Invasive Species

8.6.36 The Japanese Knotweed on-site will be eradicated by a specialist invasive species contractor, following an appropriate method statement, prior to works commencing (including vegetation clearance in affected areas). Methods of control / eradication include; disposal in a licenced landfill, sprayed with approved herbicides by a specialist invasive species contractor or the rhizomes buried to a depth of at least 5m and covered with a root barrier membrane.

Bats

Construction

8.6.37 Temporary loss of the possible barbastelle roost (Tree 41) through increased lighting would result in a significant negative effect for this species at a County level and would also cause an offence under the Wildlife and Countryside Act 1981, and the Conservation of Habitats and Species Regulations 2010. As such, the roost will be protected from lighting impacts with the adjacent road remaining unlit. The residual effect is assessed as **neutral**.

8.6.38 There are three pipistrelle roosts on the site and two feeding perches. The loss of these would result in a significant negative effect at a Local / District level and would also cause an offence under the Wildlife and Countryside Act 1981 or the Conservation of Habitats and Species Regulations (2010). As such, a Natural England licence will be applied for, for any roosts that will be destroyed or damaged as part of the proposals. This would include the demolition of the building(s) as well as any significant lighting increases on / around Tree 41. The licence stipulations are likely to include exclusion of bats to ensure they are not harmed and timing to avoid important times of the year (breeding/hibernation). Compensatory roosts nearby will also be necessary. Compensatory roosts will include integrated bat boxes / bricks within new buildings, access tiles for bats into lofts (providing breathable roofing membranes are not used) or traditional bat boxes which can be externally fixed onto retained trees or new buildings where disturbance and artificial lighting levels are low (see Appendix E1 for examples). The residual effect is assessed as **neutral**.

8.6.39 There is potential for Building E to be utilized by hibernating bats prior to demolition. Loss of potential hibernating sites will also require a Natural England EPS licence. Licence stipulations are likely to be the same as the above. Compensatory roosts suitable for hibernating bats will be provided. The pill boxes on the site could form ideal hibernating opportunities for bats with enhancement works such as installing bat boxes and other roosting features and blocking entrances to reduce the risk of vandalism. The residual effect is assessed as **minor positive**.

8.6.40 Several species have been found to use the site for foraging and commuting purposes, predominantly utilising the south and east boundaries, broad-leaved woodland in the north and grassland and scrub habitat across the middle of the site, as well as the fishing lake. These habitats are largely being retained, enhanced and / or created into habitat of higher ecological priority (i.e. the new heathland) within the network of SANGS, as set out in the habitats section.

8.6.41 Without mitigation, there is high likelihood that light pollution will negatively affect the bat assemblage utilising the retained habitats that are foraging and commuting corridors for bats. As such a sensitive lighting scheme, as described in detail below and in the Lighting Appraisal (Brookbanks, 2017), will be implemented across the site during construction and operation of the development, with particular sensitivity to the aforementioned important commuting and foraging corridors. The residual effect is assessed as **neutral**.

8.6.42 Whilst the woodlands around the site (broad-leaved in the north, mixed and coniferous in the south) are being retained, they will also be buffered from the development through green space and native species planting (see Appendix E1) with no/low level lighting along these boundaries to ensure the dark corridor which is currently on-site can persist post-development. The residual effect is assessed as **neutral**.

Operation

8.6.43 In general, Application-site lighting will be kept to a minimum during both the construction and operational phases, especially in areas of foraging/commuting corridors such as woodland edges, the fishing lake, east and south boundaries, as well as along retained greenspace habitat through the middle of Application-site (heathland and the valley). Particular consideration will be given to points where roads bisect the aforementioned habitats. Where lighting is necessary, there are a number of ways to minimise the effect of lighting on bats, so as to allow dark corridors to persist in line with paragraph 125, Chapter 11 of the NPPF. The following mitigation strategies are based on the Bat Conservation Trust Landscape and Urban design for Bats and Biodiversity (Gunnell *et al.*, 2012) and other referenced sources:

- In general, light sources will emit minimal ultra-violet light (Langevelde et al., 2011) and avoid the white and blue wavelengths of the light spectrum, to avoid attracting insects and thus potentially reducing numbers in adjacent areas, which bats may use for foraging;
- Limiting the height of lighting columns to eight meters and increasing the spacing of lighting columns (Fure, 2006) will reduce spill of light into sensitive areas such as the woodlands and central lake as well as the tree (Tree 41), and buildings with bat roosts (Buildings 6 and E) (see Appendix E1) and pillboxes which may have future roosting potential after enhancements;
- The spread of light will be kept near to or below the horizontal plane, by using as steep a downward angle as possible and eliminating bare bulbs and upward pointing light fixtures;
- Light spill will be reduced through the use of directional luminaires, shields, baffles and/or louvres. Flat, cut-off lanterns are best;
- Additionally, lights will be located away from reflective surfaces where the reflection of light will spill onto potential foraging/commuting corridors; and

- Lighting that is required for security or access will use a lamp of no greater than 2000 lumens and be PIR sensor activated, to ensure that the lights are only on when required and turned off when not in use (Jones, 2000; Hundt, 2012).

8.6.44 With these lighting implementations, it is considered that any negative effects from lighting upon potential bat populations will be minimized. The dark corridor links between the woodland and potential Barbastelle roost in the south will remain connected with the woodland in the north via the southern and eastern boundaries, as well as the grassland field with the fishing lake present. In addition, the trees with roosts themselves will remain dark and thus connected to foraging habitats.

8.6.45 Newly created garden habitats will provide additional foraging habitat for common bat species, with plant species of benefit to bats incorporated throughout the landscaping scheme, to ensure bats can continue foraging post-development.

8.6.46 There is an opportunity to provide additional roosting opportunities over and above the current provision on the site. As such provision will be made for bat boxes (in addition to those required under any EPS licence) being installed on/within the proposed buildings or mature trees around Application-site, away from artificial light. There are numerous bat box designs but the Schwegler universal bat box 1FF provides excellent summer roosting conditions and the Schwegler 2F is a good multi-purpose bat box for crevice inhabiting species including pipistrelles which have been recorded roosting and foraging on the site. As Barbastelle typically do not roost in buildings (BCT, 2015), additional roosting opportunities will be supplied for this species, in a location that will remain dark, in the form of: translocation of potentially suitable features from a tree which is not to be retained; creation of suitable features in a nearby retained tree (e.g. replicated limb fracture); or provision of an appropriate bat box for Barbastelles (e.g. the Kent Bat Box).

8.6.47 In addition, the retained habitats on the site will be enhanced for foraging bats post development. For example, the understory of the northern woodland is of poor ecological quality and as such will be enhanced. This will be achieved through planting of native species of benefit to bats and/or thinning of the understorey to create more structural diversity; enhancing it for bats and for biodiversity in general, in line with the NPPF (DCLG, 2012). This will be guided via the EMMP. Species of plant of known benefit to bats (see Appendix E1) will also be included within the landscaping scheme providing additional foraging resources. The resulting residual effect upon foraging/commuting bats is considered **neutral** with a **minor positive** residual effect predicted upon roosting bats.

Otter

Construction and Operation

8.6.48 Development impacts on otter are likely to include the reduction in use of the fishing lake as part of their foraging range. However, the impact is not considered significant given the very low level use. Through provision of mitigation for other species, including reduced traffic speed levels, green corridors and low lighting zones, the Proposed Development will result in a **neutral** effect on the local otter population.

Amphibians

Construction and Operation

8.6.49 The impact of killing and injuring common toads along the northern / eastern boundaries will be mitigated through methods described in the reptile section below. The Proposed Development will result in a **neutral** effect on the local common toad population

Breeding and Wintering Birds

Construction

8.6.50 To comply with the WCA 1981 and avoid nest destruction, clearance works affecting nesting habitat (scrub/trees/buildings/grassland) will be scheduled so that they do not occur during the bird breeding season (i.e. outside the period March-August inclusive). If this is not possible, an alternative strategy is to undertake a nesting bird survey in advance of clearance work to ensure that active birds' nests are not damaged or destroyed by the works and that Schedule 1 nesting birds are not intentionally or recklessly disturbed.

8.6.51 In order to mitigate habitat loss and disturbance impacts during construction the following measures will be implemented guided by the EMMP:

- Habitat creation/enhancement will be provided in step with habitat loss impacts, in line with policy SP2;
- Areas of created heathland in accordance with the Mitigation Plan (see Appendix E1) will create areas of suitable foraging habitats for species such as linnet and nightingale. This will provide abundant invertebrate prey and overwinter seed resources for birds, through appropriate management. This area will be treated as a low impact zone in order to minimise disturbance to species utilising the habitat;
- Specialised areas surrounding the large central fishing lake will be managed as low impact zones in order to avoid disturbance from residential pressure. Management here will include reinforcing the scrub and thorny native species around the edge of this zone, to naturally deter access to these areas. This is turn will allow for the creation of nesting and foraging opportunities within the reinforcing scrub features;
- A marginal wetland habitat will be created around the margins of the lake to mitigate for the loss of habitat around the three waterbodies within the quarry, used by cuckoo and linnets in the breeding season and teal in the winter as well as providing optimal foraging habitat for nightingale;
- A range of nectar-rich plants will be planted within the formal landscaped areas, to encourage invertebrate and plant food for birds. This will be designed in combination with the requirements for bats (see bat section); and
- A native wildflower seed mix of local provenance will be sown within discrete patches in the network of SANGS for example the edges of heathland and green links, with management to include cutting on long rotation to allow the sward to grow long, whilst providing suitable grassland foraging habitat for different bird species with a range of grass sward heights at any one time. This will allow connectivity around the site in a circular route for a range of foraging bird species.

Operation

8.6.52 The following mitigation measures will be implemented during the operational phase and guided by the EMMP:

- Implement appropriate grass cutting management of the urban greenspace to maintain short sward heights for thrushes and starlings across the more heavily

used amenity areas, and less frequent cutting (2-3 times a year, depending on ecological aims) of sown wildflower meadow areas;

- Management of ponds to enhance invertebrate populations: and important prey source for many birds. A pond-dipping platform could also be provided at the central lake with information boards to foster wildlife interest amongst the new residents;
- Install bird-nesting features or boxes into the developed realm to provide nesting opportunities for birds adapted to nesting in urban areas, such as swift *Apus apus*, house martin *Delichon urbicum*, house sparrow *Passer domesticus* and starling *Sturnus vulgaris*, to provide enhancement;
- Distribute and otherwise make available to new residents, information explaining the wildlife value of the site and how they can help nurture this resource by not deviating from designated paths, not using scrambling or mountain bikes on the designated wildlife areas, and controlling pets and reducing their potential dog-fouling pollution, predation and disturbance impacts;
- Provide dog-fouling bins; and
- Provide appropriate wildlife signage to inform the residents of the ecological value of the managed habitats within the site.

8.6.53 Taking into account the proposed mitigation, it is considered that impacts upon scrub habitats and the corresponding effect on linnet and nightingale will result in a **neutral effect.** This is due to the retention, enhancement and management of grassland scrub habitats throughout the site creating further nesting and foraging habitats within the site as compensation for habitats to be lost.

8.6.54 Impacts upon birds in association with the waterbodies such as mallard and wintering teal are also considered to result in a **neutral effect.** Although the quarry ponds will be lost to development it is considered that the management and enhancement of the large central fishing pond with the inclusion of low impact zones will offer suitable habitat for principal species. As the waterbodies within the site offered minimal ecological benefits and were considered species poor, the management plan has the potential to increase net species biodiversity.

8.6.55 Loss of arable land and grassland habitats will result in the potential loss of five skylark territories, and overwintering resource for significant skylark, linnet, fieldfare, meadow pipit and song thrush. This loss of habitat is considered to result in a **minor negative effect** upon the local breeding skylark population or other key wintering species' populations. However, considering the optimal surrounding habitat within the wider landscape it is believed that this negative impact will not impinge on the status of these species outside the site itself, as the abundant suitable farmland breeding and wintering habitat surrounding the site will not be impacted, and the breeding skylark and wintering farmland species populations in the wider landscape is unlikely to be significantly affected by the loss of this resource. Therefore the negative impact will be at the site level only.

8.6.56 A maximum of three breeding pairs of shelduck were recorded utilising the site, it is considered that the development will result in the loss of these three pairs. Nearby breeding sites at Orfordness, North Warren and Landguard support much larger populations (Mason 2011). Within the local estuaries, Holzer et al (1989) reported total breeding populations (no. pairs) in 1988 of 126 on the Deben, 114 on the Orwell, 17 on the Stour and 202 on the Alde/Ore. Slightly further afield, but within the District, the Blyth Estuary supported 72 pairs, giving a total of at least 531 pairs breeding within the

District. As the UK shelduck population has increased slightly by 2% over the period 1995-2010 (Balmer et al. 2013), and these estuaries have all been protected as SPAs over this period, it is likely that these breeding shelduck populations have not changed significantly since 1988. The three pairs using the site is approximately 0.6% of the District total, less than the 1% trigger for District importance; therefore it is of Local value.

8.6.57 The loss of three pairs is considered to be a **minor negative effect** upon the local shelduck population. As the current shelduck habitat is ephemeral, being created as a result of the on-going quarrying activities, it is likely that a do nothing option would result in the longer term loss of the habitat and shelduck population. It also indicates that this breeding site has only been occupied recently, since extraction industry activities have created suitable habitat (Linton & Fox 1991). Shelduck were not recorded on the later June survey visit. Given this, it is suspected that the three pairs may not all have bred on the site, and also that there was no successful breeding. This indicates that the site population is recent and reproductively unsuccessful, probably forming a 'sink' (Pullman, 1988) subpopulation (of the nearby larger and reproductively successful source breeding populations) of fluctuating size according to the principles of the 'buffer effect' (Krebs, 1973). Given this, the impact is considered only to be effective in the shorter term at a Local level as it is unlikely to have any significant role in the long-term functioning of the wider population (Runge et al. 2006).

8.6.58 The key areas of breeding bird habitat to be lost are grassland and scrub, however the promotion and creation of and management of heathland/acid grassland, scrub, woodland, waterbodies and species rich grassland has the potential to create/recreate habitats that will ensure this loss will be minimal and fully mitigated in the longer term. Therefore, assessing the entire breeding bird assemblage of the site, while taking into account the proposed mitigation plans, it is considered that there will be an overall **neutral effect** on the breeding and wintering bird assemblage at the Local level.

Badgers

Construction

8.6.59 There are three outlier setts in current use (Setts A, B and E) and a number of disused outliers on the site which are likely to be permanently lost under the Proposed Development. The setts in current use to be lost to development will require closure under a Natural England licence to ensure badgers are not harmed during the destruction of the sett and to comply with the Protection of Badgers Act (1992). As there are no main setts on the site, there will be no requirement for a compensatory sett to be created as part of the licence. It is considered that the permanent closure of the setts on the site will not have a significant negative effect on the local badger group's conservation status given that no main setts are being affected and that outlier/subsidiary setts naturally fall in and out of use. Alternative sett building habitat will be provided in step with development (within the low disturbance zone, in line with policy SP2) and the residual effect is assessed as **neutral**.

8.6.60 Once the quarry is not in use, there are areas of the site which could become more frequently used by badgers, including for sett building, for example: retained woodlands and some grassland fields and bunds around the site which surround the quarries. As such an updated badger survey will be undertaken prior to commencement of

construction at the site to establish current conditions and inform the Natural England licences and detailed strategy for the EMMP/CEMP.

8.6.61 Any active badger setts on the site will have a 20-30m exclusion zone in place around the extent of the sett. No excavation work will be undertaken within this buffer zone to avoid disturbing, injury or killing of badgers within their sett or damage to the sett itself. If the proposed works do fall within this buffer zone then advice will be sought from the project ecologist. It is likely a licence from Natural England will need to be obtained to temporarily or permanently close the sett which can be done between July-November (inclusive). This will ensure that no badgers are disturbed or harmed during the construction works.

8.6.62 Precautionary measures will be put in place to ensure that in the event of a badger coming on to the site during construction the risk of injuring and killing it is minimised:

- Covering any trenches at night or leaving a plank of wood leant against the side to ensure a badger can escape if it were to accidentally fall in; and
- Sealing and appropriate storing of chemicals.

8.6.63 Approximately 25% of badger foraging habitat on the site is likely to be lost with the Proposed Development. However, the Proposed Development will include creation of a network of SANGS including new heathland habitat within the large grassland field with the fishing lake. Along with more formal areas such as the formal recreation area, residential gardens, orchard/allotments and other open space, this will provide enhanced foraging for badgers resulting in a **neutral** residual impact.

Operation

8.6.64 Fragmentation effects from the Proposed Development will be mitigated through the provision of the network of SANGS allowing badgers to move through the landscape post development, especially north – south connectivity from the fishing lake to their likely main sett south of the site. These green corridors will be subject to a sensitive lighting strategy and speed limits on the site will be restricted to reduce road traffic accidents, particularly around these sensitive areas.

8.6.65 During the operational phase, the subsidiary sett retained north of the lakes will be included within the low disturbance zone, with access discouraged by thorny species planting, path diversion and signage.

8.6.66 Thus residual impacts upon the local badger social group from the Proposed Development of the site are considered to be **neutral**.

Invertebrates

Construction

8.6.67 The site is an active sand quarry, with the habitat of principal value to invertebrates being the early stages of succession by vegetation, particularly open grassland with bare substrates. Recreation of habitats within the network of SANGS will aim to create areas of sparsely vegetated grassland habitat subject to regular disturbance (for example, along SANGS pathways) with substantial structural and physical variety, to provide a range of conditions locally. Relevant design features will also include mounds and slopes within grassland areas rather than uniformly flat conditions. Habitat creation and management will be guided by the EMMP (see below for more detail). The resulting residual effect is assessed as **minor positive**.

Operation

8.6.68 In the medium and longer terms the habitats will likely become less suitable and decline in value as grassland becomes ranker and scrub invades. Although many of the individual species of conservation concern were recorded from restricted areas they are likely to have dynamic distributions, tracking areas of habitat according to their suitability, colonizing areas as they become suitable and with local losses as vegetation becomes over mature for that species. It is not thought that individual areas of the site should be 'protected' for invertebrates. Instead, the proposals allow for appropriate areas of habitat to be created / retained for invertebrates, with the phasing schedule for the scheme allowing sufficient time for colonization of created and retained habitats.

8.6.69 In addition to on-going management such as mowing, incidental disturbance will be 'designed-in' to allow for users such as walkers and cyclists to create the gradients of disturbance and early seral conditions required by many species.

8.6.70 These features will be included throughout the SANGS areas for the benefit of the invertebrate assemblage utilizing the site and will be guided by an EMMP. The resulting residual effect is assessed as **minor positive**.

8.6.71 Invertebrate species likely to utilize such habitat areas – mosaics of grassland swards and peripheral scrub – include all of the species of conservation concern recorded on the site, with the more specialist conditions to be created being 'open short sward' and 'bare sand and chalk' and a range of other conditions relevant to the invertebrate species of grassland, scrub and woodland edge conditions. More generally the habitat conditions will be relevant to a wider group of invertebrate species present locally or present on the site and not recorded, including many of the widespread moths with the status of Species of Principal Importance and listed on the Suffolk BAP. Of the scarcer species recorded locally, the habitat conditions will be relevant to heathland specialists such as the Silver-studded Blue Butterfly and potentially contribute to the conservation of this species at the landscape scale, by increasing total area of habitat available locally and contributing to landscape connectivity.

8.6.72 The above strategy is consistent with the outline habitat management relevant to former aggregate sites proposed by Buglife (undated) and the broader principles for grassland and scrub invertebrates (Fry and Lonsdale, 1991; Kirby, 2001). The resulting residual effect is assessed as **minor positive**.

Reptiles

Construction

8.6.73 Common lizards and grass snakes were observed utilising the grass field south of the fishing lake, the western field boundary and the woodland. They are also known to be present in the neighbouring CWS (Martlesham Soakaway Acid Grassland).

8.6.74 To mitigate for the loss of reptile habitat, the grassland field south of the fishing lake will be largely retained, enhanced. The creation of heathland on the site, with appropriate long-term management, will also provide enhanced habitat for reptiles post-development. Valuable features such as log piles and reptile hibernacula will be installed within reptile areas to increase the number and quality of foraging / sheltering and hibernating habitats available to the reptile population on the site post-development. This mitigation is likely to result in a residual **neutral** to **minor positive**

effect on the reptile population on the site with the retained and created habitats managed for reptiles in the long term.

8.6.75 To mitigate for death/injury impacts during construction, reptile exclusion fencing will be erected around the two grassland fields with reptiles present, as well as around the south boundary of the woodland and boundaries with the neighbouring Martlesham Soakaway Acid Grassland CWS to prevent reptiles from entering these construction areas once construction starts. Areas within the construction zone, used by reptiles, will be trapped out for reptiles, with any caught reptiles translocated to a receptor site provided of retained habitat along the western boundary of the central green space (adjacent the BT complex). The receptor site will be enhanced with features such as log piles and hibernacula providing additional foraging/sheltering resources.

8.6.76 Amphibian and Reptile Groups of the UK (ARG UK) guidance requires a minimum of 60 suitable trapping days (HGBI, 1998) for the low population class size present. However, it is considered that if capture effort is increased over and above the recommended guidance and methods such as habitat manipulation are employed, after 30 days the capture could be concluded, following 7 consecutive 'clear' trapping visits or at the judgement of the site ecologist. Natural England's *Standing Advice Species Sheet: Reptiles* recommends that capture and translocation should be undertaken during spring and early autumn, avoiding periods of inactivity and the hotter months of July and August. Effort should also be restricted to periods of appropriate weather. This will ensure no reptiles are injured or killed as a result of the construction. In addition, as toads are known to be present on the site, any trapped toads will also be translocated to the reptile receptor area.

8.6.77 The translocated population of reptiles will not be temporarily fragmented during the construction period due to sufficient habitat being retained on the site (grassland south of the lake, central lake area and boundary habitats) and new habitats created in step with development impacts, in line with policy SP2. This mitigation is likely to result in a residual **neutral** effect on the reptile population.

Operation

8.6.78 Due to the planned residential development, an increase in disturbance (for example by dog walkers) or predation (for example by domestic cats) is predicted, although predation from cats is not considered significant as reptiles are only known to contribute a small proportion of their diet (Woods *et al*, 2003). Such impacts are difficult to quantify and mitigate. However, with the provision of a low disturbance area of the heathland, as well as thorny scrub within the open areas of the grassland, hibernacula and new log piles providing additional shelter from predation and excessive disturbance within the SANGS areas, it is predicted this impact can be adequately mitigated. In addition, with the appropriate sensitive management of the heathland, as guided by the EMMP, the conservation status of reptiles on the site will be secured in the long term.

8.6.79 Retained, created and enhanced habitat around the site will ensure connectivity is maintained post development. In addition, wildlife friendly planting, throughout the landscaping scheme (i.e. within the green space / network of SANGS as well as within the green spaces in the residential areas) will ensure connectivity across the site is maintained and enhancements are provided where possible. Production of an EMMP will ensure the long-term management of these habitats for reptiles. This mitigation is

likely to result in a residual **neutral** to **minor positive** effect on the reptile population on-site.

8.6.80 The resulting effect on reptiles overall is considered to be **minor positive**.

Small and Medium-sized Mammals

Construction

8.6.81 Retention of habitats of value to hedgehogs on the site (i.e. scrub, woodland boundaries) will partially mitigate for the loss of hedgehog habitat on the site. Additional and enhanced habitat will be created throughout the site, for example the network of SANGS and green links, log piles, enhanced management of scrub etc. will mitigate for loss of foraging habitat.

8.6.82 The production of a CEMP (see Chapter 6) will detail precautionary methods that include; (i) appropriate timing of vegetation clearance outside the hibernation period (October – March) when hedgehogs are more vulnerable; or (ii) where this is not feasible, a fingertip search and/or staged habitat removal on localised patches of habitat undertaken under a method statement. The resulting effect is assessed as **neutral**.

Operation

8.6.83 Dispersal and foraging habitat for the hedgehog is thought not to be significantly reduced with the retention of boundary habitats. However, given the findings of recent studies (Wembridge, 2011) highlighting the decline of hedgehogs throughout the UK in recent years, the provision of access points into residential gardens would be an important enhancement for this species providing additional foraging resources. To facilitate the movement of hedgehogs through the site, ad hoc 13cm x 13cm holes will be provided within fencing/walls to permit movement of hedgehogs. This size gap is too small for most pets and can be undertaken by raising a fence panel per garden; installing hedgehog friendly fencing; removing a brick at the bottom of a wall or cutting a hole in fencing/walls.

8.6.84 Mitigation against the predation of dogs and recreational disturbance will be provided through creation / enhancement of new foraging / dispersal and shelter habitat, to include a ‘low / no disturbance’ area. In addition, enhancement of boundary features will be provided through wildlife friendly planting, throughout the landscaping scheme (i.e. within the green space / network of SANGS as well as within the green spaces in the residential areas) will ensure connectivity across the site is maintained and enhancements are provided where possible.

8.6.85 A reduced speed limit on the road systems on the site will reduce the likelihood of mortality of hedgehogs from road traffic accidents.

8.6.86 The sensitive lighting scheme and retention of ‘dark corridors’ across the site, recommended for other protected species, will also benefit hedgehogs.

8.6.87 This mitigation (and enhancements) is likely to result in a residual **moderate positive** effect.

Summary

Table 8.15a Summary of mitigation and residual effects from construction after mitigation and enhancements

No.	Receptor	Summary Mitigation Measures for Significant Impacts	Residual Effect
1	European sites	None required	Neutral
2	SSSI	Creation and enhancement of retained habitats on-site to provide habitats of higher quality for birds (notably nightingale) from Newbourn Springs SSSI in step with the development, in line with policy SP2 No impacts on any of the other SSSIs are anticipated in terms of disturbance and therefore no mitigation necessary No impacts on any of the SSSI are anticipated during the construction phase with regard to pollution and therefore no mitigation is required	Neutral
3	CWS	Fencing and safe chemical storage to prevent physical damage to adjacent CWS (Martlesham Soakaway Acid Grassland) CEMP to prevent pollution effects on the 14 CWS in the locality	Neutral
4	Habitats	Habitat creation and enhancement	Neutral
5	Rare and Notable Plants	Recreate habitat for rare / notable plants within retained / enhanced habitat Translocate individuals Eradicate Japanese Knotweed	Neutral
6a	Bats – Roosting	Natural England EPSL obtained and compensatory roosts created Sensitive lighting scheme to be implemented	Minor positive
6b	Bats – Activity	Creation of new habitats, enhancements of retained habitats, bat friendly planting scheme Sensitive lighting scheme employed throughout site	Neutral
7	Otter	Reduced speed levels, lighting levels and retained green corridors in and around site	Neutral
8	Amphibians	Sensitive habitat clearance along northern / eastern boundaries	Neutral
9	Birds	Management plan to recreate heathland, enhance woodland and scrub, and sensitively manage grassland Creation of new and replacement habitat and nesting opportunities/features including sand martin bank Creation of low impact, disturbance-free zones	Minor negative (Site): Breeding Skylark Minor negative (Site): Wintering skylark, linnet, fieldfare, meadow pipit, dunnock and song thrush Minor negative (Local):

No.	Receptor	Summary Mitigation Measures for Significant Impacts	Residual Effect
			Breeding shelduck Neutral: all other species and breeding and wintering assemblages
10	Badgers	Natural England licence obtained to close active setts Foraging habitats retained and enhanced around boundaries, woodland and new heathland	Neutral
11	Invertebrates	Phasing of development to ensure creation of new areas before complete loss of habitats of value to invertebrates	Neutral
12	Reptiles	Translocation of individuals from reptile areas to receptor site Enhancement of SANGS areas for reptiles	Minor positive
13	Small and Medium-sized Mammals	Sensitive vegetation removal to avoid hedgehog hibernating period Enhancement of SANGS areas for hedgehogs Sensitive lighting scheme across site	Moderate positive

Table 8.15b Summary of mitigation and residual effects from the operational phase after mitigation and enhancements

No.	Receptor	Summary Mitigation Measures for Significant Impacts	Residual Effect
1	European sites	Provision of 25.1 Ha of SANGS Financial contribution to offsite mitigation through RAMS	No Likely Significant Effects
2	SSSI	No operational impacts anticipated	None
3	CWS	Damage to adjacent Martlesham Soakaway Acid Grassland i.e. through recreation, trampling, picking and dog/cat fouling prevented through fencing and interpretation boards No recreational impacts anticipated on remaining 13 CWSs	Neutral None
4	Habitats	Habitat creation and enhancement An ecological management plan will ensure the long-term perpetuity of these habitats	Neutral
5	Rare and Notable Plants	An ecological management plan will ensure the long-term perpetuity of these species Eradicate Japanese Knotweed	Neutral

No.	Receptor	Summary Mitigation Measures for Significant Impacts	Residual Effect
6a	Bats – Roosting	Sensitive lighting scheme to be implemented Installation of bat boxes throughout scheme	Minor positive
6b	Bats – Activity	Ecological management plan implemented to ensure the long-term perpetuity of the bat assemblage Sensitive lighting scheme employed throughout site	Neutral
7	Otter	Reduced speed levels, lighting levels and retained green corridors in and around site	Neutral
8	Amphibians	No operational impacts anticipated	None
9	Birds	Management plan for heathland, woodland and scrub, and grassland Maintain and inform new residents of low impact, disturbance-free zones	Minor negative (Site): Breeding Skylark Minor negative (Site): Wintering skylark, linnet, fieldfare, meadow pipit, dunnock and song thrush Minor negative (Local): Breeding shelduck Neutral: all other species and breeding and wintering assemblages
10	Badgers	Fragmentation minimised through reduced speed levels, low lighting levels and retained green corridors	Neutral
11	Invertebrates	Management plan to create open grassland habitats with extensive structural and physical variety, with on-going management to maintain early seral habitat conditions	Minor positive
12	Reptiles	Ecological management plan for newly created habitats and receptor site	Minor positive
13	Small and Medium-sized Mammals	Sensitive lighting scheme and reduced speed levels across site Connectivity through newly created gardens through cut-outs in fences etc. Ecological management plan for newly created habitats and receptor site	Moderate positive

8.7 Cumulative and In-Combination Effects

8.7.1 Residual negative effects from the Proposed Development that may potentially contribute to cumulative effects with other developments are restricted to certain breeding and wintering farmland birds, specifically:

- Breeding skylark (minor negative at a Site level);

- Breeding shelduck (minor negative at a Local level); and
- Wintering skylark, linnet, fieldfare, dunnock, meadow pipit and song thrush (minor negative at a Site level).

8.7.2 Given the neutral or positive effects of the Proposed Development upon all other ecological receptors, it is considered that no other negative cumulative effects are likely to arise.

8.7.3 The list of other projects assessed for cumulative effects is provided in Table 8.16 below. This list includes planning permissions, applications and appeals, emerging allocations, known commitments and recent proposals in the local area. It reflects 'foreseeable' development that has a reasonable likelihood of being approved, which has been collated from meetings with planning officers and reviewing the Felixstowe Peninsula Area Action Plan, the Suffolk Coastal Site Allocations Development Plan Documents and associated ecology documents on the East Suffolk planning portal.

8.7.4 Initial screening of these projects has removed those which do not contain suitable habitats for farmland birds. In addition, projects outside of 7km from the site have been omitted from this assessment. 7km is considered appropriate as it encompasses all farmland between Ipswich, Felixstowe and the Deben Estuary and given the level of importance placed on the bird features concerned.

8.7.5 The Proposed Development may result in significant cumulative effects upon breeding skylark in relation to the loss of arable farmland (in combination with 4 other projects), as well as significant cumulative effects upon wintering skylark, linnet, fieldfare, dunnock, meadow pipit and song thrush (in combination with 5 other projects). However 3 of these projects are at the pre app stage and this assessment assumes (as a precaution) that these projects will not fully mitigate their potential effects on breeding skylark.

8.7.6 No likely cumulative effects on breeding shelduck were identified in combination with any other projects.

8.7.7 Given the general quality (for biodiversity) and distribution of arable land within the Suffolk Coastal District these cumulative effects are considered minor negative at a Local level of importance. Confidence in this prediction is moderate given the varying level of information available for other projects with respect to the above ecological features.

Table 8.16 Cumulative effects assessment summary

Ref	Site Name/Location	Total number of units*	Status	Ecology Reports and Assessments Listed on Planning Portal and Development Plan Documents	Cumulative Effect
Ap	Land to East of Bell Lane, Kesgrave, Suffolk	300	Appeal lodged: ref number: DC/15/4672/OUT	MKA Ecology Ltd (2015) Breeding Bird Survey Report: Kesgrave, Ipswich. And Norfolk Wildlife Services (2015) Environmental Statement, Chapter 8: Ecology.	No likely effects on wintering birds. Effects on Skylark unlikely due to mitigation on-site (Kesgrave, Suffolk) for breeding Skylark.

Ref	Site Name/Location	Total number of units*	Status	Ecology Reports and Assessments Listed on Planning Portal and Development Plan Documents	Cumulative Effect
				Desktop data unavailable. Habitats unlikely to support significant / notable wintering bird species, thus wintering bird surveys not undertaken. Breeding bird surveys resulted in 33 species recorded, 22 of which were breeding including BoCC Red Listed Dunnock, Linnet and Skylark, BoCC Amber Listed Nightingale and Whitethroat. No schedule 1 birds were recorded on-site.	No likely cumulative effects in combination with the Proposed Development.
Ptd	Land off Woods Lane, Melton	180	Appeal allowed with conditions. Ref number: DC/14/0991/OUT	Cotswold Wildlife Surveys (2013) Extended Phase 1 Habitat Survey of land off Woods Lane, Melton, Woodbridge, Suffolk. The data search identified 267 bird records within 2km of the site , including; 27 schedule 1 birds, 19 BoCC Red listed species and 25 BoCC Amber listed species (species not identified). The Phase 1 survey found Skylark singing in the neighbouring field (to be retained). No breeding bird surveys were recommended due to habitats on-site being sub-optimal. Nesting bird checks were recommended prior to construction.	No likely effects on breeding or wintering birds. No likely cumulative effects in combination with the Proposed Development.
Ap	Land and Buildings to the East of Bridge Farm, Top Street, Martlesham	215	Appeal lodged: ref number: DC/15/4788/OUT	FPCR Environment and Design Ltd (2015) Environmental Statement, Chapter 7: Ecology and Nature Conservation and FPCR Environment and Design (2016) Ecological Appraisal. The data search included 38 BoCC Red Listed Species; including Skylark and 31 BoCC Amber listed species. No breeding / wintering bird surveys were undertaken.	No likely effects on breeding birds. Minor negative effects on wintering bird assemblage at site level. Potential cumulative effects in combination with the Proposed Development in relation to wintering bird

Ref	Site Name/Location	Total number of units*	Status	Ecology Reports and Assessments Listed on Planning Portal and Development Plan Documents	Cumulative Effect
				Minor negative effect on potential species on-site, to include skylark, linnet and yellowhammer. Although skylark were scoped out during the updated 2016 surveys due to succession of the grassland fields (in 2014) to tall ruderal habitats (in 2016), making them unsuitable to ground nesting birds. Habitat for wintering fieldfare and meadow pipit also likely. Negligible impact on wintering birds.	assemblage.
Ap	Land at Candlet Road, Felixstowe	560	Appeal lodged: ref number: DC/15/1128/OUT	Cotswold Wildlife Surveys (2014) Preliminary Ecological Appraisal of land north of Candlet Road, Felixstowe, and Suffolk. The data search identified a "wide range of birds" including; Kingfisher, Skylark, Barn Owl, Marsh Harrier, Grey Partridge, Common Cuckoo and Turtle Dove. A total of eight species of birds were observed during the PEA, one of which was BoCC Amber listed Swallow. All others were BoCC green listed species. No breeding or wintering bird surveys were recommended due to sub-optimal habitats on-site (predominantly improved grassland grazed by horses and amenity grassland, although woodland, ponds and running water are also present). Nesting bird checks were advised prior to construction.	No likely effects on breeding or wintering birds. No likely cumulative effects in combination with the Proposed Development.
Ptd	Land at High Road, Trimley St Martin	69	Awaiting decision. Ref number: DC/16/1919/FUL	Basecology (2016) Preliminary Ecological Appraisal, Land at High Road, Trimley St Martin, Suffolk. The data search identified 460 records of 120 different	Potential for site level effects on breeding and wintering birds minus Shelduck. Potential cumulative effects in relation to

Ref	Site Name/Location	Total number of units*	Status	Ecology Reports and Assessments Listed on Planning Portal and Development Plan Documents	Cumulative Effect
				species within 1km of site. 41 notable birds were recorded. Short-term, reversible, negative impacts are predicted on farmland birds (could include Skylark, Fieldfare, Meadow pipit, Song Thrush and Linnet) without mitigation. Proposed mitigation (sensitive vegetation removal, appropriate lighting and replacement of lost habitats) was predicted to reduce these effects (Basecology, 2016).	breeding and wintering birds excluding shelduck in combination with the Proposed Development.
Ptd	Land South of Main Road, Martlesham	180	Application permitted. Ref number: C/10/1906	Permitted development with limited information available. No breeding and wintering bird surveys undertaken.	Insufficient data to assess cumulative impacts, however considered unlikely.
Ptd	Western Part of Land at Trinity Park and Land at White House Farm, Felixstowe Road, Purdis Farm	Not specified	Application permitted. Ref number: C/12/1930	Insufficient data available, however habitats on-site unsuitable for breeding or wintering assemblages of relevant species.	Insufficient data to assess cumulative impacts, however considered unlikely.
Pre-application	Melton Hill – Former SCDC Council Offices	102	Pre-application	Insufficient data available, however habitats on-site unsuitable for breeding or wintering assemblages of relevant species.	Insufficient data to assess cumulative impacts, however considered unlikely.
PA	Northern quadrant at Adastral Park	Commercial	Pre-application	No habitats suitable for breeding or wintering assemblages of relevant species.	No likely effects on breeding or wintering birds. No likely cumulative effects in combination with the Proposed Development.
PA	Land North of High Street, Walton, Felixstowe	400	Pre-application FPP4	No reports available. Site contains arable farmland but is part of the rifle club which diminishes is suitability for breeding and / or wintering birds.	No likely effects on breeding or wintering birds. No likely cumulative effects in combination with the Proposed Development.

Ref	Site Name/Location	Total number of units*	Status	Ecology Reports and Assessments Listed on Planning Portal and Development Plan Documents	Cumulative Effect
PA	Land North of Conway Close and Swallow Close, Felixstowe	150	Pre-application FPP5	No reports available. One of two arable fields already permitted (DC/13/3069/OUT). Ecology surveys for permitted field (Phase 1 Habitat Survey (2011) and Habitats Regulations Assessment (2013) both SES Ltd.) assessed no breeding or wintering habitat for significant populations of BoCC.	No likely effects on breeding or wintering birds. No likely cumulative effects in combination with the Proposed Development.
PA	Land opposite Hand in Hand Public House, Trimley St Martin	70	Pre-application FPP6	No reports available. Small (2.25ha) area of larger arable field allocated for residential development. Possible habitat present for breeding and wintering assemblages of relevant species. Site over 6km from the Proposed Development.	Possible Site level minor negative effects on breeding and wintering assemblages of relevant species excluding shelduck. Possible cumulative effects with the Proposed Development on breeding and wintering assemblages of relevant species.
PA	Land off Howlett Way, Trimley St Martin	360	Pre-application FPP7	No reports available. 10ha of arable field allocated for residential development. Possible habitat present for breeding and wintering assemblages of relevant species. Site over 6km from the Proposed Development.	Possible minor negative effects on breeding and wintering breeding and wintering assemblages of relevant species excluding shelduck. Possible cumulative effects with the Proposed Development on breeding and wintering assemblages of relevant species minus shelduck.
Ptd	Land South of Thurmans Lane, Trimley St Mary	98	Application permitted DC/16/1107/FUL	4.5ha of arable field allocated for residential development. The site assessment highlighted that the survey	No likely effects on breeding / wintering birds.

Ref	Site Name/Location	Total number of units*	Status	Ecology Reports and Assessments Listed on Planning Portal and Development Plan Documents	Cumulative Effect
				area is an intensive arable agricultural field with associated pesticide and inorganic fertilisers. There is no field margin or boundary habitat feature of conservation value. Bounded by Residential development on 3 sides. No likely impacts on farmland birds concluded. Site over 6km from the Proposed Development.	No likely cumulative effects in combination with the Proposed Development.
PA	North Ipswich Garden Suburbs	1100 + commercial	16/00608/OUT	Aspect (2016) Environmental Statement: Chapter 9, Ecology. Positive effect on breeding birds.	No likely effects on breeding / wintering birds. No likely cumulative effects in combination with the Proposed Development.
PA	Land opposite the Sorrel Horse, The Street, SHOTTISHAM	10	Pre-application SSP15	0.42ha scrub and grassland. Approximately 5km from the site.	No likely effects on breeding or wintering birds due to size and composition of site. No likely cumulative effects in combination with the Proposed Development.
PA	Ransomes, Nacton Heath	Employment provision	Pre-application SSP20	30ha arable land and lorry park at far end of industrial units, between A14 and A1156. No hedgerows / tree lines, just arable fields. On-site, there is likely habitat present for breeding and wintering bird assemblage excluding shelduck. Approximately 5km from the site.	Possible site level effects on breeding and wintering birds excluding shelduck. Possible cumulative effects in relation to breeding and wintering birds excluding shelduck in combination with the Proposed Development.

Key:

* Units to be delivered within the plan period

Ap Appeal Sites

PA Proposed Allocations

Ptd Sites approved or awaiting legal agreement

Cumulative impacts assessed on:

Suffolk Coastal District Council (2016) *Site Allocations and Area Specific Policies: Proposed Submission Document. Development Plan Document April 2016.*

Suffolk Coastal District Council (2016) *Felixstowe Peninsula Area Action Plan: Proposed Submission Document. Development Plan Document April 2016.*

And Sites on the Suffolk Coastal District Planning Portal as set out by the Planning Officer.

8.8 Summary of effects

8.8.1 The Proposed Development at land to the south and east of Adastral Park has been carefully designed to retain areas of relatively high ecological value, with a range of mitigation and enhancement measures provided for the construction and operational phases of the development to ensure no net loss of biodiversity.

8.8.2 The creation of a network of SANGS that will include heathland, wildflower meadows, grasslands and aquatic habitat will recreate/improve habitats of value for notable species of conservation concern. Creation and management of these habitats will be guided by an Ecological Mitigation and Management Plan to ensure net benefits for biodiversity in line with national and local planning policy. Table 8.17 provides a summary of effects, mitigation and residual effects.

8.8.3 The overall residual effect on biodiversity is considered to be **neutral / minor positive**.

Table 8.17 Summary of effects

No.	Receptor	Importance	Summary Mitigation Measures for Significant Impacts	Residual Effect after Cumulative Effects (importance)
1	European sites	International	Provision of 25.1 ha of SANGS. Financial contribution to offsite mitigation through RAMS	Neutral
2	SSSI	National	Creation and enhancement of retained habitats on-site to provide habitats of higher quality for birds (notably nightingale) from Newbourn Springs SSSI and in step with the development, in line with policy SP2	Neutral
3	CWS	County	Fencing and safe chemical storage to prevent physical damage to adjacent Martlesham Soakaway Acid Grassland CWS CEMP to prevent pollution effects on all 14 CWS in the locality Recreation impacts only anticipated on Martlesham Soakaway Acid Grassland i.e. through recreation, trampling, picking and dog/cat fouling to be prevented through fencing and interpretation boards	Neutral
4	Habitats	Up to District	Habitat creation and enhancement An ecological management plan will ensure the long-term perpetuity of these habitats	Neutral

No.	Receptor	Importance	Summary Mitigation Measures for Significant Impacts	Residual Effect after Cumulative Effects (importance)
5	Rare and Notable Plants	Up to District	Recreate habitat for rare / notable plants within retained / enhanced habitat Translocate individuals An ecological management plan will ensure the long-term perpetuity of these species Eradicate Japanese Knotweed	Neutral
6a	Bats – Roosting	Up to County	Natural England EPSL obtained and compensatory roosts created Sensitive lighting scheme to be implemented Installation of bat boxes throughout scheme	Minor positive (County)
6b	Bats – Activity	Up to County	Creation of new habitats, enhancements of retained habitats, bat friendly planting scheme and an ecological management plan implemented to ensure the long-term perpetuity of the bat assemblage Sensitive lighting scheme employed throughout site	Neutral
7	Otter	Site	Reduced speed levels, lighting levels and retained green corridors in and around site	Neutral
8	Amphibians	Site	Sensitive habitat clearance along northern / eastern boundaries for common toad	Neutral
9	Birds	Up to District	Management plan to recreate heathland, enhance woodland and scrub, and sensitively manage grassland Creation of new and replacement habitat and nesting opportunities/features including sand martin bank Creation and maintenance of low impact, disturbance-free zones	Minor negative (Local): Breeding Skylark Minor negative (Local): Wintering skylark, linnet, fieldfare, dunnock, meadow pipit and song thrush Minor negative (Local): Breeding shelduck Neutral: all other species and breeding and wintering assemblages (Local)
10	Badgers	Site	Natural England licence obtained to close active setts Foraging habitats retained and enhanced around boundaries, woodland and new heathland Fragmentation minimised through reduced speed levels, low lighting levels and retained green	Neutral

No.	Receptor	Importance	Summary Mitigation Measures for Significant Impacts	Residual Effect after Cumulative Effects (importance)
			corridors	
11	Invertebrates	County	Management plan to create open grassland habitats with extensive structural and physical variety, with on-going management to maintain early seral habitat conditions	Minor positive (County)
12	Reptiles	Local	Translocation of individuals from reptile areas to receptor site Enhancement of SANGS areas for reptiles Landscaping scheme of benefit to wildlife outside of SANGS areas Ecological management plan for newly created habitats and receptor site	Minor positive (Local)
13	Small and Medium-sized Mammals	Local	Sensitive lighting scheme and reduced speed levels across site Connectivity through newly created gardens through cut-outs in fences etc. Ecological management plan for newly created habitats to ensure sensitive vegetation removal to avoid hedgehog hibernating period	Moderate positive (Local)

8.9 References

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9 FLOOD RISK AND DRAINAGE

9.1 Introduction

9.1.1 This chapter has been prepared by Brookbanks Consulting and considers the effects of the Proposed Development on flood risk, surface water drainage and foul water infrastructure, drawing on the findings of the site Flood Risk Assessment (FRA) contained as Appendix F of this Environmental Statement. The Chapter describes the policy context, baseline site situation with regards to hydrology, hydrogeology, water quality, surface water and foul water drainage at the site prior to development.

9.1.2 The assessment also considers the potential effects of both the construction and operational stages of the development and identifies both the risks and associated mitigation requirements.

9.1.3 The following sections will outline the baseline and proposed site conditions and seek to provide confirmation of the appropriateness of the site for the nature of development proposed in accordance with local and national guidance.

9.2 Scope

9.2.1 Baseline conditions at the site relating to hydrology, hydrogeology, flood risk and drainage have been established using both published information and detailed site investigations.

9.2.2 The scope of potentially significant effects included within the assessment is outlined below:

- Impact on the floodplain on the proposal in terms of the location of built development;
- The potential for flood compensation measures if any infrastructure or water related development is constructed;
- A surface water drainage strategy to minimise impacts on the watercourses and hydrology in the area; and
- Potential for contamination of nearby watercourses during the course of the construction work.

9.3 Consultation undertaken

9.3.1 Consultation with the Environment Agency, Suffolk County Council, Suffolk Coastal District Council and Anglian Water has been undertaken to understand the relevant flood risk and drainage hydrology issues relating to the site and the potential wider catchment area. The general principles and inclusion of technical evidence which structures the Flood Risk Assessment was agreed with Suffolk County Council Drainage Officers, acting as the Lead Local Flood Authority.

9.4 Statutory and planning context

9.4.1 The assessment will be carried out with due regard to the following guidance:

- National Planning Policy Framework (NPPF), 2012;
- Planning Practice Guidance (PPG), 2014; and
- Suffolk Coastal and Waveney District Councils - Strategic Flood Risk Assessment and Local Plan (SFRA).

9.5 Existing environment

9.5.1 The site lies entirely within Flood Zone 1. This area is defined as being at little or no flood risk with a 1 in 1000 annual probability (0.1% chance) or less of flooding from rivers or the sea in any one year.

9.5.2 In line with the SFRA, a site specific assessment of other potential flooding mechanisms by site inspection, historical data provided within the level 1 SFRA and Anglian water records shows the land to have a low probability of flooding from overland flow, ground water and sewer flooding.

9.5.3 The key receptors at the site have been defined through the completion of the detailed assessment work within the Flood Risk Assessment.

9.5.4 Reference to the published mapping along with information obtained from site inspections identifies the presence of an unknown watercourse running along the northern boundary of the study area. The unknown watercourse originates some 1km north of the application-site, passing through mostly undeveloped land and flowing in a south easterly direction before mostly discharging into an existing pond within the development area. The Unknown watercourse can be seen to continue its course, running southwards and is culverted under Ipswich road before joining a tributary of the Mill River.

9.5.5 A copy of the Anglian Water sewerage network records has been obtained to confirm the presence of adopted foul sewers located in the BT Adastral Park, A12 Road Corridor and residential areas surrounding the site.

9.5.6 Anglian Water have prepared a detailed hydraulic modelling report which confirms that foul water connection is possible into the existing sewer assets adjacent to the site on the A12 Road Corridor.

9.6 Predicted impacts

Construction – Alteration of the Drainage Regime

9.6.1 It is anticipated that the construction and operation of the Proposed Development will result in negligible impact in terms of hydrology and hydrogeology as surface water and foul water will be effectively managed and controlled.

9.6.2 Construction activities, such as topsoil stripping within the existing open space areas will result in soil compaction and ultimately more water run-off into any nearby watercourses. This may increase the volume and the rate of surface run off. This may result in temporary pooling of water.

9.6.3 Due to the permeable nature and topography of the site, it is judged that storm water runoff would not occur from the site to any nearby watercourses. The sensitivity of the watercourses within the application-site is considered to be low and the magnitude of change, prior to mitigation, is predicted to be low.

Construction – Potential Contamination of Water Resources

9.6.4 The operation of construction vehicles and general construction activities can potentially give rise to the contamination of surface water run off from the site by pollutants such as hydrocarbons, suspended solids and construction materials. This may lead to deterioration of surface water quality.

9.6.5 The sensitivity of nearby watercourses which could be affected is considered to be low and the magnitude of change prior to mitigation is considered to be low. Therefore there is likely to be a short term low adverse effect prior to the implementation of mitigation.

9.6.6 It is anticipated that the development will necessitate earthworks comprising of shallow to deep excavations to construct building foundations, sewers and utility trenches. These excavations may lead to deterioration of ground water quality as direct pathways to the groundwater could occur.

9.6.7 As there is no defined Source Protection Zone at this site, the sensitivity of groundwater on-site is considered to be low and the magnitude of change prior to mitigation is considered to be low. Therefore there is likely to be no adverse significance prior to the implementation of mitigation.

Operation – Alteration to the drainage regime

9.6.8 It is the intention to mimic the existing natural drainage regime within the site. The built development catchments on-site will increase the volume and rates of run off directly to the nearby watercourse and ditches Prior to mitigation, due to the topography and existing pond within the application-site the increase in surface water run-off is not expected to cause both on-site ponding or downstream flooding.

Operation – Foul Drainage

9.6.9 It is the intention to install a foul drainage sewer system on-site to collect and discharge the foul water generated by the development. If mitigation is not implemented then there would be a direct, permanent, long term major adverse significant effect.

9.7 Mitigation

Construction – Alteration of the Drainage Regime

9.7.1 To prevent localised flooding associated with extreme rainfall events during the construction phase a temporary localised run-off management system will be employed by the contractor to attenuate flows for and up to a 100 years plus climate change storm event. This will comprise temporary surface water run off facilities such as storage tanks, ditches or ponds and provide on-site attenuation for surface water flows and thereby reducing flood risk.

Construction – Potential Contamination of Water Resources

9.7.2 The Principal Contractor appointed to manage and control all construction activities, including management of water resources and the storage of fuel and chemicals will put a Construction Environmental Management Plan (CEMP) for the site in place. The CEMP will detail the procedures and methods that must be followed to minimise the potential environmental effects of construction activities at the site.

9.7.3 The CEMP will describe the procedure if there is an environmental emergency, such as a fuel or chemical spillage on the site. All contractors and personnel will be briefed on this procedure before construction work commences.

9.7.4 The CEMP would stipulate:

- All construction works would be designed in accordance with the latest relevant EA guidelines and the ADAS Technical Note on Workmanship and Materials for Drainage Schemes (1995);
- Method statements would be agreed with the EA to ensure compliance with PPG prior to the commencement of construction works to ensure that surface runoff quality is managed during the construction process;
- Contractors undertaking earthworks would develop risk assessments and method statements covering all aspects of their work that have the potential to cause physical damage to structures (e.g. water supply and sewerage infrastructure), mobilise large quantities of soil/sediments or block open watercourses. Earth moving operations would be undertaken in accordance with BS 6031: 2009 Code of Practice for Earthworks;
- Works affecting soils would follow MAFF's Good Practice Guide for Handling Soils (2000) which provides comprehensive advice on soil handling including stripping, soil stockpiling and reinstatement;
- Works would comply with DEFRA guidance in the Construction Code of Practice for the Sustainable Use of Soils on Construction-sites (2009) which provides guidance on the use, management and movement of soil on-site. This action should prevent the mobilisation of sediment and prevent pollution of watercourses;
- Good practice guidance on erosion and pollution control would be followed, e.g. CIRIA Environmental Good Practice on-site (C650) and Control of Water Pollution from Construction-sites (C532);
- The principal contractor would avoid the storage of plant, machinery fuel or materials (including soil stockpiles) alongside watercourses unless unavoidable. Construction works should be programmed as far as is practicable to minimise soil handling and temporary soil storage; and
- The refuelling of plant, storage of fuels and chemicals and overnight storage of mobile plant would be within the designated contractor's compound areas. The compounds would contain appropriate facilities for the storage of fuels and chemicals i.e. bunded and locked storage containers, and would also be equipped with spill kits.

Operation – Alteration to the drainage regime

9.7.5 To minimise the potential adverse environmental effects on Flood Risk and Drainage related matters, the following specific measures are being incorporated into the Proposed Development:

- Compliance with guidance in terms of flood routing and resilience for new developments;
- Provision of a storm water SuDS management system ;
- Connection to a point of adequacy on the foul water drainage network; and
- Provision of ongoing maintenance for SuDS features, ordinary watercourse and existing artificial water bodies.

9.7.6 The Proposed Development has been designed to avoid significant adverse effects resulting during post construction phase operation. Particular design measures are also described in further detail below.

9.7.7 One of the key principles of Sustainable Drainage Systems (SuDS) is that the management of flows should be as close as reasonable practicable to the baseline conditions and their location as close as possible to the source.

9.7.8 Guidance published in CIRIA C522, SuDS Design Manual for England & Wales, recommends that surface waters from development being primarily of a residential nature have at least one stage of treatment through an appropriately sized sustainable drainage feature. Similarly, at least one treatment stage should be provided on a non-trunk road. Two levels of treatment are recommended for higher risk commercial and industrial areas.

9.7.9 In any higher polluting areas, two stages of treatment will be employed by implementing a management train approach of pre-treatment prior to discharge to the underlying strata.

9.7.10 Recently published research and procedures, outlined in CIRIA C609, shows that the incorporation of a treatment train as part of a sustainable urban drainage system provides the most effective method of removing polluting materials from surface water. Removal of between 80 - 95% of the suspended solids, heavy metals and oils can be achieved. Corresponding reductions in Chemical Oxygen Demand (COD) and Biological Oxygen Demand (BOD) can also be achieved.

9.7.11 The Flood Risk Assessment (FRA) outlines a proposed storm water management system providing a SuDS management train, incorporating source control measures and infiltration drainage systems.

9.7.12 The SuDS scheme will incorporate permeable paving (where applicable), plot soakaways and infiltration basins. These form part of the development's Green Infrastructure framework providing both a drainage and ecological function.

9.7.13 The drainage proposals contained within the FRA demonstrate compliance with current guidance by providing appropriate sustainable drainage features that passively treat storm water from the site ensuring no deterioration in water quality.

9.7.14 In areas where source control and plot soakaways are not implemented, the surface water run-off from all hardstanding areas will be collected in a piped drainage system and conveyed via gravity through the internal road network before outfalling to the proposed infiltration basins on the southern boundary of the proposed site.

9.7.15 By introducing Sustainable Drainage measures, the design takes account of the potential accelerated run-off and reduced times of concentration associated with hard paved areas to avoid increasing peak storm water discharge and consequential flood risk.

9.7.16 The outline SuDS scheme has had regard to sustainable methods that are readily accepted for adoption by the relevant authorities in discharging their maintenance responsibilities. The SuDS system will be maintained by way of an appropriate management scheme operated by the Local Authority or private management company. The below ground drainage system will be adopted and maintained by the drainage authority, Southern Water. Maintenance will ensure that the storm water management

system remains functional for the lifetime of the Proposed Development and protect the catchment from increased flood risk.

9.7.17 When assessing potential effects of the foul drainage, it is important that the proposed system is designed to convey foul waters safely from the site to a suitable treatment facility, without overloading the existing sewerage systems. Furthermore, it is also important that the treatment facility is designed to accommodate the load from the Proposed Development and that this achieves a discharge quality that does not impact on water quality standards in the receiving watercourse.

9.7.18 In the baseline condition, the Project does not benefit from a connection to the foul sewerage network. However, DETR Circular 3/99 and Building Regulations state that the first presumption when considering new development is to provide positive drainage from that development in conjunction with the local sewerage undertaker. Accordingly, Southern Water has been involved in investigating the impact of the Proposed Development on their existing sewerage infrastructure and treatment facilities.

9.7.19 Discussions with Anglian Water have identified the need for assessing the capacity of their existing network. The results of this assessment have confirmed that a suitable point of connection for the Proposed Development to discharge foul flows is situated adjacent to the site.

9.7.20 The implementation of an adoptable foul drainage network within the site coupled with the potential upgrading to the existing infrastructure network surrounding the site will ensure that the scheme has no adverse effect on the existing area.

9.8 Summary of effects

9.8.1 It is anticipated that the construction and operation of the Proposed Development will result in negligible impact in terms of hydrology and hydrogeology as surface water and foul water will be effectively managed and controlled.

9.8.2 A detailed Flood Risk Assessment in accordance with the NPPF and PPS25 has been undertaken for the proposed site and is set out in the Appendix F.

9.8.3 During the construction phase, mobilisation of construction materials and spillages will be controlled by implementation of controlled drainage, good site management and monitoring in the CEMP.

9.8.4 During operation a full drainage system will be installed to control surface water runoff.

9.8.5 During operation a full drainage system will be installed to control foul water collection and discharge.

10 GROUND CONDITIONS AND CONTAMINATION

10.1 Introduction

10.1.1 This Chapter has been prepared by Brookbanks Consulting and considers the effects of the Proposed Development on ground conditions and contamination, drawing on the findings of the site Geo-Environmental Phase 1 Desk Study contained as Appendix G1 of this Environmental Statement. This Chapter describes the policy context and baseline site situation with regards to geology, hydrogeology and contamination at the site prior to development.

10.1.2 The assessment considers the potential effects of both the construction and operational stages of the development and identifies both the risks and associated mitigation requirements.

10.1.3 The following sections will outline the baseline and proposed site conditions and seeks to provide confirmation of the appropriateness of the site for the nature of development proposed in accordance with local and national guidance.

10.2 Scope and methodology

Scope

10.2.1 Baseline conditions at the site relating to ground conditions and contamination have been established using both published information and detailed site investigations.

10.2.2 Published information has been obtained in the form of:

- BGS Published geology;
- Environment Agency Data;
- Envirocheck Site Investigation Report;
- Preliminary Unexploded Ordnance (UXO);
- Gov.UK; and
- Deben Estuary Partnership / Heaths AONB Unit / The River Deben Association.

10.2.3 Additional guidance documents which are applicable to this assessment include:

- Planning Practice Guidance (2014);
- National Planning Policy Framework (2012);
- Technical Guide to the National Planning Policy Framework (2012);
- CIRIA SP156 - Control of Water Pollution from Construction-sites (2002);
- Environmental Protection Act 1990: Part 2A: Contaminated Land, (2012);
- CIRIA C552 Contaminated Land Risk Assessment, A Guide to Good Practice, (2001);
- CIRIA C665 Assessing risks posed by hazardous ground gases to buildings, (2007); and
- CLR 11: Model Procedures for the Management of Contaminated Land.

10.2.4 Whilst now archived, in the absence of alternative 'good practice' guidance, it is recognised that the Environment Agency Pollution Prevention Guidance (PPG) notes still provide up to date and appropriate guidance for assessing contamination from proposed development.

10.2.5 The guidance documents used in the production of this ES Chapter include:

- PPG1: General Guidance to the Prevention of Pollution; and
- PPG6: Working at Construction and Demolition-sites.

10.3 Consultation undertaken

10.3.1 During the development of this Chapter, the following statutory bodies and interested parties have been consulted regarding the proposals:

- Environment Agency;
- Natural England;
- Suffolk County Council; and
- Suffolk Coastal District Council.

10.4 Statutory and planning context

National Planning Policy

10.4.1 The 'National Planning Policy Framework (NPPF) – Planning and Contaminated Land' sets out the policy background needed for considering development on land affected by contamination. It also provides an overview of the contaminated land regime in England, whilst setting out the roles and responsibilities of local authorities, developers/operators and the Environmental Agency. The document focuses on Part 2A of the Environmental Protection Act.

10.4.2 The NPPF identifies the roles of the Local Planning Authority ensuring that:

"The 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 proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation" and,

"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 presented ".

10.4.3 A comprehensive Geo-Environmental Phase 1 Desk Study has been prepared. The report is contained in Appendix G1.

10.4.4 In addition, a Phase II Stretaegic Geo-Environmental Assessment has been prepared by GEG which partially covers the Site and comprises of the quarried areas and former landfill site only. The report is contained in Appendix G2, with further details.

National Context: DEFRA: Environmental Protection Act 1990: Part 2A – Contaminated Land Statutory Guidance

10.4.5 Guidance has been published by DEFRA promotes the 'suitable for use approach'. The "suitable for use" approach focuses on the risks caused by land contamination. The approach recognises that the risks presented by any given level of contamination will vary greatly according to the use of the land and a wide range of other factors, such as the underlying geology of the site. Risks therefore need to be assessed on a site-by-site basis.

National Context: Planning Practice Guidance: Contaminated Land

10.4.6 The recently published Planning Practice Guidance identifies that contamination is most likely to arise in industrial locations and as part of any planning application, a geo-environmental appraisal should be carried out to ascertain the level of risk posed by the site and surrounding land uses past and present.

10.4.7 In terms of specifics, the guidance defers matters to the part 2A guidance discussed above.

10.5 Existing environment

10.5.1 The following paragraphs are based upon the findings of the Geo-Environmental Phase 1 Desk Study contained in Appendix G1.

Geology

10.5.2 With reference to the British Geological Survey map, the site is shown to be underlain (depth to be confirmed) by bedrock geology comprising sand from the Crag Formation, with areas of overlying superficial deposits.

10.5.3 There is no Artificial Ground/ Made Ground or Landslip areas reported on-site.

Radon

10.5.4 The site is shown to be within a low probability area affected by radon, where less than 1% of homes are above the action level, where no radon protective measures are necessary in the construction of new dwellings or extensions.

Mining

10.5.5 It is considered that the site is in an area that might have been affected by coal mining.

10.5.6 It is reported that there is No Hazard of the site being in a Non-Coal mining Area of Great Britain.

10.5.7 There are two active, opencast BGS Recorded Mineral Sites recorded within 1,000m of the site boundary, these are on-site and issued to Waldringfield Quarry. A further twenty-two ceased, mineral sites are recorded and outlined in Table 10.1:

Table 10.1 BGS Recorded Mineral Sites

BGS Recorded Mineral Sites				
Site Name - Location	**Commodity - Geology**	**Status**	**Distance (m)**	**Direction**
Waldringfield Quarry – Waldringfield	Sand & Gravel – Crag Group	Active	On-Site	East
Waldringfield Quarry – Waldringfield	Sand & Gravel – Kesgrave Formation	Active	On-Site	East
Black Heath Gravel Pit – Martlesham Heath	Sand & Gravel – Kesgrave Catchment Subgroup	Ceased	83	North
Oak Wood Pit – Martlesham Heath	Sand – Red Crag Formation	Ceased	85	South East
Martlesham Heath Gravel Pits – Martlesham Heath	Sand & Gravel – Kesgrave Catchment Subgroup	Ceased	190	North
Martlesham Heath Gravel Pits – Martlesham Heath	Sand & Gravel – Kesgrave Catchment Subgroup	Ceased	203	North West
Martlesham Heath Gravel Pits – Martlesham Heath	Sand & Gravel – Kesgrave Catchment Subgroup	Ceased	222	North West
Martlesham Heath Gravel Pits – Martlesham Heath	Sand & Gravel – Kesgrave Catchment Subgroup	Ceased	254	North West
Martlesham Heath Pit – Martlesham Heath	Sand & Gravel – Kesgrave Catchment Subgroup	Ceased	309	North West
The Folly Pit, Waldringfield	Sand & Gravel – Kesgrave Catchment Subgroup	Ceased	407	South
Oak Wood Pit – Martlesham Heath	Sand – Red Crag Formation	Ceased	412	South West
Oak Wood Pit – Martlesham Heath	Sand – Red Crag Formation	Ceased	415	South West
Brightwell Crag Pit – Brightwell	Sand & Gravel – Kesgrave Catchment Subgroup	Ceased	463	East
Alder Carr Pit – Woodbridge	Sand – Red Crag Formation	Ceased	727	South
Brightwell Hall Sand Pit – Brightwell	Sand – Red Crag Formation	Ceased	746	South
Brightwell Hall Sand Pit – Brightwell	Sand – Red Crag Formation	Ceased	750	South
Brightwell Hall Sand Pit – Brightwell	Sand – Red Crag Formation	Ceased	779	South East
Brightwell Hall Sand Pit – Brightwell	Sand – Red Crag Formation	Ceased	822	South
Alder Carr Pit – Woodbridge	Sand – Red Crag Formation	Ceased	895	South West

Mill Cottages Pit - Martlesham Heath	Sand & Gravel – Lowestoft Formation	Ceased	896	North West
Alder Carr Pit – Woodbridge	Sand – Red Crag Formation	Ceased	924	South
Foxhall Quarry – Brightwell	Sand– Kesgrave Formation Subgroup	Ceased	952	South West
Foxhall Quarry – Brightwell	Sand –Crag Group	Ceased	952	South West
Brightwell Pit – Brightwell	Sand – Red Crag Formation	Ceased	975	South West

Hydrology & Hydrogeology

10.5.8 The EA mapping shows that the site lies within Flood Zone 1; being an area of Low Probability of flooding, outside both the 1 in 100 (1% AEP) and 1 in 1,000 (0.1% AEP) year flood events.

10.5.9 Further details on hydrology and flooding are outlined within the Flood Risk Assessment (Appendix F) and within the Flood Risk chapter (Chapter 9) in the Environmental Statement.

10.5.1 According to the Environment Agency the underlying solid geology (sand) forms a Principal Aquifer, with the on-site superficial deposits forming a Secondary A Aquifer.

10.5.2 In terms of groundwater vulnerability the underlying geology forms a Minor Aquifer, with soils of high leaching potential.

Historic Land Uses

10.5.3 In appraising the site history, published Ordnance Survey maps have been reviewed dating from 1884 up to the present day. A selection of large and small scale maps used in this report are contained within the Appendix G1.

10.5.4 Inspection of the maps has revealed that the site, located in the rural area of Martlesham Heath, is shown to have initially comprised undeveloped Greenfield heath land. A small woodland area was shown in the centre, part of the 'Swale Plantation', and a number of footpaths are shown to cross the site.

10.5.5 The following historical on-site activities are shown over the years:

Table 10.2 On-Site Historical Site Uses

On-Site Historical Site Uses			
Site Use / Activity	**Date first shown**	**Date last Shown**	**Direction**
Sand Pit (Waldringfield Quarry)	1957	Still Present	Centre
Sewage Works with associated filter beds and tanks	1965	1986	West
Small Buildings	1965	Still Present	South West
Tank	1986	1986	Centre
Building (Helipad)	1994 (1999)	Still Present	North East

Ponds (former Sand Pits)	1996	Still Present	Centre
Tower	2016	Still Present	West

10.5.6 As listed above in Table 10.2, the land is shown to have been largely worked for its minerals from around 1957. As a result, there are a number of ponds (former sand pits) shown in the centre of the site by 1996. Additional tracks and paths are shown to cross the site from the early 70s. An unspecified tank is shown adjacent to the sand pit at Waldringfield Quarry but is only shown on the 1986 map.

10.5.7 A Sewage Works with associated filter beds and tanks are shown in the west of the site (south of Adastral Park) in 1965, however by 1986 these are no longer shown. This may potentially have been associated with the now disused Martlesham Heath Airfield (potential extension of the runway).

10.5.8 A number of small buildings are shown in 1965 to the present day, within the south western corner of the site. Another building is shown in the north east of the site on the 1994 map which includes an access road and a Helipad by 1994. A tower is also shown in the west of the site, off the existing tracks by 'The Swale'.

10.5.9 The historical off-site activities are detailed in Table 10.3 in order of distance from the site boundary:

Table 10.3 Off-Site Historical Site Uses

Off-Site Historical Site Uses				
Site Use / Activity	**Date first shown**	**Date last Shown**	**Distance (m)**	**Direction**
Number of small Buildings (later shown as Sheep Drift Farm by 1965)	1957	Still Present	Adjacent	South
Number of large buildings which include two Works (now part of Adastral Park) and a reservoir	1965	Still Present	Adjacent	West
Potential extension of Martlesham Heath Airfield runway (disused)	1971	Still Present	Adjacent	West
Post Office Research Centre, BT Research Laboratories, Factory with a number of small electrical Sub Stations spaced around (Adastral Park)	1979	2006 (Still Present)	Adjacent	North West
A1093/ A12 (Trunk road)	1979/ 1980	Still Present	Adjacent	West
Piggeries (shown as Seven Acres Farm in 2000 and by 2016 as Seven Acres Business Park)	1986 (2000 / 2016)	1994 (2006 / Still Present)	Adjacent	East
Caravan Park (now the Moon & Sixpence Holiday Park)	1993	Still Present	Adjacent	North East
Gravel Pit ('Old Pits')	1884	(1905)	175	West
Falcon Trailer Park	1971	Still Present	225	North
Clothing Factory, Printing Works, works	1985	1986	250	West

Off-Site Historical Site Uses				
Golf Course	1994	Still Present	250	South East
Sand Pits	1884, 1993	1904,1904 & 2000	250, 400 & 750	South West
Warehouses	1971	2000	400	North West
Large Sand & Gravel Pit with a depot, parts of which are shown as disused workings (later shown as a landfill site).	1980	Still Present	800	South West
'Martlesham Heath Airfield' (disused)	1971	1927	800	West
'Civic Amenity Site', by 2016 shown as a 'Recycling Centre'	2000	Still Present	1000	South West

10.5.10 The surrounding rural area is shown to include a number of potentially historic and current contaminative land uses within 1km of the site boundary. These mainly include: a number of sand and gravel pits; industrial uses such as works, depots and factories; a piggery; former RAF Airfield and a commercial area which included small substations and a research laboratory/ research centre (now Adastral Park). Some of these uses are shown to have since been developed over or are no longer in operation.

10.5.11 The residential areas of Martlesham Heath, Waldringfield and Newbourne are shown to have expanded (notably in the 70s and 80s), along with associated road infrastructure such as the A12 trunk road and local amenities.

10.5.12 Potentially significant contaminative land uses identified on-site include: agricultural, mineral extraction work, former sewage works, unspecified tank, small buildings and tower.

Contamination

10.5.13 There are eight Integrated Pollution Prevention and Control permits recorded within 1,000m of the site boundary which are further detailed in Table 10.4. A permit for Waldringfield Quarry, dated 31/03/2008, is shown for waste landfilling on-site by Brett Aggregates Ltd, however the permit has been revoked.

Table 10.4 Integrated Pollution Prevention and Control Permits

Integrated Pollution Prevention and Control Permits					
Property Type – Location	**Activity**	**Permit Status**	**Permit Start Date**	**Distance (m)**	**Direction**
Brett Aggregates Ltd, Waldringfield Quarry - Brightwell	Waste Landfilling; any other landfill to which the 2002 Landfill Regulations apply	Revoked	31/03/2008	On-Site	North East
Novera Energy Generation, Foxhall Generation Plant - Brightwell	Combustion; waste derived fuel greater or equal to 3Mw but less than 50Mw	Superseded by Variation	06/11/2006	985	West

Integrated Pollution Prevention and Control Permits					
Viridor Waste Management Ltd, Foxhall Landfill Site - Brightwell	Waste Landfilling; greater than 10 T/D with capacity greater than 25,000T excluding inert waste.	Effective	23/12/2014	994	West
Viridor Waste Management Ltd, Foxhall Landfill Site - Brightwell	Waste Landfilling; greater than 10 T/D with capacity greater than 25,000T excluding inert waste.	Superseded by Variation	28/02/2014	994	West
Viridor Waste Management Ltd, Foxhall Landfill Site - Brightwell	Waste Landfilling; greater than 10 T/D with capacity greater than 25,000T excluding inert waste.	Superseded by Variation	21/03/2012	994	West
Viridor Waste Management Ltd, Foxhall Landfill Site - Brightwell	Combustion; waste derived fuel greater or equal to 3Mw but less than 50Mw	Superseded by Variation	07/06/2010	994	West
Viridor Waste Management Ltd, Foxhall Landfill Site - Brightwell	Waste Landfilling; greater than 10 T/D with capacity greater than 25,000T excluding inert waste.	Superseded by Variation	15/05/2009	994	West
Viridor Waste Management Ltd, Foxhall Landfill Site - Brightwell	Waste Landfilling; greater than 10 T/D with capacity greater than 25,000T excluding inert waste.	Superseded by Variation	14/07/2005	994	West

10.5.14 There are thirteen Local Authority Pollution Prevention and Controls (from Suffolk Coastal District Council, Environmental Health Department) recorded within 1,000m of the site boundary. Four permits are recorded on-site (one permitted and three revoked), these are further detailed in Table 10.5 along with the other nine permits:

Table 10.5 Local Authority Pollution Prevention and Controls

Local Authority Pollution Prevention and Controls					
Property Type – Location	**Activity**	**Permit Status**	**Permit Start Date**	**Distance (m)**	**Direction**
Brett Concrete Ltd, Waldringfield Quarry - Brightwell	PG3/1 Blending, packing, loading and use of bulk cement.	Permitted	03/07/2003	On-Site	North East
Widing Readymix Ltd - Brightwell	PG3/16 Mobile screening and crushing processes	Revoked	29/07/2002	On-Site	North East

Local Authority Pollution Prevention and Controls					
Wilding & Smith Ltd - Brightwell	PG6/34 Respraying of road vehicles	Revoked	30/09/1993	On-Site	North East
Wilding & Smith Ltd - Brightwell	PG3/8 Quarry processes including roadstone plants and the size reduction of bricks, tiles and concrete.	Application Withdrawn	Not Supplied	On-Site	North East
DT Engineering Ltd, Seven Acres Farm – Waldringfield	PG1/1 Waste oil burners, less than 0.4MW net rated thermal input	Authorised	Not Supplied	119	North West
Clarkes Demolition Ltd, Chapel Works - Waldringfield	PG3/16 Mobile screening and crushing processes	Permitted	06/02/2013	159	North
Clarkes Demolition Ltd, Chapel Works - Waldringfield	PG3/16 Mobile screening and crushing processes	Revoked	22/06/1999	189	North
Eurovia Roadstone, Foxhall Four Quarry - Brightwell	PG3/15 Mineral dying and roadstone coating processes	Permitted	26/05/1992	665	South West
Brett Concrete Ltd, Foxhall Four Quarry - Brightwell	PG3/1 Blending, packing, loading and use of bulk cement	Revoked	01/11/1994	811	South West
Ipswich Body Repair Centre – Martlesham Industrial Estate	PG6/34 Respraying of road vehicles	Revoked	17/02/1997	629	West
Nationwide Crash Repair Centres Ltd – Martlesham Industrial Estate	PG6/34 Respraying of road vehicles	Permitted	30/07/2004	689	West
Tesco Petrol Station – Anson Road, Martlesham	PG1/14 Petrol Filling Station	Permitted	06/09/1999	824	West
Martlesham Heath Services – Anson Road, Martlesham	PG1/14 Petrol Filling Station	Authorised	06/09/1999	895	West

10.5.15 There is one Pollution Incident to Controlled Water recorded within 1,000m of the site boundary. The incident, classed as a Category 3 – Minor Incident, occurred in the north-west of the site on 26th January 1994. It involved the accidental spillage/ leakage of oils into Mill River.

10.5.16 None of the following have been recorded within 1,000m of the site boundary:

- Contaminated Land Register Entries and Notices;
- Enforcement and Prohibition Notices;
- Integrated Pollution Controls;
- Local Authority Integrated Pollution Prevention and Control;

- Local Authority Pollution Prevention and Control Enforcement;
- Prosecutions Relating to Authorised Processes;
- Prosecutions Relating to Controlled Waters;
- Registered Radioactive Substances;
- Substantiated Pollution Incident Register; and
- Water Industry Act Referrals.

Hazardous Substances

10.5.17 There are no records of the following Hazardous Substances on or within a 1,000m radius of the site boundary:

- Control of Major Accident Hazards Sites (COMAH);
- Explosive Sites;
- Notification of Installations Handling Hazardous Substances (NIHHS);
- Planning Hazardous Substance Consents; and
- Planning Hazardous Substance Enforcements.

10.5.18 There are one hundred and eleven Contemporary Trade Directory Entries recorded within 1,000m of the site boundary, of which thirty seven are recorded as 'Active'.

10.5.19 Two 'inactive' trade directory entries are recorded on-site (in the north-east), both of which were issued to Brett Aggregates Ltd for the extraction of 'Sand, Gravel and Other Aggregates'.

10.5.20 There are twenty four Trade Directory Entries identified between 0m and 250m from the site boundary, eight of which are listed as 'Active'. These are further detailed in Table 10.6:

Table 10.6 Contemporary Trade Directory Entries Located between 0 and 250m

Contemporary Trade Directory Entries Located between 0 and 250m				
Name - Location	**Classification**	**Status**	**Distance (m)**	**Direction**
Waldringfield Reproductions Ltd – Lower Flat, Waldringfield	French Polishing	Inactive	15	North West
Booth Tarmacadam – Woodbridge	Asphalt & Coated Macadam Laying Contractors	Active	27	North West
B & M Car Body Centre – Unit 3 Seven Acres Business Park, Woodbridge	Car Body Repairs	Inactive	31	North West
Goodwoodz – Unit 14c Seven Acres Business Park, Woodbridge	Furniture Manufacturers – Home & Office	Inactive	51	North West
Brett Aggregates Ltd – Sheep Drift Farm, Brightwell	Sand, Aggregates & Other Aggregates	Active	42	North East

Contemporary Trade Directory Entries Located between 0 and 250m				
Image Autosales Ltd – Martlesham Heath	Car Dealers - Used	Inactive	57	North West
Ipswich Packaging Services – Sheep Drift Farm, Brightwell	Packaging Materials Manufacturers & Suppliers	Active	76	East
Haven Trailaway – Unit 17a Seven Acres Business Park, Woodbridge	Trailers & Towing Equipment	Inactive	76	North
G. Driver Caravans Ltd – Unit 11b, Brightwell	Caravans – Servicing & Repairs	Inactive	89	South East
Brett Aggregates Ltd – Brightwell	Concrete & Mortar Ready Mixed	Active	89	South East
A W Smart Repairs – Unit 12a Seven Acres Business Park, Woodbridge	Car Painters & Sprayers	Active	92	North West
P Blasting Services – Brightwell	Blast Cleaning	Inactive	102	South East
P Blasting Services – Sheep Drift Farm, Brightwell	Blast Cleaning	Inactive	110	South East
Stromberg Carburetor – Unit 15a Seven Acres Business Park, Woodbridge	Fuel Injection Services	Active	110	North West
Mark Cutting Services Ltd – Unit 10 Seven Acres Business Park, Woodbridge	Fork Lift Trucks	Active	112	North West
Hangar 111– Unit 8b Seven Acres Business Park, Woodbridge	Car Dealers	Active	114	North West
Suffolk – Unit 10 Seven Acres Business Park, Woodbridge	Cabinet Makers	Inactive	119	North West
Haven Trailaway – Unit 17a Seven Acres Business Park, Woodbridge	Trailers & Towing Equipment	Inactive	139	North West
Pevex Enterprises Ltd – Woodbridge	Fireplaces & Mantelpieces	Inactive	135	North
Newbourne Cars - Woodbridge	Car Body Repairs	Inactive	154	North West
B & M Car Body Centre – Unit 3 Seven Acres Business Park, Woodbridge	Car Body Repairs	Active	164	North West
Suffolk Foods Ltd – Martlesham Heath	Food Products – Manufactures	Inactive	234	South
Cargo World Logistics – Martlesham Heath	Freight Forwarders	Inactive	234	South

Contemporary Trade Directory Entries Located between 0 and 250m				
First4 Cargo Handling Ltd – Martlesham Heath	Cargo Handling Services	Inactive	234	South

10.5.21 The following remaining Trade Directory Entries are located between 250m and 1,000m from the site boundary, and these are listed in Table 10.7.

Table 10.7 Contemporary Trade Directory Entries Located between 250 and 1000m

Contemporary Trade Directory Entries Located between 250 and 1000m	
Active	**Inactive**
Commercial Vehicle Dealers	Asphalt & Coated Macadam Laying Contractors x2
Cleaning Materials & Equipment	Road Haulage Services x4
Icecream Manufacturers & Suppliers	Freight Forwarders x3
Car Breakdown & Recovery Services	Car Dealers – Used
Boilers – Servicing, Replacements & Repairs	Garage Services x2
Scientific Apparatus & Instruments	Waste Disposal Services x2
Joinery Manufacturers	Ventilators & Ventilation Systems
Freight Forwarders	Water Coolers
Tyre Dealers	Car Body Repairs x5
Garage Services	Electric Motor Sales & Service
Car Dealers	Window Tinting
Blinds, Awnings & Canopies	Heating Equipment – Sales & Service x2
Carpet, Curtain & Upholstery Cleaners	Window Frames Sales & Service
Printers x2	Medical & Dental Laboratories
Wood Burning Stoves	Printers / Photocopiers x2
Engineers – general	Engineering Services
Piggeries	Joinery Manufacturers x2
Power Transmission Services	Food Colouring, Flavouring & Additive Manufacturers & Distributors
Builders & Merchants x4	Blinds, Awnings & Canopies
Blast Cleaning Equipment Manufacturers	Copying & Duplicating Machines & Suppliers
Engineering Materials	Electronic Engineers x3
Sewage Disposal – Equipment & Services	Refrigeration Equipment – Commercial
Gum & Resin Manufacturers & Distributors	Office Furniture & Equipment x4
Hospitals	Gas Appliances - Sales & Repairs
	Petrol Filling Stations x2
	X-Ray Services
	Waste Disposal Services
	Electrical Goods Sales, Manufacturers & Wholesalers x2
	Laboratories
	Automation Systems & Equipment

10.5.22 There are two Fuel Station Entries reported within 1,000m of the site in Martlesham Heath. A Tesco Extra Petrol Station is located approximately 840m west of the site, off Anson Road and a BP Petrol Station is located approximately 895m to the west, off Betts Avenue.

Waste

10.5.23 There is one BGS Recorded Landfill Site identified within 1,000m of the site. Foxhall Tip is located approximately 885m west of the site off Foxhall Road in Brightwell. It is reported that there are no threats to ground or surface water.

10.5.24 There are four Historical Landfill Sites identified within 1,000m of the site boundary. These are further illustrated below in Table 10.8.

Table 10.8 Historical Landfill Sites

Historical Landfill Sites					
Site Name - Location	**Specified Waste**	**First Input Date**	**Last Input Date**	**Distance (m)**	**Direction**
Wilding & Smith - The Swale, Brightwell	Deposited waste included inert waste	31/12/1980	31/12/1996	On-Site	North East
Not Supplied – Caravan Site, Waldringfield Caravan Site	Not Supplied	Not Supplied	Not Supplied	159	South West
Suffolk County Council – Foxhall Road, Brightwell	Deposited waste included inert, industrial, commercial, household and special waste	30/09/1963	Not Supplied	450	South West
Not Supplied – Foxhall Road, Brightwell	Deposited waste included inert, industrial, commercial, household and special waste	31/12/1994	Not Supplied	460	South West

10.5.25 There are three Licensed Waste Management Facilities (Landfill Boundaries) identified within 1,000m of the site. These are further illustrated below in Table 10.9.

Table 10.9 Licensed Waste Management Facilities (Landfill Boundaries)

Licensed Waste Management Facilities (Landfill Boundaries)					
Site Name - Location	**Site Category**	**Licence Status**	**Date Issued**	**Distance (m)**	**Direction**
Brett Aggregates - Waldringfield Quarry, Brightwell	Landfills taking non-biodegradable wastes (not construction)	Issued	10/03/1995	On-Site	North East

Brett Aggregates - Waldringfield Quarry, Brightwell	Landfills taking non-biodegradable wastes (not construction)	Issued	10/03/1995	On-Site	North West
Viridor Waste Management Limited - Foxhall Landfill Site	Waste landfilling; >10 T/D with capacity >25,000T excluding inert waste.	Effective	23/12/2014	441	South West

10.5.26 There are eight Licensed Waste Management Facilities (Locations) identified within 1,000m of the site. These are further illustrated in Table 10.10.

Table 10.10 Licensed Waste Management Facilities (Locations)

Licensed Waste Management Facilities (Locations)					
Site Name - Location	**Site Category**	**Licence Status**	**Date Issued**	**Distance (m)**	**Direction**
Brett Aggregates - Waldringfield Recycling Facility, Brightwell	Physical treatment facilities	Issued	10/07/2012	On-Site	North West
Brett Aggregates - Waldringfield Quarry, Brightwell	Management of inert or extractive waste at mine	Issued	23/08/2011	On-Site	North East
Brett Aggregates - Brightwell	Inert Landfill	Modified*	29/09/2006 *18/05/2016	On-Site	North East
Brett Aggregates - Waldringfield Quarry, Brightwell	Landfills taking non-biodegradable wastes (not construction)	Modified*	10/03/1995 *18/05/2016	On-Site	North East
F C Waste Services (UK) Ltd - Foxhall Waste Transfer Station, Brightwell	Household, commercial and industrial transfer stations	Transferred*	19/03/2008 *21/11/2012	745	South West
Viridor Waste Suffolk Ltd - Brightwell	Household, commercial and industrial transfer stations	Surrendered *	12/02/2003 *07/07/2010	917	West
Viridor Waste Suffolk Ltd - Brightwell	Composting	Modified*	06/04/2000 *13/06/2001	922	West
Viridor Waste Suffolk Ltd - Brightwell	Co-disposal landfill sites	To PPC	25/05/1994	922	West
Brett Aggregates - Waldringfield Recycling Facility, Brightwell	Physical treatment facilities	Issued	10/07/2012	On-Site	North West

Licensed Waste Management Facilities (Locations)					
Brett Aggregates - Waldringfield Quarry, Brightwell	Management of inert or extractive waste at mine	Issued	23/08/2011	On-Site	North East

10.5.27 Suffolk County Council (SCC) and Suffolk Coastal District Council (SCDC) are the Local Authorities for Landfill Coverage for the site. SCC have supplied landfill data and SCDC have passed their data on to the EA.

10.5.28 Foxhall Landfill Site in Brightwell, approximately 532m south west of the site, is a Local Authority Recorded Landfill Site. The site closed on 31/12/1982 and the types of waste accepted included domestic, commercial, dry non-hazardous industrial and asbestos.

10.5.29 There are ten Potentially Infilled Land (Non-Water) areas identified within 1,000m of the site boundary. These are further detailed below in Table 10.11.

Table 10.11 Potentially Infilled Land (Non-Water)

Potentially Infilled Land (Non-Water)			
Date of Mapping	**Use**	**Distance (m)**	**Direction**
1975	Unknown Filled Ground (Pit, quarry, etc.)	On-Site	North East
1975	Unknown Filled Ground (Pit, quarry, etc.)	11	North East
1988	Unknown Filled Ground (Pit, quarry, etc.)	89	North
1988	Unknown Filled Ground (Pit, quarry, etc.)	154	North West
1988	Unknown Filled Ground (Pit, quarry, etc.)	245	North West
1988	Unknown Filled Ground (Pit, quarry, etc.)	253	North West
1993	Unknown Filled Ground (Pit, quarry, etc.)	402	South West
1993	Unknown Filled Ground (Pit, quarry, etc.)	483	West
1993	Unknown Filled Ground (Pit, quarry, etc.)	894	North West
1975	Unknown Filled Ground (Pit, quarry, etc.)	924	South

10.5.30 There is one Potentially Infilled Land (Water) area identified within 1,000m of the site boundary. The unknown filled ground (pond, marsh, river, stream, dock etc.) is shown on a 1958 map approximately 425m south west of the site boundary.

10.5.31 There are seven Registered Landfill Sites within 1,000m of the site boundary, these are further detailed in Table 10.12.

Table 10.12 Registered Landfill Sites

Registered Landfill Sites					
License Holder – Location	**Max Input Rate**	**Authorised Waste**	**Prohibited Waste**	**Date - Status**	**Distance (m)**
Wilding (Plant & Earthmoving) Ltd – Waldringfield Quarry, Brightwell	Large (equal to or greater than 75,000 and less than 250,000 tonnes per year.)	Inert materials– comprising Suffolk Cat.A non-decomposing waste.	Contaminated soil; degradable household/commercial/industrial waste; foundry/moulding sands with phenolic binders; liquid wastes; metal waste/scrap metal; odour producing waste; other waste/waste not otherwise specified; packaged waste (mixed/unmixed); sludge wastes; special waste; waste containing list I substances; waste containing list ii substances; waste likely to pollute environment; waste with potential to harm human health	17/03/2000 Operational as far as is known	On-Site – North East
Wilding (Plant & Earthmoving) Ltd – Waldringfield Quarry, Brightwell	Large (Equal to or greater than 75,000 and less than 250,000 tonnes per year.)	Suffolk Cat. A non-decomposing waste.	Waste not otherised specified (N.O.S)	17/03/1995 Superseded	On-Site – North East
Wilding & Smith Ltd – The Swale, Brightwell	Large (Equal to or greater than 75,000 and less than 250,000 tonnes per year.)	Construction and demolition wastes	Special wastes Liquid/slurry/sludge wastes	01/01/1982 Surrendered	On-Site – North East
Suffolk Waste Disposal Co Ltd -	Large (Equal to or greater	Asbestos; gulley emptyings; household &	Clinical wastes; liquids/sludges not otherised specified (N.O.S);	25/05/1994	997 – South West

Registered Landfill Sites					
Foxhall Landfill Site (Composting)	than 75,000 and less than 250,000 tonnes per year.)	commercial waste; industrial wastes; max.waste permitted by licence; road sweepings	percussive/explosive/similar waste; special wastes not otherised specified (N.O.S); waste not otherised specified (N.O.S); other similar wastes	Operational as far as is known	
Suffolk County Council – Foxhall Landfill Site, Brightwell	Undefined	Asbestos all forms; Suffolk Cat. A (Nra) Inert; Suffolk Cat. B (Nra) Slight.Putresc.	Sodium & calcium chlorides; sodium nitrite/nitrate mixtures	01/10/1989 Superseded	997 – South West
Suffolk County Council – Foxhall Landfill Site, Brightwell	Undefined	Bentonite slurry Ex Sizewell'B'	Not supplied	01/10/1987 Lapsed/ Cancelled/ defunct/ Surrendered/ N/A	997 – South West
Suffolk County Council – Foxhall Landfill Site, Brightwell	Undefined	Asbestos; house, com + ind.waste; liquid/slurry/sludge wastes; oil contaminated sand in emergency	Not supplied	01/11/1979 Lapsed/ Cancelled/ defunct/ Surrendered/ N/A	997 – South West

10.5.32 There are two Registered Waste Treatment or Disposal Sites within 1,000m of the site boundary, these are further detailed in Table 10.13.

Table 10.13 Registered Landfill Sites

Registered Landfill Sites					
License Holder – Location	**Max Input Rate**	**Authorised Waste**	**Prohibited Waste**	**Date - Status**	**Distance (m) - Direction**
Suffolk Waste Disposal Co Ltd - Foxhall Landfill Site (Composting)	Small (Equal to or greater than 10,000 and less than 25,000 tonnes per year)	Degradable commercial waste; degradable household waste; degradable industrial waste; maximum storage for composting; maximum storage pending shredding; maximum waste permitted ny licence	Inert materials; metal waste/scrap metal; other waste / waste not otherwise specified; special waste	13/06/2001 Operational as far as is known	826 – South West
Suffolk Waste Disposal Co Ltd - Foxhall Landfill Site (Composting)	Small (Equal to or greater than 10,000 and less than 25,000 tonnes per year)	Degradable commercial waste; degradable household waste	Degradable industrial waste; liquid wastes; material with any Haz.Code (H1,H2,H3a,H3b,H4,H5,H6,H7,H8,H9,H10,H11,H12,H13,H14); metal waste/scrap metal; other waste/waste mot otherwise specified; powders; sludge wastes; special waste.	06/04/2000 Superseded	826 – South West

10.5.33 There are no provided reports of the following within 1,000m of the site boundary:

- Integrated Pollution Control Registered Waste Sites; and
- Registered Waste Transfer Sites.

10.5.34 The Environment Agency were consulted and have confirmed that the site includes: one historic landfill (The Swale), one current landfill (Waldringfield Quarry) and three waste activities (Waldringfield Quarry and Waldringfield Recycling Facility). In addition to this a Historic Landfill Site is shown approximately 175m north east of the site boundary at the Moon & Sixpence Holiday Park (Caravan Site).

10.5.35 Trading Standards were also consulted, as they licence Petroleum storage. Following an investigation into their historical records, underground storage tanks used for the storage of Petrol were found at the following three locations:

- *"Sheepdrift Farm, Brightwell (750 gallon) which was decommissioned by filling with water in 1989 – they were unable to offer any further information on the location of the tank or whether it is still in situ.*
- *There were also tanks sited at the gravel pits previously owned by Wilding & Smith, Brightwell. They were licenced in 1978 for 18,000 litre of petrol, but there is no record of what happened to this tank. However the new owners (Brett Aggregates) were licenced until July 2004 to store 10,000 litres of petroleum (in 2 @ 5000litres) underground tanks – which were made safe in 2007 (along with a further 22,500 litre underground tank presumably used for diesel or other fuel other than petrol), these tanks were made safe using resin based hard foam.*
- *BT Adastral Park site, there was at one time a can store, however the records were sent to the local Suffolk Coastal District Council in 2003 as they took over responsibility under DSEAR."*

10.5.36 Suffolk Coastal District Council was contacted and provided the following response with regards to our enquiry over any potential hazardous landfill waste, contaminated land, petroleum or can storage or any other historic uses on or within close proximity of the site:

- *"I can confirm that Waldringfield Quarry which is within this proposed development area, is listed as a 'Former Landfill Site which predates 1974' but that we hold no records of the extent of the pit area or the type of refuse which it contains. Assuming the land fill operation incorporated the disposal of domestic waste, then the pit area would contain a large quantity of contaminants and have potential to emit ground gas. However as we have no detail of the depth, extent or content of the pit we can only advise that intensive investigation is undertaken to establish these facts prior to any future development of the site.*
- *With regard to the remainder of the Adastral Park site, I can confirm that we hold no records of any other landfill, contaminated land, petroleum or can storage and any other historic uses which may be of interest to you"*

Unexploded Ordnance (UXO)

10.5.37 The following potential sources of explosive ordnance were recorded within 1,000m of the site:

Table 10.14 Unexploded Ordnance Probability Assessment

Unexploded Ordnance Probability Assessment	
Threat Source	**Details**
Airfield/ Military Facilities	RAF Martlesham Heath located on-site.
WWII Defensive Features	A radar station, 2 pillboxes and an RDF tower all located on-site and a Pickett-Hamilton fort located 35m west of the site.
WWII Luftwaffe Designated Bombing Targets	Luftwaffe aerial photography identified an airfield located on-site as a primary bombing target.
WWII Bomb Strikes Within site noundary	ARP records were not available. Anecdotal evidence suggests 'considerable number' of High Explosive Bomb and IBs landed on-site.
WWII Near site boundary	ARP records were not available. Anecdotal evidence suggests 'considerable number' of High Explosive Bomb and IBs landed within close proximity.
WWII Bomb Damage	Anecdotal evidence suggests damage occurred to structures within RAF Martlesham.
WWII Bombing Density Per 100 Hectares	The site was located within Deben Rural District, which recorded three High Explosive Bomb strikes per 100 hectares.
Ordnance Manufacture/ Storage	None
WWII Decoy Bombing Sites	None
Secondary Bombing Targets	None
Abandoned Bomb Register	None

10.5.38 The following paragraphs are based upon the findings of a Phase II Stretaegic Geo-Environmental Assessment contained in Appendix G2.

Ground Conditions (Area 1)

10.5.39 Made Ground was encountered across the majority of the Site.

10.5.40 In the north-west area of the Site, the Made Ground was encountered to depths of up to 0.05 to 2.40m and consisted typically of clayey gravelly medium Sand with occastional flint and sandstone gravel and cobbles.

10.5.41 Made Ground in the central and southern sections were up to depths of 5.70-12.60m and comprised typically of loose to medium dense medium silty gravelly sand or a very sandy gravelly silt clay with occastional to numerous gravel to cobble-sized fragments of concrete, brick, tarmacadam and with occasional cobble sized pockets of clay and silt. Gravel is of sub-rounded flint.

10.5.42 The Kesgrave Catchment Subgroup was encountered underlying the Made Ground in four of the exploratory holes. This generally comprised loose to medium dense slightly gravelly medium sand. Gravel is of sub angular flint, quartzite and occasional sandstone.

10.5.43 The Red Crag Formation was encountered underlying the Made Ground in eleven locations; and underlying the Kesgrave Catchment Subgroup in two locations. It generally comprised medium dense to very dense sand with occasional whole shells.

The Thames Clay Formation was encountered under the Made Ground in two of the locations as weak mudstone and as stiff brown silty clay.

Ground Conditions (Area 2)

10.5.44 Made Ground was encountered across the majority of the Site.

10.5.45 Made Ground generally comprised loose to medium dense fine to medium sand over medium dense to very dense clayey medium to coarse sand with occasional to numerous gravel-sized to boulder-sized fragments of concrete and brick; with rare to occasional gravel to cobble-sized fragments of tarmacadam rope, plastic and fabric. Occasional metal fragmens in five locations and cobble to boulder-sized timber fragments in six of the locations. Gravel is of sub-rounded flint and quartzite. Peaty pockets were encountered in one trial pit and a slight peaty odour encountered in two locations.

10.5.46 The Kesgrave Catchment Subgroup was not encountered.

The Red Crag Formation was encountered underlying the Made Ground in four locations. It generally comprised medium dense to very dense sand with numerous shell fragments and occasional whole shells, over extremely weak sandstone in three locations.

Groundwater

10.5.47 Groundwater was encountered in 4 trial pits from 0.50m to 4.50m as damp to wet ground.

10.5.48 Groundwater was encountered in the installed boreholes during subsequent monitoring visits in eight of the twelve cable percussion boreholes locations from 3.00m to 11.80m, and in one of the eight window sample location at 4.10m

10.6 Predicted impacts

Construction Stage

Contamination affecting humans

10.6.1 During the construction phase of the Proposed Development, the soil may be disturbed by the use of heavy machinery, excavation, stockpiling and filling which may affect sensitive receptors via pathways such as inhalation, ingestion and direct contact. The sensitivity of the receptors (residents in adjacent areas, and construction workers) is high and the magnitude of change prior to mitigation is high. There could be direct, long

term, permanent effects of major adverse significance if control and mitigation measures are not employed.

Contamination affecting fauna and flora

10.6.2 During the construction phase of the Proposed Development, the soil may be disturbed by the use of heavy machinery, excavation, stockpiling and filling which may affect sensitive receptors via pathways such as inhalation, ingestion and direct contact. The sensitivity of the receptors (fauna and flora within the SSSI) is high and the magnitude of change prior to mitigation is high. There could be direct, long term, permanent effects of major adverse significance if control and mitigation measures are not employed.

Contamination to surface water conveyance

10.6.3 During the construction phase, there is a risk that the surface water features in the surrounding area may become contaminated; there is also a risk that any standing water within the site may become contaminated.

10.6.4 Sources of contamination could be from on-site activities such as fuel / oil, chemical and waste storage. After disturbing the soil, leaching of contaminants as well as spillages of hazardous contaminants will be exposed to surface run-off which could transport them into nearby surface water features. Although the potential magnitude of change is high, there is a watercourse to the north of the site within the vicinity, the overall effect has been judged to be moderate **adverse**.

Contamination of Groundwater

10.6.5 During the construction phase, there is a risk that the concentrations of contaminants in the groundwater in the minor aquifer below the site could increase. Disturbing the soil and piling the site could open pollutant pathways which could leave the aquifers at risk from contamination. The sensitivity of the minor aquifers is medium and the magnitude of change prior to mitigation is high. There could be permanent effects of moderate to major adverse significance without the implementation of mitigation measures. Areas in particular consist of the quarry and landfill.

Operation (following completion)

Risk to Below Ground Structures from Contaminated Soil

10.6.6 The construction of the Proposed Development will involve the use of buried concrete, plastic and possibly metals. Poor design and choice of materials could result in ground contamination having significant impact on the structures, due to potential deterioration as a result of continual direct contact with any contaminants. The magnitude of change prior to mitigation is high. There could be direct, permanent effects of moderate to major adverse significance without the implementation of mitigation measures.

Risk to Proposed Soft Landscaping

10.6.7 There may be potentially contaminated ground on-site which could otherwise be adversely used for landscaping purposes or planting, should intrusive investigations not be undertaken and appropriate mitigation not be implemented. The sensitivity of the

vegetation in landscaped areas is low to medium and the magnitude of change, prior to mitigation, is high. Therefore, there is likely to be a permanent effect on the vegetation in landscaped areas of minor to moderate adverse significance prior to the implementation of mitigation measures.

10.7 Mitigation

Construction

10.7.1 The potential environmental effect of suspended solids discharges to watercourses and ground waters will be mitigated by adequate site controls developed by way of a Construction and Environmental Management Plan (CEMP), agreed with the regulatory authorities prior to implementation. All contractors working on-site will be required to adopt the procedures and proposed means of mitigation outlined in the document.

10.7.2 In order to minimise the impacts in relation to ground conditions and contamination during development, the CEMP will include the following procedures:

- Prohibition of any temporary construction discharges without approval of the Environment Agency;
- Earthworks to be completed in a manner that protects the water quality environment and ecological interest of the area. The nature of the works and the proposed implementation methods will be agreed with the Environment Agency in advance and all works will accord with the recommendations of EA Pollution Prevention Guidance for Works in, Near or Liable to Affect Watercourses;
- Discharges of waters resulting from construction activities will generally be directed to foul sewers, subject to approval of the drainage authority;
- All fuels oils and potentially contaminating substances to be stored in bunded tanks or suitable hard pave and protected areas as are appropriate;
- All works will be completed in accordance with the Environment Agency documents, PPG 6 Working at Construction and Demolition-sites and PPG21 Pollution Incident Response Planning together with current best practice measures for the management of construction activities; and
- All surplus construction and demolition materials to be removed from site and reused, recycled, or disposed, in respective order of preference.

10.7.3 It will be incumbent on the selected contractor to assess working practice related risks and impacts before implementation and control such by employing industry good practice techniques. Furthermore, the contractor will be required to develop emergency spillage, flood, fire and contamination control procedures such that any inadvertent incidents are immediately controlled to minimise the potential impact.

10.7.4 Site topography is such that limited, if any, earthworks will be required to provide gravity surface water drainage. Filling of the site where necessary will be by way of ‘cut and fill’ earthworks and imported inert material to trim building levels and highway infrastructure to provide gravity drainage across the site.

10.7.5 Other potential effects relate to the contractor’s working practices. For example, there is the potential for fuel oil spillage from stored materials supplying site plant. This potential impact will be controlled by storing such materials within bunded tanks. The works will be completed in a manner that is consistent with the need to protect the surface and ground water quality environment.

10.7.1 The impact of any potential ground gas in made ground within the quarried areas would need to be quantified during the construction stage, as well as within the landfill area.

10.7.2 The following general mitigation measures will also be adopted as part of the site construction phase to minimise the potential impacts arising from the proposed development:

Material Storage

- Storage compounds will be located away from any identified water features; and
- Designated bunded "safe" areas will be provided within the compound for storage of oils and other such potentially contaminative materials.

Silt and Earthworking

- Soil mounding to be kept to a minimum to reduce run-off;
- Haul roads to receive regular cleaning to prevent mud build up; and
- Careful regulation of wash down processes to avoid washing significant quantities of silt into drains.

Accidental Spillage

- Emergency response requirements to be included in the construction contract requirements; and
- Spill kits to be located in all site compounds and near any identified water feature.

Operation (following completion)

Exposure of Residential End-Users to Contamination

10.7.3 A cover system should be applied across all proposed areas of soft landscaping in accordance with the BRE document entitled Cover Systems for Land Regeneration, Thickness Design of Cover Systems for Contaminated Land (2004). Such would be sufficient to protect contamination risks to human health. The minimum thickness of clean cover in landscaped areas is 600mm.

Risk to Below Ground Structures from Contaminated Soil

10.7.4 Concrete will be designed and placed in accordance with normal good practice taking account of pH and sulphate concentrations in the ground. Plastic pipes will not be used where the ground or groundwater contains significant levels of light hydrocarbons or phenol.

10.7.5 Results presented in the WRC Investigation (no reference given) indicate that buried concrete could be designed for Sulphate Class DS-2 and Aggressive Chemical Environment of Concrete (ACEC) Class AC-2, in accordance with BRE Special Digest 1 (2005). However, testing of soil samples from across the rest of the site, as part of an intrusive geotechnical investigation, should be carried out to allow the correct concrete classification to be recommended.

Risk of Residential and Other End-Users to Ground Gas

10.7.6 Gas monitoring wells should be sunk across the site prior to construction to allow levels of hazardous ground gas to be monitored in accordance with current best practice. Gas control measures should be implemented if any hazardous gas is encountered within the made ground. Mitigation measures may comprise the use of membranes under floor slabs.

Risk to Proposed Soft Landscaping

10.7.7 The use of a cover system, as described above, would not only protect human health but also any proposed planting in areas designated for soft landscaping / gardens / vegetation cover. Intrusive investigations would be needed to determine which areas on-site would require these cover systems.

Additional Mitigation

10.7.8 As a result of the Phase II Ground Investigation Report which partially covered the Site, a number of Site specific remedial measures have been provided for the protection of human health and Controlled Waters. Further details are outlined within the report in Appendix G2.

10.7.9 Additional mitigation methods may be required dependent upon the assessments undertaken as part of the future geotechnical and contamination intrusive investigation across the site, which should conform to BS5930:1999 Code of Practice of Site Investigation (British Standards Institute (BSi), 1999). Additional mitigation methods may also need to be employed should the development plans change in the future.

10.8 Summary of effects

10.8.1 It is anticipated that regulatory control will ensure that developments completed elsewhere in the area will be required to implement measures similar to those outlined above that at least meet current standards. In such circumstances, the environmental effects resulting from the development will be negligible.