



# NORTHSTOWE PHASE 2 PLANNING APPLICATION

Environmental Statement: Main Report

August 2014



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## Glossary of terms

Term	Definition
AADT	Annual Average Daily Traffic
ADMS-Roads	Modelling software that calculates emissions to air from road traffic.
ALC	Agricultural Land Classification. The Agricultural Land Classification system forms part of the planning system in England and Wales. It classifies agricultural land in five categories according to versatility and suitability for growing crops. The top three grades, Grade 1, 2 and 3a, are referred to as 'Best and Most Versatile' land, and enjoy significant protection from development.
AOD	Above Ordnance Datum. This is the height above sea level.
AQA	Air Quality Assessment
AQMA	Air Quality Management Areas – this is a designated zone where specific air quality management measures are proposed by a local authority (defined in an air quality action plan) to improve air quality and ensure that air quality limit values are met.
AQS	Air Quality Strategy for England, Wales and Northern Ireland, Volume 2 (2011). The Air Quality Strategy sets out air quality objectives and policy options to further improve air quality in the UK from today into the long term. As well as direct benefits to public health, these options are intended to provide important benefits to quality of life and help to protect our environment.
Aquifer	A below-ground deposit or rock, such as sandstone, containing water that can be used to supply wells.
Acoustic barrier	Solid walls or partitions, solid fences, earth mounds, buildings, etc. used to reduce noise, without eliminating it.
Air-borne noise	This refers to noise which is fundamentally transmitted by way of the air and can be attenuated by the use of barriers and walls placed physically between the noise and receiver.
Ambient sound	The totally encompassing sound in a given situation at a given time, usually composed of sound from all sources near and far.
Arsenic	A semi metallic element that has several toxic compounds and naturally occurs in some minerals.
Audible range	The limits of frequency which are audible or heard as sound. The normal ear in young adults detects sound having frequencies in the region 20 Hz to 20 kHz, although it is possible for some people to detect frequencies outside these limits.
Background noise	Background noise is the term used to describe the noise measured in the absence of the noise under investigation. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety per cent of a sample period. This is represented as the L90 noise level (see below).
BAP	Biodiversity Action Plan – a plan developed by local authorities that identifies priority habitats and species for conservation and includes targets and mechanisms for their achievement.
BB93	Building Bulletin 93 sets out standards for education facilities
BCT	Bat Conservation Trust
BGS	British Geological Survey

Term	Definition
BH	Borehole
BIS	Department for Business, Innovation and Skills.
BMV	Best and most versatile agricultural land. Land classification as Grades 1 (excellent quality), 2 (very good quality) and 3a (good quality) under the MAFF Agricultural Land Classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land (1988).
BNS	Biological Notification Site
BPEO	Best Practicable Environmental Option
BPM	Best Practical/Practicable Means
BRE	Building Research Establishment
BRES	Business Register and Employment Survey.
Broadband	Containing the full range of frequencies
BS	British Standards
CAFE	Clean Air For Europe
CBC	Common Bird Census
CCC	Cambridgeshire County Council.
CCI	Community Conservation Index
CDRP	Crime and Disorder Reduction Partnership
CEMP	Construction Environmental Management Plan – This outline plan sets out the proposed control measures and the standards to be implemented throughout the construction of the proposed development. It sets out a series of measures and standards of work, which shall be applied by contractors throughout the construction period.
CERC	Cambridge Environmental Research Consultants
CGB	Cambridgeshire Guided Busway.
CHARM	Cambridge Huntingdon A14 Road Model
CHER	Cambridgeshire Historic Environment Record.
CHET	Cambridgeshire Historic Environment Team.
CSH	Code for Sustainable Homes
CHP	Combined Heat and Power
CIRIA	Construction Industry Research and Information Association
CLR	Contaminated Land Report
CNEA	Clean Neighbourhoods and Environment Act
Conservation Area	An area of special architectural or historic interest identified as one where the character and appearance is worthy of preservation.
CoP	Code of Practice
CoPA	Control of Pollution Act 1974
CPERC	Cambridgeshire and Peterborough Environmental Records Centre.



Term	Definition
CRoW	Countryside and Rights of Way
CSRM	Cambridge Sub-Regional Model - a comprehensive, multi-modal, interactive land use and transport model which enables the assessment of the wider impact of growth strategies, local plans and development proposals
CRTN	Calculation of Road Traffic Noise
CTMP	Construction Traffic Management Plan
CWS	County Wildlife Site – an area of local importance for nature conservation.
DCLG	Department for Communities and Local Government.
DD	Data Deficient
Decibel (dB)	The unit of sound level.
dB(A): A-weighted decibels	The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A).
DEFRA	Department of the Environment, Food and Rural Affairs.
DFD	Development Framework Document, 2012. The DFD defines the rationale and structure for Northstowe's planning and delivery as a comprehensive development, whilst providing place making principles and guidance for individual phases of development.
DfT	Department for Transport.
Diffusion tube	A passive devise for monitoring air quality and measuring ambient pollutant concentrations.
DM	Do Minimum
DMRB	Design Manual for Roads and Bridges - This is a series of 15 volumes that provide official standards, advice notes and other documents relating to the design, assessment and operation of <u>trunk roads</u> , including <u>motorways</u> in the United Kingdom.
DPD	Development Plan Document – part of the Local Development Framework.
DPH	Dwellings Per Hectare
DS	Do Something
DTM	Digital terrain model – computer based landform height model of the site
EA	Environment Agency – is a <u>non-departmental public body</u> , established in 1996 and sponsored by the United Kingdom government's Department for Environment, Food and Rural Affairs (DEFRA), with responsibilities relating to the protection and enhancement of the <u>environment</u> in England
EEFM	East of England Forecasting Model
EEM	Embedded Ecology Measures
EFT	Emissions Factor Toolkit
EcIA	Ecological Impact Assessment
EH	English Heritage - is an executive <u>non-departmental public body</u> of the British Government sponsored by the Department for Culture, Media and Sport (DCMS). By advising on the care of the historic environment in England, English Heritage complements the work of <u>Natural England</u> which aims to protect the natural environment. It

Term	Definition
	has a broad remit of managing the historic environment of England and advises the relevant Secretary of State on policy and in individual cases such as registering <u>listed buildings</u> and <u>scheduled monuments</u> .
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment – the systematic assessment of a project’s likely significant effects on the environment.
EN	Endangered
EMP	Ecological Management Plan (appended to the Planning Statement)
EPA	Environmental Protection Act - an Act of parliament that as of 2008 defines, within England and Wales and Scotland, the fundamental structure and authority for <u>waste management</u> and control of emissions into the environment.
EPR	Environmental Permitting Regulations
EPS	European Protected Species
EPUK	Environmental Protection UK
EQS	Environmental quality standard – the concentration of a particular pollutant or group of pollutants in water, sediment (any material transported by water and settled to the bottom) or biota (all living organisms of an area) which should not be exceeded in order to protect human health and the environment.
ES	Environmental Statement – a report, prepared by the Developer, which sets out a description of the proposed development and an assessment of the project’s likely environmental effects. The ES is submitted alongside the planning application for consent of a proposed development.
FE	Form Entry – this represents the number of forms (classes) that a school year group has within one intake year.
FRA	Flood Risk Assessment - an assessment of the risk of flooding, particularly in relation to residential, commercial and industrial land use.
Free-field	In England and Wales, the Environment Agency requires an FRA to be submitted alongside planning applications in areas that are known to be at risk of flooding (within flood zones 2 or 3) and/ or are greater than 1ha in area.
FTE	A situation in which the radiation from a sound source is completely unaffected by the presence of any reflecting surfaces.
Geophysical survey	Full-Time Equivalent - a unit that indicates the workload of an employed person (or student) in a way that makes workloads comparable across various contexts. An FTE of 1.0 means that the person is equivalent to a full-time worker, while an FTE of 0.5 signals that the worker is only half-time.
GIA	Non-invasive surveys for below ground archaeological imaging.
Glare	Gross Internal Area - The gross internal floor area of a building is the area measured to the internal face of the perimeter wall for each floor level.
	The uncomfortable brightness of a light source against a dark background, which results in dazzling the observer and may cause nuisance to residents and a hazard to road users.

Term	Definition
GSV	Gas Screening Value
GLVIA	Guidelines for Landscape and Visual Impact Assessment
Groundwater	Water that flows through, or contained beneath the ground surface.
GTA	Guidelines for Transport Assessment
GVA	Gross Value Added - a measure in economics of the value of goods and services produced in an area, industry or sector of an economy. In national accounts GVA is output minus intermediate consumption.
HA	Highways Agency - an executive agency, part of the Department for Transport in England. It has responsibility for managing the core road network in England. It operates a variety of information services, liaises with other government agencies as well as providing staff to deal with incidents on their roads.
ha	Hectares
HCA	Homes and Communities Agency - The HCA is the national housing and regeneration delivery agency for England and also the applicant. The HCA has been promoting the development for Northstowe as a new town for a number of years in partnership with Gallagher Longstanton Ltd as the Joint Promoter
HDV	Heavy Duty Vehicle
Heavy vehicle	Heavy vehicles are assumed to be buses, rigid trucks and semi-trailer trucks with a weight greater than 3 tonnes. Also heavy vehicles can be defined in terms of length as buses, or trucks with a length exceeding 5.25 metres.
HGV	Heavy Goods Vehicle
HIA	Health Impact Assessment – an assessment of the likely health impacts that may arise from a development.
HPA	Health Protection Agency
HSE	Health and Safety Executive
HSI	Habitat Suitability Index
IAN	Interim Advice Note
IDB	Internal Drainage Board – a kind of operating authority which is established in areas of special drainage need in England and Wales with permissive powers to undertake work to secure clean water drainage and water level management within drainage districts.
IMD	Indices of Multiple Deprivation - a measure of the level of deprivation in an area
IEEM	Institute for Ecology and Environmental Management - the professional body which represents and supports ecologists and environmental managers, mainly in the United Kingdom but increasingly in Ireland and Europe, and the rest of the world.
IEMA	Institute of Environmental Management and Assessment - a

Term	Definition
	professional body for environmental practitioners in the United Kingdom.
IfA	Institute for Archaeologists.
ILP	Institute of Lighting Professionals
IMD	Indices of Multiple Deprivation
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
Landscape character	The distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape.
LA10	The A-weighted sound pressure level of the residual noise in decibels exceeded for 10% of a given time is the LA10. It is used to describe the levels of road traffic noise at a particular location.
LA90	The A-weighted sound pressure level of residual noise in decibels exceeded for 90% of a given time is the LA90. It is used to describe the background noise levels at a particular location.
LAeqT	The equivalent steady sound levels in decibels containing the same acoustic energy as the actual fluctuating sound level over the given period, T. T may be as short as one second when used to describe a single event, or as long as 24 hours when used to describe the noise climate at a specific location. It is measured directly with an integrating sound level meter.
LAmaz	The highest A-weighted noise level recorded during a noise event
LAQM	Local air quality management – a system introduced under Part IV of the Environmental Protection Act 1995 that requires local authorities to review and assess air quality within their boundaries
LC	Least Concern
LCA	Landscape Character Areas - natural subdivision of England based on a combination of landscape, biodiversity, geodiversity and economic activity. There are 159 National Character Areas and they follow natural, rather than administrative, boundaries. The NCAs are defined by Natural England, the UK Government's advisors on the natural environment.
LDF	Local Development Framework - adopted in 2007 by South Cambridgeshire District Council
LEP	Local Enterprise Partnership - voluntary partnerships between local authorities and businesses set up in 2011 by the Department for Business, Innovation and Skills to help determine local economic priorities and lead economic growth and job creation within the local area.
Light spill	The unwanted spillage of light into adjacent areas, which may affect sensitive receptors, particularly residential properties or sensitive species such as bats.
Listed building	A building that is protected under the Planning (Listed Buildings and Conservation Areas) Act 1990 for its special architectural or historical significance.
LNR	Local Nature Reserve

Term	Definition
	Because noise varies with time, a single noise value cannot adequately define the noise ambient. For this reason, the acoustic environment is described using a number of noise level descriptors as follows;
Ln noise Descriptors	L10 The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
	L90 The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
	Leq The Equivalent sound pressure level - the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
	LAmx The maximum RMS A-weighted sound pressure level occurring within a specified time period.
LOAEL	LOAEL – Lowest Observed Adverse Effect Level: This is the level above which adverse effects on health and quality of life can be detected
Loudness	A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on. That is, the sound of 85 dB is 400 times the loudness of a sound of 65 dB.
LSOA	Lower Super Output Area - Super Output Areas (SOAs) are a set of geographical areas developed following the 2001 census, initially to facilitate the calculation of the Indices of Deprivation 2004 and subsequently for a range of additional Neighborhood Statistics. Lower Layer Super Output Areas (LSOAs) typically contain 4 to 6 output areas with a population of around 1500.
LTP	Local Transport Plan
LQ	Location Quotient - location quotient is a ratio that compares a region to a larger reference region according to some characteristic or asset.
Luminaire	A lighting unit designed to distribute the light from a lamp or lamps
LVIA	Landscape and Visual Impact Assessment
LWS	Local Wildlife Site
MAFF	The former Ministry of Agriculture, Fisheries and Food
MBT	Mechanical Biological Treatment
Mitigation	Any process, activity or entity designed to avoid, reduce or remedy adverse environmental effects likely to be caused by a development project.
MMQ	Mean Maximum Queue
MRF	Material Recycling Facility

Term	Definition
NAAP	Northstowe Area Action Plan – Adopted in 2007 and sets out policy direction for site.
NEAP	Neighbourhood equipped area of play – a play area equipped mainly for older children, with at least eight types of equipment.
NEC	Noise Exposure Category.
NERC	Natural Environment and Rural Communities
NIA	Net Internal Area – The NIA is the Gross Internal Area less the floor areas taken up by lobbies, enclosed machinery rooms on the roof, stairs and escalators, mechanical and electrical services, lifts, columns, toilet areas (other than in domestic property), ducts, and risers.
NMU	Non-Motorised Users. This includes pedestrians, cyclists and horse riders.
NNR	National Nature Reserve
NO <sub>2</sub>	Nitrogen dioxide – a reddish brown gas (in high concentrations), respiratory irritant and precursor to photochemical processes that produce other pollutants and photochemical smog. NO <sub>2</sub> is a contributor to global warming
NO <sub>x</sub>	Nitrogen Oxides – a collective expression to describe oxides of nitrogen.
NOEL	NOEL – No Observed Effect Level: This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
NPPF	National Planning Policy Framework - published by the Department of Communities and Local Government in March 2012, consolidating over two dozen previously issued documents called Planning Policy Statements (PPS) and Planning Policy Guidance Notes (PPG) for use in England.
NPSE	Noise Policy Statement for England
NPV	Net Present Value - a calculation that compares the amount invested today to the present value of the future cash receipts from the investment. I.e., the amount invested is compared to the future cash amounts after they are discounted by a specified rate of return.
NTS	Non-Technical Summary – this is the summary of the entire Environmental Statement Report, written in a non-technical language.
ODPM	Office of the Deputy Prime Minister
ONS	Office for National Statistics - The UK's largest independent producer of official statistics and is the recognised national statistical institute for the UK. It is responsible for collecting and publishing statistics related to the economy, population and society at national, regional and local levels. It also conducts the census in England and Wales every ten years.
OS	Ordnance Survey
OSIA	Off-Site Infrastructure Area
PAH	Polycyclic aromatic hydrocarbons
PCU	
Phase I Habitat Survey	The Phase I Habitat Classification and associated field survey technique provides a standardised system to record semi-natural

Term	Definition
	vegetation and other wildlife habitats. The approach is designed to cover large areas of countryside relatively rapidly. Each habitat type/feature is identified by way of a brief description of its defining features. It is then allocated a specific name, an alpha-numeric code, and unique mapping colour.
PIA	Personal Injury Accidents.
PM10	Particulate Matter with a diameter of 10 microns or less.
PM2	Particulate Matter less than 2.5 microns in size
PPE	Personal Protective Equipment.
PPG	Planning Practice Guidance.
PPS	Planning Policy Statement
PRoW	Public Rights of Way
Rating level	The noise level of an industrial noise source which includes an adjustment for the character of the noise. Used in BS 4142
RECAP	Recycling in Cambridgeshire and Peterborough Partnership
Receptor	A component of the natural or manmade environment, such as a person, water or a building that is affected by an impact.
RDB	Red Data Book - the world's most comprehensive inventory of the global conservation status of biological species
Residual effects	An effect that remains following implementation of mitigation, i.e. an effect that cannot be mitigated.
RFC	Ratio of Flow to Capacity
RTD	River Terrace Deposits
SACs	Special Areas of Conservation - is defined in the European Union's Habitats Directive (92/43/EEC), also known as the Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora. They are to protect the 220 habitats and approximately 1000 species listed in annex I and II of the directive which are considered to be of European interest following criteria given in the directive.
SCDC	South Cambridgeshire District Council.
SFRA	Strategic Flood Risk Assessment
Scheduled Monument	Archaeological site or historic building, given protection against unauthorised change. The sites are designated under the Ancient Monuments and Archaeological Areas Act 1979 and have been selected by a set of non-statutory criteria to be of 'national importance'.
Scoping	A stage in the EIA process in which the scope of the environmental assessment work is identified and statutory consultees are consulted.
SHMA	Strategic Housing Market Assessment - A framework for councils to follow to develop their understanding of how housing markets operate.
SOAEL	SOAEL – Significant Observed Adverse Effect Level: This is the level above which significant adverse effects on health and quality of life occur.
SIC	Standard Industrial Classification - a system for classifying industries by a four-digit code.

Term	Definition
Sky glow	The upward illumination of the night sky, or part of it. It is usually caused by artificial lighting that emits light pollution.
SNH	Scottish Natural Heritage
SOC	Standard Occupational Classification - a common classification of occupational information for the United Kingdom. Within the context of the classification jobs are classified in terms of their skill level and skill content.
Sound Power Level	The sound energy radiated per unit time by the sound source when measured on the decibel scale
SPA	Special Protection Area - a designation under the European Union Directive on the Conservation of Wild Birds
SPD	Supplementary Planning Document.
SRP	Soil Resource Plan
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
SSV	Soil Screening Value
STW	Sewage Treatment Works.
SuDS	Sustainable Drainage Systems.
SWMP	Site Waste Management Plan
TA	Transport Assessment - A Transport Assessment is a comprehensive and systematic process that sets out transport issues relating to a proposed development. It identifies what measures would be taken to deal with the anticipated transport impacts of the scheme and to improve accessibility and safety for all modes of travel, particularly for alternatives to the car such as walking, cycling and public transport.
TP	Trial Pit
Topography	The detailed description of the surface features of a region, including landforms and surface configuration.
UKBAP	UK Biodiversity Action Plan – a plan prepared by the government that describes the biological resources of the UK and provides detailed plans for the conservation of these resources at a national level.
VU	Vulnerable
WCA	Wildlife and Countryside Act
WSI	Written Scheme of Investigation – this is a programme of archaeological mitigation works.
WEEE	Waste Electrical and Electronic Equipment
WFD	Water Framework Directive
WHO	World Health Organisation
WQS	Water Quality Standard
ZTV	Zone of Theoretical Visibility – the extent over which the new development would potentially be visible.



# 1 Introduction

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1.1.1 This Environmental Statement (ES) has been prepared to support the planning application by the Homes and Communities Agency (HCA) for Phase 2 of the proposed new town, Northstowe, which seeks planning permission for the following:

## 1.2 Description of development:

1.2.1 Development of Phase 2 of Northstowe with details of appearance, landscaping, layout, scale and access reserved (save for the matters submitted in respect of the Southern Access Road (West)) comprising:

- 1) development of the main Phase 2 development area for up to 3,500 dwellings, two primary schools, the secondary school, the town centre including employment uses, formal and informal recreational space and landscaped areas, the eastern sports hub, the remainder of the western sports hub (to complete the provision delivered at Phase 1), the busway, a primary road to link to the southern access, construction haul route, engineering and infrastructure works; and
- 2) construction of a highway link (Southern Access Road (West)) between the proposed new town of Northstowe and the B1050, improvements to the B1050, and associated landscaping and drainage.

1.2.2 For the purposes of the Environmental Statement, the application area is referred to as 'Northstowe Phase 2 development' and comprises:

- Main Phase 2 development area - for the outline application area;
- Southern Access Road (West) – for the full application area

1.2.3 This ES assesses the environmental effects of the development that would be permitted to come forward were planning permission to be granted of the planning application in accordance with the parameters and details submitted. It is submitted under the Town and Country Planning (Environmental Impact Assessment) Regulations 2011 (referred to as 'the EIA Regulations').

1.2.4 The relevant planning authorities are South Cambridgeshire District Council (SCDC) and Cambridgeshire County Council (CCC).

## 1.3 Site location and context

- 1.3.1 The application site extends to 216 hectares and comprises two parts: the main Phase 2 development area and the Southern Access Road (West), as shown in Figure 1.1 Site boundary and location plan. Each of the parts is described below.

### Main Phase 2 Development Area

- 1.3.2 The area of the main Phase 2 development area is approximately 165 hectares. The area is bordered to the east by the route of the Cambridgeshire Guided Busway (CGB), and to the west by Longstanton. The area includes the former Oakington Barracks, which currently comprises of three buildings, with no current use; slabs remaining from demolished buildings; remaining facilities associated with the barracks including sports amenities and green space; and a water tower which is the tallest structure on the site and visible feature in the wider landscape. The area surrounds the existing settlement of Rampton Drift, comprised of 92 properties, originally built as part of the barracks complex, although this area is not included in the application. The wider main Phase 2 Development area includes areas of hardstanding and open space associated with the former airfield (much of this currently occupied by agricultural tenants), farmland including Brookfield Farm and Larksfield Farm. The area also includes a section of Rampton Road.
- 1.3.3 To the south of the main Phase 2 development area, is land that is identified for Phase 3 of development of Northstowe.
- 1.3.4 Intervening vegetation results in the site being largely screened from surrounding villages and farmsteads. There are groups of trees throughout the former Oakington Barracks including avenues of mature trees around the barracks complex and leading to the station headquarter building. There are also groups of mature trees in the western corner of the site and around Rampton Drift. These all contribute to the setting of the site and adjacent Longstanton.
- 1.3.5 The spire of All Saints church in Longstanton and the water towers are the only built features visible in the wider landscape.
- 1.3.6 There are groups of mature trees throughout the former Oakington Barracks including avenues of mature trees around the barracks complex and leading to the station headquarter building. There are also groups of mature trees in the western corner of the site and around Rampton Drift. These all contribute to the wooded setting to the site and adjacent Longstanton.
- 1.3.7 Drains and ditches are a prominent feature in the Cambridgeshire landscape and there are several surface water drains running through the site. The nearest water courses are the Beck Brook which

meanders along the eastern boundary of the site (50m from the site boundary at its closest point) and Oakington Brook 1km south of the site.

### **Southern Access Road (West)**

- 1.3.8 The area for the Southern Access Road (West) runs from the B1050 to the boundary of Northstowe, as shown in Figure 1.1. This area currently comprises arable fields and extends to approximately 51 hectares. Wilson's Road, a public right of way crosses the area, providing a link from Longstanton towards Bar Hill.

## **1.4 The surrounding area**

- 1.4.1 The area surrounding the site is dominated by agricultural land, with a few scattered dwellings and small settlements. In addition to the settlements of Longstanton, Oakington and Rampton Drift, the site is also in proximity to Rampton (approximately 1km to the north-west), Willingham (approximately 2km to the north), and Cottenham (approximately 2.5km to the west).
- 1.4.2 To the north of the main Phase 2 area is the proposed site of Phase 1 of Northstowe, for which an outline planning application was submitted by Gallagher Estates to SCDC in February 2012, and permission granted on 22nd April 2014. Construction works for Phase 1 are set to commence in summer 2014.
- 1.4.3 To the south of the main Phase 2 development area, and through which its access routes run is land that is identified for phase 3 of Northstowe.
- 1.4.4 The A14 runs approximately 3km to the south west of the site. The B1050 Hatton Road/Longstanton western bypass runs from the A14 to a roundabout to the north west of the site.

## **1.5 Site Selection**

- 1.5.1 Northstowe is a planned new town of 10,000 homes, situated approximately 10km north-west of Cambridge on the former RAF Oakington site and surrounding farmland.
- 1.5.2 There has been a long term acknowledged need for key strategic and additional developments in the Cambridgeshire Sub Region in order to support the continued growth of Cambridge. The need for a new town for the sub region was first allocated within the Cambridgeshire and Peterborough Structure Plan, adopted in 2003 and has since been developed through policies referenced in the Planning Statement accompanying this application.

- 1.5.3 An Area Action Plan (NAAP, 2007) has been prepared for Northstowe and sets out policy direction for the site. For the reasons explained in the Planning Statement this is considered to be the primary policy document against which the application should be determined.
- 1.5.4 A requirement of the NAAP (Policy NS/2) is that a site-wide masterplan should be approved as part of the application for initial development. Given the change in agreed strategy to phased applications, a standalone Development Framework Document (DFD, 2012) for Northstowe was developed by the Joint Promoters and the planning authorities to satisfy the requirements of this policy.
- 1.5.5 The DFD defines the rationale and structure for Northstowe's planning and delivery as a comprehensive development, whilst providing placemaking principles and guidance for individual phases of development. Part of the DFD is a Framework Masterplan for the whole of Northstowe, which sets out the broad distribution of different types of development across the Northstowe site, including:
- up to 10,000 dwellings, a proportion of which will be affordable, at a density of about 40 dwellings per hectare with higher densities at the centre reducing towards the settlement edge;
  - employment centres equivalent to approximately 20 hectares of dedicated employment land;
  - town and local centres comprising retail, hotel, leisure, community facilities such as police, fire and ambulance services and residential uses (approximately 11.6 hectares);
  - four sports hubs equivalent to approximately 39 hectares (including a synthetic turf pitch at the secondary school);
  - green separation between Longstanton and Oakington and the built development;
  - education facilities from nurseries and early years to adult education, including one secondary school and seven primary schools;
  - significant open spaces including informal open space and water park as well as children's play space (approximately 135 hectares);
  - allotments and community orchards;
  - high quality public transport system serving the whole town;
  - use of renewable energy sources, such as micro-generation, and minimisation of energy consumption through careful design; and
  - an exemplar drainage strategy.
- 1.5.6 This document was endorsed by the Northstowe Joint Development Control Committee in July 2012, as a material consideration for all subsequent planning applications.

- 1.5.7 In 2007, a planning application was submitted for the entire Northstowe site, and extensive public consultation was carried out. However, during the recession Government support for the A14 road improvement, which would have provided access to the Northstowe site was removed, and so the application was withdrawn. Since then, the HCA and Gallagher have worked on a phased approach to delivering Northstowe. An application for Phase 1 was submitted in 2012 and permission subsequently granted in April 2014 following completion of a Section 106 Agreement.
- 1.5.8 The Highways Agency is currently progressing proposals for the A14 Cambridge to Huntingdon Improvement Scheme. The proposals will be submitted for determination as a Development Consent Order (for determination by the Secretary of State) in late 2014. It is anticipated that a decision will be made on the scheme in 2016 and that the works will be complete prior to first occupation of homes in Phase 2.

## 2 Environmental Impact Assessment

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### 2.1 Introduction

- 2.1.1 Environmental Impact Assessment (EIA) is required for certain categories of projects and involves a process of drawing together, in a systematic way, an assessment of a project's likely significant environmental effects which must be considered before 'development consent', in this case 'planning permission', is granted.
- 2.1.2 The EIA process results in information about the proposed development along with its associated environmental effects being presented within an ES for the consideration by the determining authority in deciding whether planning permission should be granted.
- 2.1.3 The EIA process itself has a number of required key characteristics including that it is:
- Systematic – the EIA is comprised of a series of tasks that are defined by both regulation and practice;
  - Analytical – the assessments require the application of specialist skills and experience from the environmental sciences;
  - Impartial – the EIA must be used to inform the decision making rather than promote the project itself;
  - Consultative – the EIA process must allow for and provide opportunity for interested parties and statutory consultees to provide feedback on the project and assessments undertaken; and
  - Iterative - the EIA process should allow for environmental concerns to be addressed during the planning and design stages of the project.

### 2.2 Regulatory context

- 2.2.1 The need for EIA for mixed use development projects is identified in the Town and Country Planning (Environmental Impact Assessment Regulations 2011 (the EIA Regulations) which implement Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.
- 2.2.2 The proposed development is classified as urban development and is not included within Schedule 1 of the EIA Regulations, which determines mandatory requirement for EIA. However, under Schedule 2 of the EIA Regulations urban developments over 0.5 hectares require screening for the need of EIA.
- 2.2.3 In considering the need for EIA, the HCA has had regard to:
- the screening criteria in Schedule 3 of the EIA Regulations

- the scale and nature of the project;
- the environmental character of the project location; and
- the potential environmental effects.

2.2.4 HCA concluded that an EIA would be required for the project. An EIA has been undertaken and an ES has therefore been prepared to support the planning application.

2.2.5 Schedule 4 of the EIA Regulations sets out the information that should be provided in the ES. This is outlined in Table 2.1 below together with details of where this information is located within this ES.

**Table 2.1 Schedule 4 information requirements**

<b>Schedule 4 requirement</b>	<b>Where assessed/ included in this ES</b>
A description of the development	Chapter 3
An outline of the main alternatives studied	Chapter 4
A description of the aspects of the environment likely to be significantly affected by the development including, in particular, population, fauna, flora, soil, water air, climatic factors, material assets, including the architectural and archaeological heritage, landscape and the inter-relationship between the above factors.	Chapters 5 - 14
A description of the likely significant effects of the development on the environment, which should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary development.	Chapters 5 - 14
A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment	Chapters 5 - 14
Non-technical summary	Provided with this ES
An indication of any difficulties (technical deficiencies or lack of know-how) encountered by the applicant in compiling the required information.	Included within the topic assessment chapters, (Chapters 5 – 14)

## 2.3 EIA Guidance

2.3.1 This ES has been prepared in accordance with best practice guidance including:

- IEMA Quality Mark – this is run by the Institute of Environmental Management and Assessment (IEMA) and is based around a set of EIA Commitments, which organisations registered to the scheme agree to comply with. The IEMA EIA Quality Mark provides registrants with a benchmark for their EIA activities and allows them to demonstrate their commitment to effective practice; and
- Planning Practice Guidance, Environmental Impact Assessment, March 2014.

## 2.4 EIA Scoping

- 2.4.1 Scoping is the identification of the likely potential significant issues that may arise as a result of the proposed development. As part of the scoping process the applicant asks the local planning authority for its formal opinion on the information to be supplied in the ES for a proposed development. Scoping also helps to ensure that issues and potential effects are assessed at the appropriate level of detail within the EIA.
- 2.4.2 A request for a scoping opinion was submitted to SCDC on 10th March 2014. In accordance with the provisions of Regulation 15 of the EIA Regulations, SCDC was simultaneously and formally informed that an ES would be submitted with the planning application for Northstowe Phase 2 development. A scoping opinion was subsequently adopted by SCDC on 3rd June 2014.
- 2.4.3 The ES has been prepared based on the scoping responses received. Full details of the scoping responses along with how these have been addressed within the EIA are set out in Appendix A1. However, a list of consultees is provided in Table 2.2 and a summary of the keys issues identified during scoping is set out in Table 2.3.

**Table 2.2 Scoping consultees**

SCDC/CCC Consultees	External Consultees
Iain Green (Environmental Health Officer - Public Health Specialist)	Anglian Water
David Hamilton (Landscape Design Officer)	Cambridgeshire Constabulary
Greg Kearney (Environmental Health Officer - Planning Specialist)	Cambridgeshire Fire and Rescue
Pat Matthews (Drainage Manager)	English Heritage
Rob Mungovan (Ecology Officer)	Environment Agency
Ian Howes (Principal Urban Design Officer)	Highways Agency
Clare Sproats (Scientific Officer – Contaminated Land)	Natural England
Tam Parry (Principal Transport Officer)	Cambridgeshire and Peterborough Clinical Commissioning Group
Andy Thomas (Senior Archaeologist)	CATCH – the local Clinical Commissioning Group
Kenny Abernethy, (Scientific Officer (Air Quality))	NHS Property Services
Helen Bord, (Scientific Officer, (Contaminated Land)	Public Health which is part of Cambridgeshire County Council
Mike Salter, (Highways officer)	NHS England
Lois Bowser, (Northstowe Team Leader)	Cambridgeshire Travel for Work Partnership
Sarah Lyons (Housing Officer)	



**Table 2.3 EIA Scoping opinion and response – general comments related to EIA**

Topic	Key issues identified in scoping report	Additional issues raised during consultation
Socio-economic effects	<p>Increased population and effects on local demographics and the need for supporting community infrastructure;</p> <p>Generation of employment during construction and post-construction; The types of jobs generated should be considered in the context of the available workforce in the area. This applies equally to the construction and operational;</p> <p>Provision of new market, intermediate and affordable housing; and</p> <p>Increased demand for local services and facilities, provision of new health, education and leisure and retail facilities</p>	<p>Consideration of arts, museums and libraries;</p> <p>Health Impact Assessment; and</p> <p>Effects of artificial lighting on the amenity of future and existing residential properties.</p>
Traffic and Transport	<p>Increased traffic flows during construction and once the development is completed, leading to effects on the local highway network and associated potential for environmental effects;</p> <p>Changes to local highway infrastructure, including provision of road connection between the site and B1050 and/or Dry Drayton Road;</p> <p>Creation of new, non-motorised user, pedestrian, cycle and equestrian infrastructure; and</p> <p>Increased use of public transport (including the Cambridgeshire Guided Bus) and provision of a new bus route.</p>	<p>No additional issues raised.</p>
Noise and vibration	<p>Increase in noise and vibration from construction activities;</p> <p>Increase in noise from road traffic noise from internal circulation on roads within the proposed development;</p> <p>Changes in road traffic noise due to changes in traffic flow or composition on existing surrounding roads;</p> <p>Plant machinery noise associated with commercial and residential buildings, offices, leisure facilities; and</p> <p>Loading/unloading associated with delivery vehicles</p>	<p>Cumulative impacts with Phase 1;</p> <p>The impact of traffic noise from primary roads within Northstowe Phase 2 development on future noise sensitive premises that form part of the development itself requires numerical noise modelling / contouring to various floor levels; and</p> <p>Increase in noise from Local Area for Play, Local Equipped Area for Play or Neighbourhood Equipped Area for Play or similar.</p>

Topic	Key issues identified in scoping report	Additional issues raised during consultation
Air Quality	Emissions of NO <sub>2</sub> and PM <sub>10</sub> from construction and post-construction traffic; and Generation of dust and particulate matter during construction	Introduction of new receptors close to the A14 and the B1050, both of which generate air pollution; and A Low Emissions Strategy should be prepared (can be separate from the ES).
Hydrology and Flooding	Effects on surface water quality due to increased sediment loading during construction and post-construction; Effects on ground contamination from increased infiltration and interaction with groundwater through Sustainable Drainage Systems (SUDS); Effects on the hydrology and associated flood risk of surrounding watercourses due to increased surface water runoff post-construction; Effects on fluvial flooding risk to site through culverts under CGB (including surface water flood risk due to backwater effects when downstream watercourses are under flood conditions); Effects on flood risk through the proposed SUDS features and groundwater; Effects arising from the increased demand for potable water and wastewater treatment and the associated upgrade works required post construction; and Effects on the hydrology and associated flood risk of surrounding watercourses due to increased surface water run-off.	Effects on potable water supply; and Interaction between watercourses.
Geology, hydrogeology and soils	Potential direct impacts, in the short term and/or long term, on groundwater and surface water receptors arising from existing contamination at the site which may be released during construction; Potential direct impacts on humans (construction workers, site visitors and neighbours) arising from existing contamination at the site which may be released during construction; Potential pollution of the ground, and/or groundwater or surface water, arising from inappropriate storage or handling of hazardous substances, particularly liquids (such as fuels) during the construction period; Protection of future users of the site from landfill gases in the ground and	Impacts related to construction waste.

Topic	Key issues identified in scoping report	Additional issues raised during consultation
	<p>from emission of those gases at the surface;            Potential for buried munitions and ordnance to release contamination and/or cause damage; and            Effects on agricultural land quality and soil resources.</p>	
Ecology	<p>The loss of existing habitats, particularly trees, woodlands, scrub, grassland and waterbodies, including habitat fragmentation;            Indirect impacts of habitat loss associated with the loss of breeding, foraging and roosting habitat for protected species;            The creation of new habitats; and            Disturbance to habitats and protected species, both during and after construction, particularly potential long-term impacts associated with recreational pressure and changes in use.</p>	No additional issues raised.
Archaeology and Cultural Heritage	<p>Effects on buried archaeological remains on the site during construction;            Effects on the setting of nationally listed buildings in the vicinity of the site during and post-construction;            Effects on the setting of the Longstanton Conservation Area during and post-construction;            Effects on the archaeology and historic land use of RAF Oakington; and            Effects on the historic landscape in the potential areas of excavation for fill and infrastructure work.</p>	<p>The status of Longstanton Paddocks;            The relationship of the existing ditch network to historic drainage regimes;            Potential need for further investigative work.</p>
Landscape and Visual	<p>Changes to landform/topography of the site as a result of earthworks;            Changes to tree cover and existing vegetation including historic hedgerows and field patterns;            Changes to drainage features and ditches characteristic of the local landscape;            Changes to land use including built features, settlement patterns, and building materials;            Changes to public rights of way, including historic green lanes.</p>	<p>Visual impact on views of the proposed development and how that would affect the setting of existing settlements; and            A lighting assessment should be included within the EIA.</p>

## 2.5 Assessment Methodology

2.5.1 Once the scope of the EIA has been established, individual environmental topics are subject to survey and investigation to establish the baseline conditions that exist before the proposed development proceeds. This is followed by assessment to identify and predict the significance of the likely environmental impacts of the proposed development. The assessment methodologies applied are based on recognised best practice and guidance specific to each topic area; relevant details of assessment methodologies are provided in the appropriate assessment chapters of this ES.

2.5.2 The technical studies that have been undertaken for each topic area have generally followed the same approach:

- Collection and collation of existing baseline information of the study area in addition to any supplementary survey work required to fill any data gaps or to update any outdated information;
- Frequent consultation with both internal specialists within the team and relevant external consultees. This has been both within and across topic areas;
- Consideration of the potential effects of the proposed development on the existing baseline, followed by identification of possible design changes that would lead to the avoidance or reduction of predicted adverse effects (and likewise the enhancement of any positive effects);
- Assessment of the final scheme design and evaluation of the significance of any residual and cumulative effects; and
- Compilation of the relevant ES chapter.

2.5.3 Many of the environmental effects are relevant to more than one topic area and, therefore, attention has been paid to the interrelationship between them and referenced accordingly. For example, there would be secondary effects on ecological resources/receptors as a result of changes to hydrological regimes. These are assessed within the ecological assessment with a cross reference to the direct effects within the hydrology assessment chapter. Another example is the cultural heritage assessment which has received input from the landscape and visual impact assessment.

2.5.4 In general, the ES assessment chapters have followed the same general format set out below, although there is variation between topics:

- Introduction - presents the potential scope of assessment and sets the general scene for the topic;
- Approach and methodology – a description of the methods used to establish the baseline conditions, identify the likely effects of the proposed development and the assessment of their

significance. Details of any consultations are generally included in this section;

- **Assessment criteria and assignment of significance** - a description of the approach taken to identify the magnitude of an impact, the sensitivity of a receptor and how these combine to result in an assigned significance;
- **Data limitation** – a description of any survey and/or data limitations;
- **Baseline environment** – describing the current state and circumstances of the receptors and changes that might reasonably be expected to occur if the proposed development was not implemented;
- **Design mitigation** – mitigation that has been included within the design of the proposed development, i.e. are part of the proposed development and measures not required to be secured through legal agreements or planning obligations;
- **Seasonal/temporal change** - refers to seasonal change in baseline conditions, where appropriate;
- **Medium and long term temporal change** – the potential for the future baseline to differ from that surveyed. Consideration is given to whether the baseline is likely to change over the project lifetime or during periods considered in the assessment;
- **Potential effects of the proposed development** – this is an assessment of the significant environmental effects of the proposed development as set out in Chapter 3: Proposed Development, i.e. mitigation that is incorporated as part of the design of the proposed development to avoid or reduce effects. Effects are considered for site establishment, site operation and site restoration stages of the proposed development which includes the following:
  - Site enabling works;
  - Construction; and
  - Operation.

2.5.5 **Prevention and mitigation** – measures which would be implemented to avoid, reduce, control, manage or compensate for potential significant effects. Preliminary measures included to mitigate environmental effects in construction are set out in the Construction Environmental Management Plan (CEMP) and are additional to those already included in the design to comply with non-environmental legal requirements. Enhancement measures are also set out;

2.5.6 **Survey and monitoring** – recommendations for any surveys or monitoring that should be undertaken before and during site enabling works, construction and operation;

- 2.5.7 **Residual effects** – an assessment of the significance of the effects likely to arise as a result of the proposed development following implementation of any mitigation measures;
- 2.5.8 **Cumulative and in-combination effects** – an assessment of significant environmental effects that may arise alongside or incremental to other developments which are in planning, consented or operational;
- 2.5.9 **Statement of significance** – a short statement on the overall effects and the assessed significance for the topic; and
- 2.5.10 **References** – references that have been used within the assessment are referenced throughout the chapter as they appear.

## Additional consenting regulatory regimes

- 2.5.11 In addition to the EIA Regulations, other regulatory frameworks have been observed. These include:
- Habitat Regulations Assessment (HRA) – The UK Habitats Regulations are used to implement the EU Habitats Directive (Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora). Following a review of designated sites within the study area, it was concluded that an HRA would not be required; and
  - The Water Framework Directive (2000/60/EEC) - The Project will aim to attain the highest achievable level of water quality standards. This would be achieved with the incorporation of Sustainable Drainage Systems (SUDS) into the design to improve the quality of the runoff from the proposed site;

## 2.6 Identification and significance of effects

- 2.6.1 Schedule 4 of the EIA Regulations sets out the information to be included in an ES, including the aspects of the environment likely to be significantly affected by the development; a description of the likely significant effects of the development on the environment; and a description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment.
- 2.6.2 Developments may affect different environmental elements to varying degrees, and not all impacts arising from a development are of sufficient concern to require detailed investigation or assessment within the EIA process.
- 2.6.3 Within each chapter of this ES, definitions are given for what environmental receptors (or receiving environments) are being assessed along with a description of what changes the proposed

development are likely to cause the affected receptors. The magnitude (or scale) of these changes is defined.

- 2.6.4 In broad terms, significance can be said to be a function of:
- Resource value (international, national, regional or local level importance);
  - Magnitude of effect (either adverse or beneficial);
  - Timescales involved (temporary or permanent); and
  - Receptor sensitivity.
- 2.6.5 Unless otherwise specified within the assessment chapter, the definitions of timescales that have been used include:
- Short term: less than 1 year;
  - Medium term: 1-5 years; and
  - Long term: greater than 5 years.
- 2.6.6 Professional judgement, along with relevant and accepted guidance is used within each assessment chapter to assess the interaction between receptor value (i.e. its importance or sensitivity) and the predicted magnitude of change to identify whether an effect is significant and what level of significance should be assigned (e.g. high, medium, low or negligible significance). In some cases, this is based on quantitative assessment whereas in others, it is only possibly to use professional judgement and qualitative descriptions. In all cases, clear justification for the assessment approach has been set out along with all assumptions and limitations.
- 2.6.7 Where there are no topic specific standards/guidance for assessing significance, the criteria set out in Table 2.4 and Table 2.5 for sensitivity of receptor and magnitude of effect respectively have been used within the assessments.

**Table 2.4 Definitions of Sensitivity**

Level of Sensitivity	Definition of Sensitivity Examples
High	Environment is subject to major change(s) due to impacts: species present in nationally important numbers, or globally threatened; Special Area of Conservation; National Park; World Heritage Site; a panoramic viewpoint.
Medium	Environment clearly responds to effect(s) in a quantifiable and/or qualifiable way: species present in locally important numbers; people travelling on roads; lowland agricultural landscape; an archaeological feature that is not unusual but cannot be considered common.
Low	Environment responds in a minimal way, or not at all, to effect(s) such that only minor, or no, changes are detectable: views from softwood commercial plantation; an archaeological feature that is common, or has been mostly destroyed; common, widespread species.

2.6.8 The magnitude of the effect on the baseline can then be assessed considering the scale, extent of change, nature and duration of effect

**Table 2.5 Definitions of magnitude**

Level of Magnitude	Definition of Magnitude
High	Total loss or major alteration to key elements/ features/ characteristics of the baseline (pre-development) conditions such that post development character/composition/attributes of baseline will be fundamentally changed.
Medium	Partial loss or alteration to one or more key elements/ features/ characteristics of the baseline (pre-development) conditions such that post development character/ composition/ attributes of baseline will be partially changed
Low	Minor loss of or alteration. Change arising from the loss/alteration will be discernible but underlying character/composition/attributes of the baseline condition will be similar to pre development circumstances/patterns
Negligible	Very minor loss or alteration to one or more key elements/features/characteristics of the baseline (pre-development) conditions. Change barely distinguishable, approximating to the "no change" situation.

2.6.9 Using these definitions, a combined assessment of sensitivity and magnitude can then be undertaken to determine how significant an effect is, as demonstrated in Table 2.6. Where effects are classified as being of moderate and/or major significance (either beneficial or detrimental), the effect is considered significant in EIA terms. Table 2.7 provides a description for each of these criteria definitions.

2.6.10 The majority of assessments have used these criteria; however the ecological and cultural heritage assessments have used IEEM and DMRB criteria respectively as these are deemed current best practice.

**Table 2.6 Table Significance Matrix**

		SENSITIVITY		
		Low	Medium	High
MAGNITUDE	High	Moderate	Major / Moderate	Major
	Medium	Minor / Moderate	Moderate	Major / Moderate
	Low	Minor	Minor / Moderate	Moderate
	Negligible	Negligible	Negligible	Negligible



**Table 2.7 Definition of significance levels**

Significance	Criteria Definition
Major	These effects are likely to be key factors or important considerations at a regional or district scale but, if adverse, are potential concerns to the project, depending upon the relative importance attached to the issue during the decision making process. They are generally, but not exclusively associated with sites and features of national importance and resources/features which are unique and which, if lost, cannot be replaced or relocated.
Moderate	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.
Minor	These effects may be raised as local issues but are unlikely to be of importance in the decision making process. Nevertheless, they are of relevance in the detailed design of the project.
Negligible	Effects which are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

## 2.7 Cumulative effects

- 2.7.1 Cumulative effects are defined as those that result from incremental changes caused by other past, present or reasonably foreseeable actions/developments, in combination with the proposed development. Cumulative effects may result in effects that are more than, or less than the sum of the individual effects. For the purpose of this assessment these have included consideration of effects related to:
- A14 Cambridge to Huntingdon Improvement Scheme;
  - Home Farm, Longstanton (S/0682/95/O); and
  - Northstowe Phase 1 (S/0388/12/OL).
- 2.7.2 The cumulative project list has been agreed with SCDC and confirmed in their scoping response (dated 3 June 2014).
- 2.7.3 Cumulative effects have been considered within each of the topic assessment chapters with cross referencing between the topics where appropriate. Future baseline scenarios have been developed for use within the assessment for transport, air quality and noise. This therefore factors in future schemes and the cumulative effect that they would have.
- 2.7.4 In combination effects are those which would be likely to arise from interactions between the different elements of the Proposed Development to give rise to additional or greater or smaller effects: and of any interaction between effects on different environmental media to give rise to any further, additional, fewer or smaller effects.

2.7.5 The cumulative and in combination effects of the Proposed Development and other proposed or permitted schemes are described within individual topic chapters.

2.7.6 For the avoidance of doubt, Northstowe Phase 1, which has been consented, has been considered as part of the future baseline.

## 2.8 Assumptions and limitations

2.8.1 It has been assumed that information provided by third parties, including publically available information and databases is correct at the time of publication. Assumptions specific to environmental aspects are discussed in the relevant topic assessment chapters of this ES.

## 2.9 Project team

2.9.1 HCA has engaged a multidisciplinary team to provide advice on the development proposals, and to identify and address the potential environmental issues which might arise. Table 2.8 below identifies contributors to the assessment work.

**Table 2.8 Contributors to the EIA**

Topic	Contributor
EIA coordination (and chapters 1-4)	Arup
Air quality (chapter 5)	Hyder
Noise & Vibration (chapter 6)	Hyder
Transport assessment (chapter 7)	Hyder
Socio-economic( chapter 8)	Genecon
Archaeology and cultural heritage (chapter 9)	Arup
Ecology (chapter 10)	Arup
Geology, hydrogeology & soils (chapter 11)	Hyder
Hydrology & flooding (chapter 12)	Hyder
Waste (chapter 13)	Hyder
Landscape and Visual Impact (chapter 14)	Arup

## 2.10 ES Structure

2.10.1 As highlighted in 2.2 above, the ES contains the environmental information that is required by the EIA Regulations and comprises a number of elements that are outlined in the sections below.

2.10.2 A non-technical summary (NTS) summarises, in non-technical language, the findings of the EIA. This is included with the main ES (Volume I).

*Environmental Statement (Volume I)*

- 2.10.3 Volume I of the ES (this volume) includes the introductory chapters (1 - 4) and the EIA topic chapters (5 - 14), which are listed in Table 2.8.

*Environmental Statement (Volume II): Appendices*

- 2.10.4 Volume II includes the technical reports, figures and drawings that accompany the ES technical assessments.

*Environmental Statement (Volume III): Figures*

- 2.10.5 Volume III includes all the figures that are referenced within this ES, however figures relating to the description of development are integrated into the main text for ease of reference.

## 2.11 Application documents

- 2.11.1 The ES is being submitted to SCDC for determination as part of the planning application. Table 2.9 lists other documents submitted.

**Table 2.9 Documents submitted with the application**

Application documents
Design and Access Statement
Environmental Statement
Transport Assessment
Flood Risk Assessment and Drainage Strategy
Supporting documents
Arboricultural Survey Report and plans
Economic Development Strategy
Energy Strategy
Framework Travel Plan
Geo Environmental Assessment and Outline Remedial Strategy
Health Impact Assessment
Illustrative Masterplan (Phase 2)
Planning Statement
Site Wide Construction Environmental Management Plan
Stakeholder and Community Engagement Report
Sustainability Statement including low emissions
Town Centre Retail Impact Assessment
Town Centre Strategy
Utilities Report
Waste Strategy

## 3 Proposed development

### 3.1 Description of the proposed development

3.1.1 A planning application has been submitted for the proposed Northstowe Phase 2 development with details of appearance, landscaping, layout, scale and access reserved (save for the matters submitted in respect of the Southern Access Road (West)) comprising:

- 1) development of the Main Phase 2 development area for up to 3,500 dwellings, two primary schools, the secondary school, the town centre including employment uses, formal and informal recreational space and landscaped areas, the eastern sports hub, the remainder of the western sports hub (to complete the provision delivered at Phase 1), the busway, a primary road to link to the southern access, construction haul route, engineering and infrastructure works; and
- 2) construction of a highway link (Southern Access Road (West)) between the proposed new town of Northstowe and the B1050, improvements to the B1050, and associated landscaping and drainage.

3.1.2 The various components of the proposed Northstowe Phase 2 development are described in detail in the following sections. However, in summary the proposals include those listed in Table 3.1 below.

**Table 3.1 Development proposals for Northstowe Phase 2**

Development proposals	
Housing	Up to 3,500 dwellings. A proportion of the housing would be affordable housing (the % of overall units is yet to be determined).
Employment	Employment floorspace would comprise a total of approximately 21,200 sq.m GIA.
Town Centre	Northstowe Phase 2 includes the delivery of the town centre for the whole of Northstowe - the area of the town centre is approximately 9.3 hectares.
Building heights	A range of building heights are proposed, as shown on Plan 9 submitted with the application. Building heights would be greatest in the town centre and in part of the area of the former barracks, with a maximum height of 18.5m above proposed ground level (up to five storeys). This would also be the proposed height of the employment buildings and one small area of residential building on the western side of the site. The eastern schools would be up to 12m in height, the western school would be up to 9m in height. The remaining residential buildings would be up to 11m in height (up to three storeys).
Building densities	A range of densities are proposed, as shown on Plan 7. The densities are: 35-40 dwellings per hectare (dph), 41-60 dph and 61 dph and over.

Development proposals	
Education	Provision would be made for two primary schools (one of 2 form entry, one of 3 form entry) and one secondary school (12 form entry) including post 16 facilities and special educational needs.
Landscaping, play, sport and recreation	Provision has been made for approximately 52 ha of informal and formal open space including: the eastern sports hub; the remainder of the western sports hub; play space provision including LEAPS, NEAPS and LAPS, green separation and greenways.
Energy	There is to be a low carbon approach to the proposed development (more details are set out in the Energy Strategy and Low Emissions Strategy appended to the Sustainability Statement)
Drainage	Sustainable Urban Drainage Systems (SuDS) are incorporated into the surface water drainage system for the proposed development. These SuDS are proposed for the whole development site and locally within each development parcel.  Foul water would be directed to Anglian Water's Uttons Drove sewage treatment works. The proposed foul water drainage strategy consists of gravity sewers draining to six lift pumping stations and one terminal pumping station which would form the main foul outfall for the site.
Access and movement	A new highway link is proposed from the B1050, this will link into the road and busway corridors that run through the site. The primary roads and busway link directly to the equivalent roads in Phase 1.  Initial construction access would be via Phase 1, once the new highway link is build the construction route would be via the existing Airfield Perimeter Road.
Car Parking	An average of 1.5 spaces per dwelling would be provided.
Lighting	As the core area of the scheme is currently in outline only a detailed lighting strategy is unwarranted at this time. Lighting for the Southern Access Road (West) is shown on submitted drawings.
Site levels	The Main Phase 2 development area is proposed to be predominantly at existing ground level to retain existing landscape/ ecology features where possible and construction / development platform depth up to + 0.5m across the site. An area of fill is proposed in the northeast where there is a requirement to increase levels to minimise flood risk and to link with the Phase 1 development levels. Refer to Plan 10 submitted with the application – Proposed Site Levels for further details.

## Housing

- 3.1.3 Northstowe Phase 2 proposes to provide a supply of up to 3,500 dwellings which would range in size and density across the site. A variety of house types and size would be provided broadly in accordance with the following development schedule set out in Table 3.2 .

**Table 3.2 Indicative housing schedule**

Dwelling size	Number of units	% of dwelling type
1 bed	275	8%
2 bed	441	24.5%
3 bed	1,447	41%
4 bed	832	24%
5 bed	88	2.5%
<b>TOTAL</b>	<b>3,500</b>	<b>100%</b>

3.1.4 Affordable housing would be provided as part of the development and would be scattered throughout the housing areas. It is not yet determined what proportion affordable housing would be of the total housing stock.

3.1.5 Housing in the town centre area would generally be located above retail or other commercial uses. These buildings would have the capacity to go up to five storeys in total (maximum height 18.5m). The storey heights are shown on the Building Heights Parameter Plan (Figure 3.1).

### Employment area

3.1.6 Employment areas are likely to be concentrated within the town centre.

3.1.7 Employment floorspace would comprise a total of approximately 21,200 sq.m. Gross Internal Area (GIA).

3.1.8 Employment uses in Northstowe Phase 2 development would comprise those uses included in Use Class B1 Business i.e. offices, research and development and light industry.

3.1.9 The height of buildings in the employment area is identified on the Building Heights Parameter Plan (Figure 3.1).

### Town Centre

3.1.10 The area identified for the town centre is 6.96 hectares, the location of which is shown on the Land Use Parameter Plan (Figure 3.2).

3.1.11 Non-residential floorspace within the town centre would comprise approximately 57,500 sq.m. GIA. The precise use and layout of this area would be determined by subsequent reserved matters applications should outline planning permission be granted.

- 3.1.12 Provision has been made for the following types of uses to be located within the town centre: retail, food and beverage, health centre, civic hub, community meeting space, place of worship, youth facilities, crèche and library. The scale of different uses is set out in the Retail Impact Assessment and Planning Statement, submitted with this planning application. Within the town centre area provision has been made for a town square. The extent of the town square is shown on the Landscape and Open Space Parameter Plan (Figure 3.3). It is approximately 55m x 55m.
- 3.1.13 The busway passes through the town centre and a busway stop would be provided in this area (one of three busway stops in the complete Northstowe development, excluding the stops on the CGB itself). Other bus services would also be found along the busway in the town centre area. These are discussed within the Transport Assessment for Northstowe Phase 2.

### Building heights

- 3.1.14 The building heights strategy has been designed with regard to the sensitivity of the location of Longstanton village on the site's western edge and Rampton Drift which would be enveloped by the proposed development and the main roads through the site. The Building Heights Parameter Plan (Figure 3.1) shows the locations of each of these buildings heights across the site.
- 3.1.15 Residential buildings along the edges of the proposed development would be up to three storeys with a maximum height of 11m. Residential buildings across the majority of the rest of the site would also have a maximum height of 11m (up to three storeys). It is proposed that there would be higher buildings along the main road to the town centre leading from Northstowe Phase 1 area in the north of the site (max height of 14.5m and up to four storeys) and one section of residential buildings that would be up to a maximum height of 18.5 m and five storeys.
- 3.1.16 Town centre buildings would be up to 18.5m in height (up to five storeys) as would be the employment buildings to the southern end of the town centre. It is proposed that residential provision would be incorporated into these town centre buildings.
- 3.1.17 The schools on the proposed site would be up to a height of 12m. The sports hub would be up to 8m (up to two storeys).

### Building densities

- 3.1.18 There would be a range of building densities across the site in ranges of 35-40 dwellings per hectare (dph), 41-60 dph and 61 dph and over. The density of the housing is related to the typology of building, the need for which is discussed in the Housing Strategy document that

has been prepared and submitted in support of this application and appended to the Planning Statement. The locations of these densities are shown on the Residential Density Parameter Plan (Figure 3.4).

## Education

- 3.1.19 Provision has been made for two primary schools (one 2 form entry (FE) and one 3 FE) and one secondary school (12FE) in the Northstowe Phase 2 application. The schools would be designed, built and operated by third parties.
- 3.1.20 One primary school is proposed on the site of the officers' mess building to the west of Rampton Drift. A school on this site could potentially re-use the existing building (subject to modifications) to reflect the heritage of the site or provide a new build solution. This site is 2.54 hectares.
- 3.1.21 A schools area is proposed to the east of the town centre. This area has been identified to make provision for a primary school, secondary school, special education needs (if required) and sixth form.
- 3.1.22 For the purposes of Northstowe Phase 2 development it has been assumed that a secondary school of 7FE (11 to 16 including any SEN) and 2 FE (sixth form) is required.
- 3.1.23 The Building Heights Parameter Plan (Figure 3.1) sets out the proposed maximum building heights on the schools sites, which indicate up to three storeys on the eastern site and two storeys on the former officers' mess site.

## Play, sport and recreation

- 3.1.24 Provision has been made for an eastern sports hub and the remainder of the western sports hub, as well as play space. The western sports hub would form part of the sports hub that is to be provided as part of Phase 1 Northstowe development, this would be completed as part of the proposed Northstowe Phase 2 development. The provision of outdoor sport is set out in Table 3.3 below to meet SCDC standards.

**Table 3.3 Areas of outdoor sports hubs**

Use Type	Area (ha)
Outdoor Sport – eastern sports hub	8.23
Outdoor Sport – western sports hub	2.44

- 3.1.25 In addition, there is other open space provision, as shown on the Landscape and Open Space Plan (Figure 3.3). The composition of the landscape/open space areas are set out in Table 3.4 below.



**Table 3.4 Landscape/ open space areas for Northstowe Phase 2**

Use Type	Description
Green separation	This area separates Longstanton from the proposed development, in line with the requirements of the DFD.
Greenway - informal	<p>The greenways are a defining feature of Northstowe and provide key east west links across the development. The informal greenways would provide an ecological area that contributes to offsetting the effects of development (see Chapter 10: Ecology). These greenways also have a recreation and open space function.</p> <p>There are three informal greenways:</p> <ol style="list-style-type: none"> <li>1. At the north to align with the Phase 1 greenway, including retention of existing hedgerows that define the site boundary.</li> <li>2. Along Rampton Road.</li> <li>3. Along the southern edge of the development.</li> </ol>
Greenway - formal	The formal greenways are located within the development areas and provide a recreational and open space function, with ecological benefits. These greenways allow the retention of trees.
Water park	The water park is required to provide an area of flood attenuation for a 1:200 year + climate change flood event (refer to Chapter 12: Hydrology and Flooding). The water park also has an ecological, recreation and open space function.
Town square	The town square is a formal 'square' within the town centre area. It is likely that this area would be hard landscaped as it would be used for a range of activities to support the vitality and vibrancy of the town centre.

- 3.1.26 There would be a visual and material link where the greenways cross the road network.

## Landscaping

- 3.1.27 The layout of the proposed development has been derived from establishing a grid layout that originates from the existing grid orientation of the former barracks and therefore respects the location of existing hedgerows, and evokes the linearity of the fen landscape. The grid structure would ensure the integration of historical and natural features. The north-west / south-east orientation of the grid would ensure that dwellings are protected from prevailing winds and oriented for maximum sunlight throughout the year.
- 3.1.28 The formal greenways, located within the central grid of the site are oriented in a south-west to north-east direction, which also coincides with the prevailing wind flows. Within these greenways rows of alternating tree lines, together with dense shrub masses and hedges slow down and block strong winds to provide a quiet open space.

- 3.1.29 The informal greenways around the periphery of the site form a linear planted edge along with a solid buffer and protection from prevailing winds with their long interwoven ribbons of rough grassland, tree clusters and shrubs.

### Low carbon energy

- 3.1.30 An Energy Strategy has been submitted with the Phase 2 application and demonstrates how the Phase 2 development will meet the ambitious sustainability aspirations and priorities set out in policy and the Exemplar Addendum. Given the application is in outline the Energy Strategy has adopted a strategic approach.
- 3.1.31 As the development will be post-implementation of the 2016 Building Regulations (which are set to implement zero carbon buildings standards), Phase 2 has adopted the following approach:
1. Mandatory Fabric Energy Efficiency (FEE) Level, to ensure energy efficiency by energy efficient building design.
  2. Mandatory onsite Carbon Compliance Level, to ensure energy efficiency by energy efficient building design and to reduce carbon emissions through on-site low carbon and renewable energy technologies and near-site heat networks.
  3. Mitigation of the remaining carbon emissions through use of 'Allowable Solutions'.
- 3.1.32 By adopting enhanced fabric efficiency standards in all residential dwellings, the total energy demand across the site is reduced by circa 2%, which reduces the sites carbon emission by 1%. The 2% improvement over Building Regulations (2013) equates to an approximate reduction of 32% over Building Regulations (2006), and is therefore substantially greater than the 10% required by Policy NE/1 of the Development Control Policies DPD.
- 3.1.33 The strategy identifies that solar PV is the most appropriate initial step towards meeting zero carbon. The provision of solar PV to 26% of the available roof space would meet 13% of the regulated energy demand of the development, which surpasses the 10% Development Control Policies DPD policy requirements, and would reduce Northstowe regulated emissions below the Carbon Compliance Target.

3.1.34 The table below summarises how Phase 2 meets and exceeds policy targets and the strategy that is proposed to address policy aspirations and the requirements of Building Regulations.

	Requirement	Northstowe Phase 2 Proposals
Policy Target	10% CO2 reduction on 2006 Building Regulations through Fabric Energy Efficiency.	32% CO2 reduction from 2006 Building Regulations.
	10% energy provided by on-site renewable technology.	Minimum of 12% regulated energy provided by on-site renewable technology (based upon PV to 26% of available roof space).
	10% CO2 reduction through on-site renewable technology.	20% CO2 reduction provided by on-site renewable technology.
	CSH Level 4: 25% improvement on 2010 Building Regulations.	100% reduction (Zero Carbon).
	BREEAM Very Good: No minimum requirement.	100% reduction (Zero Carbon).
Policy Aspiration	Aspiration to achieve 20% of predicted energy needs from renewable technology.	Potential near site land based PV farm would increase renewables provision to exceed of 20% aspirational target.
Building regulations	Zero Carbon from regulated energy.	Fabric Energy Efficiency and Carbon Compliance targets met. Viability study to be undertaken for Town Centre District Heat Network. Remaining reductions through Allowable Solutions.

## Drainage

3.1.35 A surface water drainage system for the development would be provided incorporating SuDS (Sustainable Drainage Systems) which combined with landscaping features provide an enhanced environment without increasing the rate of surface water run-off from the developed site. These SuDS facilities would be provided for the whole development site and locally within each sub-phase. The proposed drainage strategy is outlined in the Drainage Strategy accompanying the application, which indicates the location of the water park ponds and key swales (see also Figure 3.2).

3.1.36 Surface water drainage for the existing site discharges to on-site ditches and watercourses. The proposed development would discharge surface water flows into attenuation ponds via swales.

3.1.37 The two attenuation ponds would be located within the new large water park, which would be constructed to the east of the site. Surface water would be stored within the ponds and would be discharged at a controlled rate via a pumping arrangement. The pumping would occur outside of flood events, and the onsite drainage

would be designed to accommodate a 1 in 200 year storm event + 30% climate change without flooding.

- 3.1.38 In the event that water levels in the receiving watercourses off-site are too high, the telemetry system would halt any discharge from the lifting pumps so as not to release any more water from the storage ponds, until the water levels subside.
- 3.1.39 In addition to the rates of discharge, other SuDs methods such as permeable paving, filter drains and green roofs would help to improve the water quality of the surface water run-off before it exits the site.
- 3.1.40 Foul water would be directed to Anglian Water's Uttons Drove STW, which discharges into the Uttons Drove drain, as this treatment facility is best suited for improvement in order to receive the increased effluent associated with the new development in the area. An upgrade to the watercourses between Uttons Drove and Webbs Hole Sluice together with a pumping station at Webbs Hole Sluice would be required to accommodate the increased treated outflow from the STW.
- 3.1.41 The proposed foul water drainage strategy for Northstowe Phase 2 development consists of gravity sewers draining to six lift pumping stations and two terminal pumping stations, which would form the main foul outfall for the site. The first terminal pumping would be located within phase 1 of the development and serve the first 1500 dwellings. The second terminal pumping station would be located in the proposed Northstowe Phase 2 development area and serve phase 2 as well as making passive provision for phase 3. These terminal pumping stations would discharge effluent directly to Uttons Drove STW. The main gravity spine sewer is to be located along the alignment of the proposed CGB route through the site from south to north. The terminal pumping station would discharge effluent directly to Uttons Drove STW. The main gravity spine sewer is to be located along the alignment of the proposed CGB route through the site from south to north.

## Waste

- 3.1.42 A Waste Strategy has been prepared for the site and is submitted in support of the planning application. With regards to construction waste, it is anticipated that any non-hazardous generated material may be reused on-site for landscaping or other purposes, therefore only minimal volumes of non-hazardous material may require disposal off-site. Hazardous materials, such as asbestos would be disposed off-site in an appropriate manner.
- 3.1.43 The alignment, location, level and grading of the proposed development has been designed to minimise unnecessary excavation volumes. It has also been designed to enable flexibility in the landscaping, so that it can accommodate the changes in spoil

volumes that may arise when site conditions differ from those assumed during the design. Both these approaches should enable all excavation waste (including treated soils except where it remains hazardous) to be reused on-site where conditions allow. It is expected that only minimal volumes of material may require disposal off-site.

## Water supply

- 3.1.44 Cambridge Water supplies the area around Northstowe from the Cherry Hilton Reservoir to the south east of Cambridge. Water is transferred from there to Coton and Madingley Reservoirs to the west of Cambridge. Madingley Reservoir feeds trunk mains that pass northwards to the west of Oakington and Longstanton to supply areas to the north of Over. Villages on each side, including Oakington and Longstanton, are supplied by branch mains from these trunk mains.
- 3.1.45 Cambridge Water has confirmed that phases beyond Phase 1 could be served by extending the Phase 1 spine main network into Northstowe Phase 2 and beyond.

## Access

- 3.1.46 The Movement and Access Parameter Plan (Figure 3.5) shows the location of the primary roads and busway within Northstowe Phase 2. These roads link directly to the equivalent roads in Phase 1. The busway corridor would vary in width along its length to accommodate different section typologies, although the busway carriageway itself would generally be 6.5 metres in width.
- 3.1.47 To the south of the main area of development a series of corridors are shown to allow for the development of the primary roads and busway to their connection points. The roads would link to the Southern Access Road (West) and junction, the busway would link to the CGB at the existing spur north of Oakington. The width of the corridors and roads/busway is shown below in Table 3.5.
- 3.1.48 To the south of the main area of development a series of corridors are shown to allow for the development of the primary roads and busway to their connection points. The roads would link to the Southern Access Road (West) and junction, the busway would link to the CGB at the existing spur north of Oakington. The width of the corridors and roads/busway is shown below Table 3.5.

**Table 3.5 Access roads within the proposed site**

Route	Corridor width	Roadway width
Primary road	24 metres	7.3 metres carriageway Plus footpaths, cycleway and swales
Busway	20 metres	7.3 metres
Airfield Perimeter Road	Approximately 16 metres (varies)	As existing
Secondary roads	20 metres	6.1 metres
Southern Access Road (West)	39 metres	9.3 metres

3.1.49 Secondary roads within the Main Phase 2 development area are not shown on the Movement and Access Parameter Plan (Figure 3.5). Full details of the road and busway sections are included in the Design and Access Statement that has been submitted with the planning application.

## Utilities

3.1.50 UK Power Networks, formerly EDF, is the electricity supplier for the Northstowe area. The existing site and the surrounding villages are currently supplied from a substation at Histon which is connected to a primary substation located adjacent to Hattons Road south of Longstanton. A small number of substations are also situated throughout the development area. Previously, the long term strategy to service the future demand from the Northstowe development was to upgrade the Histon sub-station. UKPN has now confirmed that the Histon substation would not require any upgrade with significant load transfer to the new Arbury Grid.

3.1.51 An additional 11kV cable would be needed from the Longstanton sub-station to the site. This capacity would be predominantly utilised by the Phase 1 site and the initial sub-phases on Northstowe Phase 2. The remainder of Northstowe Phase 2 would take the total number of units beyond 3000 (7MVA) units (total of Phase 1 and Phase 2). At this stage, a new 33kV supply would need to be connected from the Histon sub-station to a new on-site primary sub-station (33kV/11kV). This new sub-station would be located within the proposed site infrastructure. The location of the substation would need to be determined at detailed design stage.

3.1.52 National Grid is the regional gas supply company for the area around the site. The main supply in the area is an eight inch intermediate pressure gas main that runs along the western verge of the A14. This supplies a 4 inch intermediate pressure main leading to a pressure reduction station in Oakington, which in turn then supplies Oakington and Longstanton with medium pressure gas. To supply the whole of the site beyond an initial 750 units in Phase 1 would require

significant reinforcement of the off-site gas network according to National Grid.

- 3.1.53 This would include works to the upstream High Pressure (HP) gas main as well as reinforcement to the main adjacent to the A14.
- 3.1.54 The site would connect to the main via two branches:
- Along Hattons Road / Longstanton Bypass into the northern end of the development
  - Along Southern Access Road (West) into the southern end of the development.
- 3.1.55 The programme for the HP network reinforcement delivery is reported to be three years. British telecom (BT) and Virgin Media operate in the Northstowe area. BT has strategic infrastructure in the area running along the A14, Hattons Road and Dry Drayton Road with limited Virgin infrastructure Longstanton.
- 3.1.56 There is currently only limited spare capacity in the existing networks and upgrading works are necessary to serve the development. The upgrading works would provide new high speed telecoms connections that would comprise below ground infrastructure together with a limited number of small cabinets/pillars that would be located on the line of the existing network.

### Site levels

- 3.1.57 The Levels Plan submitted with the application shows the proposed levels for the proposed Northstowe Phase 2 development. The Main Phase 2 development area is proposed to be predominantly at existing ground level to retain existing landscape/ ecology features where possible and construction / development platform depth up to + 0.5m across the site. An area of fill is proposed in the northeast where there is a requirement to increase levels to minimise flood risk and to link with the Phase 1 development levels. (See Earthworks Strategy within the Geo Environmental Assessment and Outline Remedial Strategy for more detail).

## 3.2 Northstowe Phase 2 construction

### Sub-phasing

- 3.2.1 The construction of Northstowe Phase 2 development is proposed to be built out in in six key residential phases (shown in Figures 3.7 and 3.8) and one overlapping phase of construction for the Southern Access Road (West) . A final phasing plan would be agreed in advance of commencement with SCDC and CCC. These timescales may vary depending on changes to housing market conditions.

- 3.2.2 Sub Phase A (2016-2018): To include secondary school, completion of water park and enhancement of green separation (west);
- 3.2.3 Sub Phase B (2017-2019): To include initial residential units adjoining Phase 1, commencement of access road to south (through future Phase 3 area to connect to Southern Access Road (West));
- 3.2.4 Sub Phase C (2019-2021): Town centre commences, including initial retail facilities, primary school, completion of Southern Access Road (West);
- 3.2.5 Sub Phase D (2021-2023): Residential area to south and construction of town square and sports hub (east);
- 3.2.6 Sub Phase E (2023-2026): Residential area established in former barracks area, continuation of town centre, primary school;
- 3.2.7 Sub Phase F (2026-2029); Last residential area and completion of town centre and northern sports hub.

### Other key land use phasing dates

- 3.2.8 Town centre construction to commence in Phase C and is expected to continue to develop up to 2031 dependent on demand for retail and employment uses.
- 3.2.9 The Southern Access Road (West) would be constructed between 2017-2020.
- 3.2.10 It is envisaged that construction works would commence in 2016 and be completed in 2031. First occupancy is expected in 2019. Non-residential buildings are expected to come forward post 2019.

### Main Phase 2 development area

#### Site preparation

- 3.2.11 Site preparation works would be required prior to any construction and this would include the following activities:
- **Establishment of site compounds** – areas for construction compounds are proposed for Main Phase 2 development area within the former Oakington Barracks hardstanding area and for the Southern Access Road (West) the location is proposed adjacent to the B1050. Details of both compounds would be subject to further discussion with the Councils and a CEMP would be prepared for each sub phase (including the SAR (West)).
  - **Demolition of buildings** – all buildings that are currently on the site would be demolished except for:



- The Water Towers - No decision has yet been made about what these towers would be used for;
- Officers' Mess - a Georgian style building surrounded by dense planting with main access from an avenue of mature lime trees. This building is proposed to be converted into a primary school;
- Listed pillboxes
- The Guard's House; and
- Part of the former barracks' road layout would be retained, which includes the tree-lined avenue running from Rampton Road to the former administrative building of the barracks site

3.2.12 **Site remediation** – site investigations have identified the potential for contamination to exist on site. This would need to be remediated in order to make the site suitable for development. Further information on the principles of works to be undertaken are summarised within Chapter 11: Geology, Hydrogeology and Soils. In addition a Remediation Strategy has been prepared for the site and is submitted in support of the planning application. It identifies the need for and methodology for remediation of:

- Contaminated soils (organic and inorganic);
- Asbestos;
- Radiological contamination;
- Groundwater contamination;
- Ground gases; and
- Unexploded Ordnance (UXO)

3.2.13 **Earthworks** - Earthworks and cut and fill are required to enable land raising and re-profiling of the site for sustainable drainage purposes.

### Earthworks and spoil

3.2.14 The primary aim of the earthworks strategy is to lift ground levels above the 1-in-100 year flood level (including allowance for climate change) in order to provide flood protection where necessary and to enable the proposed development to be drained to the proposed attenuation ponds to the north east of the Main Phase 2 site. This is shown on Figure 3.6.

3.2.15 A summary of the proposed cut and fill volumes for the earthworks strategy is shown in Table 3.6. Topsoil would be stripped and stored separately for later re-use within the proposed development and landscaped areas. Any contaminated spoil would need to be removed to an appropriately licensed landfill for disposal.

**Table 3.6 Estimated cut and fill volumes**

<b>Works</b>	<b>Quantity(m<sup>3</sup>)</b>
<i>Main Phase 2</i>	
Volume of Incoming/ displaced material	800,000
Volume of Cut	191,000
Volume of Fill	968,000
Outline Cut and Fill Balance	795,000
<b>Overall Earthworks Cut/Fill</b>	<b>-5000</b>
<i>Southern Access Road (West)</i>	
Volume of Incoming/ displaced material	105,653
Volume of Cut	3,601
Volume of Fill	185,113
Outline Cut and Fill Balance	181,512
<b>Overall Earthworks Cut/Fill</b>	<b>75,859</b>

## Employment

- 3.2.16 It is estimated that during the construction phase there would be the generation of 747 FTE direct construction jobs. This assumption is used in the ES and is based on experience of other schemes of similar scale. However, as part of the application is in outline only at this stage (and represents the majority of construction works), detailed estimates of employment numbers to be generated during the construction phase are not available. More details are provided within Chapter 8: Socio-Economic Assessment.

## Working hours

- 3.2.17 Working hours during the construction phase would be limited to:
- 07:30hrs – 19:00hrs Monday to Friday;
  - 07:30hrs – 13:00hrs Saturday; and
  - No noisy activities on Sundays.

## Plant and Machinery

- 3.2.18 The plant and equipment that would likely be utilised during the construction phase may include scrapers, dozers, 360 degree excavators, backhoe loaders, dumpers, dump trucks, rollers and compressors. Other heavy equipment may also be required during the construction of buildings including lifting plant, cranes and fork lift trucks. Precise details of the nature and quantity of plant and machinery for each phase are unknown at this stage but would be defined in the Construction Method Statement that would be prepared by the contractor.

## Construction Materials

- 3.2.19 The construction materials required would likely be those normally associated with a development of this nature, including items such as bricks, windows, roof tiles, blockwood, bulk timber, timber trusses, ready mixed concrete, plasterboard, dense bitumen/ stone macadam, concrete kerbing and sub-base crushed concrete. Where possible, this would be sourced locally.

## Construction Environmental Management Plan

- 3.2.20 An outline Construction Environmental Management Plan (CEMP) has been prepared for the proposed development of Northstowe Phase 2 and submitted in support of the planning application.
- 3.2.21 The CEMP contains control measures and the standards to be implemented throughout the proposed construction of the development. It sets out a series of measures and standards of work, which shall be applied by contractors throughout the construction period to:
- provide effective planning, management and control during construction to control potential impacts upon people, businesses and the natural and historic environment; and
  - provide the mechanisms to engage with the local community and their representatives throughout the construction period.
- 3.2.22 Full details are provided in the CEMP submitted in support of the planning applications.

## Vehicle movements during construction

- 3.2.23 Construction vehicles would access the Northstowe Phase 2 development initially through Phase 1 (to construct the Secondary School and initial homes) during the period of time until the Southern Access Road (West) and Primary Road through Phase 3 is complete.
- 3.2.24 Once the Southern Access Road (West) is complete, all construction vehicles would access the development from the A14 at Bar Hill, and the Southern Access Road (West). Construction Traffic Management Plans would be in place to ensure there is no access from local roads.
- 3.2.25 From the roundabout junction of the Southern Access Road (West) and the Primary Road through Phase 3 (to the south of Longstanton Road), a construction haul route would be provided using the existing eastern perimeter road. This would be only for construction vehicles and would enable a separation of construction and operational traffic during the build out of the development.

- 3.2.26 To minimise the impact of construction traffic, HGVs would not be permitted to enter or leave the site during the peak hours of 08:00 to 09:00 and 17:00 to 18:00.
- 3.2.27 It has been estimated that 5,506 vehicle departures (one way) would be needed over the construction period. This is equivalent to less than two HGV departures per day on average throughout the construction phase (or four two-way HGV trips assuming each vehicle returns back to the site). Further information can be found in chapter 7.
- 3.2.28 Build out rates have also been taken into consideration in the calculations which suggest that the construction phase traffic would be distributed across the different construction phases as set out in Table 3.7.

**Table 3.7 Vehicle movements for construction materials by phase**

	Sub-Phases					
	A	B	C	D	E	F
Construction Material HGVs	717	7,203	8,366	11,473	14,848	4,919
Building Waste HGVs	87	809	1,240	1,243	1,566	561
Infrastructure waste HGVs	4	34	53	53	67	24
Total one-way HGV movements per day (average)	2	11	14	18	16	8
Total two-way HGV movements per day (average)	4	22	28	36	32	16

### Southern Access Road (West) Construction

- 3.2.29 This section describes the construction methods and phasing of the proposed Southern Access Road (West). A likely worst-case scenario has been applied, based on experience in relation to other developments of a similar size and nature and the professional judgement of the assessment team.
- 3.2.30 The environmental impacts of the Southern Access Road (West) would be managed through implementation of measures in the outline CEMP and through the development of a phase-specific CEMP and CTMP to be approved by SCDC.
- 3.2.31 The hours of work are set out in Section 3.2.17. The Southern Access Road (West) would be constructed over the period 2017 to 2020 at the same time as initial parts of the Main Phase 2 development area are being constructed. Once completed, traffic would be restricted

from accessing the Northstowe Phase 2 site from this access, except under exceptional circumstances.

- 3.2.32 It is envisaged that the road would be built in one phase, with the main construction compound located off the B1050 and construction activity progressing from south to north. Bridge construction would be concurrent with the road construction. The works would be executed largely offline with online works required to tie in to the roundabout junction with the B1050. During junction tie in works, there is likely to be a requirement for temporary traffic management on the B1050 resulting in temporary delays to traffic.
- 3.2.33 It is anticipated that the Southern Access Road (West) would be fully operational by Q2 of 2020.
- 3.2.34 The number of workers required to construct the Southern Access Road (West) is likely to fluctuate but is estimated to be approximately 50 people.
- 3.2.35 Table 3.8 sets out the likely sequence of construction activities on site.

**Table 3.8: Predicted construction sequence for Southern Access Road (West)**

Preparatory works	Ecological/archaeological mitigation
	Erection of temporary fencing
	Erection of temporary traffic signage/management
	Temporary construction compound, site security, welfare, parking and temporary utilities
	Temporary stopping up of PRow
	Site clearance (trees/hedgerows)
	Soil strip and stockpile
	Creation of temporary haul road from Main Phase 2 development area
	Utilities installation and diversions
Construction works	Earthworks, road construction and surfacing
	Construction of
	Land raising and abutment formation for bridge deck
	Permanent connection to B1050
	Permanent access arrangements
	Installation of road markings and signage
	Installation of lighting at roundabout junctions
	Removal of site compound and temporary infrastructure
Landscape works	

## Ecology and archaeology works

- 3.2.36 An Ecological Clerk of Works would be employed to supervise site works, primarily vegetation clearance, tree protection measures and landscaping/habitat creation.
- 3.2.37 All topsoil stripping and other intrusive works would be subject to an archaeological watching brief. Where the topsoil strip identified features of interest, works would cease in the area until investigations have occurred.

## Site Establishment

- 3.2.38 The site would be secured with suitable temporary fencing at the boundary of works areas. Site clearance and vegetation removal, including limited hedgerow translocation would be carried out along the route outside of the bird breeding season, to avoid impacts on nesting birds. Where works were required outside of this period, they would be supervised by an Ecological Clerk of Works. Tree protection for retained trees would be implemented in accordance with BS5837.
- 3.2.39 The Southern Access Road (West) construction compound would be established adjacent to the B1050 to supervise all deliveries entering the site. Site compound facilities would include, main site office, welfare facilities, materials storage areas, site parking. Compound lighting would be directional and face into the site to minimise any light spill. Buildings would be of prefabricated modular construction and could be up to two storeys in height. Temporary utilities including power, drainage, water supply and telecommunications would be provided as required.
- 3.2.40 Prior to the works and subject to consent the existing bridleway would be stopped up until the new bridleway was operational.

## Earthworks

- 3.2.41 The earthworks design is intended to minimise offsite disposal of excavated material. Subject to detailed testing of the existing ground conditions, a soil strip would be undertaken with stockpiling of stored topsoil in accordance with Defra guidelines (for further information refer to the Earthworks Strategy submitted in the CEMP with this planning application).

## Carriageway and associated infrastructure

- 3.2.42 Initially the carriageway would be constructed up to base course level with the final wearing course layer to be added toward the end of the construction phase for each section of the proposed route. It is not anticipated that piling would be required. After the final wearing

course layers are laid, the proposed lighting columns for the roundabout, road markings and signage would be erected.

- 3.2.43 Surface water drainage would be installed at the same time as the carriageway is constructed. Surface water is proposed to drain to attenuation ponds located at intervals along the road alignment. The attenuation ponds would then discharge to the local drainage ditch network and hydrobrake system to control the rate of surface water discharge. The ponds serve to reduce the peak flows from the highway network to reduce any potential effects on flooding within the local drainage network.

### **Wilson's Road bridge**

- 3.2.44 Footings would be excavated for the bridge abutments and precast or cast in-situ concrete wingwalls would be installed. Fill materials would be used to raise the earth embankments. The bridge deck would be installed once the abutments were complete. Landscaping works would then be implemented on the bridge approaches to allow establishment of landscape planting.

### **Permanent Road Connections and Accesses**

- 3.2.45 The construction work to connect the carriageway to the B1050 would result in minor disruption to the existing road network and the need for temporary traffic management. This would be carried out in consultation with the Highway Authority and any other relevant stakeholders.
- 3.2.46 The construction of the new roundabout link to the B1050 would be a significant change to the operation of the road, therefore as much of the works as possible would be carried out within the construction site before multiple phasing would re-route traffic to complete the roundabout. This work would last a few months with temporary traffic lights, reconfigurations and lane narrowing likely to be necessary to complete the construction to avoid a full closure of the B1050.
- 3.2.47 Once construction works were completed landscaping works would be undertaken for the Southern Access Road (West).
- 3.2.48 Once opened the Southern Access Road (West) would be used for all construction works except under exceptional circumstances.

### **Construction Site Access and Traffic Implications**

- 3.2.49 Two way vehicles movements would be principally associated with the delivery of materials, removal of waste and journeys to and from

the site by contractors (refer to Chapter 7 and the Transport Assessment for further details).

## Construction Site Access and Egress

- 3.2.50 The proposed access/egress to the site would be off the B1050 at the proposed southern junction of the road. This would be next to the main Southern Access Road (West) site compound.
- 3.2.51 All vehicles accessing the site would be expected to park on site and would be restricted from parking on any public roads. This would be set out in the CTMP.
- 3.2.52 Security access and management of the construction phase would be arranged to minimise the amount of construction traffic queuing outside of the construction site boundary. This would include setting specific delivery dates and collection times; consolidation of deliveries; a requirement for authorisation when visiting the site via vehicle, including restrictions on the workforce travelling to site by car.
- 3.2.53 Whilst no long-term road closures are envisaged, there would be a requirement for traffic management on the B1050 which may include road closures and one-way arrangements controlled by lights.

## Construction Plant and Equipment

- 3.2.54 The following plant and equipment have been used to inform the relevant assessments within this volume of the ES, notably the noise and vibration assessment:
- Road Planer;
  - Tracked Excavator;
  - Dozer;
  - Dumpers;
  - Vibratory Roller (22t);
  - Breaker mounted on backhoe;
  - Concrete Crusher Plant;
  - Asphalt Paver;
  - Diesel Generator;
  - Delivery Lorry;
  - Tracked Mobile Crane;
  - Telescopic Handler;
  - Wheeled Loader;
  - Tower Crane;



- Concrete Saw;
- Compressor;
- Excavator;
- Roller Compactor;
- Water Pump;
- Concrete Pump & Concrete mixer truck discharging;
- Poker Vibrator;
- Percussion Drill;
- Circular Saw;
- Angle Grinder; and
- Welder.

## 4 Alternatives and design evolution

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### 4.1 Introduction

- 4.1.1 Schedule 4 of the EIA Regulations requires “an outline of the main alternatives studied by the applicant or appellant and an indication of the main reasons for the choice made, taking into account the environmental effects”.
- 4.1.2 As discussed in Section 1.1 and the Planning Statement, the site location for a new town in Cambridgeshire has been decided as a result of careful site selection studies over several years. The allocation of Northstowe in adopted policy documents has led the HCA to conclude that it was not appropriate to investigate potential alternative sites further.
- 4.1.3 The development proposals for Northstowe Phase 2 have evolved as a result of careful consideration and evaluation of alternatives over a number of years. Location and layout within the site is a result of the evaluation of a number of options over the last year. The proposed development is the option which responded best to the process of evaluation, environmental constraints and the vision for Northstowe.
- 4.1.4 This chapter outlines the evaluation processes by discussing the evolution of the master plan.

### 4.2 Alternatives for Main Phase 2 Development Area Boundary Definition

- 4.2.1 The options for the extent of the proposed Main Site development area have been informed by:
- The existing policy framework set out in the DAS and Planning Statement (in particular the DFD);
  - Assessment of the physical features and conditions in existence including location of the CGB to the east;
  - Longstanton to the west; and
  - Phase 1 to the North.
- 4.2.2 The established location of Phase 1 and the DFD dictated that the next phase of development should be to the immediate south of Phase 1. The HCA undertook analysis to establish the scale (coverage and number of homes) that should be included in Main Phase 2 development area. This initial analysis identified that:
- Phase 1 provides 1,500 dwellings approximately at an average density of 37.5 dph (net density);
  - If this density was applied across the site, it would result in a shortfall of 2,500 dwellings, equivalent to approximately 25% of

the total number of dwellings proposed for the whole of Northstowe;

- In order to achieve the provision of the remaining 8,500 dwellings, the overall site would need to be developed at an average of 53dph;
- Therefore, in the determining the boundary and site capacity options for the Main Site development area, options were considered for increasing and varying density.

4.2.3 The above was to ensure that the residential development coming forward beyond the Main Site development area could be achieved at a minimum average density of 40 dph as dictated by policy;

4.2.4 A higher density for the Main Site development area was also deemed suitable because this phase contains the town centre, and so, it should be the denser area of the whole Northstowe.

4.2.5 The southern boundary limits to the Main Site development area have been defined by the strong greenway link east to west set in the DfD Framework masterplan and also following the initial drainage strategy work, as the water attenuation requirements for Main Phase 2 development area which require the inclusion of the water park area to serve the whole of Main Site development area drainage needs.

### 4.3 Alternative – design options for Main Phase 2 Development Area

4.3.1 The master plan for the proposed development has evolved through consultations with SCDC and CCC, the Parish Forum, public exhibitions; further details of which can be found in the Stakeholder and Community Engagement Report submitted in support of the application.

4.3.2 There are numerous permutations/ alternatives possible for the layout within the Main Phase 2 development area, however the starting point for the proposed application is the adopted policy basis of the NAAP and supporting DFD. As a result of environmental assessment work (in particular landscape, cultural heritage assessment) and consultation there has been some minor design alternatives tested, resulting in the final proposal. The main elements of the master plan that were revised from the original policy basis are detailed in the Design and Access Statement and include those outlined below.

#### Internal Access Routes

4.3.3 The routes of the spine route / busway and primary roads have been realigned from the DFD. The reconfiguration of the block layout into a grid system originates from the road alignment of the former barracks site.

- 4.3.4 The key realignment of the primary road structure from DfD to the proposed layout was the realignment of the western primary road in order to make it more bus friendly and move it away from the edge of the development.
- 4.3.5 There have been some changes to busway crossings and access points:
- 4.3.6 Increased number of transport crossings across the busway to allow for increased movement and permeability around the site; and
- 4.3.7 Access proposed at the north east and north west corner of Rampton Drift ensuring the use of existing access arrangements.

## Landscape

- 4.3.8 The DFD shows the landscape blocks all at the edge of the site. Through the design process it has been considered that bringing the landscape into the site by adding more greenways and improving connections between east and west would enhance the ecological value and have positive health impacts. The green separation zone to the west has also been enhanced. There has also been some re-alignment of the grid pattern based on tree surveys ensuring the mature trees are to be retained.
- 4.3.9 Some minor alternations have been incorporated to the landscape areas around Rampton Drift. These have been introduced to make best use of existing landscaping to provide a buffer between the new development and existing homes.

## Education provision

- 4.3.10 Relocation of the primary school to potentially make use of the existing officers mess building and to provide playing fields backing onto Rampton Drift.
- 4.3.11 The area identified for a primary and secondary school on the eastern half of the site has been revised to introduce greater flexibility in how education provision is delivered at the site. CCC is in the process of developing its requirements for Northstowe and the changes have been introduced to allow the areas identified for schools to be used for primary, secondary, special education needs and/or sixth form. To support this approach the eastern most primary road has been relocated to run around the education sites rather than through them.

## Building heights

- 4.3.12 The maximum building heights for residential development has been increased in the area north of the town centre along the route of the

busway. This responds to general support for higher density and taller buildings in Northstowe Phase 2 and would align with the proposals for Phase 1. The area around Rampton Drift would comprise up to two storey buildings to protect the amenity of existing residents.

## 4.4 Alternatives for Southern Access Road (West)

- 4.4.1 Policy NS/10 of the NAAP states that adequate highway capacity would be required to serve all stages of development, which may include new roads into the southern end of Northstowe from Hatton's Road and from Dry Drayton junction. Multiple options for highways links into the south of the site were considered. These are also discussed in the Design and Access Statement submitted with this planning application.
- 4.4.2 As part of the public consultation on the proposals (see the Stakeholder and Community Engagement Report submitted as part planning application) external access from both the west (Bar Hill junction) and east (Dry Drayton junction) were consulted on. Since then, extensive transport modelling work (see Transport Assessment submitted with this application) has been commissioned by the HCA to assess the impact of the proposed Northstowe Phase 2 development and inform the Framework Travel Plan for the development. This work has shown that provision of a second southern access link from the existing Dry Drayton junction into the southern end of Northstowe does not bring significant benefits for Northstowe Phase 2, and in fact leads to additional traffic generation drawing traffic from the western access and the A14 local access roads. For this reason, provision of this link is not included as part of the proposals for Northstowe Phase 2.
- 4.4.3 A new Southern Access Road (West) would be provided from the southern end of Northstowe to connect to the B1050 east of the Bar Hill junction. This would be provided early in the delivery of Northstowe Phase 2 development and would minimise the impact of traffic generation on surrounding communities. Careful consideration has been given to the design of the access road to ensure there would be no 'rat-running' of traffic through nearby villages. Close collaboration with the Highways Agency has been undertaken to ensure that the development and traffic assumptions used in the Phase 2 proposals and the A14 road improvements are compatible and complement each other.
- 4.4.4 Analysis undertaken as part of design development (see Transport Assessment for full details) has demonstrated that the Southern Access Road (West) could be provided as a single carriageway rather than a dual carriageway for Phase 2, as the forecast flows are significantly lower than both the capacity of a dual and single carriageway road. However, the longer term capacity requirements for Northstowe mean that a dual carriageway may be required and

this is assessed as the worst case. However, as part of the delivery of the Northstowe Phase 2 delivery it is intended that the link would be constructed as a single carriageway.

## 5 Air Quality

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### 5.1 Introduction

- 5.1.1 This air quality chapter assesses the impact of the proposed Northstowe Phase 2 development on local air quality; this includes assessments of pollutants associated with both the operational and construction phase. This chapter presents the results of detailed dispersion modelling and applies appropriate guidance to categorise the significance of impacts as compared to the future baseline. Where possible, predicted impacts have been mitigated in order to lessen the significance of impacts associated with the proposed Northstowe Phase 2 development.

### 5.2 Review of Proposed Development

- 5.2.1 The proposed development has the potential to impact on existing receptors as a result of additional traffic flows on the local road network associated with the operational phase of the proposed development. In addition pollutant concentrations at on-site receptors require consideration to ensure that future occupants of the proposed development would not be exposed to unacceptable concentrations of air pollutants.
- 5.2.2 The development is located close to an Air Quality Management Area (AQMA), designated by South Cambridgeshire District Council (SCDC), therefore additional traffic flows associated with the development could lead to a worsening of air quality within the AQMA and across the local road network. The roads and receptors located within the AQMA are considered within this assessment.
- 5.2.3 Additionally, should an on-site energy centre be included within the development, this could affect future air pollutant concentrations in and around the site.
- 5.2.4 Construction phase activities such as land clearance and earthworks could result in fugitive dust emissions which have the capacity to cause loss of amenity and impact air pollutant concentrations in the vicinity of the site.
- 5.2.5 The potential effects on carbon dioxide emissions as a result of increased heating/power demand are examined in the separate energy statement that is submitted in support of the Northstowe Phase 2 planning application.

## 5.3 Approach and methods

- 5.3.1 This section sets out the legislative and policy framework that underpins air quality assessment work in the UK and sets out the different methodologies for assessment of Northstowe Phase 2.

### Legislation and guidance

- 5.3.2 The air quality assessment has been undertaken in accordance with current international and national legislation (as English air quality legislation transposes EU Directives), national and local plans and policies relating to air quality in the context of the proposed development. These are outlined below. An overview of the policy context is provided in the planning statement.

### European Legislation

- 5.3.3 EU Framework Directive 96/62/EC on ambient air quality assessment and management<sup>1</sup> came into force in November 1996 and had to be implemented by Member States by May 1998. The Directive aims to protect human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants. As a Framework Directive it requires the Commission to propose 'Daughter' Directives setting air quality objectives, limit values and alert thresholds, as well as guidance on the monitoring of individual pollutants.
- 5.3.4 The European Commission worked together with Clean Air For Europe (CAFE) to produce and publish a new European Directive in 2008 (Directive 2008/50/EC)<sup>2</sup>. Key changes included a new air quality objective for particulate matter smaller than 2.5µm (micrometres) in aerodynamic diameter (PM2.5). The objective includes a limit value and exposure reduction target. Member states had until 2010 to transpose the new directive.

### National Air Quality Strategy

- 5.3.5 Part IV of the Environment Act (1995) requires the UK Government to produce a national Air Quality Strategy (AQS) which contains standards, objectives and measures for improving ambient air quality. Air pollution can seriously affect people's health and also the environment. Exposure can be over the long term or short term. The AQS sets out objectives that are maximum ambient concentrations that are not to be exceeded either without exception or with a permitted number of exceedences over a specified timescale.

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<sup>1</sup> The Council of the European Union (1996) Air Quality Framework Directive 96/62/EC.

<sup>2</sup> Council of European Communities (2008), Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe 2008/50/EC.



5.3.6 The latest version of the AQS for England, Scotland, Wales and Northern Ireland was published in 2007<sup>3</sup>. There were no major changes to the objectives set out in the 2000 strategy or its addendum.

## National Legislation

5.3.7 The ambient air quality standards and objectives relevant to this assessment are presented in Table 5.1. These are given statutory backing in England through the Air Quality Regulations 2000<sup>4</sup>, the Air Quality (Amendment) Regulations 2002<sup>5</sup> and the Air Quality Standards Regulations (2007)<sup>6</sup>. The Air Quality Standards Regulations 2010<sup>7</sup> came into force on the 11th June 2010 and transpose the requirements of the European Union Directive 2008/50/EC.

**Table 5.1 Relevant Air Quality Objectives/EU Limit Values**

Pollutant	Air Quality Objectives			EU Limit Values	
	Concentration	Averaging Period	Compliance Date	Concentration	Compliance Date
NO <sub>2</sub> (Nitrogen Dioxide)	200µg/m <sup>3</sup>	1-hour mean (not to be exceeded more than 18 times per year)	31 December 2005	200µg/m <sup>3</sup> (18 exceedences)	1 January 2010
	40µg/m <sup>3</sup>	annual mean	31 December 2005	40µg/m <sup>3</sup>	1 January 2010
PM <sub>10</sub> (Particulate matter less than 10 microns in size)	50µg/m <sup>3</sup>	24-hour mean (not to be exceeded more than 35 times per year)	31 December 2004	50µg/m <sup>3</sup> (35 exceedences)	1 January 2005
	40µg/m <sup>3</sup>	annual mean	31 December 2004	40µg/m <sup>3</sup>	1 January 2005

5.3.8 Local authorities have no legal requirement to comply with AQS objectives; they are however required to demonstrate best efforts to work towards achieving AQS objectives in order to meet statutory EU limit values.

<sup>3</sup> Department for the Environment, Food and Rural Affairs (2007), The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Department for the Environment, Food and Rural Affairs.

<sup>4</sup> Statutory Instrument No. 928, Air Quality (England) Regulations (2000), The Stationery Office Limited.

<sup>5</sup> Statutory Instrument No. 3043, Air Quality (England) (Amendment) Regulations (2002), The Stationery Office Limited.

<sup>6</sup> Statutory Instrument No. 64, the Air Quality Standards Regulations (2007), The Stationery Office Limited.

<sup>7</sup> Statutory Instrument No. 1001, the Air Quality Standards Regulations (2010), The Stationery Office Limited.

- 5.3.9 Under the Local Air Quality Management (LAQM) regime, local authorities have a duty to undertake periodic reviews of local air quality against the AQS objectives/limit values. Where a local authority's review and assessment of local air quality indicates that AQS objectives/limit values are not expected to be achieved, local authorities are required to designate an AQMA.

### National Planning Policy Framework (NPPF)

- 5.3.10 The NPPF<sup>8</sup> defines pollution as:

*'Anything that affects the quality of land, air, water or soils, which might lead to an adverse impact on human health, the natural environment or general amenity. Pollution can arise from a range of emissions, including smoke, fumes, gases, dust, steam, odour, noise and light.'*

- 5.3.11 The NPPF outlines a set of core land-use planning principles that should underpin both plan making and decision-taking. The principle relating to air quality states the following:

*'The planning system should contribute to and enhance the natural and local environment by...preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability.'*

*'To prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account...'*

- 5.3.12 Finally, the NPPF states that:

*'...planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan.'*

- 5.3.13 The Government has revised and updated national planning practice guidance to support the NPPF in order to make it more accessible. The guidance is available as an online resource<sup>9</sup> and includes advice relating to; planning and air quality, the role of Local Plans with regard to air quality, when air quality is likely to be relevant to a planning decision, what should be included within an air quality assessment and how impacts on air quality can be mitigated.

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<sup>8</sup> Department for Communities and Local Government (2012), National Planning Policy Framework.

<sup>9</sup> Department for Communities and Local Government (2014),

<http://planningguidance.planningportal.gov.uk/blog/guidance/air-quality/why-should-planning-be-concerned-about-air-quality/>

- 5.3.14 The guidance advises that, in terms of determining whether air quality is relevant to a planning decision, considerations could include whether the development would:
- Significantly affect traffic in the immediate vicinity of the proposed development site or further afield;
  - Introduce new point sources of air pollution (such as biomass boilers, centralised boilers and Combined Heat and power (CHP) plant) within or close to an AQMA or introduce relevant combustion within a Smoke Control Area;
  - Expose people to existing sources of air pollutants (such as by building new homes);
  - Give rise to a potentially unacceptable impact (such as dust) during construction for nearby sensitive locations;
  - Affect biodiversity; and
  - Give rise to adverse impacts upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation (including that applicable to wildlife).
- 5.3.15 The guidance states that “assessments should be proportionate to the nature and scale of development proposed and the level of concern about air quality, and because of this are likely to be locationally specific. The scope and content of supporting information is therefore best discussed and agreed between the local planning authority and applicant before it is commissioned.”
- 5.3.16 The guidance indicates that the following could be included within an air quality assessment:
- “A description of baseline conditions and how these could change;
  - relevant air quality concerns;
  - the assessment methods to be adopted and any requirements around verification of modelling air quality;
  - sensitive locations;
  - the basis for assessing impact and determining the significance of an impact;
  - construction phase impact; and/or
  - acceptable mitigation measures”

## Local Planning Policy

- 5.3.17 A detailed overview of local planning policy is contained within the planning statement. The most pertinent policy relating to air quality is

contained with the Development Control Policies DPD<sup>10</sup>, which states the following:

“POLICY NE/16 Emissions

1. Development proposals will need to have regard to any emissions arising from the proposed use and seek to minimise those emissions to control any risks arising and prevent any detriment to the local amenity by locating such development appropriately.
2. Where significant increases in emissions covered by nationally prescribed air quality objectives are proposed, the applicant will need to assess the impact on local air quality by undertaking an appropriate modelling exercise to show that the national objectives will still be achieved. Development will not be permitted where it would adversely affect air quality in an Air Quality Management Area.”

## Guidance

- 5.3.18 Potential effects have been assessed in accordance with best practice guidance, as detailed in the following sections, and the implications of the above policies have been considered throughout the air quality assessment.

## Study Area

- 5.3.19 The study area in terms of traffic emissions includes any receptors within 200m of any roads which would be affected by the development. Following the Environmental Protection UK (EPUK) guidance<sup>11</sup>, a significant change in traffic flows is considered to be a change in Annual Average Daily Traffic (AADT) flows of greater than 10% (5% in an AQMA) or a change in vehicle speed of more than 10kph on roads with more than 10,000 AADT, or a change in Heavy Duty Vehicles (HDV) of more than 200 per day. In addition, the Design Manual for Roads and Bridges (DMRB)<sup>12</sup> provides the following criteria for determination as to whether there is likely to be a significant impact on air quality as a result of a scheme:
- Daily AADT flows will change by 1,000 or more; or
  - Daily HDV AADT flows will change by 200 or more; or
  - Daily average speed will change by 10 km/hr or more; or
  - Peak hour speed will change by 20 km/hr or more; or

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<sup>10</sup> SCDC (2007), Local Development Framework: Development Control Policies.

<sup>11</sup> Environmental Protection UK (2010), Development Control: Planning for Air Quality (2010 update).

<sup>12</sup> Highways Agency (2007) Design Manual for Roads and Bridges Volume 11, Section 3, Part 1, HA207/07.

- Road alignment will change by 5m or more.

5.3.20 Figure 5.1 presents the affected roads as defined by the EPUK and DMRB criteria. In addition, the Figure shows the extent of SCDC's A14 Corridor AQMA.

5.3.21 In accordance with the Institute of Air Quality Management (IAQM) dust guidance<sup>13</sup>, the study area for construction dust comprises an area 350m from the redline boundary and an area within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

## Methodology

5.3.22 The proposed development has the potential to cause air quality effects during the construction and operational phases. These can be summarised as:

- Construction phase: dust emissions from demolition, earthworks, construction and track out and vehicular emissions from construction traffic;
- Operational phase: vehicular emissions from traffic associated with the proposed development; and
- Should an on-site energy centre be included within the development, this may impact future air pollutant concentrations in and around the site.

5.3.23 In terms of haulage vehicles, the construction phase is not expected to lead to an increase of over 200 Heavy Goods Vehicles (HGVs) per day on the local road network. The transport assessment states that the peak average number of one-way movements in any of the build out phases is 18 (during sub phase D). Therefore construction traffic emissions are not considered likely to give rise to significant effects as defined in the EPUK guidance<sup>14</sup> which stipulates that an assessment of construction vehicles is only required for:

*'large, long term construction sites that would generate large HGV flows (greater than 200 movements per day) over a period of a year or more'.*

5.3.24 Construction vehicle exhaust emissions have therefore not been considered further in this assessment.

5.3.25 Consultation regarding the air quality methodology has been undertaken with the Environmental Health Officer (EHO) of SCDC, and the methodology has been agreed.

<sup>13</sup> IAQM (2014), Guidance on the Assessment of Dust from Demolition and Construction.

<sup>14</sup> Environmental Protection UK (2010) Development Control: Planning for Air Quality (2010 update).

## Site Enabling Works and Construction Effects – Fugitive Dust

- 5.3.26 There is the potential for fugitive dust emissions to occur as a result of construction phase activities. These have been assessed in accordance with the methodology outlined within the IAQM guidance (2014)<sup>15</sup>.
- 5.3.27 The most common air quality impacts that may arise during demolition and construction activities are:
- Dust deposition, resulting in the soiling of surfaces; and
  - Elevated PM10 concentrations, as a result of dust generating activities on site.
- 5.3.28 These impacts may affect human and ecological receptors. The IAQM guidance defines a human receptor as:
- ‘any location where a person or property may experience the adverse effects of airborne dust or dust soiling, or exposure to PM10 over a time period relevant to the Air Quality Objectives. In terms of annoyance effects, this will most commonly relate to dwellings, but may also refer to other premises such as buildings housing cultural heritage collections (e.g. museums and galleries), vehicle showrooms, food manufacturers, electronics manufacturers, amenity areas and horticultural operations (e.g. salad or soft-fruit production).’*
- 5.3.29 An ecological receptor is defined as:
- ‘any sensitive habitat affected by dust soiling. This includes the direct impacts on vegetation or aquatic ecosystems of dust deposition, and the indirect impacts on fauna (e.g. on foraging habitats).’*
- 5.3.30 The risk of dust emissions from construction/demolition activities causing an adverse effect on human or ecological receptors depends on:
- The type of construction activities being undertaken, and the duration of these activities;
  - The size of the construction site;
  - The meteorological conditions (such as wind speed, wind direction and rainfall);
  - The proximity of the receptors to the construction activities;
  - The effectiveness of the dust mitigation measures; and
  - Receptors’ sensitivity to dust.
- 5.3.31 Activities on the proposed construction site have been divided into four types to reflect their different potential impacts. These are:

<sup>15</sup> IAQM (2014), Guidance on the Assessment of Dust from Demolition and Construction.

- demolition;
- earthworks;
- construction; and
- trackout of mud and debris onto the highway.

5.3.32 The potential for dust emissions was assessed for each activity that is likely to take place and considers three separate dust effects:

- annoyance due to dust soiling;
- harm to ecological receptors; and
- the risk of health effects due to an increase in exposure to PM10.

5.3.33 The detailed assessment steps are presented in Appendix 5.1.

## Assessment of Operational Effects – Road Traffic Impacts

5.3.34 The traffic data for the operational impact assessment is set out in the Transport Assessment (Appendix 5.3). The traffic scenarios provided are detailed in Table 5.2 and have been used to assess the development's impacts.

**Table 5.2 Modelled Road Traffic Scenarios**

Scenario	% build out of Phase 2	Traffic Summary
Base Year 2011	0	Base Year for Model Verification
Interim 2026	58%	Base Year+Growth to 2026+Completed Phase 1+58% Phase 2
Do Minimum (DM) 2031	0%	Base Year+Growth to 2031+Completed Phase 1
Do Something (DS) 2031	100%	Base Year+Growth to 2031+Completed Phase 1+100% Phase 2

5.3.35 For the purposes of determining significance, air quality effects are based on the full build out scenario in 2031. Emission rates from the road network are predicted to reduce slightly between 2026 and 2031, as the proportion of vehicles in the national fleet convert to cleaner vehicles (Euro 6/VI). The increase in traffic flows is predicted to be greatest for the full opening of the development (assumed to be 2031) and is expected to result in the largest increases in traffic generated by the development and hence the largest changes in pollutant concentrations. The interim year of 2026 (roughly midway through the phase 2 build-out) was modelled to establish whether exceedences of the annual mean concentrations for NO<sub>2</sub> and PM<sub>10</sub> are likely in the years prior to the completion of phase 2 when emissions from vehicles will be higher.

- 5.3.36 All scenarios other than the Base Year (2011) include the A14 improvement works.
- 5.3.37 The operational traffic assessment has been undertaken using the detailed dispersion model ADMS-Roads. The results of the models have been verified using the results of the NO<sub>2</sub> diffusion tube monitoring collected in 2011 for this assessment (see section 5: Baseline Conditions). Further details of the modelling methodology and verification can be found in Appendix 5.2.
- 5.3.38 The traffic data used in the assessment is presented in Appendix 5.3.

### Operational Plant Impacts

- 5.3.39 At this stage of the planning process there is no detailed information regarding the type of engines to be used in the energy plant. It is however recommended that once the CHP plant emissions are available that the impacts on both future and existing receptors are confirmed.

### Sensitive Receptors

- 5.3.40 Receptors potentially sensitive to the emissions associated with the operational phase were identified within the vicinity of the proposed development. LAQM.TG(09)<sup>16</sup> provides the following examples of where annual mean AQS objectives should apply:
- residential properties;
  - schools
  - hospitals; and
  - care homes.
- 5.3.41 These have been considered during the selection of receptor locations.
- 5.3.42 Traffic associated with the proposed development has the potential to affect air quality at both existing and proposed sensitive receptors. The assessment considers those proposed new receptors located south-east of A14 Junction 32 and those located north west of Longstanton close to the B1050.
- 5.3.43 In addition to the sensitive receptors within 200m of affected roads, the impact of the proposed development on receptors within the A14 Corridor AQMA has been taken into account.

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<sup>16</sup> Department for the Environment, Food and Rural Affairs (2009) Local Air Quality Management Technical Guidance LAQM.TG(09), Department for the Environment, Food and Rural Affairs.



5.3.44 New on-site receptors constructed as part of Phase 2 have been considered to determine whether the air quality concentrations at the receptors are below the annual mean objectives for NO<sub>2</sub> and PM<sub>10</sub>. The proposed building footprints detailed in the Phase 2 Design and Access Statement have been used to select a number of on-site worst case locations adjacent to existing and proposed roads.

5.3.45 The location of receptors assessed are presented in Figure 5.2 and provided in Table 5.3.

**Table 5.3 Location of Worst Case Sensitive Receptors**

Receptor ID	Future/Existing	Receptor Type	X	Y
WC1	Future	Residential	541063.6	266097.3
WC2	Future	Residential	541069.6	266146.3
WC3	Future	Residential	541088.8	266143.5
WC4	Future	Residential	541085.2	266094.9
WC5	Future	Residential	541166.5	266632.8
WC6	Future	Residential	540908.3	266793.8
WC7	Future	Residential	540921.3	266804.6
WC8	Future	Residential	540729.5	266979.8
WC9	Future	Residential	540735.9	266998.5
WC10	Future	Residential	540472.3	267111.2
WC11	Future	Residential	540463.3	267084.4
WC12	Existing	Residential	542513.9	261471.1
WC13	Existing	Residential	542553.5	261393.6
WC14	Existing	Residential	543774.9	261628.7
WC15	Existing	Residential	544235.2	261794.1
WC16	Existing	Residential	545386.3	261904.4
WC17	Existing	Residential	544863.2	261767.4
WC18	Existing	Residential	545732.9	262060.1
WC19	Existing	Residential	539498.1	267471.8
WC20	Existing	Residential	536245.3	267394.6
WC21	Existing	Residential	536370.6	267843.8
WC22	Existing	Residential	537787.8	267331.1
WC23	Existing	Residential	538913.9	265509.6
WC24	Existing	Residential	538625.3	264481.4
WC25	Existing	Residential	538756.7	263637.2
WC26	Existing	Residential	539845.4	262816.9
WC27	Existing	Residential	540523.1	262280.4
WC28	Existing	Residential	540219.2	263540.1
WC29	Existing	Residential	541027.1	264217.8
WC30	Existing	Residential	539844.9	268173.5

Receptor ID	Future/Existing	Receptor Type	X	Y
WC31	Existing	Residential	540044.4	269242.4
WC32	Existing	Residential	540180.8	270040.2

## Long Term NO<sub>2</sub> Trends

- 5.3.46 A report produced on behalf of Defra in 2011<sup>17</sup> considered NO<sub>2</sub> monitoring data from across the UK and suggested that reductions in concentrations have slowed in recent years. It is now agreed amongst many air quality professionals that future predictions of NO<sub>2</sub> concentrations may be underestimated. Defra updated the air quality tools in June 2014 (new Emission Factor Toolkit (EFT), background maps and NO<sub>x</sub>/ NO<sub>2</sub> converter) in order to close this 'gap' between forecast and monitored NO<sub>2</sub> trends. The revised tools should account for the gap between forecast and monitored concentrations. Given the historic trend in NO<sub>2</sub> concentrations, the modelled NO<sub>2</sub> concentrations presented in this chapter have been undertaken in accordance with the Highways Agency's (HA's), Interim Advice Note (IAN) 170/12v3<sup>18</sup>. This requires the modelled results to be adjusted to account for the trend in monitoring data and the predicted impact of Euro 6/VI vehicles entering the fleet.
- 5.3.47 The method advocated in IAN 170/12v3 is based on adjustment of the modelled results for the opening years of the proposed development (phases 2026 and 2030 have been considered). The modelled NO<sub>2</sub> concentrations for both the 'do-minimum' and 'do-something' scenarios are uplifted using a gap factor based on the 2011 modelled baseline NO<sub>2</sub> concentrations and an alternative projection factor (based on a projected Base Year, which is the Base Year traffic data with Opening Year emissions and backgrounds). The modelled results are therefore uplifted so that they are more representative of the actual monitored trend, rather than a projected trend.

## Significance criteria

- 5.3.48 The significance of air quality effects is dependent upon both the magnitude of change in air pollutant concentrations in relation to national AQS objective/EU limit values and absolute pollutant concentrations in relation to national AQS objective/EU limit values. Descriptors for magnitude of change and significance are outlined in the EPUK guidance document Development Control: Planning for Air Quality (2010 Update)<sup>19</sup> and these descriptors have been adopted to

<sup>17</sup> Defra (2011) Trends in NO<sub>x</sub> and NO<sub>2</sub> emissions and ambient measurements in the UK

<sup>18</sup> Highways Agency (2013), Interim Advice Note 170/12 v3: Updated air quality advice on the assessment of future NO<sub>x</sub> and NO<sub>2</sub> projections for users of DMRB Volume 11, Section 3, Part 1 'Air Quality'.

<sup>19</sup> Environmental Protection UK (2010), Development Control: Planning for Air Quality (2010 update).

assess the impacts of the proposed development on air quality. Table 5.4 and Table 2.1 present the magnitude of change and significance criteria used to assess air quality impacts.

**Table 5.4 Definition of Magnitude of Change for NO<sub>2</sub> and PM<sub>10</sub>**

Magnitude of Change	Annual Mean NO <sub>2</sub> /PM <sub>10</sub> (µg/m <sup>3</sup> )	Days PM <sub>10</sub> greater than 50 µg/m <sup>3</sup>
Large	+/- Greater than 4	+/- Greater than 4
Medium	+/- 2-4	+/- 2-4
Small	+/- 0.4-2	+/- 1-2
Imperceptible	+/- Less than 0.4	+/- Less than 1

**Table 5.5 Air Quality Significance of Effects for Changes to Annual Mean Pollutant Concentration at a Receptor (Annual Mean NO<sub>2</sub> and PM<sub>10</sub>)**

Absolute Concentration in Relation to Objective/Limit Value	Change in Concentration*		
	Small	Medium	Large
Increase with Proposed Development			
Above Objective/Limit Value With Proposed Development	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value With Proposed Development (100 to 90% of Objective)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value With Proposed Development (90 to 75% of Objective)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value With Proposed Development (less than 75% of Objective)	Negligible	Negligible	Slight Adverse

Decrease with Proposed Development			
Above Objective/Limit Value Without Proposed Development	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value Without Proposed Development (100 to 90% of Objective)	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value Without Proposed Development (90 to 75% of Objective)	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value Without Proposed Development less than 75% of Objective)	Negligible	Negligible	Slight Beneficial

\*An imperceptible change is of negligible significance.

#### 5.3.49 Factors to judge the overall significance include:

- Number of properties affected by slight, moderate or major air quality impacts and a judgement on the overall balance;
- Where new exposure is introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective or limit value will be relevant;
- The magnitude of changes and the descriptions of the impacts at the receptors;
- Whether or not an exceedence of an objective or limit value is predicted to arise in the study area where none existed before or an exceedence area is substantially increased;
- Whether or not the study area exceeds an objective or limit value and this exceedence is removed or the exceedence area is reduced; and
- The extent to which an objective or limit value is exceeded e.g. an annual mean NO<sub>2</sub> of 41µg/m<sup>3</sup> should attract less significance than an annual mean of 51µg/m<sup>3</sup>.

## 5.4 Consultation

5.4.1 Consultation was undertaken with SCDC's air quality officer and environmental health team regarding existing air quality issues and the proposed methodology. The scoping response from SCDC stated that the authority was generally satisfied with the approach and monitoring in regards to air quality. The response stipulated that the AQMA declared by SCDC on the A14 north of Cambridge should be included in any Air Quality Assessment and detailed modelling. Effects of the development on traffic flows within the AQMA declared by CCC in the city centre were deemed to be negligible by the transport planning team. Therefore the impact of the development to air quality within the city centre AQMA was scoped out.

5.4.2 In addition, SCDC requested a low emissions strategy which should consider all aspects of transport-related emission reductions. A Travel Plan is being submitted as part of the development which will outline measures to reduce emissions.

## 5.5 Baseline conditions

5.5.1 Part IV of the Environment Act 1995 sets out the principles of LAQM and includes provision for a national AQS. It is a requirement of the Act that local authorities review current and future air quality within their areas, and assess whether air quality objectives are being achieved or are likely to be achieved. Where it is anticipated that an air quality objective will not be met, it is a requirement of the Act that an AQMA be declared. Where an AQMA is declared, the local authority is obliged to produce an Action Plan in pursuit of the achievement of the air quality objectives.

- 5.5.2 The development is located within the administrative boundary of SCDC. Baseline information has therefore been collected from the Council to determine the current baseline pollutant concentrations. In addition to SCDC, the HA is currently undertaking air quality monitoring close to the development as part of an assessment of the A14 improvement works road scheme. This data has also been obtained to provide additional information regarding the current baseline environment.

### AQMAs

- 5.5.3 SCDC has undertaken Review and Assessment of air quality within their area of jurisdiction. The extent of the designated AQMA is presented in Figure 5.1. The AQMA was initially declared in July 2007 following measured and modelled exceedences of the annual mean objective for NO<sub>2</sub>. The following year, exceedences of the daily mean objective for PM<sub>10</sub> were identified at the Bar Hill and Impington continuous monitoring stations. As a result of this, a detailed assessment of PM10 was carried out. This led to the revocation of the original AQMA and the designation of a second AQMA to include PM<sub>10</sub> in July 2008. After discussions with Defra, it was decided that the boundary for the PM<sub>10</sub> (which was originally slightly smaller than that of the NO<sub>2</sub> AQMA) would be the same as the original boundary for NO<sub>2</sub>.

### Monitoring Data

- 5.5.4 SCDC's most recent Air Quality Review and Assessment reports<sup>20</sup> and the HA's A14 improvement works monitoring were reviewed to provide information regarding the current baseline environment and data for the model verification process. The traffic model has a baseline of 2011, therefore the 2011 monitoring data has been used in the model verification process. The SCDC monitoring data located in the vicinity of the proposed development for 2011 and 2012 are presented in Table 5.6.

**Table 5.6 2011 and 2012 SCDC Diffusion Tube Monitoring Data<sup>21</sup>**

Hyder ID	Site Name	X	Y	Type	Annual Mean NO2 2011 (µg/m3)	Data Capture (DC) (%)	Annual Mean NO2 2012 (µg/m3) (bias adjusted )	2012 DC
SCDC1	1 The Coppice, Histon	544230	262048	Diffusion Tube	20.6	100	19.8	100

<sup>20</sup> SCDC (2014), Air quality page: <https://www.scambs.gov.uk/content/local-air-quality-management>.

<sup>21</sup> SCDC (2014), Air quality page: <https://www.scambs.gov.uk/content/local-air-quality-management>.

Hyder ID	Site Name	X	Y	Type	Annual Mean NO2 2011 ( $\mu\text{g}/\text{m}^3$ )	Data Capture (DC) (%)	Annual Mean NO2 2012 ( $\mu\text{g}/\text{m}^3$ ) (bias adjusted )	2012 DC
SCDC2	The Gables, High Street, Histon	543770	263678	Diffusion Tube	36.3	100	33.8	100
SCDC3	22 Water Lane, Histon	544050	263306	Diffusion Tube	31.2	83	29.1	83.3
SCDC4	1 Brook Close, Histon	543955	263588	Diffusion Tube	21.1	92	19.5	100
SCDC5	72 Cambridge Road, Impington	544243	261819	Diffusion Tube	25.3	92	23.1	91.7
SCDC6	19 Lonetree Avenue, Impington	544119	261862	Diffusion Tube	23.7	100	21.8	100
SCDC7	1A Weavers Field, Gorton	542537	261467	Diffusion Tube	32.6	100	29.5	100
SCDC8	1 Catchall Farm Cottages	540509	262290	Diffusion Tube	25.6	100	24.4	100
SCDC9	Orchard Park School (triplicate)	544557	261571	Diffusion Tube	21	100	20.1	100
SCDC10	Chieftain Way, Arbury Park	544828	261738	Diffusion Tube	22.9	100	21.7	91.7
SCDC11	Topper Street, Arbury Park	545056	261784	Diffusion Tube	22.5	100	21.7	100
SCDC12	Flack End, Arbury Park	545435	261906	Diffusion Tube	26.3	92	25.8	83.3
SCDC13	1. 22 Topper Street, Arbury Park	545169	261764	Diffusion Tube	23.6	100	24	91.7

Hyder ID	Site Name	X	Y	Type	Annual Mean NO <sub>2</sub> 2011 (µg/m <sup>3</sup> )	Data Capture (DC) (%)	Annual Mean NO <sub>2</sub> 2012 (µg/m <sup>3</sup> ) (bias adjusted )	2012 DC
SCDC14	2. Co-op, High Street, Histon	543768	263708	Diffusion Tube	22.9	100	22.2	100
SCDC15	Hackers Fruit Farm, Lolworth	539846	262826	Diffusion Tube	37.2*	100	41.5	100
SCDC16	Hill Farm Cottages, Lolworth	536926	264956	Diffusion Tube	32.9*	100*	36.7	100
SCDC17	Rhadegund Farm Cottages, Lolworth	538744	263640	Diffusion Tube	19.7*	100*	22	100
SCDC18	Bar Hill	538685	263760	Automatic	43	89.4	39	99.6 (January to September)
SCDC19	Impington	543739	261625	Automatic	31	97.2	31	97.4
SCDC20	Orchard Park Primary School	544558	261579	Automatic	25	92.1	21	91.6
	*Indicates that data capture for 2011 was poor (less than 75%). Therefore 2012 data was used and factored to be representative of 2011 following the annualisation protocol detailed in TG09. Annualised factors are summarised in Appendix 5.2.							

5.5.5 Table 6 shows that only one exceedence of the annual mean objective for NO<sub>2</sub> was recorded in 2011 and 2012. This was at the Bar Hill continuous monitor located approximately 15m north east of the A14 near junction 29 for 2011 and at Hackers Fruit Farm Lolworth in 2012.

5.5.6 Monitoring data undertaken by the HA as part of the A14 improvements scheme began in January 2014. This data has not been used in the verification process given the availability of data at the time of the assessment. The three months of data has been presented for indicative purposes, however the monitoring data has been bias adjusted (using the 2013 national bias adjustment factor) and annualised to 2011 annual mean equivalents. Any sites which did not have the full three months' data have been disregarded. Table 5.7 shows the HA data annualised to 2011. All monitoring undertaken by the HA was by diffusion tubes.

**Table 5.7 HA Monitoring Data**

HA ID	X	Y	Equivalent Annual Mean NO <sub>2</sub> 2011 (µg/m <sup>3</sup> )
A14_002_0114	542538	261467	34.3
A14_003_0115	543738	261626	26.4
A14_005_0115	544242	261815	26.3
A14_007_0115	545832	261691	25.7
A14_008_0115	544258	262755	25.3
A14_009_0115	540995	264168	21.1
A14_015_0115	539845	262823	34.2
A14_0171_0115	536942	264931	44.9
A14_0172_0115	536956	264986	31.5
A14_0173_0115	536987	265050	29.2

5.5.7 The HA dataset shows that only one site is predicted to exceed the annual mean objective for NO<sub>2</sub> in 2011. This site (A14\_0171\_0115) is located 12m north-east of the A14.

5.5.8 In addition to the NO<sub>2</sub> monitoring data, PM<sub>10</sub> is also monitored at the automatic analysers, the results of which are presented in Table 5.8.

**Table 5.8 Monitored PM<sub>10</sub> Concentrations**

ID	Site Name	Annual Mean PM10 2011 (µg/m <sup>3</sup> )	Data Capture (%)	Number of Daily Means Greater than 50µg/m <sup>3</sup>	Annual Mean PM10 2012 (µg/m <sup>3</sup> )	Data Capture (%)	Number of Daily Means Greater than 50µg/m <sup>3</sup>
SCDC18	Bar Hill	23	71.4	26	13	48	0
SCDC19	Impington	54	73.1	119	58	94.3	180
SCDC20	Orchard Park Primary School	23	92	10	21	83.3	4

5.5.9 The concentrations of PM<sub>10</sub> at Bar Hill and Orchard Park are well below the AQS Objectives. The monitored concentrations at the Impington site show large exceedences of the PM<sub>10</sub> AQS Objective.



Further analysis was undertaken to determine the cause of the large exceedences.

- 5.5.10 Plate 1 illustrates the hourly average concentrations for 2011 and 2012 recorded by the monitor. This indicates that the monitor has been reading high PM<sub>10</sub> concentrations overnight, particularly in 2012. There are a large number of daily exceedences recorded at this analyser which appear out of character when compared to other monitors. The background concentrations are much higher than the concentrations recorded at the other two monitors. In comparison with monitors which generally record high PM<sub>10</sub> concentration, this monitor records concentrations in excess of those recorded, even than those in London. In addition, if the cause of these high concentrations was traffic related it would be expected that NO<sub>2</sub> concentrations would be elevated. However, this is not the case, with concentrations of NO<sub>2</sub> recorded at the monitor being below the AQS Objective. Given this uncertainty, it points to an analyser PM<sub>10</sub> malfunction and as a result, the data from this analyser has been excluded from the verification process for PM<sub>10</sub>. The analyser was taken offline for maintenance between February 2013 and April 2014. Monthly average PM<sub>10</sub> concentrations at the monitor following repair were lower and ranged between 26-37 µg/m<sub>3</sub>.

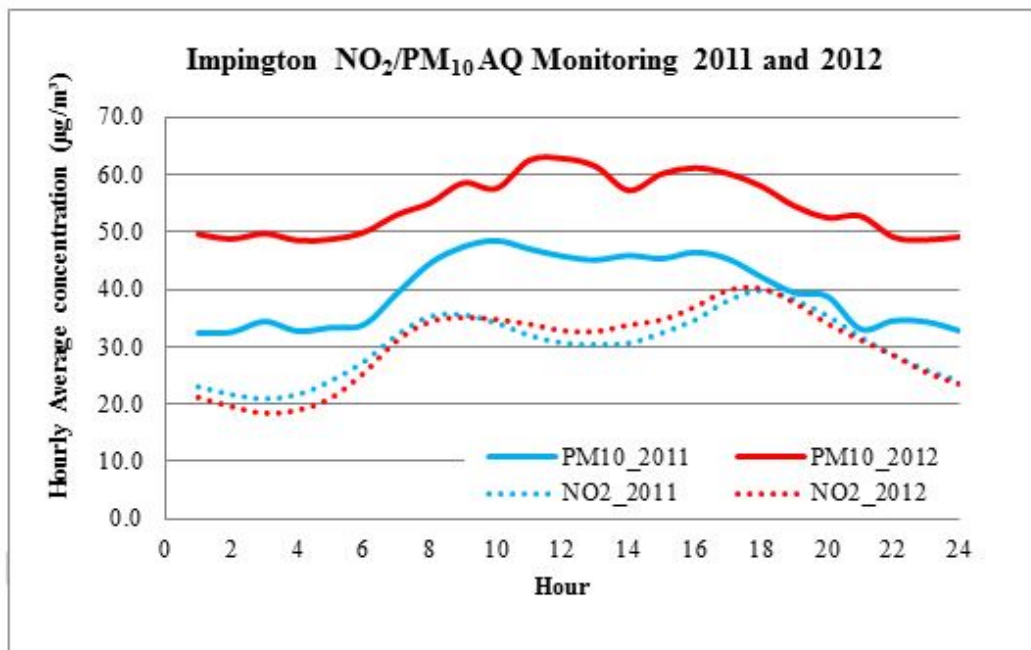


Plate 1: NO<sub>2</sub>/PM<sub>10</sub> Concentrations Recorded at the Impington Air Quality Monitoring Station - 2011 and 2012

## Defra Background Maps

- 5.5.11 Predictions of background pollutant concentrations on a 1km by 1km grid basis have been produced by Defra for the entire of the UK to assist Local Authorities in their Review and Assessment of air

quality<sup>22</sup>. The receptors considered in this assessment are located in a number of different grid squares. Table 5.9 presents the maximum, minimum and average background concentrations of the background NO<sub>2</sub> and PM<sub>10</sub> used in the assessment, for the Base Year 2011 and opening years 2026 and 2031.

**Table 5.9 Background Pollutant Concentrations**

	2011			2026			2031		
	NO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>	NO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>	NO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>
Maximum	17.5	26.0	22.1	12.4	17.8	21.8	12.4	17.7	20.3
Minimum	12.0	16.8	16.8	8.3	11.2	15.3	8.2	11.2	13.7
Average	13.9	20.0	18.4	9.4	13.0	17.1	9.3	12.9	15.5

5.5.12 Table 5.9 indicates that background concentrations across the site are below the relevant AQS Objectives.

### Baseline Air Quality Modelling

5.5.13 The baseline results of pollutant modelling for each of the existing receptors considered in this assessment are shown in Table 5.10. The results have been verified following the verification process presented in Appendix 5.2. Figure 5.2 shows the locations of the receptors considered in the assessment.

**Table 5.10 Base Year (2011) Annual Mean NO<sub>2</sub> and PM<sub>10</sub> Concentrations**

Receptor ID	Coordinates		Annual Mean Concentration (µg/m <sup>3</sup> )	
	X	Y	NO <sub>2</sub>	PM <sub>10</sub>
WC12	542514	261471	31.3	22.6
WC13	542554	261394	26.9	21.9
WC14	543775	261629	30.5	23.8
WC15	544235	261794	32.5	22.6
WC16	545386	261904	27.7	21.3
WC17	544863	261767	22.9	21.3
WC18	545733	262060	29.8	22.2
WC19	539498	267472	17.5	18.8
WC20	536245	267395	19.2	19.0
WC21	536371	267844	21.6	19.2
WC22	537788	267331	18.8	18.7
WC23	538914	265510	24.9	20.8
WC24	538625	264481	22.9	21.4
WC25	538757	263637	32.8	24.0

<sup>22</sup> Defra (2014), <http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html>.

Receptor ID	Coordinates		Annual Mean Concentration ( $\mu\text{g}/\text{m}^3$ )	
	X	Y	NO <sub>2</sub>	PM <sub>10</sub>
WC26	539845	262817	33.4	23.3
WC27	540523	262280	31.8	24.8
WC28	540219	263540	25.9	20.1
WC29	541027	264218	27.7	19.3
WC30	539845	268174	26.4	18.6
WC31	540044	269242	26.9	18.1
WC32	540181	270040	28.8	17.8

5.5.14 The Base Year modelled concentrations indicate there are no predicted exceedences of the NO<sub>2</sub> and PM<sub>10</sub> AQS Objectives. The highest modelled NO<sub>2</sub> concentration is predicted at receptor WC26 (33.4 $\mu\text{g}/\text{m}^3$ ), which is located close to the A14.

## 5.6 Environmental design/Design mitigation

5.6.1 Exhaust emissions from operational phase traffic have the potential to cause an adverse impact on local air quality. As such, an aim for the operational phase should be to reduce vehicle trips to and from the site. There are a number of design practices that may be employed in order to achieve the reduction in vehicle trips, including:

- Minimising reliance upon motor vehicle use;
- Promoting alternative transport options;
- Inclusion of integrated cycle paths into surrounding environments;
- Inclusion of pedestrian walkways into surrounding environments;
- Inclusion of electric charging points;
- Implementation of a Travel Plan; and
- Integration of public transport provisions.

5.6.2 Details regarding the energy centre have not yet been finalised, however, it should be ensured that any turbines are low NO<sub>x</sub> burners and engines use a lean burn technology, should an alternative to fossil fuel usage not be viable.

## 5.7 Potential effects

### Site Enabling and Construction effects

5.7.1 Construction effects have been assessed following the methodology detailed in the IAQM (2014) construction dust guidance; the detailed methodology and magnitude criteria can be found in Appendix B1. The applied assessment steps are discussed below.

## Step 1

- 5.7.2 The desk-study undertaken to inform the baseline identified sensitive receptors within 350m of the site boundary. As such, a detailed assessment of potential dust impacts was required. The study area for the construction assessment is shown in Figure 5.3.

## Step 2A

### Demolition

- 5.7.3 There are numerous existing site structures which would require demolishing, many of which are large ex-MOD buildings. All of the existing structures will be demolished with the exception of the Water Tower, Officer's Mess, listed pill boxes and the Guard's House, which will be converted as part of the proposed Northstowe Phase 2 development. It is considered that the building material is potentially dusty, therefore the magnitude of potential dust emissions magnitude from demolition activities is considered to be **large**.

### Earthworks

- 5.7.4 The proposed Northstowe Phase 2 development covers a large area and a large quantity material would require moving. Earthworks involving cut and fill are required to enable land-raising and re-profiling of the site for drainage purposes. The magnitude of potential dust emissions from earthworks is therefore considered to be **large**.

### Construction

- 5.7.5 A number of buildings and infrastructure are to be constructed as part of the proposed Northstowe Phase 2 development; these include 3,500 dwellings, three schools, a town centre, formal and informal recreational space and landscaped areas, an eastern sports hub, an extension to the existing busway, a primary link road to the southern access, construction haul route, engineering and infrastructure works and construction of a highway link between the new town and the B1050 south of Longstanton. Due to the nature and scale of the proposed development, the magnitude of potential dust emissions from construction works is considered to be **large**.

### Trackout

- 5.7.6 The CEMP states that construction vehicles will access the proposed Northstowe Phase 2 development via the Primary Roads through Phase 1 until the southern access road enables connection to the proposed haul road. Once the southern access road is complete, all

vehicles will access the development from the A14 at Bar Hill and southern access road.

5.7.7 Information provided on the number of HDV trips to be generated during the construction phase indicates that there will be a maximum daily average of 18 HDV movements (sub phase D). The magnitude of potential dust emissions from trackout is therefore considered **medium**, in the context of the IAQM criteria.

5.7.8 The dust emission magnitude for the site is summarised in Table 5.11. The IAQM dust emission magnitude criteria that were met for activity are listed.

**Table 5.11 Dust Emission Magnitude Summary**

Activity	Dust Emission Magnitude	IAQM Dust Emissions Magnitude Criteria that are met
Demolition	Large	Total building Volume >50,000m <sup>3</sup> , potentially dusty construction material.
Earthworks	Large	Total site area is >10,000m <sup>2</sup> , >10 Heavy earth moving vehicles may be active at any one time, total material moved exceeds 100,000 tonnes
Construction	Large	Total building volume is likely to exceed 100,000m <sup>3</sup>
Trackout	Medium	10-50 HDV outward movements in any one day

## Step 2B

5.7.9 The sensitivity of the area to construction dust has been determined for each construction activity, and is summarised in Table 5.12.

**Table 5.12 Summary of the Sensitivity of the Area**

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium	High	High	Low
Human Health	Low	Low	Low	Low
Ecological	n/a	n/a	n/a	Low

5.7.10 The sensitivity of the surrounding area (any receptor within 350m of the site) to dust was considered to be high given the proximity of the site to existing residential properties, schools and care homes.

5.7.11 The sensitivity of an area takes account of the specific sensitivities of receptors in the area to the potential impact, the proximity and number of those of those receptors in relation to the potential impact, the local background concentration (for PM10 and human health) and site specific factors such as natural shelters (e.g. trees) to reduce the risk of wind-blown dust.

- 5.7.12 On-site PM10 background concentrations are well below 24 µg/m<sup>3</sup> therefore the IAQM guidance states that the area of assessment can be considered to be of low sensitivity in terms of human health. Additionally, local meteorological provides evidence that the wind prevails from the south-west, which would disperse dust towards the less populated area north-west of the site rather than the populated area to the south-west (see Plate 1, Appendix 5.1).
- 5.7.13 The existing and planned ponds located by the access road in the Phase 3 area have been considered as the only ecological receptors that required consideration in the construction phase. The ponds are considered to be of low sensitivity as they are not currently an ecologically designated habitat (e.g. SSSI, SAC, etc.). An ecological receptor of 'low' sensitivity is defined by the IAQM as a location with a local designation where the features may be affected by dust deposition. The IAQM guidance shows that only those sources of dust within 50m of the ecological receptor should be considered, therefore Trackout is the only construction activity associated with Phase 2 that has the potential to affect the ponds.

## Step 2C

- 5.7.14 The risk of impacts with no mitigation applied was then defined based upon the interaction between the magnitude of emission and the highest level of area sensitivity (determined in Steps 2A and 2B, respectively) for each construction activity. Using the matrices presented in Appendix 5.1, the risk of dust impacts was determined, as presented in Table 5.13.

**Table 5.13 Summary of the Risk of Dust Impacts**

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High	High	High	Low
Human Health	Medium	Low	Low	Low
Ecological	n/a	n/a	n/a	Low

- 5.7.15 It should be noted that the potential for impacts depends significantly on the distance between the dust generating activity and receptor location. Risk has been predicted based on a worst-case scenario of works being undertaken at the closest sensitive area to the proposed Northstowe Phase 2 development site boundary. Those receptors at Rampton Drift are considered to be worst case for the Demolition, Earthworks and Construction activities and the risk ratings in Table 5.13 reflect the risk at Rampton Drift as the worst case receptors. Trackout occurs over a larger area and those receptors considered in the risk rating are those closest to the haul routes. With the worst case approach considered, actual risk would be lower than that predicted in Table 5.13 at the majority of receptors in the construction phase.

- 5.7.16 Table 5.13 shows that there is generally a low risk of human health being adversely affected during the construction phase. Demolition of structures close to Rampton Drift pose a medium level of risk although the duration of the demolition is likely to be relatively short-term in the context of the build-out.
- 5.7.17 There is a high risk of dust soiling at those receptors within 0-50m of Earthworks, Demotion and Construction activities without any mitigation. These activities are longer term and of larger dust emission magnitude than trackout.
- 5.7.18 Ecological receptors at the ponds in the Phase 3 area are at low risk of from trackout. There is a negligible risk from the other construction activities.

### Step 3

- 5.7.19 Based on the risk ratings presented in Table 5.13, mitigation measures have been proposed to reduce the potential impacts, as summarised in Table 5.18. These measures are derived from the IAQM guidance and have been adapted for the proposed development. These may be reviewed prior to the commencement of construction works and incorporated into the outline CEMP which has been prepared for submission with the planning application.

### Operational effects

- 5.7.20 NO<sub>2</sub> and PM<sub>10</sub> concentrations at receptors in 2026 have been modelled assuming the proposed development is operational. The results of the modelling on both existing and future receptors are presented in Table 5.14 for comparison against the AQS Objectives.

**Table 5.14 Predicted Concentrations with Development - 2026**

Receptor ID	Predicted 2026 Annual Mean Concentration (µg/m <sup>3</sup> ) With Development*	
	NO <sub>2</sub>	PM <sub>10</sub>
Future Receptors		
WC1	13.2	14.3 (0)
WC2	13.5	14.3 (0)
WC3	13.6	14.3 (0)
WC4	13.5	14.3 (0)
WC5	10.0	14.3 (0)
WC6	13.5	13.9 (0)
WC7	14.1	13.9 (0)
WC8	12.9	13.9 (0)
WC9	14.0	13.9 (0)
WC10	12.6	14.1 (0)

Receptor ID	Predicted 2026 Annual Mean Concentration ( $\mu\text{g}/\text{m}^3$ ) With Development*	
	NO <sub>2</sub>	PM <sub>10</sub>
WC11	11.7	14.1 (0)
Existing		
WC12	23.7	19.1 (2)
WC13	19.9	18.5 (2)
WC14	23.0	20.4 (4)
WC15	23.9	18.9 (2)
WC16	19.6	17.5 (1)
WC17	15.8	17.8 (1)
WC18	21.3	18.2 (2)
WC19	12.5	15.4 (0)
WC20	14.7	15.7 (0)
WC21	16.0	15.7 (0)
WC22	14.4	15.4 (0)
WC23	20.6	17.1 (1)
WC24	16.9	17.6 (1)
WC25	24.9	20 (3)
WC26	25.3	19.4 (3)
WC27	24.2	21 (5)
WC28	18.6	16.4 (0)
WC29	20.1	15.7 (0)
WC30	19.1	15 (0)
WC31	19.4	14.6 (0)
WC32	21.8	14.3 (0)

\*Number in brackets indicates number of exceedences of the 24-hour AQS objective for PM10

- 5.7.21 Table 5.14 indicates that the predicted concentrations of NO<sub>2</sub> and PM<sub>10</sub> are well below the respective AQS Objectives at both existing receptor locations and at future receptor locations that would be introduced as part of the proposed development.
- 5.7.22 Dispersion models are inherently less accurate at predicting the number of exceedences of the 24-hour mean PM10 objective than for the annual mean objective. LAQM (TG(09)) details how an estimate of the number of exceedences of the 24-hour AQS objectives for PM10 from can be extracted from the annual average concentration. This methodology was applied to calculate the number of 24 hour exceedences of PM10 objectives in Table 5.14.



5.7.23 Modelled NO<sub>2</sub> and PM<sub>10</sub> concentrations at proposed future receptors in 2031 have been modelled and are presented in Table 5.15 for comparison against the AQS.

**Table 5.15 Predicted Concentrations with Development - 2031**

Receptor ID	Predicted 2031 Annual Mean Concentration (µg/m <sup>3</sup> ) With Development*	
	NO <sub>2</sub>	PM <sub>10</sub>
WC1	14.7	15 (0)
WC2	15.3	15 (0)
WC3	15.3	15 (0)
WC4	15.2	15 (0)
WC5	10.2	14.4 (0)
WC6	15.1	14.6 (0)
WC7	16.1	14.7 (0)
WC8	14.3	14.5 (0)
WC9	15.9	14.7 (0)
WC10	14.0	14.7 (0)
WC11	12.8	14.5 (0)

\*Number in brackets indicates number of exceedences of the 24-hour AQS objective for PM10

5.7.24 Table 5.15 indicates that the predicted concentrations of NO<sub>2</sub> and PM<sub>10</sub> are well below the AQS Objectives at all future receptor locations that would be introduced as part of the proposed development. The majority of receptors are located well away from the main source of road traffic emissions (the A14).

5.7.25 To determine the proposed development's impact on existing receptors, modelled concentrations for the Do Minimum and Do Something scenarios for 2031 have been compared (a Do Minimum scenario was not required for 2026). Table 5.16 presents the NO<sub>2</sub> results, the predicted change in NO<sub>2</sub> concentrations as a result of the development and the significance of the effects in accordance with the EPUK guidance is also presented. The modelled results presented have been uplifted in accordance with the guidance provided in IAN 170/12v3 to provide worst case concentrations.

**Table 5.16 Modelled NO<sub>2</sub> Concentrations at Existing Receptors in 2031**

Receptor ID	Predicted 2031 Annual Mean Concentration (µg/m <sup>3</sup> )		Change (µg/m <sup>3</sup> )	EPUK Magnitude	EPUK Significance
	Do Minimum NO <sub>2</sub>	Do Something NO <sub>2</sub>			
WC12	22.9	23.5	0.6	Small	Negligible
WC13	19.3	19.6	0.3	Imperceptible	Negligible
WC14	22.2	22.7	0.5	Small	Negligible

Receptor ID	Predicted 2031 Annual Mean Concentration ( $\mu\text{g}/\text{m}^3$ )		Change ( $\mu\text{g}/\text{m}^3$ )	EPUK Magnitude	EPUK Significance
	Do Minimum $\text{NO}_2$	Do Something $\text{NO}_2$			
WC15	23.3	23.7	0.4	Small	Negligible
WC16	19.2	19.4	0.2	Imperceptible	Negligible
WC17	15.6	15.7	0.1	Imperceptible	Negligible
WC18	20.9	21.1	0.2	Imperceptible	Negligible
WC19	12.3	12.3	0	Imperceptible	Negligible
WC20	14.2	14.7	0.5	Small	Negligible
WC21	15.1	16.4	1.3	Small	Negligible
WC22	13.5	14.8	1.3	Small	Negligible
WC23	18.3	20.6	2.3	Medium	Negligible
WC24	15.9	16.8	0.9	Small	Negligible
WC25	23.8	24.3	0.5	Small	Negligible
WC26	24.1	24.6	0.5	Small	Negligible
WC27	23.1	23.5	0.4	Small	Negligible
WC28	17.6	18.2	0.6	Small	Negligible
WC29	19.0	19.8	0.8	Small	Negligible
WC30	17.4	19.0	1.6	Small	Negligible
WC31	17.7	19.4	1.7	Small	Negligible
WC32	20.4	21.5	1.1	Small	Negligible

5.7.26 The results presented in Table 5.16 indicate that the effect of the proposed development at all receptor locations, in terms of  $\text{NO}_2$  concentrations, is predicted to be negligible.

5.7.27 The modelled impact of the proposed development on  $\text{PM}_{10}$  concentrations is presented in Table 5.17.

**Table 5.17 Modelled  $\text{PM}_{10}$  Concentrations at Existing Receptors in 2031**

Receptor ID	Predicted 2031 Annual Mean Concentration ( $\mu\text{g}/\text{m}^3$ )*			EPUK Magnitude**	EPUK Significance
	Do Minimum $\text{PM}_{10}$	Do Something $\text{PM}_{10}$	Change ( $\mu\text{g}/\text{m}^3$ )		
WC12	19.1 (2)	19.1 (2)	0 (0)	Imperceptible	Negligible
WC13	18.5 (2)	18.5 (2)	0 (0)	Imperceptible	Negligible
WC14	20.4 (4)	20.4 (4)	0 (0)	Imperceptible	Negligible
WC15	18.9 (2)	19 (2)	0.1 (0)	Imperceptible	Negligible
WC16	17.5 (1)	17.5 (1)	0 (0)	Imperceptible	Negligible
WC17	17.8 (1)	17.8 (1)	0 (0)	Imperceptible	Negligible

Receptor ID	Predicted 2031 Annual Mean Concentration ( $\mu\text{g}/\text{m}^3$ )*			EPUK Magnitude**	EPUK Significance
	Do Minimum $\text{PM}_{10}$	Do Something $\text{PM}_{10}$	Change ( $\mu\text{g}/\text{m}^3$ )		
WC18	18.2 (2)	18.2 (2)	0 (0)	Imperceptible	Negligible
WC19	15.4 (0)	15.4 (0)	0 (0)	Imperceptible	Negligible
WC20	15.7 (0)	15.7 (0)	0 (0)	Imperceptible	Negligible
WC21	15.7 (0)	15.8 (0)	0.1 (0)	Imperceptible	Negligible
WC22	15.4 (0)	15.5 (0)	0.1 (0)	Imperceptible	Negligible
WC23	17.1 (1)	17.1 (1)	0 (0)	Imperceptible	Negligible
WC24	17.6 (1)	17.7 (1)	0.1 (0)	Imperceptible	Negligible
WC25	20 (3)	20.2 (4)	0.2 (1)	Imperceptible	Negligible
WC26	19.4 (3)	19.5 (3)	0.1 (0)	Imperceptible	Negligible
WC27	21 (5)	21.1 (5)	0.1 (0)	Imperceptible	Negligible
WC28	16.4 (0)	16.5 (0)	0.1 (0)	Imperceptible	Negligible
WC29	15.7 (0)	15.7 (0)	0 (0)	Imperceptible	Negligible
WC30	15 (0)	15.2 (0)	0.2 (0)	Imperceptible	Negligible
WC31	14.6 (0)	14.7 (0)	0.1 (0)	Imperceptible	Negligible
WC32	14.3 (0)	14.4 (0)	0.1 (0)	Imperceptible	Negligible

\*Number in brackets indicates number of exceedences of the 24-hour AQS objective for  $\text{PM}_{10}$

\*\*Magnitude based on worst case change (i.e. either change in number of days that exceed the 24-hour mean, or change in annual mean concentration)

5.7.28 The results presented in Table 5.17 indicate that the effect of the proposed development at all receptor locations, in terms of  $\text{PM}_{10}$  concentrations, is predicted to be negligible.

5.7.29 Details regarding energy production for the site were not available at the time of assessment. However, it is considered that, given the magnitude of change at existing receptor locations, and that air quality concentrations are well below the relevant AQS objectives, the incorporation of an energy centre at the development site is unlikely to have a significant effect in terms of air quality.

## Mitigation and enhancement

### Site Enabling and Construction Phase

5.7.30 Whilst air quality effects of construction vehicle emissions are predicted to be negligible, a Travel Plan would be implemented for the construction phase (as outlined in the CEMP), which would ensure the most economical use of construction vehicles, thus keeping the number of construction vehicles to a minimum.

5.7.31 In order to mitigate against the impacts of construction dust at receptors, Best Practice Measures (BPM) should be adopted. Based on the risk ratings presented in Table 5.13, mitigation measures have been proposed to reduce the potential impacts, as summarised in Table 5.18.

**Table 5.18 Mitigation Measures<sup>23</sup>**

Mitigation Measure	High Risk Measures H=Highly recommended D=Desirable
Communications	
Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	H
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.	H
Display the head or regional office contact information.	H
Dust Management	
Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority.	H
Site Management	
Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.	H
Make the complaints log available to the local authority when asked.	H
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.	H
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. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.	H
Monitoring	
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 site boundary, with cleaning to be provided if necessary.	H
Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.	H

<sup>23</sup> IAQM (2014) Guidance on the Assessment of Dust from Demolition and Construction

Mitigation Measure	High Risk Measures H=Highly recommended D=Desirable
Increase the frequency of site inspections 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 dry or windy conditions.	H
Agree dust deposition, dust flux, or real-time PM10 continuous monitoring locations with the Local Authority. Where possible, commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.	H
Preparing and maintaining the site	
Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	H
Erect solid screens or barriers around dusty activities or the site boundary so that they are at least as high as any stockpiles on site.	H
Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.	H
Avoid site runoff of water or mud.	H
Keep site fencing, barriers and scaffolding clean using wet methods.	H
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site, cover as described below.	H
Cover, seed or fence stockpiles to prevent wind whipping.	H
Operating vehicle/machinery and sustainable travel	
Ensure all vehicles switch off engines when stationary - no idling vehicles.	H
Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.	H
Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph on unsurfaced 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).	H
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	H
Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).	H
Operations	
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.	H

Mitigation Measure	High Risk Measures H=Highly recommended D=Desirable
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	H
Use enclosed chutes and conveyors and covered skips.	H
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	H
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.	H
Waste Management	
Avoid bonfires and burning of waste materials.	H
Demolition	
Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).	H
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.	H
Avoid explosive blasting, using appropriate manual or mechanical alternatives.	H
Bag and remove any biological debris or damp down such material before demolition.	H
Earthworks	
Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	H
Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.	H
Only remove the cover in small areas during work and not all at once.	H
Construction	
Avoid scabbling (roughening of concrete surfaces) if possible.	H
Ensure sand and other aggregates are stored in banded 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.	H
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.	H

Mitigation Measure	High Risk Measures H=Highly recommended D=Desirable
For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.	D
Trackout	
Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.	H
Avoid dry sweeping of large areas.	H
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	H
Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	H
Record all inspections of haul routes and any subsequent action in a site log book.	H
Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.	H
Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	H
Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.	H
Access gates to be located at least 10m from receptors where possible.	H

- 5.7.32 The identified mitigation measures are incorporated into the outline Construction Environmental Management Plan (CEMP), reflecting the requirements of BPM, which was submitted with this planning application. This will be developed in more detail prior to commencement of works and should outline environmentally sensitive areas, mitigation measures to protect such areas, and method statements for specific construction activities and phases.

### Operational Phase

- 5.7.33 During the operation phase, no mitigation measures are proposed, given the proposed development's impacts are predicted to be negligible. However to further reduce the impacts, a Framework Travel Plan and Low Emissions Strategy (appended to the Sustainability Strategy) has been included as part of this planning submission, which seeks to reduce the number of vehicle movements associated with the development by encouraging sustainable modes of transport.

## Residual Effects

### Site enabling and construction residual effects

- 5.7.34 It is considered that with the implementation of the proposed mitigation measures (as detailed in Table 5.18) and consideration of the CEMP, construction dust impacts are not predicted to be significant in terms of dust soiling, effect on human health and effect on ecology, therefore there should be no residual effects.
- 5.7.35 Construction vehicle emissions are not considered to be significant owing to a low average volume of construction-phase movements.

### Operational residual effects

- 5.7.36 The residual effects of road vehicle emissions associated with the operation of the Proposed Development are predicted to be negligible.
- 5.7.37 Impacts of a proposed energy centre are unlikely to be significant. However, this should be confirmed by way of detailed dispersion modelling at reserved matters stage.

## Cumulative Effects

### Site enabling and construction cumulative effects

- 5.7.38 Provided that all other developments adopt suitable mitigation measures, such as those outlined in Table 5.18, or other suitable control options, the potential cumulative effect from fugitive dust emissions during the construction phase should remain as non-significant.
- 5.7.39 Construction traffic generated by other developments would cause increases in exhaust related pollutants in the vicinity of the site. However due to NO<sub>2</sub> and PM10 concentrations being well below the respective AQS objectives, the temporary nature of the construction activities and the low volume of daily average construction movements, significant cumulative effects are not anticipated.

### Operational cumulative effects

- 5.7.40 The air quality assessment undertaken has covered the road network surrounding the proposed development, and is essentially a cumulative assessment as the traffic data used for the assessment contains traffic flows from other developments, including:
- Northstowe Phase 1;



- A14 Cambridge to Huntington Improvement Scheme; and
- Home Farm, Longstanton.

5.7.41 Therefore the cumulative operational effect in terms of air quality is also considered to be negligible.

## Limitations and Assumptions

### Limitations

5.7.42 Data regarding any proposed energy centre for the development have not been finalised, as such, a quantitative assessment has not been possible.

### Assumptions

5.7.43 It is assumed that there would be no temporal variation in construction vehicles numbers within each of individual construction sub-phases A-F; consequently sub-phase specific daily averages of construction movements were used.

5.7.44 It is assumed that any energy centre that is incorporated in the development would have low NO<sub>x</sub> burners or use lean burn technology and that the emissions would be modelled once detailed information is available.

## Assessment Summary Matrix

5.7.45 Table 5.19 summarises the assessment of air quality effects predicted for the proposed Northstowe Phase 2 development.

Table 5.19 Summary Matrix

<b>Assessment Summary Matrix</b>				
<b>Description of Effects</b>	<b>Significance of Effects</b>	<b>Description of Mitigation Measures and Enhancement</b>	<b>Description of Residual Effects</b>	<b>Significance of Residual Effects</b>
<b>Site enabling works and construction assessment</b>				
Construction vehicle emissions	Negligible	Construction travel plan	Construction vehicle emissions	Negligible (not significant)
Construction dust	Large, -ve, D, MT, R	Best practice mitigation measures, as presented in summarised in Table 5.18.	Construction dust	Negligible (Not significant)
<b>Operational assessment</b>				
Operational vehicle emissions	Negligible	Travel plan	Operational vehicle emissions	Negligible (Not significant)
Operational energy centre emissions	Negligible	Seek alternative to using fossil fuel, or use clean burn technology / low NOx burners	Operational energy centre emissions	Negligible (Not significant)
<i>Key: +ve (beneficial), -ve (adverse), D (direct), InD (indirect), ST (short term), MT (medium term), LT (long term), P (permanent), R (reversible)</i>				

## 6 Noise and Vibration

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### 6.1 Introduction

- 6.1.1 The noise and vibration assessment considers the suitability of the site for the proposed Northstowe Phase 2 development by assessing existing noise impacts on the site from nearby noise sources.
- 6.1.2 The assessment also considers potential noise and vibration impacts emanating from the site and their effects on people who are likely to be exposed to changes in noise levels arising from construction and operation of the scheme. Particular attention has been given to people in their homes, at their place of work and in non-residential buildings such as classrooms, health care facilities and places of worship.

### 6.2 Review of Proposed Development

- 6.2.1 The noise assessment considers noise impacts associated with the construction of the proposed Main Phase 2 development area outline application as well as operational noise impacts associated with the development. Key receptors include existing residential dwellings as well as future receptors such as residential dwellings, schools and recreational spaces. Key existing noise sources include road traffic on the local road network and the guided busway to the east of the Development site., Key future noise sources will include road traffic on the existing road network and on the proposed Southern Access Road (West)
- 6.2.2 Construction and operational noise effects have also been assessed for the Southern Access Road (West) full planning application, which links the proposed Main Phase 2 development area with the B1050 Hatton's Road north of the A14 Bar Hill junction. The traffic noise assessment considers the changes in traffic associated with the new road link.

### 6.3 Approach and methods

- 6.3.1 The noise and vibration assessment considers the suitability of the site for residential development in line with the NPPF<sup>24</sup>. The noise assessment also considers both construction and operational noise impacts associated with the proposed development. The construction impacts were assessed in accordance with the provisions in BS 5228:

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<sup>24</sup> Department for Communities and Local Government (2012), National Planning Policy Framework (NPPF).

2009 +A1 2014 'Code of practice for noise and vibration control on construction and open sites'<sup>25</sup>.

6.3.2 Operational impacts will arise from increased road traffic and from fixed plant and similar installations to be constructed on site. Operational traffic was assessed using the provisions in the Design Manual for Roads and Bridges (DMRB) Volume 11, Part 7, Section 3 – Noise and Vibration<sup>26</sup>. Noise from operational plant was assessed according to the provisions in BS 4142: 1997 'Method for rating of industrial noise affecting mixed residential and industrial areas' (BS4142)<sup>27</sup>.

6.3.3 The baseline noise survey serves as a basis for the assessment of the suitability of the site for development and for assessing construction and operational noise impacts.

### Legislation and guidance

6.3.4 The following guidance and legislation are of relevance and have been considered in the noise assessment:

### National Planning Policy Framework (NPPF)

6.3.5 As of 27th March 2012, the Department of Communities and Local Government (DCLG) published the NPPF, which replaces PPG24<sup>28</sup>, originally published in 1994.

6.3.6 Prior to the publication of the NPPF, PPG24 outlined the Government's guidance relating to the assessment of noise affecting new residential developments.

6.3.7 Under the NPPF Planning policies and decisions should aim to:

- avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them

<sup>25</sup> BS 5228: 2009 +A1 (2014), 'Code of practice for noise and vibration control on construction and open sites.

<sup>26</sup> Highways Agency (2011), The Design Manual for Roads and Bridges (DMRB) Volume 11, Part 7, Section 3 – Noise and Vibration.

<sup>27</sup> BS 4142: 1997 'Method for rating of industrial noise affecting mixed residential and industrial areas' (BS4142)

<sup>28</sup> Department for Communities and Local Government (1994) Planning Policy Guidance Note 24 (PPG24)

because of changes in nearby land uses since they were established;

- identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

## Noise Policy Statement for England

6.3.8 To avoid and mitigate adverse noise effects on health arising from and impacting on new development, the NPPF makes reference to The Noise Policy Statement for England (NPSE)<sup>29</sup>. The NPSE was published in March 2010 and covers all forms of noise other than occupational noise.

6.3.9 For the purposes of this report “Neighbourhood Noise” is most relevant as NPSE defines at paragraph 2.5:

6.3.10 “neighbourhood noise” which includes noise arising from within the community such as industrial and entertainment premises, trade and business premises, construction sites and noise in the street

6.3.11 The explanatory note to the NPSE introduces three concepts relating to the adverse impacts of noise. The following three statements have been reproduced from the explanatory note:

- “NOEL – No Observed Effect Level: This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.”
- “LOAEL – Lowest Observed Adverse Effect Level: This is the level above which adverse effects on health and quality of life can be detected”
- “SOAEL – Significant Observed Adverse Effect Level: This is the level above which significant adverse effects on health and quality of life occur.”
- The NPSE acknowledges that the values for NOEL, LOAEL and SOAEL are likely to vary depending on the noise source and environment and at present there are no defined numerical values to allow flexibility within the policy until further evidence and guidance is presented.

6.3.12 The NPSE has three aims as follows:

- The first aim of the NPSE is to avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development. The first aim of the NPSE states that significant adverse effects on health and quality of life should be

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<sup>29</sup> Noise Policy Statement for England (NPSE) (2012)

avoided while also taking into account the guiding principles of sustainable development.

- The second aim of the NPSE is to mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development. This aim of the refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur.
- The third aim of the Noise Policy Statement for England is, where possible, to contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.”

### **World Health Organisation – Guidance on Community Noise**

- 6.3.13 The World Health Organisation (WHO) Guidelines for Community Noise<sup>30</sup> discusses the issue of community noise and provides health-based noise guidelines.
- 6.3.14 This guidance forms the basis of many noise limitations and design ranges for internal and external ambient noise levels, which are repeated specifically for developments within the United Kingdom in BS 8233: 2014<sup>31</sup>.

### **BS8233:2014 – Guidance on Sound Insulation and Noise Reduction for Buildings**

- 6.3.15 Formerly a code of practice, the recent 2014 revision of BS8233: 2014 ‘Guidance on Sound Insulation and Noise Reduction for Buildings’ has recently been issued as a guidance document. The standard is mainly concerned with building design from an acoustic standpoint. It does however contain information relevant to environmental noise more specifically by stating guidance for desirable internal noise levels for dwellings and other buildings. An extract of Table 4 of the document is reproduced in Table 6.1 below:

<sup>30</sup> World Health Organisation (WHO) Guidelines for Community Noise 1999

<sup>31</sup> BS8233:2014 – Guidance on Sound Insulation and Noise Reduction for Buildings

**Table 6.1: Indoor ambient noise levels for dwellings (from Table 4 of BS8233-2014)**

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35dB L <sub>Aeq</sub> , (16hour)	-
Dining	Dining room / area	40dB L <sub>Aeq</sub> , (16hour)	-
Sleeping (Daytime resting)	Bedroom	35dB L <sub>Aeq</sub> , (16hour)	30dB L <sub>Aeq</sub> , (8hour)

6.3.16 The information contained within Table 6.1 (Table 4 of BS8233: 2014) is based upon research by the World Health Organisation for use in their guidance document on community noise.

### Construction Noise

6.3.17 Construction noise impacts were considered in accordance with BS 5228. BS 5228-1 gives recommendations for basic methods of noise control relating to construction and open sites. It applies to work activities and operations that generate significant noise levels. It also includes industry-specific guidance. BS 5228-2 deals with vibration control on construction and open sites. BS5228 also provides guidance concerning methods of predicting and measuring noise and assessing its impact on those exposed to it.

6.3.18 There are no national noise criteria for limiting or assessing noise from construction sites. BS 5228 – 1 Annex E gives different methods of guidance on significance of noise effects from construction. BS 5228 2009 +A1:2014 Annex E recommends the ABC method to establish construction noise limits. The limits are discussed in Section 3.4.

6.3.19 If the existing ambient noise levels exceed the threshold values presented in Table 2, then a significant effect is deemed to have occurred if the total LAeq noise level for the period increases by more than 3dB due to construction activity. The ABC method should only apply to residential receptors.

### BS4142

6.3.20 British Standard (BS) 4142:1997; “Method for rating industrial noise affecting mixed residential and industrial area” provides a method for determining the industrial noise level and background noise level at the outside edge of a building and assessing whether the industrial noise is likely to give rise to complaints from residents. The industrial noise level is required to be corrected with any acoustic features to give a rating level.

6.3.21 BS4142 has been used to assess noise from the substation and other mechanical plant to be installed on site. At this stage it is unlikely that details for the plant to be installed on site will be available. In the

absence of this information, the background (LA90) noise levels recorded on site will be used to set design noise levels to be achieved at detailed design.

- 6.3.22 The likelihood of complaint is then assessed by subtracting the measured background noise level from the rating level. The greater the difference between rating level and background noise level the greater the likelihood of complaints.
- A difference of around +10 dB or more indicates that complaints are likely.
  - A difference of around + 5 dB is of marginal significance.
  - If the rating level is more than 10 dB below the measured background noise level then this is a positive indication that complaints are unlikely.

### **Design Manual for Roads and Bridges, Volume 11, Section 3, Part 7 (HD213/11)**

- 6.3.23 The DMRB, Volume 11, Section 3, Part 7 (HD213/11) provides guidance on the assessment of impacts that road projects (new construction, improvements and maintenance) may have on levels of noise and vibration.
- 6.3.24 The guidance describes different levels of assessment and requires that noise calculations are undertaken in accordance with the procedures given in Calculation of Road Traffic Noise (CRTN) and those relevant additional procedures identified within HD213/11.
- 6.3.25 The noise levels calculated should be façade levels, unless the receptor is an open space where free-field levels should be calculated. All levels should be calculated as LA10,18-hour dB at a default height of 1.5m above ground level. For dwellings with a first floor, the noise level should be calculated at 4m above ground.

### **Control of Pollution Act 1974**

- 6.3.26 Section 61 of the Control of Pollution Act 1974 (COPA)<sup>32</sup> sets out procedures for those undertaking works to obtain 'Prior Consent' for construction works within agreed noise limits.

### **Study Area**

- 6.3.27 A desk study and site observations have indicated that road traffic is the most prominent noise impact on the proposed Main Phase 2 development site. The most significant impact likely from the Development will be an increase in road traffic on the existing road

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<sup>32</sup> Control of Pollution Act 1974



network. For this reason (DMRB Volume 11, Section 3, Part 7 was an important consideration in carrying out the noise assessment.

- 6.3.28 The noise assessment has considered road traffic noise impacts associated with the development and therefore, in terms of DMRB, the assessment considered links within 1km of the Development boundary.
- 6.3.29 Construction and operational noise impacts are likely to remain more localised.

## Methodology

### Construction Noise

- 6.3.30 The construction noise levels have been predicted with distance from source by using the measured LAeq 1hr using the following formula as described in BS5228:

$$K_h = 20 * \log_{10} (R/10)$$

Where

$K_h$  = the correction for propagation across hard ground

$R$  = the distance to the receptor location

10 = the distance in metres at which the sound pressure level from the plant has been measured, as recorded in the Tables in BS5228.

- 6.3.31 At this stage of the Development design, there is no detail on the construction methods and plant likely to be used during the construction phases. Therefore, it is not possible to state precisely where plant would operate and for how long during the working day. This makes it difficult to accurately predict noise levels for direct comparison with the typical noise, therefore, a worst case (noisiest) assessment has been undertaken in that, where applicable, the worst case assumption is made in each case.
- 6.3.32 The main impact during the construction phase of the project would be noise from plant and on-site construction traffic. Indicative construction noise levels have been predicted for varying distances from the site, which represent the dwellings closest to the red line boundary and most likely to encounter high noise levels during construction.

## Site Assessment (NPPF/NPSE)

6.3.33 An assessment has been carried out in accordance with the NPPF and NPSE to establish the suitability of the site for the proposed Development. As discussed in Section 3.2, the NPSE acknowledges that the values for NOEL, LOAEL and SOAEL are likely to vary depending on the noise source and environment and at present there are no defined numerical values to allow flexibility within the policy until further evidence and guidance is presented

6.3.34 Considering the guidance in the WHO Community Noise Guidelines and the recommended internal noise levels for bedrooms in BS8233, the following criteria (Table 6.2) are considered appropriate for determining the suitability of the site for residential development.

**Table 6.2: Proposed Criteria for Permissible Development**

External noise levels	Development permitted	Development permitted with mitigation	Development not normally permitted	Internal levels to be achieved	External Living Areas
Daytime dB <sub>L<sub>A</sub>,16hour</sub>	≤55	>55≤63	>63	≤35	≤55
Night time dB L <sub>A,8hour</sub>	≤40	>40≤55	>55	≤30  ≤45L <sub>AFmax</sub> (10 - 15 times per night)	≤40

6.3.35 The criteria set out in Table 6.2 correlate with the criteria in PPG24, which preceded the NPPF.

## Operational Traffic Noise Assessment

6.3.36 The assessment of operational impacts from road traffic noise has been undertaken in accordance with DMRB. Noise calculations were predicted using the technical memorandum CRTN. CRTN was produced in 1975 and updated in 1988 and it is still the standard method for calculating noise from a road in the UK. In the UK the standard index used for traffic noise is the LA10,18-hour level, which is quoted in decibels.

6.3.37 CRTN calculates the LA10, 18-hour using the following traffic composition:

- 18 Hour annual average weekday traffic flow;
- Percentage of heavy goods vehicles; and
- Average speed.

- 6.3.38 Calculations were undertaken at representative sensitive receptors within 1km of the red line for the Northstowe Phase 2 development boundary.
- 6.3.39 Predictions of road traffic noise have been carried out in accordance with CRTN using the computer model 'IMMI' (software for modelling and mapping noise from roads, railways, industrial, construction and other open sites). This is a 3-dimensional computer model with digitised inputs that include road segments, barriers, buildings and the receptor points at which the noise levels are to be calculated. The model's base data includes the following:
- Traffic Composition for 'Do-Something' Scenario: traffic flows, percentage of HGVs and traffic speeds;
  - Road Configuration: gradient, surface texture, vertical and horizontal alignment and depth / height of cuttings or embankments; and
  - Receiver Location: distance from road, angle of view, ground absorption and shielding from natural or purpose built barriers.
- 6.3.40 IMMI has been used to calculate the noise level in terms of dB LA10 18 hour selected sensitive receptors at a default height of 4m to represent noise levels at the upper floor of receptor locations. Noise levels have been calculated for the receptors for the following scenarios;
- Without the Development in the opening year of the project (Do Minimum); and
  - With the Development in the opening year of the project (Do Something).

### Operational Plant Noise

- 6.3.41 BS 4142:1997 is used to determine the impacts of noise upon residential units. The guidance provided within BS 4142 provides a method whereby the likelihood of complaints due to noise from industrial sources can be assessed.
- 6.3.42 The standard advises that the existing background noise levels outside noise sensitive premises are compared with the rating noise levels from any nearby industrial activities. The rating noise level should include corrections for any acoustic character to the noise that makes it more readily discernible to a listener (e.g. whines, crashes, bangs etc).
- 6.3.43 The background noise level (LA90) is the noise level that is exceeded for 90% of the monitoring period at the assessment location. For BS4142 it is usual to measure the background noise level at the nearest noise sensitive receptor to the industrial noise source.

- 6.3.44 The specific noise level is the LAeq produced by the noise source under investigation, measured as close as possible to the source, over a given reference time interval. The rating noise level is the specific noise level plus any adjustments for the acoustic characteristics of the noise as specified in clause 8.2 of BS4142. An adjustment of +5dB is applied when the specific noise has a discrete distinguishable tone or distinct impulsive characteristic.

## Significance criteria

### Construction Noise

- 6.3.45 The ABC method involves rounding the existing ambient noise levels to the nearest 5dB for the appropriate time period (night, evening/weekends or day) and then comparing these levels to the total noise level, including construction noise. If the total noise level exceeds the existing rounded value, then a significant effect is deemed to have occurred. Further details are provided in Table 6.3.

**Table 6.3: Threshold of significant effect at dwellings from construction noise**

Assessment category and threshold value period	Threshold value, in dB(A)		
	Category A	Category B	Category C
Night-time (23:00 – 07:00)	45	50	55
Evenings and weekends 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75

Category A is the threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.

Category B is the threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.

Category C is the threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values

### Operational Traffic Noise

- 6.3.46 The DMRB is used for the assessment of operational noise impacts for road schemes and gives guidance on the magnitude of impact from noise changes upon the local environment. The significance of predicted increases in road traffic noise as a result of the proposed development has been assessed according to the criteria described below in Table 6.4.

**Table 6.4: Magnitude of Noise Change Criteria – Road Traffic Noise**

Change in Traffic Noise, LA10, 18h (dB)	Significance of Noise Change
0	No change
0.1 – 0.9	Negligible
1 – 2.9	Minor
3 – 4.9	Moderate
5+	High

6.3.47 The importance or sensitivity of each resource is assessed using the criteria provided in Table 6.5, which are based on the Technical Advice Note: Assessment of Noise (Scottish Government)<sup>33</sup>.

**Table 6.5: Determining the Importance / Sensitivity of Resource**

Importance/ sensitivity of resource or receptor	Criteria
Very High	Ambient noise level is intrinsic for community noise levels, health and amenities, e.g. rural dwellings, hospitals, cultural heritage sites, existing ambient level is low.
High	Dwellings and other sensitive receptors located in urban areas
Medium	Offices and Cultural Heritage sites located in urban areas
Low	Commercial establishments such as large shopping complexes
Negligible	Factories and industrial process sites

6.3.48 Using the above definitions, a combined assessment of sensitivity and magnitude can then be undertaken to determine how significant an effect is, as demonstrated in Table 6.6 below.

**Table 6.6: Table Significance Matrix**

		Low	Medium	High
		SENSITIVITY		
MAGNITUDE	High	Moderate	Major / Moderate	Major
	Medium	Minor / Moderate	Moderate	Major / Moderate
	Low	Minor	Minor / Moderate	Moderate
	Negligible	Negligible	Negligible	Negligible

## 6.4 Consultation

6.4.1 Scoping responses from SCDC have been considered in finalising the methodology and approach for the noise assessment. As requested

<sup>33</sup> Technical Advice Note: Assessment of Noise (Scottish Government)

at scoping, the B1050 Longstanton Western Bypass was included in the noise assessment

- 6.4.2 Consultation has been held with Greg Kearney, the Environmental Health Officer (EHO) at SCDC to agree the noise assessment methodology. As part of the consultation, noise monitoring locations and the duration of noise monitoring have been agreed.

## 6.5 Baseline conditions

- 6.5.1 Noise measurements were taken at various locations around the proposed Development Site between the 5 June 2014 and 10 June 2014 to establish existing ambient noise conditions. Monitoring locations and duration of monitoring have been agreed with Greg Kearney, EHO for SCDC. The measurement locations are shown on Figure 6.7.

- 6.5.2 A combination of shorter duration attended measurements and longer duration unattended surveys was agreed, The longer duration surveys were carried out to consider a typical weekday and one day over a weekend, as agreed with the EHO. Details relating to the duration of noise monitoring at each location are shown in Table 6.7.

**Table 6.7: Summary of baseline survey results**

Ref	Location	Duration	
		Day	Night
NM1	101 Longstanton Rd	3hr CRTN	1 hr
NM2	15 Ladywalk Longstanton	2hr	1hr
NM3	19 Church View, Oakington	2hr	1hr
NM4	51 Mills Lane, Longstanton	24 Hour	
NM5	86 Rampton Drift Longstanton	24 Hour	
NM6	Magdalene Close Longstanton	24 Hour	
NM7	Phypers Farm Oakington	3hr CRTN	1 hr.
NM8	St Michael's Mount Longstanton	2hr	1hr
NM9	Guided Busway A	Longer Duration (5 days)	
NM10	Guided Busway B	Longer Duration (5 days)	
NM11	B1050 Longstanton	Longer Duration (5 days)	
NM12	Home Farm	Longer Duration (5 days)	
NM13	Hazlewell Cottage	Longer Duration (5 days)	
NM14	Poplar Villas	Longer Duration (5 days)	

- 6.5.3 In all measurement positions the parameters logged throughout each survey period were  $L_{Aeq}$ ,  $L_{Amax}$ ,  $L_{Amin}$ ,  $L_{A90}$  and the conditions were dry with a wind speed of less than 5 m/s-1, apart from Saturday June 2014 when heavy rain fell during the daytime. Wet roads are likely to

result in elevated road tyre noise and therefore Sunday's survey data would be more representative of weekend conditions.

6.5.4 It had been agreed to carry out measurements at two locations along the guided busway. At location NM10 muck spreading was being carried out, which would have compromised noise measurements. Further north tenant farmers did not want equipment placed where cattle were grazing. Measurements along the busway have therefore been taken at NM9 only. This location is near a water treatment plant, consequently it is representative of noise impacts on the Main Phase 2 Development site from both the busway and the water treatment plant.

6.5.5 The following instruments were used for carrying out the noise surveys (Table 6.8):

**Table 6.8: Instruments used for noise surveys**

Ref	Instrument Description/ Serial Number
NM1	Cirrus CR31B Serial No. C19938FF
NM2	Cirrus CR31B Serial No. C19935FF
NM3	Cirrus CR31B Serial No. C19938FF
NM4	Rion NL52 Serial Number 00620868
NM5	Rion NL52 Serial Number 01032449
NM6	Rion NL32 Serial Number 00451268
NM7	Cirrus CR31B Serial No. C19938FF
NM8	Cirrus CR31B Serial No. C19935FF
NM9	Rion NL52 Serial Number -0051043
NM10	-
NM11	Rion NL52 Serial Number 00921176
NM12	Rion NL52 Serial Number 00231665
NM13	Rion NL52 Serial Number 00732075
NM14	Rion NL52 Serial Number 01021277

6.5.6 The baseline survey results are summarised in

6.5.7 Table 6.9 below. A full set of noise data is included in Appendix C1.

**Table 6.9: Summary of baseline noise survey data**

Ref	Day	Date	Period	L <sub>Aeq</sub>	L <sub>max</sub>	L <sub>min</sub>	L <sub>A10</sub>	L <sub>A90</sub>
NM1	Thursday	05 June 2014	Day	59.8	86.6	41.8	56.5	45.8
	Thursday		Night	57.1	80.3	36.2	50.5	39.6
NM2	Thursday	05 June 2014	Day	49.6	72.0	38.3	51.4	44.7
	Thursday		Night	41.4	60.7	31.7	44.1	35.0

Ref	Day	Date	Period	L <sub>Aeq</sub>	L <sub>max</sub>	L <sub>min</sub>	L <sub>A10</sub>	L <sub>A90</sub>
NM3	Thursday	05 June 2014	Day	49.4	67.6	39.2	51.5	43.2
	Friday		Night	36.7	51.8	32.6	37.7	34.8
NM4	Thursday	05 June 2014	Day	50.2	79.5	28.3	50.2	39.3
	Friday		Night	48.9	77.6	25.7	42.7	34.7
NM5	Thursday	05 June 2014	Day	52.9	99.0	28.4	49.2	39.4
	Friday		Night	41.4	72.3	23.4	40.6	33.5
NM6	Thursday	05 June 2014	Day	56.3	84.7	29.3	57.6	41.3
	Friday		Night	50.1	80.0	24.9	44.9	35.2
NM7	Thursday	05 June 2014	Day	55.2	77.9	43.1	56.5	47.6
	Friday		Night	49.5	61.9	44.8	51.1	47.1
NM8	Thursday	05 June 2014	Day	58.2	75.5	43.1	62.0	48.7
	Friday		Night	41.4	51.4	38.4	42.4	39.9
NM9	Thursday	05 June 2014	Day	46.9	80.9	23.2	47.2	36.8
		05 June to 06 June	Night	43.2	69.3	19.2	39.4	30.0
	Friday	06 June 2014	Day	46.6	76.9	25.7	45.0	31.9
		06 June to 07 June	Night	47.4	79.1	27.6	41.7	33.3
	Saturday	07 June 2014	Day	46.9	77.3	20.9	46.4	33.8
		07 June to 08 June	Night	47.0	71.9	17.2	39.5	27.6
	Sunday	08 June 2014	Day	45.4	79.1	24.5	45.0	33.3
		08 June to 09 June	Night	47.2	71.5	16.1	45.3	34.5
	Monday	09 June 2014	Day	48.6	78.2	22.0	47.7	33.0
		09 June to 10 June	Night	45.6	74.6	22.8	43.4	33.2
NM11	Tuesday	10 June 2014	Day	48.5	77.6	30.2	48.0	35.1
	Thursday	05 June 2014	Day	70.4	98.7	30.9	74.7	47.1
		05 June to 06 June	Night	64.4	94.9	22.4	56.7	33.8
	Friday	06 June 2014	Day	70.7	93.9	32.6	75.3	44.2
		06 June to 07 June	Night	62.3	86.1	30.8	56.4	37.3
	Saturday	07 June 2014	Day	69.9	103.2	31.1	74.5	43.9
		07 June to 08 June	Night	61.6	84.5	19.7	57.0	31.4
	Sunday	08 June 2014	Day	68.6	97.8	23.2	72.8	40.2
		08 June to 09 June	Night	62.6	96.0	18.3	54.2	29.6
	Monday	09 June 2014	Day	69.8	103.2	23.2	74.1	43.5
	09 June to 10 June	Night	60.6	84.5	18.3	52.8	28.3	
Tuesday	10 June 2014	Day	69.2	94.1	30.8	74.3	42.0	



Ref	Day	Date	Period	L <sub>Aeq</sub>	L <sub>max</sub>	L <sub>min</sub>	L <sub>A10</sub>	L <sub>A90</sub>
NM12	Thursday	05 June 2014	Day	51.3	80.6	28.6	53.6	45.1
		05 June to 06 June	Night	48.9	74.7	25.5	48.2	37.0
	Friday	06 June 2014	Day	50.9	76.1	33.3	53.4	41.1
		06 June to 07 June	Night	47.8	83.1	31.7	46.2	38.8
	Saturday	07 June 2014	Day	53.2	91.3	28.1	56.0	44.2
		07 June to 08 June	Night	50.4	85.8	21.2	48.7	34.6
	Sunday	08 June 2014	Day	52.7	82.9	22.4	54.0	40.6
		08 June to 09 June	Night	48.4	82.9	19.8	42.4	31.1
	Monday	09 June 2014	Day	52.9	86.3	26.8	55.0	42.2
		09 June to 10 June	Night	52.0	83.9	28.9	49.9	38.8
	Tuesday	10 June 2014	Day	55.1	83.9	34.6	58.5	45.8
NM13	Thursday	05 June 2014	Day	63.1	103.5	51.1	65.4	56.9
		05 June to 06 June	Night	58.2	75.6	41.5	59.4	54.0
	Friday	06 June 2014	Day	57.0	84.8	40.6	58.7	51.7
		06 June to 07 June	Night	51.8	72.9	37.5	53.9	46.9
	Saturday	07 June 2014	Day	65.0	95.0	46.3	63.8	54.4
		07 June to 08 June	Night	54.6	75.8	38.3	57.0	48.4
	Sunday	08 June 2014	Day	58.7	80.0	33.8	61.2	51.9
		08 June to 09 June	Night	53.9	78.6	27.0	54.7	41.8
	Monday	09 June 2014	Day	59.4	94.7	39.4	61.0	52.7
		09 June to 10 June	Night	58.1	74.9	39.3	59.2	52.9
	Tuesday	10 June 2014	Day	64.1	109.3	22.3	62.3	52.8
NM14	Thursday	05 June 2014	Day	55.1	79.2	43.6	58.2	49.1
		05 June to 06 June	Night	51.7	74.2	35.6	52.2	46.6
	Friday	06 June 2014	Day	57.0	90.9	39.2	60.4	47.0
		06 June to 07 June	Night	50.7	72.5	38.6	51.5	45.1
	Saturday	07 June 2014	Day	54.6	87.0	40.8	57.6	47.5
		07 June to 08 June	Night	48.7	71.8	28.2	50.0	41.9
	Sunday	08 June 2014	Day	52.0	86.6	24.5	55.5	42.7
		08 June to 09 June	Night	51.6	89.5	25.1	48.5	39.1
	Monday	09 June 2014	Day	55.5	85.9	28.7	58.4	45.6
		09 June to 10 June	Night	52.0	84.4	26.8	51.2	44.1
	Tuesday	10 June 2014	Day	56.1	81.0	35.2	59.5	47.2

6.5.8 The baseline data in

6.5.9 Table 6.9 indicates that generally the surrounding areas are quiet residential and ambient noise levels, particularly at night, are low. Near busier roads such as the B1050 and Dry Drayton the traffic noise levels are high.

- 6.5.10 The current noise baseline reflects current noise impacts on the proposed development site. However, the current noise baseline is likely to change even if the proposed Development did not go ahead, with road traffic likely to be the most significant noise impact.
- 6.5.11 A traffic assessment was carried out, considering baseline traffic data. This data was used to predict future road traffic impacts without the proposed Development (referred to as the Do-Minimum scenario).
- 6.5.12 In order to predict the future baseline, road traffic on affected routes as calculated for the Do-Minimum scenario (2031), was used to predict noise levels at selected receptor locations.

## **6.6 Environmental design/Design mitigation**

- 6.6.1 At detailed design stage design mitigation will be considered to reduce noise impacts on sensitive receptor locations within the Main Phase 2 Development boundary.

## **6.7 Potential effects**

### **Site establishment and construction effects**

#### **Construction Noise**

- 6.7.1 Given the stage of project design, assumptions have been made regarding the plant and equipment (as set out in Table 6.8-6.9) to be used during each phase of construction. Detailed information on construction method and exact plant to be used would only be finalised once contractors have been appointed to carry out the works. Typical impacts associated with the various construction activities are assessed below, and more specific impacts associated with the three phases of construction at specific receptor locations are then discussed in the subsequent sections.
- 6.7.2 The noise emissions from assumed plant have been predicted using the sound pressure levels as described in BS 5228: 2009 Part 1. The sound pressure levels (L<sub>p</sub>) in BS 5228 have been presented as a LA<sub>eq</sub> at a distance of 10m (Table 6.10). It has been assumed that plant would be operating for long periods of time ("percentage on-time") so as to present a possible worst case.
- 6.7.3 Typical combined impacts associated with the key construction activities are indicated in Appendix C2, and these are rated against the significance criteria provided in Table 3. The predictions are based on typical plant required for each construction activity and assume that all the plant would run simultaneously, which is most unlikely.

**Table 6.10: List of construction plant and associated sound pressure level (LAeq,T) in dB at 10m**

Plant	BS5228 Table Reference	Percentage On Time	Lp at 10m (LAeq dB)
Pulverizer on excavator	Table C1 No. 4	70	76
Tracked Crusher	Table C.1 No.15	70	84
Concrete breaker	Table C1 No. 9	60	90
Circular Saw	Table C4 No.73	40	84
Angle Grinder	Table C4 No.93	40	80
Dumpers	Table C4 No. 9	60	77
Road Planer	Table C.5 No.7	70	82
Tracked Excavator	Table C.5 No. 18	70	80
Dozer	Table C.5 No. 12	60	77
Dumpers	Table C4 No. 9	60	77
Vibratory Roller (22t)	Table C5 No. 28	60	77
Breaker mounted on backhoe	Table C1 No. 1	70	92
Concrete Crusher Plant	Barton Plant Hire	70	84
Asphalt Paver	Table C5 N0. 33	60	75
Diesel Generator	Table C4 No. 84	100	74
Delivery Lorry	Table C.2 No.35	70	80
Tracked Mobile Crane	Table C4 No.52	60	75
Telescopic Handler	Table C4 No.54	75	79
Wheeled Loader	Table C2 No. 26	75	79
Tower Crane	Table C4 No.49	60	77
Concrete Saw	Table C4 N0. 71	10	85
Compressor	Table C5 No.5	80	75
Excavator	Table C5 No.34	75	82
Roller Compactor	Table C.5 No.29	60	76
Water Pump	Table C.2 No.45	75	65
Concrete Pump & Concrete mixer truck discharging	Table C.4 No. 28	80	79
Poker Vibrator	Table C.4 No. 33	80	78
Percussion Drill	Table C4 N0. 69	40	85
Circular Saw	Table C4 No.72	40	79
Angle Grinder	Table C4 No.93	40	80
Welder	Table C3 No.31	40	73

6.7.4 Construction noise impacts depend on the distance of works from receptor locations, therefore noise impacts have been predicted at distances of 50m, 100m, 200m and 500m from where the construction works take place. A possible worst case has been presented by considering propagation across hard ground and by not

considering screening afforded by topographical features, buildings or other structures. The predicted construction noise impacts associated with the various items of plant, with distance from source, are shown in Appendix C2.

- 6.7.5 The construction noise impacts predicted in Appendix 6B indicate that unmitigated noise levels would be significant (ranging from slight to substantial) within 200m of the works, with the highest noise levels experienced closer to source. The predicted noise levels are based on a possible worst case scenario, and it should be noted that construction noise tends to fluctuate and is usually of fairly short duration.
- 6.7.6 Demolition of the existing hardstanding and other structures is likely to generate high noise levels close to source. Demolition works close to Mills Lane and Rampton Drift will need to be adequately screened to reduce demolition noise impacts.
- 6.7.7 Construction noise impacts can however be mitigated. The mitigation measures to be implemented would be selected to suit the specific circumstances at each construction area, considering the nature of the works, the plant to be used and the distance and position of the receptor locations in relation to the works. Fixed plant would for example be easier to screen, while screening would not be practical for mobile plant. This will be considered in more detail in the phase-specific CEMP documentation, as discussed in the outline CEMP.
- 6.7.8 The effectiveness of any screening measures adopted would depend on the properties of the screening material, the location of the acoustic screen in relation to the source, the height of the acoustic screen and the height of the receptor in relation to the noise source. As a rule of thumb, when there is no clear line of sight between noise source and receptor, a 10 dB reduction in noise level can be expected.
- 6.7.9 Beyond 200m from the works, construction noise impacts are expected to be negligible.
- 6.7.10 There is a potential for vibration to be generated during construction. This will depend on the construction method and the type of plant to be used. There are no recognised methods for predicting construction vibration. BS5228 sets out some empirical formulae for predicting vibration from piling that require information on energy per blow from the piling rig and knowledge of ground type. In the absence of a detailed construction programme predicting vibration impacts is not possible. Vibration impacts will also depend on proximity to receptor locations and on local conditions such as ground conditions.
- 6.7.11 Buildings are reasonably resilient to ground-borne vibration and vibration-induced damage is rare. BS 5228-2 recommends that a conservative threshold for minor or cosmetic damage should be taken

as a ppv of 10mms-1 for intermittent vibration and 5mms-1 for continuous vibration to determine whether there is any risk of building damage, particularly from construction works involving piling.

- 6.7.12 Surface plant such as cranes, compressors and generators are not recognised as sources of high levels of environmental vibration and reference to Figure 1 of 'Control of Vibration and Noise during Piling' (British Steel. 1998) confirms that even at a closest distance of 10m, peak particle velocities (ppv) significantly less than 5mms-1 are generated by such plant. For example, the indication is that a bulldozer would generate a ppv of approximately 0.6mms-1 and a 'heavy lorry on poor road surface' a ppv of less than 0.1mms-1 at 10m. These values are well below limits at which even cosmetic building damage becomes likely (5mms-1).

### Construction Traffic

- 6.7.13 Construction vehicles will access the Phase 2 development initially via the Primary Roads through Phase 1 (to construct the Secondary School and initial homes) during the period of time until the Southern Access Road (SW) and Primary Road through Phase 3 is complete.
- 6.7.14 Once the Southern Access Road (SW) is complete, all construction vehicles will access the development from the A14 at Bar Hill, and the Southern Access Road (SW). Construction Traffic Management Plans will be in place to ensure there is no access from local roads.
- 6.7.15 From the roundabout junction of the Southern Access Road (SW) and the Primary Road through Phase 3 (to the south of Longstanton Road), a construction haul route will be provided using the existing eastern perimeter road. This will be only for construction vehicles and will enable a separation of construction and operational traffic during the build out of the development. The following construction vehicle volumes have been predicted for the various phases of construction:

**Table 6.11: Construction traffic volumes for construction phases**

	Sub-Phases					
	A	B	C	D	E	F
Construction Material HGVs	717	7,203	8,366	11,473	14,848	4,919
Building Waste HGVs	87	809	1,240	1,243	1,566	561
Infrastructure waste HGVs	4	34	53	53	67	24
Total one-way HGV movements per day (average)	2	11	14	18	16	8
Total two-way HGV movements per day (average)	4	22	28	36	32	16

- 6.7.16 Given the estimated volumes of predicted construction traffic, it is unlikely that there will be a significant noise impact from construction traffic. According to DMRB, a 25% increase in traffic would equate to a 1dB(A) increase in noise. A 3dB increase is perceptible to the human ear. Construction traffic is unlikely to contribute significantly to existing traffic volumes.

## Operational effects

### Site Assessment (NPPF and NPSE)

- 6.7.17 The noise contour produced for the Do-Something 2031 (with development traffic and cumulative traffic considered) indicates that the site will fall predominantly in the range that indicates 'Development permitted' as per the criteria based on the NPSE as described in Table 6.2. Noise levels from traffic are predicted to be below 55dB across most of the site (Figure 6.2).
- 6.7.18 Near major roads noise levels are likely to be elevated and the appropriate siting of sensitive receptors will need to be considered.
- 6.7.19 At detailed design stage consideration will need to be given to Main Phase 2 Development on-site traffic volumes and the associated noise levels.
- 6.7.20 Further assessment will also be required at detailed design stage to consider noise impacts on the proposed schools. Building Bulletin 93 (BB93)<sup>34</sup> sets out acoustic design criteria. BB93 states that noise levels in unoccupied playgrounds, playing fields and other outdoor areas should not exceed 55 dB LAeq,30min and there should be at least one area suitable for outdoor teaching activities where noise levels are below 50 dB LAeq,30min. The 2031 Do-Something noise contours across the site (Figure 6.2) indicate that the criteria in BB93 are likely to be met, but further assessment will need to consider traffic and other noise sources in close proximity to schools at detailed design stage.
- 6.7.21 Noise survey data collected at NM9 (along the guided busway), indicate that noise levels at the site boundary are consistently between 43dB(A) and 48dB(A) 15m from the busway. Measurements at this location considered noise from the busway as well as the adjacent water treatment plant and presents a worst case presentation of noise from the busway. It is therefore unlikely the busway will impact on the amenity of the proposed development.

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<sup>34</sup> Building Bulletin 93 (BB93)- Acoustic Design of Schools

## Operational Traffic

- 6.7.22 The most likely operational noise impact associated with the development is the potential increase in road traffic. The traffic noise assessment has considered increased traffic on the local road network with the full Phase 2 Development in place in 2031 (Do-Something Scenario).
- 6.7.23 The 2031 Do-Something Scenario has been compared against the 2031 Do-Minimum Scenario (without the proposed Phase 2 Development) and the change in noise level has been compared against the criteria for assessing magnitude of change described in DMRB (Table 6.4).
- 6.7.24 The Do Something 2031 noise contours are presented on Figure 6.2, which shows noise impacts for existing receptor locations as well as noise impacts across the proposed Northstowe Phase 2 development. In addition, traffic noise levels have been predicted at selected receptor locations at a height of 4m to indicate noise impacts at the upper floor of residential properties. The selected receptor locations correlate closely with the noise monitoring locations agreed with the EHO for SCDC.
- 6.7.25 The traffic noise levels are predicted as LA10, 18hr levels. These are converted to LAeq, 16hr levels using the following formula:
- $$L_{Aeq, 16\text{-hour}} = L_{A10, 18\text{-hour}, 18\text{-hour}} - 2 \text{ dB}$$
- 6.7.26 The change in noise level and associated magnitude of noise change at selected receptor locations is described in Table 6.12.
- 6.7.27 The magnitude of change in traffic noise level at the selected receptor locations is generally Negligible to Minor Adverse, except at NM5 (88 Rampton Drift) where a Major Adverse impact is indicated. The large increase of 38.2 dB(A) at this receptor location is due to the large change in traffic volumes.
- 6.7.28 In the Do-Minimum scenario traffic flows are very low and the increase in traffic in the Do-Something scenario suggests a substantial increase in noise. The overall noise level at NM5 is 56.7 dB(A), without mitigation, which is slightly above the suggested daytime level of 55dB(A) for outdoors levels to protect amenity.
- 6.7.29 Provision of acoustic screening along Rampton Drift may be considered. This option will however be subject to construction of an acoustic fence being possible. Available space for the acoustic fence, visual impacts and underground services would need to be considered.

**Table 6.12: Magnitude of change in traffic noise level with development**

Ref	Receptor	Do Minimum (2031)		Do Something (2031)		Difference	Magnitude of Noise Change
		L <sub>A10,18hr</sub>	L <sub>Aeq,16hr</sub>	L <sub>A10,18hr</sub>	L <sub>Aeq,16hr</sub>		
NM1	101 Longstanton	61.8	59.8	57.2	55.2	-4.6	Moderate Beneficial
NM2	Lady Walk	45.9	43.9	46	44	0.1	Negligible
NM3	Church View	42	40	42.8	40.8	0.8	Negligible
NM4	Mills Lane	40.9	38.9	44.2	42.2	3.3	Moderate Adverse
NM5	88 Rampton Drift	20.5	18.5	58.7	56.7	38.2	Major Adverse
NM6	Magdelene Close	41.5	39.5	44.2	42.2	2.7	Minor Adverse
NM7	Phypers Farm	58.1	56.1	58.5	56.5	0.4	Negligible
NM8	St Michaels Mount	62.7	60.7	50.9	48.9	-11.8	Major Beneficial
NM12	Holme Farm	42.2	40.2	41.8	39.8	-0.4	Negligible
NM13	Hazelwell Cottage	68.6	66.6	72	70	3.4	Moderate Adverse
NM14	Poplar Villas	68.1	66.1	68.3	66.3	0.2	Negligible

6.7.30 At Hazelwell Cottage (NM13) the change in noise level is Moderate Adverse. The predicted noise levels are however high, with 66.2 dB(A) predicted for the Do-Minimum and 70.0 dB(A) for the Do-Something. Acoustic screening should be considered for the cottage immediately adjacent to the B1050 as overall noise levels are high. If installation of acoustic fencing is not possible, improved glazing would need to be considered.

6.7.31 The predicted increase of 3.3 dB(A) at NM4 (Mills Lane) is considered Moderate Adverse. The overall predicted noise level of 42.2 dB(A) is below the 55dB(A) recommended by the WHO to protect amenity in outdoor areas. No mitigation is therefore proposed at this location.

### Operational Plant

6.7.32 Noise impacts from fixed plant to be installed on site would be assessed as part of reserved matters applications once detailed design information is available.

6.7.33 Noise survey data collected at the closest off-site receptor locations, NM4 (Mills Lane) and NM5 (Rampton Drift) indicate that night-time background (LA90) noise levels are low, 39.3 dB(A) and 33.5 dB(A) respectively. Operational plant to be installed on site would need to be designed with due consideration of the background noise levels at nearby receptor locations.



- 6.7.34 In accordance with BS4142, a noise rating level from operational plant 5dB(A) above background noise would be of marginal significance and 10dB(A) above background would most likely result in noise complaints.
- 6.7.35 The design of fixed plant installations will be the subject of reserved matters applications.

## Mitigation and enhancement

### Construction Noise

- 6.7.36 Detailed measures to mitigate against construction noise impacts would be developed once a detailed construction programme and inventory of plant to be used is available, and would be agreed with relevant Stakeholders as part of each contractor's phase-specific CEMPs. An outline CEMP has been submitted as part of the planning applications for the proposed Northstowe Phase 2 development.
- 6.7.37 General construction management measures that would be put in place to limit environmental impacts. The CEMP for the proposed Northstowe Phase 2 development would include general measures to minimise noise impacts from the construction phase, including:
- Best Practicable Means' (BPM) (as outlined in Section 72 of the Control of Pollution Act 1974) would be employed in order to minimise noise and vibration levels throughout the period of the works; and
  - Recommendations and good practice as set out in BS 5228 would be adopted as appropriate, including:
    - Construction works would be confined to the normal working hours as prescribed by SCDC;
    - Careful selection of plant, construction methods and programming. Only plant conforming with relevant national or international standards, directives and recommendations on noise and vibration emissions would be used;
    - Construction plant will be located, as far as is reasonably practicable, away from adjacent occupied buildings or as close as possible to noise barriers or site hoardings where these are located between the plant and the buildings;
    - Static and semi-static plant/equipment would be fitted with suitable enclosures where practicable;
    - Personnel would be instructed on BPM to reduce noise and vibration as part of their induction training and as required prior to specific work activities;
    - When plant is not being used, it would be shut down and not left to idle;

- Vehicles would not wait with engines running;
- Where practicable, all audible warning systems and alarms would be designed to minimise noise. Broadband reverse alarms would be fitted to all vehicles;
- Local residents would be consulted in advance of the works commencing; and
- Localised mobile screening would be used where reasonably practicable to reduce the noise levels from handheld tools such as concrete saws;

## Operational Noise

- 6.7.38 Permanent operational impacts relate to increased road traffic noise and noise from infrastructure and plant to be installed on site.
- 6.7.39 The assessment of operational traffic noise impacts on the existing road network has indicated that noise increases at receptor locations due to traffic associated with the proposed Northstowe Phase 2 development would generally be negligible and not significant.
- 6.7.40 Along Rampton Drift (NM5) the increase in noise level is indicated as significant (Major Adverse), but the overall noise level of 56.7 dB(A) is not excessively high. To reduce noise levels at Rampton Road to below 55dB(A) the use of acoustic barriers along Rampton Road can be considered, although it is likely that the final design would include buildings between Rampton Drift and the CGB, which would act as a noise barrier and help to reduce noise effects. A noise level of 55dB(A) would be considered appropriate to protect amenity in outside areas such as gardens.
- 6.7.41 At NM13 (Hazelwell Cottage) the predicted increase or change in traffic noise is Moderate Adverse in terms of DMRB. Existing traffic noise levels are already high (66.6 dB(A)) and the overall future noise level is predicted to be high (70 dB(A)). Installation of an acoustic barrier at this location is recommended to protect the amenity of the occupants
- 6.7.42 The installation of acoustic barriers would require further assessment to ensure this is a feasible option. Factors such as adequate space, visual impacts and obstruction of any underground services would need to be considered. Alternate options for mitigation would include providing glazing with a higher sound reduction index.
- 6.7.43 It is anticipated that at other receptor locations no further mitigation measures would be required for off-site receptors.
- 6.7.44 Where impacts from road traffic noise are predicted at on-site houses and buildings, this would be mitigated to acceptable levels by incorporating acoustic measures in the design of houses and

buildings. These measures would include the use of higher specification glazing and possibly secondary glazing. However, the exact location and details of these measures would be developed at the detailed design stage based on further assessment work.

6.7.45 Noise from pump stations would be mitigated to acceptable levels through the incorporation of mitigation measures into the design of the building envelope, and selection of suitable plant. Measures would include:

- Where possible, quiet plant or low-noise options would be used within the buildings;
- Noise levels within buildings could be reduced by applying sound absorbing materials on the inside walls and ceilings and for lining air ducts;
- The building envelope would be constructed from materials and in a manner that provide the necessary level of sound reduction;
- Acoustic doors and louvres could be used to reduce noise transfer to the outside;
- Silencers and/ or acoustic louvres of the correct design would also be used for the exhausts and inlets to reduce fan noise;
- Inlets and outlets would be in rounded or bell-mouth shapes to avoid turbulence;
- Stacks and other outlets would be fitted with attenuators;
- All connection points would be fitted with flexible joints to avoid transfer of noise via pipework and other services; and
- Vibrations from the machines will be transmitted to the building structure via the physical joints. Therefore, all pipes and ducts would be mechanically isolated from machines, using flexible connectors. Spring-type isolators are effective in reducing the vibration and noise generating from generators to the floor.

## Residual Effects

### Site enabling and construction residual effects

6.7.46 Construction noise impacts are for the duration of construction works only. Appropriate mitigation measures would reduce noise impacts to acceptable levels and therefore no residual noise impacts are expected from construction activities.

### Operational residual effects

6.7.47 Operational traffic is likely to result in a significant change in noise levels on Rampton Drift (NM5, north east corner). It is likely that the final design would include buildings between Rampton Drift and the

CGB, which would act as a noise barrier and help to reduce noise effects and would ensure that there is no residual noise impact.

- 6.7.48 At NM13 (Hazelwell Cottage) the increase in noise level is of marginal significance but overall noise levels are high. Implementing appropriate mitigation, such as the use of acoustic barriers would ensure that there is no residual noise impact.
- 6.7.49 Further investigation would need to be carried out to establish whether installation of barriers is feasible. Alternate mitigation would include improved glazing at affected receptors.

### Cumulative Effects

- 6.7.50 Cumulative noise impacts are likely where other proposed developments take place within proximity of the proposed Development. The cumulative impacts would potentially relate to operational impacts as well as construction noise impacts.
- 6.7.51 The most likely cumulative operational noise impacts are likely to relate to cumulative road traffic noise impacts. Cumulative road traffic noise impacts have been included in the traffic data provided for this assessment and have therefore been considered in the assessments above.
- 6.7.52 With regards to the cumulative assessment, traffic data for the following schemes has been included in the 2031 Do Something traffic data and the cumulative impacts are therefore considered in the noise contours on Figure 6.2:
- A14 Cambridge to Huntingdon Improvement Scheme;
  - Home Farm, Longstanton (S/0682/95/O); and
  - Northstowe Phase 1.
- 6.7.53 As indicated in the operational traffic assessment, the change in traffic noise level at the selected receptor locations is generally Negligible to Minor Adverse, except at NM5 (edge of north east Rampton Drift) where a Major Adverse impact is indicated. The large increase of 38.2 dB(A) at this receptor location is due to the large change in traffic volumes. It is likely that the final design (to be determined at reserved matters application stage) would include buildings between Rampton Drift and the CGB, which would act as a noise barrier and help to reduce noise effects.

## Limitations and Assumptions

### Limitations

- 6.7.54 The assessment has considered construction and operational noise impacts based on available information. The assessment has considered parameter plans, site layout and the traffic data provided in the Traffic Assessment.
- 6.7.55 As Main Phase 2 development area is at outline planning stage there is no detailed construction data available and construction noise impacts have been predicted based on an assumed schedule of construction plant to be used. For Northstowe Phase 2 development, once contractors have been commissioned, their method statement and specific plant to be used will be considered in developing tailored mitigation as required.
- 6.7.56 Assessment of noise from operational plant has not been possible as there is no design information available at this stage to allow prediction of operational plant noise.

### Assumptions

- 6.7.57 Since there is no detailed construction data available, construction noise impacts have been predicted based on an assumed schedule of construction plant to be used.

### Assessment Summary Matrix

- 6.7.58 The assessment summary matrix below (Table 6.13) describes the effects that have been identified and the significance of the effects that have been identified.

**Table 6.13: Assessment Summary Matrix**

<b>Assessment Summary Matrix</b>				
Description of Effects	Significance of Effects:	Description of Mitigation Measures and Enhancement	Description of Residual Effects	Significance of Effects
<b>Site enabling works and construction assessment</b>				
Construction traffic	Negligible	None required		Negligible (Not significant)
Construction noise impacts	-ve (slight – substantial), D,MT, R	Acoustic barriers, considerate construction practices, selection of quieter plant.	No residual effects with mitigation in place	Negligible (Not significant)
Construction vibration	Negligible	None required		Negligible (Not significant)
<b>Operational assessment</b>				
Noise effects for users of site	Noise levels fall predominantly in the range that indicates 'Development permitted'	Appropriate design of any fixed plant to be installed on site.	Noise levels fall predominantly in the range that indicates 'Development permitted'.	Negligible (Not significant)
Traffic noise impacts at 88 Rampton Drift	-ve major, D, LT, P	Acoustic screening (or buildings likely when final detailed development proposals come forward)	No residual effects with mitigation in place.	Negligible (Not significant)
Traffic noise impacts at Mills Lane/ Hazelwell Cottage	-ve moderate, D,LT, P	Acoustic screening	No residual effects with mitigation in place.	Negligible (Not significant)
Traffic noise impacts at Magdelene Close	-ve minor, D, LT, P	Acoustic screening.	No residual effects	Negligible (Not significant)

<b>Assessment Summary Matrix</b>				
Description of Effects	Significance of Effects:	Description of Mitigation Measures and Enhancement	Description of Residual Effects	Significance of Effects
Traffic noise impacts at Lady Walk, Holme Farm, Church View, Phypers Farm and Poplar Villas	-ve, negligible, D, LT, P	No mitigation proposed	No residual effects.	Negligible (Not significant)
Traffic noise reduction at St Michaels Mount	+ve Major, D, Lt, P	No mitigation proposed	No residual effects	Negligible (Not significant)
Traffic noise reduction at 101 Longstanton	+ve Moderate. D, Lt, P	No mitigation proposed	No residual effects	Negligible (Not significant)
Key: +ve (beneficial), -ve (adverse), D (direct), InD (indirect), ST (short term), MT (medium term), LT (long term), P (permanent), R (reversible)				

## 7 Transport and Access

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### 7.1 Introduction

- 7.1.1 This chapter assesses the potential traffic and transport effects associated with the proposed Northstowe Phase 2 development. Full details of the development proposed are presented in Chapter 3 of this Environmental Statement (ES), which sets the basis against which this assessment has been conducted.
- 7.1.2 This chapter includes an overview of the methodology for the description of baseline conditions, consideration of the traffic and transport construction and operational effects and the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed.
- 7.1.3 This assessment and a Transport Assessment (TA) has been prepared in liaison with South Cambridgeshire District Council (SCDC), Cambridgeshire County Council (CCC) and the Highways Agency (HA).
- 7.1.4 The Transport Assessment (TA) Report has been undertaken to determine the impact of the scheme in terms of operational capacity on the surrounding network and access to the site by sustainable modes. The TA should be read in conjunction with this chapter.

### 7.2 Review of Proposed Development

#### Site Location and Surrounding Area

- 7.2.1 The site of Northstowe Phase 2 is currently accessed by vehicular transport from the A14 via the B1050 Hatton's Road and Dry Drayton Road. The Highways Agency is currently progressing proposals for the A14 Cambridge to Huntingdon Improvement Scheme with a view to a submission for a Development Consent Order in late 2014.
- 7.2.2 The B1050 Hatton's Road forms a grade separated junction with the A14 at its southern end (Bar Hill junction) and broadly routes from north to south linking to Longstanton (via Hatton's Road) and Willingham to the north (via Station Road). Between Longstanton and the A14, the B1050 is a single carriageway road, with no street lighting or footways on either side. Dry Drayton Road currently forms a route from the A14 to Oakington. The A14 forms part of the trunk road network maintained and operated by the Highways Agency, and is the main route from Cambridge to Felixstowe to the east and Birmingham to the west (via the M6).



- 7.2.3 Longstanton Road links Dry Drayton Road to School Lane in Longstanton, although through movements for vehicles are prohibited (apart from access, taxis, mopeds and buses). Within Oakington the road is a narrow single carriageway, providing access to a number of further residential roads and provides street lighting and a footway on each side of the carriageway. Between Oakington and Longstanton there are no footways or street lighting. Cambridge Road routes from Dry Drayton Lane to the south east, providing a route into Cambridge via the A1307 Huntingdon Road.
- 7.2.4 Rampton Road is a no-through road which broadly routes through the northern part of the application 1(Phase 2) site and links to a byway which continues to Rampton in the east.
- 7.2.5 The Cambridgeshire Guided Bus (CGB) opened in August 2011 and runs along the eastern boundary of the overall development site of Northstowe, providing a unique opportunity for future residents to rely on higher levels of public transport accessibility and be connected with Cambridge and Huntingdon. Usage of the service has been good, and Stagecoach has stated that additional buses are planned to be provided by the end of 2014 to increase capacity on the route. The CGB stops are located approximately 1km to the south east and the north of the Main Phase 2 development area.
- 7.2.6 Within the vicinity of the site there are a number of existing bus services in operation that serve Oakington and Longstanton. The closest stops to the site in Longstanton are on High Street which is around 600m from the boundary of the site. The closest stops in Oakington are situated on High Street which is around 400 m from the boundary of the site. Destinations served include Bar Hill, Swavesey, Willingham, Over, Cambridge, St Ives, Huntingdon and Peterborough.
- 7.2.7 There are a number of existing walking and cycling routes surrounding and adjoining the site including Public Rights of Way (PRoW), footways and cycleways. There is a public byway which links Rampton Drift and Longstanton to the southwest to Rampton in the northeast. This right of way crosses the CGB and links from Rampton to Histon and a footpath running adjacent to Cottenham Lode. A byway links to the northwest via a bridleway routing along Over Road and Ramper Road which accesses Swavesey and the Ouse Valley Way to the northwest. The public byway which routes south of Longstanton runs south towards Bar Hill, but does not provide a crossing over the A14 and as such is limited in terms of its use at the southern end.
- 7.2.8 Footways are adjacent to the majority of the carriageways throughout the villages of Longstanton and Oakington and these provide part of suitable routes for which to access the proposed development site by foot. There are a number of access points into the site from Longstanton via PRoW (footpaths, bridleways and byways).

- 7.2.9 The proposed development site also has access to a wider commuter bicycle network which already provides good connectivity between neighbouring communities and Cambridge. There are existing cycle routes between the site and Swavesey to the north and Histon / Girton in the south, including the National Cycle route adjacent to the busway as well as a local cycle route from Girton to Swavesey along Cambridge Road, Longstanton Road, and the B1050.
- 7.2.10 Between Girton and Oakington there is an off-carriageway shared walking/cycleway provided on the northern side of the carriageway, which also ties into an off-carriageway route adjacent to Park Lane linking to Histon and the CGB. At its southern end in Girton the cycle route ties into the extensive network of routes within Cambridge.

## Transport Aspects of the Proposals

- 7.2.11 Details of the access strategy by all modes of travel are set out below. Figure 7.1 shows the proposed walking, cycling and equestrian routes linking to the site, Figure 7.2 shows the proposed bus service routes and Figure 7.3 shows the highway access strategy.

## Travel by Non-car Modes

### Walking and Cycling

- 7.2.12 There will be a comprehensive, permeable network of walking routes throughout the development and segregated cycleways will follow the corridor of primary and secondary roads (Plan 8 with the planning submission). There will be a number of key cycling connections within the development, which are:
- North west to south east following the busway through the centre of the development;
  - Following the Busway on the eastern and northern side to connect to the CGB walking, cycling and bridleway route via a proposed new crossing
  - On Rampton Drift from Longstanton Village Centre;
  - Through the water park on the eastern side;
  - Crossing west to east through the development in a number of locations, connecting homes to the town centre, schools and sports facilities;
  - Alongside the east and west Primary Roads; and
  - Connecting to Woodside in the west.
  - The provision of a comprehensive, direct network of segregated walking and cycling routes aims to make journeys on foot or cycle the most convenient modes for short journeys within the site in order to minimise the number of vehicle trips between on-site

origins and destinations. The network also provides the connections to the edge of the site to enable good connectivity with the adjacent communities and to longer distance walking and cycling routes.

7.2.13 Outside of the development the following new/ improved walking and cycling routes are proposed for Phase 2 (as shown on Figure 7.1):

- Alongside the Southern Access Road (West) and the B1050 (eastern side) from the Phase 2 development to connect to the Non-Motorised Users (NMU) crossing of the A14 and routes alongside the A14 Local Access Roads, as included in the HA scheme;
- Alongside the Busway connecting to the CGB route via a new signalised crossing north of the Busway/ CGB junction (with an alternative route onto Station Road through the Phase 3 land under discussion for the longer term);
- Alongside Cambridge Road between Oakington and Girton (requiring an upgrade of the existing footway to accommodate cyclists);
- Rampton Road will provide a greenway into the centre of the development from Longstanton village for cyclists, pedestrians and equestrians;
- Longstanton Road will be closed to vehicles except for emergency access (and potentially buses in the long term) on the SE section and be dedicated to walkers, cyclists and equestrians along its length from Longstanton to Oakington. There will be Pegasus crossings provided where Longstanton Road meets the Primary Road through Phase 3; and
- Improvement to the bridleway from Woodside in Longstanton SW towards the A14 including a crossing of the SW Link.
- A short section on Dry Drayton Road in the village of Oakington.

7.2.14 It is noted that as part of Northstowe Phase 1 there are proposals to improve walking and cycling connections alongside the B1050.

## Public Rights of Way

7.2.15 Improvements to the PROW are anticipated to be provided as part of the development potentially including the following (as shown on Figure 7.7):

- An improved crossing of the CGB on Rampton Drift to be considered potentially involving a warning system for pedestrians and cyclists of the approach of buses to the location;
- Resurfacing of the existing bridleway to Rampton and widening of the existing cycle path alongside carriageway between Rampton and Cottenham;

- Resurfacing of the existing footway between CGB crossing at Rampton Drift and Rampton Road and a new facility alongside Rampton Road;
- An upgrade of the footpath to bridleway status to allow off-road access from Northstowe to Over via the CGB maintenance track or alternatively an upgrade of the informally used path from Longstanton Road, Over and crossing of the CGB route; and
- Minor improvements to the byway to Aldreth, which may include minor physical works and historical interpretation signs, this would improve a leisure trail/ connection from Northstowe.

## Busway

- 7.2.16 A busway is proposed through the heart of Northstowe town centre which will link from the CGB route in the south-east (where there is a junction provided west of Oakington) through Phase 1 to the Longstanton Park and Ride in the north-west. Figure 7.2 shows the proposed busway route.
- 7.2.17 The busway will join the primary access road from the south for a short section and for Phase 2 this will be a shared route to the southern end of the town centre where primary routes on the east and west will diverge taking general traffic to the other parts of the Phase 2 development and connect to the Phase 1 Primary Roads. From this point the busway will be a bus only corridor. The busway is a strategic investment into public transport, giving buses significant priority over general traffic into the heart of the proposed Northstowe Phase 2 development.
- 7.2.18 Subject to viability calculations and negotiations, the initial proposal is that the busway will be used by Guided Buses as well as local bus services (i.e. the Citi 5). As such it will be a standard carriageway construction (not a Guided route) with measures to prevent other vehicles from using the busway. This is likely to use a camera number plate recognition system with enforcement by the County Council as highway authority.
- 7.2.19 Bus stops will be provided along the busway at intervals of no more than 800m for all services and stops at closer intervals will be planned for local bus routes where walking distances to the edge of the development are furthest. The aim is that the majority of residents are within 400m of a bus stop. It is proposed that there will be three Busway stops within the complete Northstowe Phase 2 development.
- 7.2.20 Bus stops will be provided with a shelter with seating, real time information and appropriate kerbing to allow use by both local buses and Guided buses.

## Access Routes and Junctions

- 7.2.21 Figure 7.3 illustrates the proposed highway strategy for the proposed Northstowe Phase 2 development. The proposed new road link will be from the B1050, the Southern Access Road (west) to the south west of the site forming a new access roundabout with the B1050. The link is shown as a dual carriageway from the B1050 to the southern end of Phase 3 land, although it is intended to be provided as a single carriageway for Phase 2. Extensive transport modelling using the Cambridge Sub Regional Model (CSRМ) led to the conclusion that a single carriageway would provide sufficient capacity. This is detailed in the Transport Assessment. A dual carriageway is put forward in the application however to safeguard the wider corridor for later phases of Northstowe. It would then be a single carriageway northwards and linked into the southern end of Northstowe Phase 2 development. Longstanton Road will be cut off to through traffic movements (although these are prohibited currently it is still used by some through traffic movements) but retain walking, cycling, equestrian and the long term potential for bus (from Oakington) access.
- 7.2.22 The northern access junctions for Phase 1 will also form a means of access into Phase 2 from the north via the Phase 1 primary roads.
- 7.2.23 A second new access is likely to be provided to the east onto Dry Drayton Road (Southern Access Road (East)) as part of the full Northstowe development beyond Phase 2 (i.e. Phase 3). The second access route would link the Northstowe site from its southern end to Dry Drayton Road which in turn would form a junction with the proposed local road as part of the A14 HA improvement scheme. The HA is developing a revised junction at Bar Hill and Dry Drayton as part of the A14 improvement scheme which will accommodate Phase 1 and 2 traffic from Northstowe and will safeguard land to enable the provision of capacity for the full Northstowe development. The section of the B1050 from the Bar Hill junction to the new Northstowe access roundabout will be a two lane dual carriageway.
- 7.2.24 Internally within the development there would be vehicle access via two Primary Roads. Each Primary Road is proposed to be 7.3m in width and will be connected to the Phase 1 Primary Roads in the north and the access road and busway arriving at the Main Phase 2 development area from the south. The two routes will comprise the:
- Eastern Primary Road: serving the eastern side of the town centre, secondary school, eastern primary school, sports facilities and residential areas to the east of the bus way; and
  - Western Primary Road: serving Rampton Drift existing residential areas, housing to the west of the Busway, the western side of the town centre and the western primary school.

- 7.2.25 The Primary Roads will be designed as 30 mph roads with changes in alignment to discourage traffic speeding and provide access without making journeys by car significantly advantageous over other modes.
- 7.2.26 There will be a network of secondary roads internal to the development and there are proposed to be four locations where routes will cross the Busway, requiring appropriate junction layouts to ensure buses aren't subject to undue delay as well as cater for walking, cycling and traffic movements.

### Parking Provision

- 7.2.27 The overall provision of parking for residential units will average 1.5 spaces per dwelling, in line with the SCDC standards. Allocated spaces will be in garages or on plot parking. Unallocated spaces will be on street or in parking courts. In addition to the provision for each dwelling, there will be on-street provision for visitors.
- 7.2.28 The level of provision of parking for the town centre, employment and education is proposed based on an accumulation of parking demand and consideration of the SCDC standards. Parking for education uses and employment will be provided as part of the school and employment developments, and managed by those occupants. Parking for town centre uses will be provided in public car parks and thus shared across the different uses.
- 7.2.29 The details of parking locations, layout and management will form part of future reserved matters applications.
- 7.2.30 The provision for cycle parking will be detailed in future applications. The aim for the development is to provide a higher level of cycle parking and storage provision than the SCDC standards to facilitate cycling as a main mode of travel for residents, shoppers, students and employees within the Main Phase 2 development area. Full details of proposed provision are included in the Transport Assessment.

### Construction traffic

- 7.2.31 Construction vehicles will access the Phase 2 development initially through Phase 1 (to construct the Secondary School and initial homes) during the period of time until the Southern Access Road (West) and Primary Road through Phase 3 is complete.
- 7.2.32 Once the Southern Access Road (West) is complete, all construction vehicles will access the development from the A14 at Bar Hill, and the Southern Access Road (West). Construction Traffic Management Plans will be in place to ensure there is no access from local roads.

- 7.2.33 From the roundabout junction of the Southern Access Road (West) and the Primary Road through Phase 3 (to the south of Longstanton Road), a construction haul route will be provided using the existing eastern perimeter road. This will be only for construction vehicles and will enable a separation of construction and operational traffic during the build out of the development.
- 7.2.34 For the construction of the Southern Access Road (West) it is assumed that construction will begin from the western end near the B1050 and a construction compound will be provided in the vicinity on the eastern side of the B1050. The means of temporary access will be agreed with the Highway Authority but is likely to require temporary traffic signals on the B1050 or use of an existing access point within the land in HCA control.

## 7.3 Approach and methods

- 7.3.1 The methodology in determining the nature, extent and significance of effects arising from the proposed Northstowe Phase 2 development is as follows:
- Identification of the long term operational effects of the proposals on the existing highway network, based on the additional traffic generation, changes in travel patterns, distribution, journey times, queuing and delays obtained from the outputs of the CSRM model and detailed operational assessments of junctions within the study area with reference to thresholds within the IEMA guidelines;
  - Personal Injury Accident (PIA) data for the highway network has been obtained and analysed in order to identify any road safety issues;
  - A qualitative analysis of construction effects has been undertaken based on the likely construction phasing and staging and estimated number of movements based on experience of other similar sites. Details of the likely routing of construction vehicles to the site has been set out;
  - The base situation has been established through analysis of the CSRM model for a 2011 base assessment year as well as a 2031 Do minimum scenario (future flows not including the Northstowe Phase 2 site);
  - The cumulative effect of the proposed Northstowe Phase 2 development as well as the Phase 1 site has been considered in the future year assessment; and
  - Mitigation measures to reduce the adverse effects of vehicular traffic as well as the demand for public transport services and local walking and cycling links during the operational phase have been developed. In addition mitigation measures for construction vehicles, including haulage routes within the site and on-site management measures have been considered; and

- Consultation with key stakeholders – CCC, HA, SCDC and the public through the consultation in March 2014.

## Legislation and guidance

### National Policy

#### National Planning Policy Framework (2012)

- 7.3.2 The NPPF sets out 12 core planning principles that should underpin decision making. The main principle which relates to transport planning of new developments is:
- Actively manage patterns of growth to make the fullest possible use of public transport, walking and cycling and focus significant development in locations which are or can be made sustainable.
- 7.3.3 Chapter 4 ‘Promoting sustainable transport’ and specifically Paragraph 29 states that ‘the transport system needs to be balanced in favour of sustainable transport modes, giving people a real choice about how they travel.’
- 7.3.4 Paragraph 32 states that ‘decisions should take account of whether:
- The opportunities for sustainable transport modes have been taken up depending on the nature and location of the site, to reduce the need for major transport infrastructure;
  - Safe and suitable access to the site can be achieved for all people; and
  - Improvements can be undertaken within the transport network that cost effectively limit the significant impacts of the development. Development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe.’
- 7.3.5 Paragraph 34 states that ‘decisions should ensure developments that generate significant movement are located where the need to travel will be minimised and the use of sustainable transport modes can be maximised.’
- 7.3.6 Paragraph 35 states that ‘developments should be located and designed where practical to:
- Accommodate the efficient delivery of goods and supplies;
  - Give priority to pedestrian and cycle movements, and have access to high quality public transport facilities;
  - Create safe and secure layouts which minimise conflicts between traffic and cyclists or pedestrian, avoiding street clutter and where appropriate establishing home zones;



- Incorporate facilities for charging plug-in and other ultra-low emission vehicles; and
- Consider the needs of people with disabilities by all modes of transport.'

7.3.7 Finally, Paragraph 38 states that for larger scale residential developments in particular 'key facilities such as primary schools and local shops should be located within walking distance of most properties.'

7.3.8 National Planning Policy Guidance was updated in March 2014 to provide guidance on a range of categories. This included Travel Plans and transport assessments in relation to decision making and also provides detailed advice on the EIA process and procedures.

The Strategic Road Network and the Delivery of Sustainable Development - DfT Circular 02/13

7.3.9 DfT Circular 02/13 sets out the way in which the Highways Agency will engage communities and the development industry to deliver sustainable development and, thus, economic growth, whilst safeguarding the primary function and purpose of the strategic road network. In relation to environmental impact, developers must ensure all environmental implications associated with their proposals, are adequately assessed and reported so as to ensure that the mitigation of any impact is compliant with prevailing policies and standards. It states that where a likely negative impact on the environment resulting from the proposals occurs outside of a highway boundary as a result of the proposals (for example air quality, visual impacts, artificial light or noise impacts at new housing affected by a road); any required mitigation measures must be located outside of the strategic road network's highway boundary.

7.3.10 The Circular requires developers to ensure adequate environmental information is provided at all stages of the planning process to satisfy the local planning authority and any other consenting authorities that the environmental impacts have been appropriately considered, that measures have been included within the proposals as required by relevant policies or otherwise, as fully as is reasonably possible, and to enable all residual impacts to be taken into account by the local planning authority in the development consent process.

Guidance on Transport Assessment, Department for Transport, (March 2007)

7.3.11 Government guidance on the assessment of development proposals is set out in the Guidelines for Transport Assessment: March 2007 (GTA). Reflecting the desire to build sustainable communities both in terms of the consumption of natural resources in providing new transport infrastructure and the on-going resource and environmental

demands of those travelling, the core principles of GTA are set out in paragraph 1.19 of the document and are summarised below:

- 7.3.12 Managing the existing network through:
- Making best possible use of existing transport infrastructure; and
  - Managing access to the highway network
- 7.3.13 Mitigating residual impacts through:
- Demand management;
  - Improvements to the local public transport network, and walking and cycling facilities;
  - Minor physical improvements to existing roads; and
  - Provision of new or expanded roads.

## Local Policy

Local Transport Plan 3 (LTP3) March 2011

- 7.3.14 Cambridgeshire County Councils' Third Local Transport Plan (LTP3) sets out the existing and future transport issues within Cambridgeshire and how they will seek to address them. LTP3 covers the period 2011-2026 and specifically sets out details of Northstowe, the expected issues in relation to transport and congestion and how CCC will look to mitigate some of the impacts.

Draft Transport Strategy for Cambridge and South Cambridgeshire

- 7.3.15 The purpose of this strategy is to:
- Provide a detailed policy framework and programme of schemes for the area, addressing current problems and consistent with the policies of LTP3.
  - Support the Cambridge and South Cambridgeshire Local Plans, and take account of committed and predicted levels of growth, detailing the transport infrastructure and services necessary to deliver this growth.
- 7.3.16 The Transport Strategy outlines the policy approach, transport infrastructure and services necessary to support planned growth and its travel demand into the longer term, including the key requirements related to growth to 2031. Although the strategy takes a long term view, it recognises that many of the interventions will not be delivered early, however some will not be required in the short or medium term. The strategy takes into account jobs and housing growth in the period to 2031, although it looks to set a vision for transport the longer term towards 2050.

## Best Practice Guidance

- 7.3.17 As a matter of best practice, this assessment has been undertaken based on current relevant guidance for assessing the significance of environmental effects of traffic. This includes:
- “Guidelines on the Environmental Assessment of Road Traffic” published in 1993 by The Institute of Environmental Assessment (IEA) (now The Institute of Environmental Management & Assessment (IEMA) (These guidelines have been used to gauge the significance of the changes in environmental conditions caused by an increase in road traffic).
  - DMRB, Volume 11 (DETR)<sup>35</sup>.
- 7.3.18 The IEMA guidelines suggest a range of topics to be considered when determining the magnitude and significance of the environmental impacts of development proposals. These topics include: noise, vibration, severance, driver and pedestrian delay, fear and intimidation, accidents and safety, hazardous loads, dust and dirt and ecological effects.
- 7.3.19 The IEMA Guidance makes it clear that a “critical feature of Environmental Assessment is determining whether a given impact is significant.” Further, “for many effects there are no simple rules or formulae which define thresholds of significance and there is, therefore, a need for interpretation and judgement on the part of the assessor backed up by data or quantified information whenever possible. Such judgements will include the assessment of the numbers of people experiencing a change in environmental impact”.
- 7.3.20 DMRB Volume 11 provides guidance for determining the significance of environmental effects. It states that the “criterion for arriving at the assessment of environmental effects can be considered in a formulaic manner. In most cases the output of an environmental impact assessment will be to report on the significance of a particular effect.” This formulaic approach is considered in more detail later in this chapter but generally speaking the significance of the effect is formulated as a function of the receptor or resource environmental value (or sensitivity) and the magnitude of project impact (change). In other words, significance criteria are used to report the effect of the impact.

## Study Area

- 7.3.21 The study area has been defined through analysis of the network with reference to the IEMA guidelines and through consultation discussions with CCC (see Figure 7.5). The study area was defined within the ES Scoping Chapter which was submitted to the LHA in advance of the production of this ES.

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<sup>35</sup> <http://www.dft.gov.uk/ha/standards/dmr/vol11/index.htm>

- 7.3.22 The study area also includes PRow, walking / cycling routes and public transport services within the vicinity of the site and linking to local areas.

## Methodology

- 7.3.23 The approach outlined below has been followed to assess likely significant effects, identify outline mitigation measures and assess likely residual effects:
- Undertaking desk studies (including requesting information from third parties) within the agreed study area;
  - Undertaking site visits (surveys) within the agreed study area;
  - Consideration of the baseline information obtained, proposed development and issues raised through consultation with interested parties as a result of responses to the Environmental Impact Assessment Scoping Report and through consultation;
  - Prediction of potential effects based on baseline information and proposed development details;
  - Identification of likely significant effects based on best practice, guidance and professional judgement;
  - Identification of appropriate mitigation measures; and
  - Prediction of residual effects based on baseline information, the Scheme details and mitigation measures.

## Environmental Effect Assessment Criteria

- 7.3.24 The IEMA Guidelines recommend that two rules are considered when assessing the effect of development traffic on a highway link:
- 7.3.25 Rule 1: Include highway links where traffic flows will increase by more than 30% (or the number of Heavy Goods Vehicles (HGVs) will increase by more than 30%); and
- 7.3.26 Rule 2: Include any other specifically sensitive areas where traffic flows will increase by 10% or more.
- 7.3.27 These rules are based upon knowledge and experience of environmental effects of traffic and also acknowledge that traffic forecasting is not an exact science. The 30% threshold is based upon research and experience of the environmental effects of traffic, with less than a 30% increase generally resulting in imperceptible changes in the environmental effects of traffic. At a simple level, the guidance considers that projected changes in total traffic flow of less than 10% create no discernible environmental effect, hence the second threshold as set out in Rule 2.

- 7.3.28 Column 3 in Table 2.1 of the IEMA Guidelines sets out a list of likely significant effects which should be assessed. These are set out below. The guidelines (paragraph 2.4) acknowledge that not all of the effects listed would be applicable to every development.

### Noise and vibration

- 7.3.29 The effects of noise and vibration have been assessed within Chapter 6: Noise and Vibration which includes an assessment of the impacts of road traffic, and are therefore not included within this chapter.

### Visual effects

- 7.3.30 The visual effect of traffic is complex and subjective and includes both visual obstruction and visual intrusion. The IEMA Guidelines acknowledge that in the majority of situations, the changes in traffic resulting from a development will have little effect. Landscape and visual effects of the proposed development are considered in Chapter 15: Landscape and Visual Effects.

### Severance

- 7.3.31 Severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery. Severance is difficult to measure, and by its subjective nature, is likely to vary between different groups within a single community. In addition to the volume, composition and speed of traffic, severance is also likely to be influenced by the geometric characteristics of a road, the demand for movement across a road, and the variety of land uses and extent of community located on either side of a road. All these factors are considered when determining the likely severance effect. In general terms, according to the IEMA guidelines, a 30% change in traffic flow is likely to produce a 'slight' change in severance, with 'moderate' and 'substantial' changes occurring at 60% and 90% respectively.

### Driver delay

- 7.3.32 Delay to drivers generally occurs at junctions where opposing vehicle manoeuvres are undertaken, with vehicles having to give or receive priority depending upon the type of junction arrangement. Driver delay could also occur on narrow rural roads if flows are increased (particularly those whereby it is difficult for vehicles to pass). A number of roads and junctions surrounding the site could be affected by changes in vehicle demand resulting from the proposed development and as such extensive traffic modelling work has been undertaken to understand the impact on delay, queues and capacity at key junctions and on key links on the surrounding highway network.

## Pedestrian delay

- 7.3.33 The delay incurred by pedestrians is generally a direct consequence of their ability to cross roads. Thus the provision of crossing facilities, the geometric characteristics of the road, and the traffic volume, composition and speed are all factors that can affect pedestrian delay and have been considered when assessing this effect. It should be noted that the IEMA guidelines advise that in assessing levels of, and changes in, pedestrian delay, assessors do not attempt to use quantitative thresholds given the range of local factors and conditions which can influence pedestrian delay. Instead, the Guidelines recommend the use of professional judgement to determine whether pedestrian delay is a significant effect. Pedestrian delay has been considered in the context of the change in travel demand generated by the proposed development for existing movements as well as the trip generation resulting from the proposed development itself. The development would alter existing movements as there are likely to be additional pedestrian movements between the site and surrounding local areas such as Longstanton and Oakington and as such the changes in this permeability and travel behaviour has been fully considered within this assessment.

## Pedestrian amenity

- 7.3.34 The term pedestrian amenity is broadly defined as the relative pleasantness of a journey. It is considered to be affected by traffic flow, speed and composition, as well as footway width, lighting and quality and the separation/protection from traffic. It encompasses the overall relationship between pedestrians and traffic, including fear and intimidation which is the most emotive and difficult effect to quantify and assess. The IEMA guidance references a study which suggests that a tentative threshold for judging the significance of changes in pedestrian amenity would be where the traffic flow (or its HGV component) is halved or doubled.
- 7.3.35 There are no commonly agreed thresholds for estimating levels of danger or fear and intimidation, however the IEMA guidelines also suggest the adoption of values from Crompton (1981) when considering any effect on pedestrian fear and intimidation. These thresholds are replicated in Table 7.1. These thresholds could be used as a first approximation of the likelihood of pedestrian fear and intimidation, although other factors need to be considered such as proximity to traffic and footpath widths.

**Table 7.1 Pedestrian fear and intimidation thresholds**

Degree of hazard	Average traffic flow over 18 hour day (vehicles per hour)	Total 18 hour heavy goods vehicle flow	Average speed over 18 hour day (miles per hour)
Extreme	1,800 +	3,000 +	20 +
Great	1,200–1,800	2,000–3,000	15-20
Moderate	600–1,200	1,000–2,000	10-15

Source: Crompton (1981)

## Accidents and safety

- 7.3.36 Consideration has been given to the local circumstances, in particular traffic speed, flow and composition, as well as vehicle conflict and pedestrian activity and the potential increases resulting from the Scheme. These factors enable a professional judgement to be made regarding the significance of the effect.

## Hazardous loads

- 7.3.37 Paragraph 2.4 of the IEMA Guidelines acknowledge that most developments would not result in an increase in the number of movements of hazardous or dangerous loads.. The proposed development is unlikely to generate a significant level of hazardous loads. Management of loads would form part of the CTMP and loads would be routed appropriately via the new Southern Access Road (West), the B1050 and the A14 and away from existing residential areas. Thus hazardous or dangerous loads are not considered to represent a safety issue. Hazardous loads have therefore not been considered further within this assessment

## Air Pollution including Dust and Dirt

- 7.3.38 The effects on air quality, dust and dirt have been assessed within Chapter 5: Air Quality and are therefore not included within this chapter.

## Obtaining Baseline Information

- 7.3.39 The approach followed to obtain baseline information has involved the identification of the study area in consideration of the proposed development type, issues raised through consultation as a result of scoping and consultation, professional judgement and best practice / guidance outlined in the following documents:
- Environmental Impact Assessment: A Guide to Good Practice and Procedures (The Department for Communities and Local Government, 2006)

- Guidelines for the Environmental Assessment of Road Traffic (Institute of Environmental Management and Assessment (IEMA), 1993)
- Guidance on Transport Assessment (Department for Transport (DfT), 2007)
- The Strategic Road Network and the Delivery of Sustainable Development Circular 02/13 (DfT), 2013
- The Design Manual for Roads and Bridges (DMRB) (Highways Agency, 1993)
- National Planning Policy Framework (NPPF) Department of Communities and Local Government, 2012)

7.3.40 National Planning Policy Guidance (NPPG) (Department of Communities and Local Government, 2014). Table 7.2 summarises the sources of baseline information and the nature of the baseline information obtained.

**Table 7.2: Transport and Access Assessment - Baseline Information**

Source	Baseline Information Requested / Obtained
Cambridgeshire County Council (via WSP and Atkins)	Outputs from the Cambridgeshire Strategic Regional Model (CSRM) including a Do Minimum and Do Something Scenario for 2031.
Highways Agency	Traffic Data for A14, Junction Designs for A14 schemes
Cambridgeshire County Council	Link flows data for a number of roads surrounding the site from October 2013 and February 2014. PRow Mapping and details of potential improvements.
Cambridgeshire County Council	Public Transport Data
Cambridgeshire County Council	Personal Injury Accident Data within required study area
Nationwide Data Collection	Turning count traffic data for 14 Junctions
Design Manual for Roads and Bridges	Accident data statistics, link flow capacities.
The Department for Transport (DfT)	National accident statistics

## Significance criteria

7.3.41 The following section outlines the criteria that have been used to determine the assessment of effects.

## Receptor Value / Sensitivity

7.3.42 Areas along the highway routes that could be sensitive to changes in traffic / HGV volumes have been identified. Sensitive areas are defined by the presence of sensitive receptors, such as hospitals,



residential properties, community centres, conservation areas, schools, equestrian facilities or accident black spots. A summary of the receptors to consider is reported in Table 7.3.

**Table 7.3: Transport and Access Assessment - Receptor Sensitivity**

Receptor Sensitivity	Receptor Type
Major	Receptors of greatest sensitivity to traffic flow: schools, colleges, playgrounds, accident blackspots, retirement homes, urban/residential roads without footways that are used by pedestrians (Paragraph 2.5 IEMA Guidelines, 1993)
Moderate	Traffic flow sensitive receptors including: congested junctions, doctors' surgeries, hospitals, shopping areas with roadside frontage, roads with narrow footways, unsegregated cycleways, community centres, parks, recreation facilities
Minor	Receptors with some sensitivity to traffic flow: places of worship, public open space, nature conservation areas, listed buildings, tourist attractions and residential areas with adequate footway provision
Negligible	Receptors with low sensitivity to traffic flows and those sufficiently distant from affected roads and junctions

## Magnitude of Change and Significance of Effects

- 7.3.43 The environmental effects of road traffic resulting from the proposals have been assessed upon the local highway network in accordance with the IEMA guidelines. The assessment has been carried out for all routes within the identified study area.
- 7.3.44 Assessments have been undertaken across a typical working day with the effects compared across the peak morning and evening hours as well as the average inter-peak hour and over a daily period. On any link where increases in traffic flow are in excess of the above IEMA impact thresholds (30% on any link or 10% on sensitive links), a detailed environmental assessment against the assessment criteria have been undertaken on this link.
- 7.3.45 In order to determine the significance of effects, the following parameters have been considered:
- The sensitivity of each link on the preferred route;
  - The percentage increase in total traffic and/or HGVs as a result of the Scheme along each link on the preferred route; and
  - The environmental effects as set out within IEMA Guidelines on each link where the impacts of the scheme are above the significance thresholds.
- 7.3.46 The effects can be beneficial or adverse; a description of the scale of magnitude used based on guidance contained in DMRB is set out in Table 7.4.

**Table 7.4 Magnitude of Effects**

<b>Magnitude of Effect</b>	<b>Description</b>
Negligible	No significant effects
Minor	Not noteworthy or material – impacts are of low magnitude and frequency and will not exceed relevant quality standards, residual effects will be negligible
Moderate	Noteworthy, material – impacts are of moderate magnitude and frequency. Relevant quality standards may be exceeded to limited extent. Possible secondary impacts, residual effects will be minimal.
Major	Impacts are likely to be of a high magnitude and frequency with quality standards being exceeded, at times considerably. There may be secondary impacts of some magnitude, residual effects will be of some significance.
Substantial	Impacts will be of a consistently high magnitude and frequency with Standards exceeded by a significant margin. Secondary impacts also likely to have a high magnitude and frequency. Significant residual effects.

7.3.47 The determination of the overall significance of the effects is a judgement as to whether the magnitude and duration of impacts, when combined with the characteristics of the road network and the sensitivity of receptors, would impact at a regional or district scale or are important at the local scale but cumulatively lead to an overall increase in the effects of traffic (as set out in Table 7.9). If this is the case, then the effects are considered to be significant

## 7.4 Consultation

7.4.1 This assessment has been carried out following consultation with CCC, the Local Highway Authority (LHA), the Highways Agency (HA) and SCDC as part of regular transport officer meetings. The key scoping/ pre-application meetings took place on the 7th May and the 28th May 2014.

7.4.2 There has also been public consultation on the scheme whereby local transport issues were raised. Meetings have also taken place with the Northstowe Parish Forum including Parish Council members and local authority councillors and with the Northstowe Transport Working Group. Issues raised during this liaison have been taken into account in the assessment of the potential transport effects of construction and operation presented within this chapter.

## 7.5 Baseline conditions

### Highway network

7.5.1 A description of the key links within the vicinity of the site and the potential effects which could arise on each link as a result of the scheme proposals has been set out below. The local highway

network and surrounding areas are referenced by the link flow location plan (Figure 7.4).

### **B1050 Hatton's Road**

- 7.5.2 The B1050 Hatton's Road would form the main access to the proposed Northstowe Phase 2 development from the A14. The B1050 forms a grade separated junction with the A14 at its southern end and broadly routes from north to south linking to Longstanton (via Hatton's Road) and Willingham to the north (via Station Road). The B1050 Hatton's Road between Longstanton (Hatton's Road roundabout) and the A14 is a single carriageway road of approximately 7.3m in width, with no street lighting or footways on either side which is subject to national speed restrictions. The B1050 Hatton's Road forms a bypass around Longstanton with three roundabouts forming junctions with Hatton's Road, Ramper Road and Station Road broadly to the west and northwest of Longstanton. The B1050 Station Road provides a north-south link to Willingham in the north and extends to Bar Hill to the south.

### **B1050 Station Road**

- 7.5.3 The B1050 Station Road commences at a roundabout junction with High Street at the northern end of Longstanton and is approximately 7.3m in width and is subject to a speed restriction of 40mph. Station Road provides an access route between Longstanton and Willingham and has a shared footway / cycleway on its eastern side linking Longstanton and the busway Park and Ride. The approved Phase 1 Northstowe site will provide an access along this section of the B1050.
- 7.5.4 There are three residential properties or sensitive receptors along the route between the A14 and the Hatton's Road roundabout, although only one of these is within 30m of the carriageway and there are no further sensitive receptors until Station Road (broadly opposite the proposed Phase 1 access junctions). There are further residential properties to the north of the proposed Phase 1 access junctions and then further north of the Park and Ride access.
- 7.5.5 To the south of the Ramper Road roundabout however, the number of sensitive receptors is minimal and the likely number of pedestrian movements is likely to be low. As such the applicable environmental effect criteria on this section of the route would relate to driver delay and accidents and safety. To the north of this towards Station Road, there would also be potential effects from severance, pedestrian delay, fear and intimidation and dust and dirt. However, this route already has a significant volume of traffic, including by HGVs and as such to an extent pedestrians would already be used to the composition of traffic.

## Dry Drayton Road

- 7.5.6 Dry Drayton Road currently forms a route from the A14 to Oakington, routing to the south east of the site. Dry Drayton Road forms an at grade junction with the A14 at its south western end and broadly routes from northeast to southwest linking to Oakington in the north and Junction 30 of the A14. Dry Drayton Road is a single carriageway road of approximately 7.3m in width, subject to national speed restrictions and with no street lighting or footways. Dry Drayton Road forms one arm of a four arm signal controlled junction with Cambridge Road, Longstanton Road and Water Lane at its northern end in the village of Oakington.
- 7.5.7 Dry Drayton Road to the south of the signal controlled junction has some properties fronting the carriageway, and a number of access points to properties on the section north of the A14 with one property directly fronting the road.. As with the B1050, this route already experiences high traffic volumes and some HGV traffic and as such users of this route would be used to these traffic flows. The village of Oakington itself has a number of properties situated adjacent to the carriageway and as such all the environmental criteria would apply to this route (continuing north on Water Lane from Dry Drayton Road).

## Longstanton Road (Airfield Road)

- 7.5.8 Longstanton Road links Dry Drayton Road to School Lane in Longstanton, although through movements for vehicles are prohibited (apart from access, taxis, mopeds and buses). Within Oakington the carriageway varies in width between approximately 6m and 7.3m, with frontage access to a number of residential properties. Within Oakington the road is a narrow single carriageway with a speed restriction of 30mph, providing access to a number of further residential roads and provides street lighting and a footway on each side of the carriageway. Between Oakington and Longstanton the carriageway narrows to around 5.5m with no footways or street lighting. Within Longstanton, the carriageway increases in width up to around 7m and there is frontage access to a number of residential properties as well as a narrow footway on the east side of the carriageway.
- 7.5.9 Although the existing road is prohibited to through movements, these do currently occur and the change in traffic levels has been assessed. Notably the route will be closed to traffic with the proposed development and this brings a significant reduction in impacts on the link.

## Cambridge Road / Oakington Lane

- 7.5.10 Cambridge Road routes from Dry Drayton Lane to the south east becoming Oakington Road to the south and providing a route into Cambridge via the A1307 Huntingdon Road. Within the vicinity of

Oakington, Cambridge Road is approximately 6m in width, has a shared footway / cycleway on its eastern side, street lighting and is subject to a 30 mph speed restriction. The speed limit increases to 40mph between Oakington and Girton before reducing to 30 mph within the vicinity of Girton and remaining at this level until the priority junction with the A1307.

- 7.5.11 There are residential areas along this route, particularly in the villages of Girton and Oakington and as such all environmental criteria would apply on this route. As with Dry Drayton Road and Hatton's Road though there is a high volume of existing traffic and HGV flows.

### Ramper Road

- 7.5.12 Ramper Road routes west from the B1050 linking to Boxworth End at its western end. Ramper Road is approximately 5m in width and provides a route from Longstanton to Swavesey in the west and an alternative route to the A14 via Boxworth End. There is no street lighting or footways provided along the route and as such limited pedestrian movements. However the easterly section from the Over Road junction towards Utton's Drove is marked as part of a long distance footpath but there is no provision for pedestrians. Ramper Road also provides access to Over Road / Gravel Bridge Road which routes northwest from Longstanton to Over and has a road width of around 5.5 to 6m.
- 7.5.13 There are two properties along Ramper Road (Highfield Cottages on the north side of the road to Utton's Drove) until Swavesey / Boxworth End where various properties front the carriageway. As such all environmental criteria would apply to this route, as well as Middle Watch and Boxworth End.

### High Street, Longstanton

- 7.5.14 High Street is the main access road through Longstanton, linking the B1050 Station Road to the north and School Lane to the south and has a speed restriction of 30mph and street lighting along its length. High Street is approximately 6m in width and provides frontage access to a number of residential properties as well as Hatton Park primary school. Footways are provided on each side of the carriageway of approximately 2m in width. At its southern end High Street forms a staggered crossroads with School Lane and Woodside.
- 7.5.15 Although there are properties, a school, shops and village hall within the vicinity of this road, the traffic flows are likely to reduce in this location following the proposed Northstowe Phase 2 development as vehicles will not be able to access Northstowe from Longstanton village. In addition, the current through movements on Longstanton Road (which are prohibited but do occur) will be reduced as this through route will be closed.

## Rampton Road / School Lane

- 7.5.16 Rampton Road is a no through road which broadly routes through the proposed Main Phase 2 development area site and links to a byway which continues to Rampton in the east. Rampton Road becomes School Lane to the west of Woodside which links to Hatton's Road at its western end via a priority junction and forms a route to the A14 at Bar End. School Lane is approximately 5.5m in width, to the west of Stokes Close it is subject to national speed restrictions and has no street lighting or footways and to the east of this it has a 30 mph speed restriction, footways on the north side of the carriageway and street lighting. Rampton Road would not continue into Northstowe and as such traffic flows from the development would not affect this route.

## A14

- 7.5.17 The A14 forms part of the trunk road network maintained and operated by the Highways Agency. The A14 forms the main route from Cambridge to Felixstowe to the east and Birmingham to the west (via the M6). Within the vicinity of the site there are two junctions at Bar Hill (J29) and Dry Drayton (J30) whereby Oakington and Longstanton can be accessed. The A14 is currently three lanes in each direction between the Bar Hill junction and the M11, reducing to two lanes to the north of the Bar Hill junction.
- 7.5.18 The Highways Agency's proposed improvements to the A14 from Cambridge to Huntingdon will upgrade the A14 in the vicinity of Northstowe to four lanes (in each direction) and provide a parallel single carriageway local access route connecting the Trinity Foot, Bar Hill and Dry Drayton junctions and linking to the northwest of Cambridge.
- 7.5.19 Traffic to and from Northstowe will have access onto the A14 at the Bar Hill junction. There have been discussions with the Highways Agency and their consultants J2A to ensure that the Bar Hill junction is designed in the A14 Cambridge to Huntingdon Improvements to accommodate the forecast flows from Northstowe Phases 1 and 2. Moreover, the implications of the full 10,000 homes have also been considered (Phases 1, 2 and 3). This has been agreed with the Highways Agency as well as in conjunction with officers from the County and District Council.
- 7.5.20 From the Bar Hill junction to the junction with the Southern Access Road (West), the B1050 will be upgraded to a dual carriageway to accommodate Northstowe development traffic as well as wider traffic growth on the B1050 corridor in the period to 2031.

## Road Safety

- 7.5.21 Personal Injury Accident data has been obtained for the most recent five year period available between 01 December 2008 and 30 November 2013 from Cambridgeshire County Council. This has been used to assess the level of injury accidents occurring on the proposed route to the application site. A full detailed review of accidents is provided within the Transport Assessment. Within the study area (not including the A14) there were a total of 126 collisions of which 109 were classified as slight injury accidents and 17 were classified as serious injury accidents. There were no fatal injury accidents within the study area.
- 7.5.22 In addition to the above, accident data was obtained on the A14 between the Swavesey junction and Girton, the data showed 129 accidents occurring on this link during the study period. These accidents are not considered further within this chapter as the A14 is subject to a separate study and upgrade scheme being undertaken by the Highways Agency.
- 7.5.23 A plot of all accidents within the study area (outside the A14) is provided within Figure 3.2 of the separately submitted Transport Assessment.
- 7.5.24 The accident data demonstrates that 24 accidents involved cyclists, 17 involved motorcyclists, five involved pedestrians, three involved buses and two involved an HGV.
- 7.5.25 In relation to clusters of accidents – there were two locations which showed some common causation between accidents. One occurred on the B1050 Station Road just east of the B1050 Longstanton bypass / Station Road roundabout and the other occurred on Rampton Road (between Cottenham and Rampton).
- 7.5.26 On the B1050 Station Road the accident data indicates that all accidents involved vehicles travelling in a southbound direction, which either collided with objects / left the carriageway without another vehicle being involved or collided head on with vehicles travelling in the other direction. As such this could suggest a deficiency with the carriageway markings or speeding at this location. As part of the Phase 1 application, a number of new access points are being provided at approximately this location and this should reduce vehicle speeds accordingly and the carriageway would be upgraded. It is considered that the changes on the highway network implemented as a result of the Phase 1 development improve safety issues on this stretch of the highway and as such there are no specific highway improvements required as part of the Northstowe Phase 2 development.

- 7.5.27 On Rampton Road there was a pattern of single vehicle accidents, whereby vehicles have left the carriageway and/or struck an unknown object at a corner, with all accidents occurring in rainy, snowy or icy conditions. This suggests that there may be an issue with vehicle speeds at this location and this will be considered within the assessment.
- 7.5.28 Aside from these issues, the overall accident record in the entire study area over a five year period does not suggest any specific safety deficiencies on the local highway network in the vicinity of the site that may be exacerbated as a result of the proposed scheme.

## Public Transport

### Bus

- 7.5.29 Within the vicinity of the Main Phase 2 site there are a number of existing bus services in operation that serve Oakington and Longstanton, including the four services which route along the CGB. The existing services are shown on Figure 7.6. The closest stops to the Main Phase 2 site in Longstanton are on High Street which is around 600m from the boundary of the site. The closest stops in Oakington are situated on High Street which is around 400m from the boundary of the Main Phase 2 site. The CGB stops are located approximately 1km to the south east and the north of the Main Phase 2 site boundary.

### Rail

- 7.5.30 Cambridge Rail Station is located approximately 11km to the southeast of the site. Guided Busway services A and C route to the station, which provides frequent services to a range of regional destinations such as London, Birmingham, Norwich and Ipswich. A new rail station is being developed on the mainline, known as Cambridge Science Park Station which is located in the north of Cambridge, close to the Science Park, St John's Innovation Centre and Cambridge Business Park. Planning permission has been granted to build the railway station, a direct bus link from the Busway to the station and foot and cycleways to nearby roads. The Science Park CGB stop is only 10 minutes from Longstanton Park and Ride by bus, thus Northstowe will be within a short journey of the proposed new station.

## Walking and Cycling

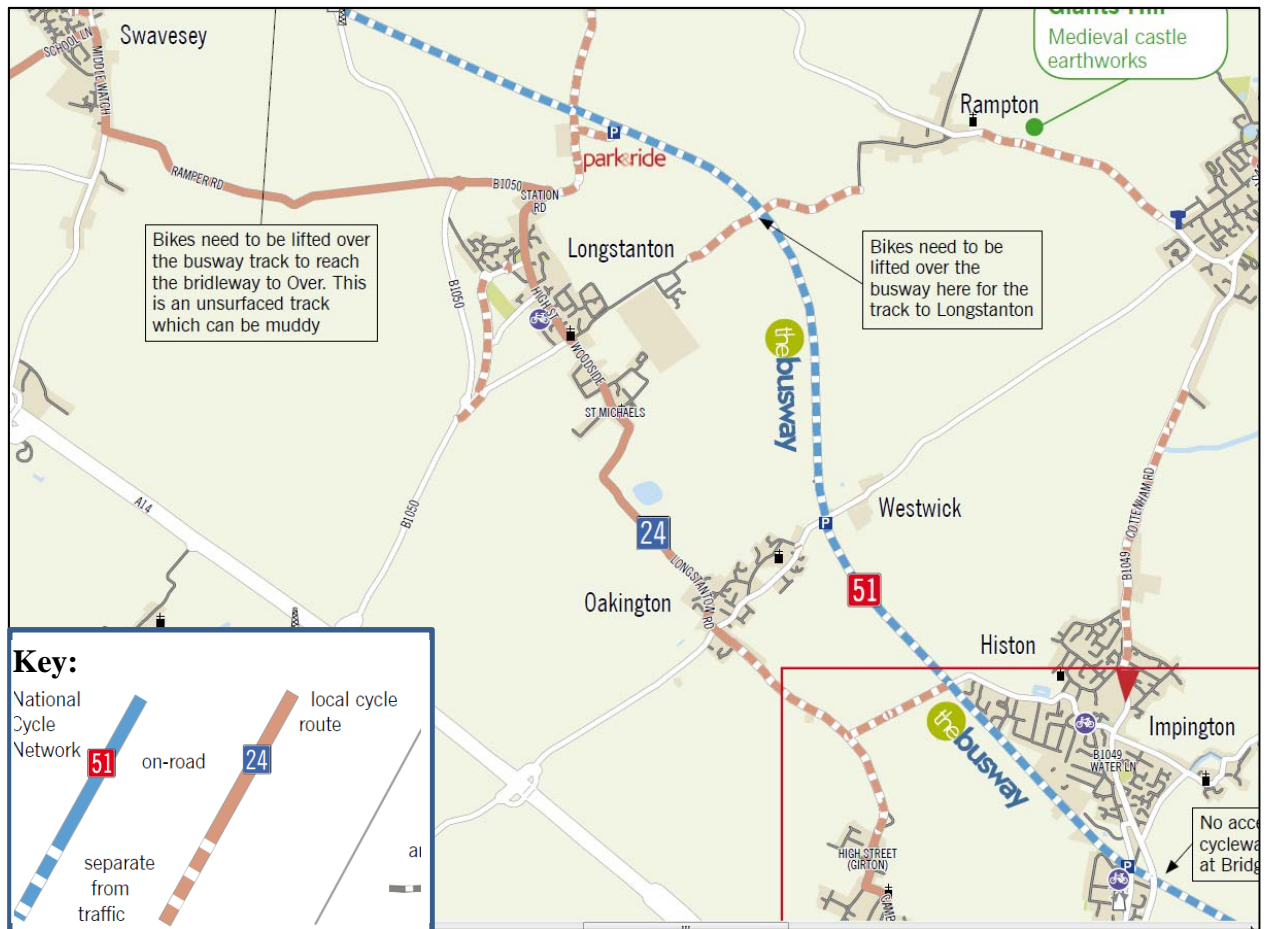
- 7.5.31 There are a number of existing walking and cycling routes surrounding and adjoining the site including PRow, footways and cycleways. The key PRow within a close proximity to the site are shown within Figure 7.6. There is a public byway which links Rampton Drift and Longstanton to the southwest to Rampton in the



northeast. This PRoW crosses the CGB via an at grade crossing. This byway also links from Rampton to Histon and a footpath running adjacent to Cottenham Lode. The byway routes through the Northstowe site and is currently grassed over to the south of the CGB with a gravel track to the north of the CGB.

- 7.5.32 The CGB at grade crossing has deep cuttings to guide the buses which cause some difficulty for cyclists to cross at this point as they are required to dismount and carry bicycles across the tracks. The crossing links to a shared footway / cycleway which runs adjacent to the east side of the CGB at this location, crossing to the other side of the CGB to the south at Westwick. This cycleway forms part of the National Cycle Network (Route 51) and links to Cambridge to the south and Huntingdon (via Over / Swavesey) to the north.
- 7.5.33 To the south of Over on Longstanton Road there are informal tracks where people have walked down the verge to the cycleway / busway from the road bridge. This section appears to have a high level of demand and could be upgraded to allow access to the busway. There is also no at grade crossing to allow pedestrians / cyclists access to the National Cycle Route 51 on the southern side of the tracks.
- 7.5.34 The public byway which routes around the southern boundary of the site links to a public footpath which runs south towards Bar Hill. This does not currently provide a crossing over the A14 and as such is limited in terms of its use. In addition, the byway links to the northwest via a bridleway routing along Over Road and Ramper Road which accesses Swavesey and the Ouse Valley Way to the northwest.
- 7.5.35 There is a long distance footpath connecting Dry Drayton, Oakington, Longstanton and Swavesey mainly alongside the carriageway or sharing the carriageway in locations such as Longstanton Road and on Ramper Road west of Over Road.
- 7.5.36 The cycle routes between the site and Swavesey to the north and Histon / Girton in the south are shown in the graphic from Cambridgeshire County Council below. This demonstrates the National Cycle route adjacent to the busway as well as a local cycle route (24) which routes from Girton to Swavesey along Cambridge Road / Longstanton Road / Longstanton High Street / B1050 / Ramper Road / Middlewatch. Between Girton and Oakington there is an off-carriageway shared walking/cycleway provided on the northern side of the carriageway, which also ties into an off-carriageway route adjacent to Park Lane linking to Histon and the CGB. At the Oakington Crossroads, advanced stop lines are provided for cyclists to ease movements across the junction. On Longstanton Road from the Oakington crossroads the route becomes on-carriageway and for the remainder of the route to Swavesey the cycle route is on-carriageway. At its southern end in Girton the cycle route ties into the extensive network of routes within Cambridge.

### Cycle Routes within the vicinity of the site



Source: Cambridgeshire County Council

- 7.5.37 Shared walking / cycleways route adjacent to Hatt Shared walking / cycleways route adjacent to Hatton's Road and the B1050 Station Road link areas to the south of Longstanton with Willingham. These provide suitable and preferred routes for walking and cycling from the site to surrounding areas (although no walking or cycling facilities are provided to the south of the B1050 Hatton's Road roundabout linking to the Bar Hill junction).
- 7.5.38 Footways are adjacent to the majority of the carriageways throughout the villages of Longstanton and Oakington. There are a number of access points into the Phase 2 site from Longstanton via PRow (footpaths, brideways and byways).
- 7.5.39 Covered, well lit and CCTV monitored cycle parking is available at the two closest CGB stations to the site to encourage cycling as follows:
- Longstanton Park & Ride - 50 spaces; and
  - Oakington - 30 spaces.
- 7.5.40 The footway and cycleway links and facilities as well as the PRow network surrounding the site, together with the proposed

improvements in the Access and Travel Strategy provide excellent permeability from the site to surrounding areas and will encourage walking and cycling to and from these areas.

## Base Traffic Data

7.5.41 Traffic survey data was obtained from an independent specialist survey company (Intelligent Data Ltd) for 14 junctions within the proximity of the Northstowe site. Turning movements have been obtained at each of these junctions for every 15 minute period between 0700 and 1900. The surveys were undertaken on 25th February 2014 for junctions 1 to 12 and 7th November 2013 for the remaining two junctions (13 and 14).

7.5.42 The junctions where traffic flows have been obtained are summarised below:

- Girton Road / Huntingdon Road priority junction;
- New Road / Cambridge Road priority junction;
- Hatton's Road / B1050 roundabout;
- Over Road / Hatton's Road roundabout;
- High Street / Over Road mini roundabout;
- Station Road / B1050 roundabout;
- B1050 / Ramper Road roundabout;
- Over Road / Ramper Road junction;
- Boxworth End / Ramper Road / Middlewatch priority junction;
- Boxworth End Road / Rose and Crown priority junction;
- Oakington Road / Rampton Road mini roundabout;
- High Street / Station Road / Berrycroft Road / Over Road signal controlled junction;
- High Street / Rampton Road / Woodside / School Lane staggered crossroads; and
- Dry Drayton Road / Longstanton Road signal controlled junction.

7.5.43 The Transport Assessment used the surveys above to undertake base year capacity assessments of each of the junctions and compare with queue length surveys which were undertaken at the same time. This verified the models to ensure these were demonstrating, within acceptable limits, what occurs on the ground. Future year do minimum (no Northstowe Phase 2) and do something (Northstowe Phase 2) flows were then input into the verified models to establish the impacts of the development traffic on the network.

7.5.44 To assess the transport impacts of the proposed Northstowe Phase 2 development, the Cambridge Sub-Regional Model (CSRM) has been used. CSRM is a multi-modal land use and transport interaction

model that was developed and validated with a base year of 2006 and forecast years at five-year intervals to 2031. The year of 2011 now forms the 'base year'.

- 7.5.45 The model has been reviewed and developed by the HA to form the basis for the A14 Cambridge to Huntingdon study. The updated HA model is now referred to as the Cambridge Huntingdon A14 Road Model (CHARM). In order to ensure the model appropriately represents the baseline transport situation and can therefore predict the impacts of the proposed development, the following was undertaken:
- 7.5.46 A benchmarking and review exercise to check how closely the model validates against baseline traffic data followed by agreed updates to the model with the HA's consultants; and
- 7.5.47 A review of the trip generation and modal share results using the National Travel Survey and TRICS database compared to the CSRM results.
- 7.5.48 Full details of the benchmarking and review are provided within the Transport Assessment. In summary the review benchmarked the model flows against Northstowe specific traffic counts provided by CCC to establish suitable base year and future year flows. The base traffic flows for a 2011 base year are summarised by road link within Table 7.5. The peak periods are shown in Passenger Car Units (PCU's) and the 18 Hour and Daily Flows are shown in Total Vehicles (Veh.). The location of the road links for which base year flows have been obtained is shown in Figure 7.4.

**Table 7.5 2011 Base Year Traffic Flows**

Link No	Link Name	2011 Base					
		AM Peak (PCU)	PM Peak (PCU)	18 Hour (Total Veh)	Daily (Total Veh)	18 Hour (HGV)	Daily (HGV)
1	Site 1 – B1050 Hatton's Road, northeast of A14	1,250	1,424	13,746	13,940	542	566
2	Site 2 – Dry Drayton Road, northeast of A14	1,129	1,211	11,657	11,814	313	319
3	Site 3 – Ramper Road, west of Longstanton Bypass roundabout	457	441	4,778	4,844	104	109
4	Site 4 – B1050 Station Road, north of Cambridgeshire Guided Busway	925	1,050	9,117	9,258	531	551
5	Site 5 – Cambridge Road, Oakington	725	784	7,859	7,963	160	165
6	Site 6 – Rampton Road, between Rampton and Willingham	489	500	4,442	4,511	114	118

Link No	Link Name	2011 Base					
		AM Peak (PCU)	PM Peak (PCU)	18 Hour (Total Veh)	Daily (Total Veh)	18 Hour (HGV)	Daily (HGV)
7	Site 7 – B1050 Earith Road, north of Willingham	1,093	1,314	11,299	11,467	506	525
8	Site 8 – A1096 Harrison Way, St. Ives	2,491	2,545	24,416	24,775	1,438	1,492
9	Site 9 – Willingham Road, between Over and Willingham	241	332	2,730	2,768	40	41
10	Site 10 – Longstanton Road (the airfield road), Oakington	227	220	2,101	2,133	64	66
11	Site 11 - Swavesey Road, Fen Drayton - NOT IN MODEL						
12	Site 12 - Boxworth End, Swavesey (just north of A14)	583	614	6,245	6,326	62	63
13	Site 13 - Ramper Road, just east of Swavesey	188	189	1,953	1,978	40	40
14	Site 14 - Longstanton High Street	205	233	2,140	2,169	69	70
15	Site 15 - B1049, North of Cottenham	1,032	793	9,566	9,695	406	418
16	Site 16 - Cottenham Road, just south of Cottenham	1,188	983	10,555	10,711	429	446
17	Site 17 - Bridge Road, Histon (near A14)	1,845	1,659	18,503	18,765	629	658
18	Site 18 - Oakington Road, Oakington (busway)	861	848	7,460	7,570	255	257
19	Site 19 - New Road, Histon	658	706	7,239	7,333	139	142
20	Site 20 - Butt Lane, Milton (west of A10)	251	337	3,180	3,221	100	103
21	A14 West of Junction 28 (Swavesey) - proposed Huntingdon Southern Bypass	-	-	-	-	-	-
22	A14 East of Junction 28 (Swavesey)	6,919	7,279	81,557	85,801	16,082	18,870
23	A14 East of Junction 29 (Bar Hill)	8,344	8,821	96,911	101,546	16,675	19,549
24	A14 East of Junction 31 (Girton)	7,077	6,238	69,861	73,133	11,854	13,890
25	A14 East of Junction 32	6,445	6,251	67,195	70,339	11,457	13,414

Link No	Link Name	2011 Base					
		AM Peak (PCU)	PM Peak (PCU)	18 Hour (Total Veh)	Daily (Total Veh)	18 Hour (HGV)	Daily (HGV)
	(Histon)						
26	Local Access Road west of Bar Hill	-	-	-	-	-	-
27	Local Access Road east of Bar Hill	-	-	-	-	-	-
28	Local Access Road south of Dry Drayton	-	-	-	-	-	-
29	B1050 North of Bar Hill Junction	1,250	1,424	13,746	13,940	542	566
30	Hatton's Link Road	-	-	-	-	-	-
31	Dry Drayton Link Road	-	-	-	-	-	-
32	Primary Road 1 - Centre	-	-	-	-	-	-
33	Primary Road 2 - East	-	-	-	-	-	-
34	B1050 N of Hatton's Road Roundabout	982	1,074	10,564	10,714	417	435
35	Hatton's Road E of B1050 and N of School Lane	236	301	2,661	2,699	100	104
36	A14 East of Dry Drayton	8,166	8,625	94,738	99,271	16,310	19,123
37	Cambridge Road, S of Girton	297	248	2,857	2,895	108	111
38	High Street Willingham	1,141	1,220	11,083	11,247	495	514
39a	Junction 31 (Girton) - A14 (SB) to A14 Northern Bypass (EB)	1,675	1,580	17,901	18,769	3,181	3,729
39b	Junction 31 (Girton) - Huntingdon Road (NB) to A14 (NB)	470	609	5,934	6,222	1,054	1,236
39c	Junction 31 (Girton) - A14 Northern Bypass (WB) to A14 (NB)	1,427	1,524	16,226	17,012	2,883	3,380
40a	Junction 32 (Histon) On-Slips	1,122	1,289	13,256	13,898	2,356	2,761
40b	Junction 32 (Histon) Off-Slips	1,582	1,295	15,820	16,587	2,811	3,295
41	Oakington Road, between Dry Drayton and A14	517	492	4,406	4,471	151	152
42	B1050, between Ramper Road/B1050 roundabout and Station Road	992	1,114	10,865	11,017	422	441

- 7.5.49 The A14 is proposed to be improved along its length between Cambridge and Huntingdon including widening to 4 lanes in each direction in the vicinity of Bar Hill and the provision of a local access road which runs adjacent to the A14 and links to the B1050 at the Bar Hill junction. This local access road will provide a link into Cambridge from the B1050 and also from Dry Drayton Road, as the junction with the A14 is being closed at this location.
- 7.5.50 These improvements and changes will redistribute traffic across the network which is demonstrated in the strategic modelling of the Do Minimum future year traffic flows.

## Future Traffic Flows

- 7.5.51 As set out previously the assessment has been undertaken considering a future year in 2031. This represents the full occupation/ Opening Year of the development when the impacts of traffic will be at the highest level. The strategic modelling therefore provides traffic flows for a 2031 Do Minimum scenario which includes the A14 scheme improvement and the Phase 1 Northstowe site only. The future year traffic flows for the 2031 Do Minimum Scenario are set out in Table 7.6

**Table 7.6 2031 Do Minimum Traffic Flows**

Link No	Link Name	2031 Do Minimum					
		AM Peak (PCU)	PM Peak (PCU)	18 Hour (Total Veh)	Daily (Total Veh)	18 Hour (HGV)	Daily (HGV)
1	Site 1 – B1050 Hatton's Road, northeast of A14	1,905	2,132	21,480	21,771	666	696
2	Site 2 – Dry Drayton Road, northeast of A14	1,218	1,284	12,548	12,712	443	452
3	Site 3 – Ramper Road, west of Longstanton Bypass roundabout	639	632	7,560	7,654	140	147
4	Site 4 – B1050 Station Road, north of Cambridgeshire Guided Busway	1,245	1,378	12,923	13,110	628	654
5	Site 5 – Cambridge Road, Oakington	867	807	9,514	9,631	179	185
6	Site 6 – Rampton Road, between Rampton and Willingham	695	691	5,828	5,924	160	166
7	Site 7 – B1050 Earith Road, north of Willingham	1,460	1,546	13,597	13,805	553	573
8	Site 8 – A1096 Harrison Way, St. Ives	2,605	2,591	29,250	29,622	1,373	1,430
9	Site 9 – Willingham	335	422	3,467	3,517	40	41

Link No	Link Name	2031 Do Minimum					
		AM Peak (PCU)	PM Peak (PCU)	18 Hour (Total Veh)	Daily (Total Veh)	18 Hour (HGV)	Daily (HGV)
	Road, between Over and Willingham						
10	Site 10 – Longstanton Road (the airfield road), Oakington	197	214	2,315	2,345	83	87
11	Site 11 - Swavesey Road, Fen Drayton - NOT IN MODEL						
12	Site 12 - Boxworth End, Swavesey (just north of A14)	912	1,040	10,063	10,196	156	160
13	Site 13 - Ramper Road, just east of Swavesey	340	347	4,129	4,177	61	62
14	Site 14 - Longstanton High Street	220	238	2,574	2,605	77	79
15	Site 15 - B1049, North of Cottenham	1,153	874	11,518	11,662	601	620
16	Site 16 - Cottenham Road, just south of Cottenham	1,420	1,368	13,787	13,983	576	600
17	Site 17 - Bridge Road, Histon (near A14)	2,382	2,353	25,076	25,423	888	928
18	Site 18 - Oakington Road, Oakington (busway)	1,035	979	8,923	9,053	399	405
19	Site 19 - New Road, Histon	849	744	10,318	10,433	154	157
20	Site 20 - Butt Lane, Milton (west of A10)	352	599	4,815	4,876	157	160
21	A14 West of Junction 28 (Swavesey) - proposed Huntingdon Southern Bypass	6,549	6,804	80,704	84,902	16,600	19,307
22	A14 East of Junction 28 (Swavesey)	9,168	9,560	112,119	117,652	19,805	23,244
23	A14 East of Junction 29 (Bar Hill)	10,787	11,244	129,780	135,783	20,490	24,044
24	A14 East of Junction 31 (Girton)	10,193	9,951	110,509	115,218	15,335	17,978
25	A14 East of Junction 32 (Histon)	9,119	9,479	105,465	110,010	14,889	17,441
26	Local Access Road west of Bar Hill	504	604	6,495	6,570	131	136
27	Local Access Road east of Bar Hill	1,128	1,267	13,358	13,517	297	305



Link No	Link Name	2031 Do Minimum					
		AM Peak (PCU)	PM Peak (PCU)	18 Hour (Total Veh)	Daily (Total Veh)	18 Hour (HGV)	Daily (HGV)
28	Local Access Road south of Dry Drayton	418	342	3,115	3,163	110	112
29	B1050 North of Bar Hill Junction	1,905	2,133	20,775	21,068	645	675
30	Hatton's Link Road	-	-	-	-	-	-
31	Dry Drayton Link Road	-	-	-	-	-	-
32	Primary Road 1 - Centre	-	-	-	-	-	-
33	Primary Road 2 - East	-	-	-	-	-	-
34	B1050 N of Hatton's Road Roundabout	1,487	1,624	16,030	16,255	494	517
35	Hatton's Road E of B1050 and N of School Lane	363	429	3,925	3,980	138	143
36	A14 East of Dry Drayton	10,792	11,249	124,311	130,260	19,628	23,067
37	Cambridge Road, S of Girton	581	474	5,515	5,588	194	201
38	High Street Willingham	1,440	1,570	14,128	14,338	580	601
39a	Junction 31 (Girton) - A14 (SB) to A14 Northern Bypass (EB)	2,310	2,495	26,420	27,701	4,069	4,786
39b	Junction 31 (Girton) - Huntingdon Road (NB) to A14 (NB)	962	928	10,393	10,896	1,601	1,883
39c	Junction 31 (Girton) - A14 Northern Bypass (WB) to A14 (NB)	2,295	2,660	27,250	28,571	4,197	4,937
40a	Junction 32 (Histon) On-Slips	1,934	1,695	19,956	20,923	3,073	3,615
40b	Junction 32 (Histon) Off-Slips	2,428	2,153	25,188	26,409	3,879	4,563
41	Oakington Road, between Dry Drayton and A14	749	790	6,719	6,818	301	305
42	B1050, between Ramper Road/B1050 roundabout and Station Road	1,675	1,878	18,351	18,607	560	585

7.5.52 The traffic flows above show that in a Do Minimum scenario the local highway network links with the highest traffic flows are forecast to be the B1050 (particularly north of the Bar Hill junction), the A1096, Dry Drayton Road, Cambridge Road, New Road, Ramper Road and the local access road east of Bar Hill.

## 7.6 Environmental design/Design mitigation

- 7.6.1 As part of the Northstowe Phase 2 development, a new single carriageway access route into Northstowe would be provided and this would link with a new roundabout junction onto the B1050 Hatton's Road. The HA are developing a new junction at Bar Hill as part of the A14 improvement scheme and this would be linked by a dual carriageway to the new B1050 / Northstowe roundabout.
- 7.6.2 Longstanton Road which is currently used by traffic between Longstanton and Oakington will be physically closed to through vehicle movements.
- 7.6.3 Rampton Road will be closed to vehicles from Longstanton to avoid issues of development traffic travelling through the centre of Longstanton village. A greenway will be provided instead from Longstanton village to Northstowe town centre for cyclists, pedestrians and equestrians.
- 7.6.4 These embedded mitigation measures will redistribute traffic across the network which is demonstrated in the strategic modelling of the future years.
- 7.6.5 The masterplan for the Phase 2 development incorporates a comprehensive and permeable network of walking and cycling routes to reduce traffic movements. The busway through the centre of the site and bus services will ensure that public transport is an attractive option to access the Main Phase 2 development area and its town centre and for journeys to Cambridge and outlying communities connected by local bus services.

## 7.7 Potential effects

- 7.7.1 The potential effects have been assessed for the construction and operational phases of the development within this section.

### Site establishment and construction effects

- 7.7.2 The construction of Northstowe Phase 2 can be divided into a number of proposed sub-phases. These are listed in Table 7.7. Sub-phases A and B are anticipated to take place prior to the completion of the Southern Access Road (West). Sub Phase B and C includes the construction of the Southern Access Road (West) and Primary Road through Phase 3. It is envisaged that construction works will commence in 2016 and be completed in 2031. First occupancy is expected in 2019. Non-residential buildings are expected to come forward post 2019.

**Table 7.7 Proposed construction sub-phases of Northstowe Phase 2**

Sub-Phase	Start	End
A	2016	2018
B	2017	2019
C	2019	2021
D	2021	2023
E	2023	2026
F	2026	2028
Town Centre / Phase 2 complete		2031

- 7.7.3 Construction vehicles will access the Phase 2 development initially through Phase 1 (to construct the Secondary School and initial homes) during the period of time until the Southern Access Road (West) and Primary Road through Phase 3 is complete.
- 7.7.4 Once the Southern Access Road (West) is complete, all construction vehicles will access the development from the A14 at Bar Hill, and the Southern Access Road (West).
- 7.7.5 With regards to construction vehicle movements, it has been estimated that 45,132 tonnes (83,973 m<sup>3</sup>) of waste will arise from the construction phase associated with materials in relation to buildings (2019 – 2031). This would result in a total of 5,506 HGV departures (one way) based on collections of 20 yards (15.25 m<sup>3</sup>) skips. This is equivalent to less than two HGV departures per day on average throughout the construction phase (or four two-way HGV trips assuming each vehicle returns back to the site).
- 7.7.6 In addition, there would be 3,200 tonnes (3,574m<sup>3</sup>) of waste generated from infrastructure. This would equate to a total of 234 vehicles assuming loads of 15.25 m<sup>3</sup>. Across the entire construction period this would equate to less than one HGV every two weeks on average.
- 7.7.7 It has been assumed that all excavation waste will be re-used on the site and it has been estimated that there would be 1,408,773 tonnes (1,124,183 m<sup>3</sup>) of waste arising from the excavation phase. This would result in 74,945 HGV departures being avoided, based on collections of 15 m<sup>3</sup> HGVs (or 149,890 two-way HGV movements). This is equivalent to a reduction of 22 HGV departures per day over the entire construction phase (44 two-way HGV movements).
- 7.7.8 It has been estimated that 47,526 HGV arrivals onto site (one way) will be needed during construction transporting construction materials to the site, based on the 2011 UK Industry Performance Report Key Performance Indicators (KPI). This is equivalent to nine HGV arrivals per day, on average, throughout the construction phase (or 18 two-way movements).

7.7.9 The construction HGV vehicle movements in each Sub Phase are summarised in Table 7.8.

**Table 7.8 HGV Vehicle movements for construction and waste materials by sub-phase**

	Sub-Phases					
	A	B	C	D	E	F
Construction Material HGVs	717	7,203	8,366	11,473	14,848	4,919
Building Waste HGVs	87	809	1,240	1,243	1,566	561
Infrastructure waste HGVs	4	34	53	53	67	24
Total one-way HGV movements per day (average)	2	11	14	18	16	8
Total two-way HGV movements per day (average)	4	22	28	36	32	16

7.7.10 It can be seen that the peak time period for construction is Sub Phase E (2023 to 2026) with a daily average of 18 construction vehicle arrivals / departures (36 two-way movements). This will add a negligible amount of additional HGV traffic to the road network and is prior to the full traffic generation of the Phase 2 development. Construction workers would also generate light vehicle movements onto the network (less movements than when the development is built out), however these movements would not be generated once the site is fully built out. As such the assessment of the 2031 operational phase of the full build-out of Phase 2 is considered a worst case and no further assessment of traffic impact has been undertaken of the construction phase.

7.7.11 From the roundabout junction of the Southern Access Road (West) and the Primary Road through Phase 3 (to the south of Longstanton Road), a construction haul route will be provided using the existing eastern perimeter road. This will be only for construction vehicles and will enable a separation of construction and operational traffic during the build out of the development.

7.7.12 For the construction of the Southern Access Road (West) it is assumed that construction will begin from the western end near the B1050 and a construction compound will be provided on the eastern side of the B1050. The means of temporary access will be agreed with the Highway Authority but is likely to require temporary traffic signals on the B1050.

7.7.13 A CTMP will be prepared prior to construction, which will set out the appropriate route to the site for construction vehicles and contain management measures to mitigate the effects of vehicles on the highway network. This will also include measures for construction

worker vehicles including a construction worker travel plan to manage the vehicle generation of the construction, and construction worker parking.

## Operational effects

7.7.14 The operational effects have been assessed for a 2031 year and assuming that the Phase 2 development is complete. The assessment has been undertaken assuming the following scenario:

- Do Something 2031 = Phase 2 development + A14 scheme + Southern Access Road (West).

7.7.15 It should be noted that the Do Something scenario assesses the cumulative impact of Phase 2 alongside the committed and planned developments in the 'Do Minimum' including Northstowe Phase 1 and transport proposals including the A14 improvement scheme.

7.7.16 The flows from the Do Something strategic modelling have been compared to the Do Minimum in order to determine the effects of the Northstowe development on different parts of the network in terms of percentage changes in traffic flows. The two-way total vehicle / PCU and HGV flows by link for each scenario over the peak periods, 18 hour and daily periods are set out within Table 7.9. The resultant percentage changes in HGV and vehicle flows in comparison to the Do Minimum scenario are shown in Table 7.9.

**Table 7.9 2031 Do Something Traffic Flows**

Link No	Link Name	2031 Do Something					
		AM Peak (PCU)	PM Peak (PCU)	18 Hour (Total Veh)	Daily (Total Veh)	18 Hour (HGV)	Daily (HGV)
1	Site 1 – B1050 Hatton's Road, northeast of A14	1,613	1,869	17,819	18,070	652	682
2	Site 2 – Dry Drayton Road, northeast of A14	1,306	1,408	14,165	14,344	476	487
3	Site 3 – Ramper Road, west of Longstanton Bypass roundabout	825	837	10,806	10,929	134	141
4	Site 4 – B1050 Station Road, north of Cambridgeshire Guided Busway	1,361	1,632	16,555	16,770	617	643
5	Site 5 – Cambridge Road, Oakington	820	887	9,766	9,883	180	186
6	Site 6 – Rampton Road, between Rampton and Willingham	683	685	6,204	6,299	187	193
7	Site 7 – B1050 Earith Road, north of Willingham	1,551	1,580	15,716	15,936	554	575

Link No	Link Name	2031 Do Something					
		AM Peak (PCU)	PM Peak (PCU)	18 Hour (Total Veh)	Daily (Total Veh)	18 Hour (HGV)	Daily (HGV)
8	Site 8 – A1096 Harrison Way, St. Ives	2,602	2,600	29,181	29,553	1,380	1,438
9	Site 9 – Willingham Road, between Over and Willingham	307	374	3,123	3,169	40	41
10	Site 10 – Longstanton Road (the airfield road), Oakington	0	0	0	0	0	0
11	Site 11 - Swavesey Road, Fen Drayton - NOT IN MODEL						
12	Site 12 - Boxworth End, Swavesey (just north of A14)	995	1,007	11,451	11,591	160	164
13	Site 13 - Ramper Road, just east of Swavesey	495	473	6,780	6,850	55	57
14	Site 14 - Longstanton High Street	141	173	1,749	1,772	47	49
15	Site 15 - B1049, North of Cottenham	1,138	926	11,665	11,808	590	608
16	Site 16 - Cottenham Road, just south of Cottenham	1,395	1,325	13,597	13,789	576	599
17	Site 17 - Bridge Road, Histon (near A14)	2,372	2,288	24,808	25,154	904	946
18	Site 18 - Oakington Road, Oakington (busway)	1,022	1,009	8,610	8,736	401	406
19	Site 19 - New Road, Histon	806	705	9,712	9,821	157	160
20	Site 20 - Butt Lane, Milton (west of A10)	338	593	4,601	4,660	157	160
21	A14 West of Junction 28 (Swavesey) - proposed Huntingdon Southern Bypass	6,627	6,830	81,089	85,278	16,541	19,230
22	A14 East of Junction 28 (Swavesey)	9,218	9,525	111,624	117,141	19,808	23,245
23	A14 East of Junction 29 (Bar Hill)	11,385	11,877	138,752	144,963	20,478	24,030
24	A14 East of Junction 31 (Girton)	10,281	10,062	112,942	117,711	15,316	17,956
25	A14 East of Junction 32 (Histon)	9,113	9,488	106,231	110,797	14,881	17,432
26	Local Access Road west of Bar Hill	501	646	6,378	6,454	133	138

Link No	Link Name	2031 Do Something					
		AM Peak (PCU)	PM Peak (PCU)	18 Hour (Total Veh)	Daily (Total Veh)	18 Hour (HGV)	Daily (HGV)
27	Local Access Road east of Bar Hill	1,433	1,642	18,041	18,247	302	310
28	Local Access Road south of Dry Drayton	402	314	3,099	3,145	115	118
29	B1050 North of Bar Hill Junction	3,208	3,818	36,340	36,845	1,312	1,371
30	Hatton's Link Road	1,596	1,956	17,602	17,852	636	664
31	Dry Drayton Link Road						
32	Primary Road 1 - Centre	1,463	1,499	17,597	17,847	636	664
33	Primary Road 2 - East	132	457				
34	B1050 N of Hatton's Road Roundabout	1,231	1,392	13,529	13,718	495	518
35	Hatton's Road E of B1050 and N of School Lane	336	401	3,652	3,704	123	128
36	A14 East of Dry Drayton	11,409	11,907	131,532	137,825	19,413	22,848
37	Cambridge Road, S of Girton	565	508	5,614	5,688	190	197
38	High Street Willingham	1,493	1,654	14,771	14,991	522	543
39a	Junction 31 (Girton) - A14 (SB) to A14 Northern Bypass (EB)	2,394	2,394	26,329	27,605	3,952	4,651
39b	Junction 31 (Girton) - Huntingdon Road (NB) to A14 (NB)	1,035	1,035	11,388	11,940	1,709	2,012
39c	Junction 31 (Girton) - A14 Northern Bypass (WB) to A14 (NB)	2,441	2,441	26,852	28,154	4,031	4,744
40a	Junction 32 (Histon) On-Slips	1,920	1,920	21,122	22,146	3,171	3,731
40b	Junction 32 (Histon) Off-Slips	2,391	2,391	26,299	27,573	3,948	4,646
41	Oakington Road, between Dry Drayton and A14	767	767	6,701	6,800	314	317
42	B1050, between Ramper Road/B1050 roundabout and Station Road	1,646	1,646	16,920	17,159	630	659

**Table 7.10 2031 Percentage Change in Flows - Do Something compared to Do Minimum**

Link No	Link Name	2031 Percentage Change in Flows following development						Significant (IEMA rule 1 or 2)
		AM Peak (PCU)	PM Peak (PCU)	18 Hour (Total Veh)	Daily (Total Veh)	18 Hour (HGV)	Daily (HGV)	
1	Site 1 – B1050 Hatton's Road, northeast of A14	-15.3%	-12.3%	-17.0%	-17.0%	-2.1%	-2.0%	No
2	Site 2 – Dry Drayton Road, northeast of A14	7.2%	9.6%	12.9%	12.8%	7.6%	7.6%	Yes – Rule 2
3	Site 3 – Ramper Road, west of Longstanton Bypass roundabout	29.1%	32.4%	42.9%	42.8%	-4.6%	-4.4%	Yes Rule 1
4	Site 4 – B1050 Station Road, north of Cambridgeshire Guided Busway	9.3%	18.4%	28.1%	27.9%	-1.8%	-1.6%	Yes - Rule 2
5	Site 5 – Cambridge Road, Oakington	-5.4%	9.9%	2.7%	2.6%	0.6%	0.6%	No
6	Site 6 – Rampton Road, between Rampton and Willingham	-1.6%	-1.0%	6.5%	6.3%	16.7%	16.2%	Yes - Rule 2
7	Site 7 – B1050 Earith Road, north of Willingham	6.3%	2.2%	15.6%	15.4%	0.3%	0.4%	Yes - Rule 2
8	Site 8 – A1096 Harrison Way, St. Ives	-0.1%	0.3%	-0.2%	-0.2%	0.6%	0.5%	No
9	Site 9 – Willingham Road, between Over and Willingham	-8.5%	-11.2%	-9.9%	-9.9%	1.3%	1.4%	No
10	Site 10 – Longstanton Road (the airfield road), Oakington	-100%	-100%	-100%	-100%	-100%	-100%	No
12	Site 12 - Boxworth End, Swavesey (just north of A14)	9.2%	-3.1%	13.8%	13.7%	2.3%	2.1%	Yes - Rule 2
13	Site 13 - Ramper Road, just east of Swavesey	45.5%	36.3%	64.2%	64.0%	-9.4%	-9.1%	Yes - Rule 1
14	Site 14 - Longstanton High Street	-35.7%	-27.1%	-32.0%	-32.0%	-39.0%	-38.3%	No
15	Site 15 - B1049, North of Cottenham	-1.4%	6.0%	1.3%	1.3%	-1.9%	-2.0%	No
16	Site 16 - Cottenham Road, just south of Cottenham	-1.8%	-3.2%	-1.4%	-1.4%	-0.1%	-0.1%	No
17	Site 17 - Bridge Road, Histon (near A14)	-0.4%	-2.8%	-1.1%	-1.1%	1.8%	1.9%	No
18	Site 18 - Oakington Road, Oakington	-1.3%	3.0%	-3.5%	-3.5%	0.6%	0.1%	No



Link No	Link Name	2031 Percentage Change in Flows following development						Significant (IEMA rule 1 or 2)
		AM Peak (PCU)	PM Peak (PCU)	18 Hour (Total Veh)	Daily (Total Veh)	18 Hour (HGV)	Daily (HGV)	
	(busway)							
19	Site 19 - New Road, Histon	-5.1%	-5.2%	-5.9%	-5.9%	2.1%	2.0%	No
20	Site 20 - Butt Lane, Milton (west of A10)	-3.9%	-1.1%	-4.4%	-4.4%	-0.2%	-0.2%	No
21	A14 West of Junction 28 (Swavesey) - proposed Huntingdon Southern Bypass	1.2%	0.4%	0.5%	0.4%	-0.4%	-0.4%	No
22	A14 East of Junction 28 (Swavesey)	0.6%	-0.4%	-0.4%	-0.4%	0.0%	0.0%	No
23	A14 East of Junction 29 (Bar Hill)	5.5%	5.6%	6.9%	6.8%	-0.1%	-0.1%	No
24	A14 East of Junction 31 (Girton)	0.9%	1.1%	2.2%	2.2%	-0.1%	-0.1%	No
25	A14 East of Junction 32 (Histon)	-0.1%	0.1%	0.7%	0.7%	-0.1%	-0.1%	No
26	Local Access Road west of Bar Hill	-0.6%	7.0%	-1.8%	-1.8%	1.8%	1.3%	No
27	Local Access Road east of Bar Hill	27.1%	29.6%	35.1%	35.0%	1.7%	1.8%	Yes - Rule 1
28	Local Access Road south of Dry Drayton	-3.7%	-8.2%	-0.5%	-0.6%	4.6%	4.8%	No
29	B1050 North of Bar Hill Junction	68.4%	79.0%	74.9%	74.9%	103%	103%	Yes - Rule 1
34	B1050 N of Hatton's Road Roundabout	-17.2%	-14.3%	-15.6%	-15.6%	0.2%	0.2%	No
35	Hatton's Road E of B1050 and N of School Lane	-7.4%	-6.5%	-6.9%	-6.9%	-10.7%	-10.7%	No
36	A14 East of Dry Drayton	5.7%	5.8%	5.8%	5.8%	-1.1%	-1.0%	No
37	Cambridge Road, S of Girton	-2.8%	7.2%	1.8%	1.8%	-2.4%	-2.3%	No
38	High Street Willingham	3.7%	5.4%	4.6%	4.6%	-9.9%	-9.7%	No
39a	Junction 31 (Girton) - A14 (SB) to A14 Northern Bypass (EB)	3.6%	-4.0%	-0.3%	-0.3%	-2.9%	-2.8%	No
39b	Junction 31 (Girton) - Huntingdon Road (NB) to A14 (NB)	7.7%	11.6%	9.6%	9.6%	6.8%	6.9%	No
39c	Junction 31 (Girton) - A14 Northern Bypass (WB) to A14 (NB)	6.4%	-8.2%	-1.5%	-1.5%	-4.0%	-3.9%	No

Link No	Link Name	2031 Percentage Change in Flows following development						Significant (IEMA rule 1 or 2)
		AM Peak (PCU)	PM Peak (PCU)	18 Hour (Total Veh)	Daily (Total Veh)	18 Hour (HGV)	Daily (HGV)	
40a	Junction 32 (Histon) On-Slips	-0.7%	13.3%	5.8%	5.8%	3.2%	3.2%	No
40b	Junction 32 (Histon) Off-Slips	-1.5%	11.1%	4.4%	4.4%	1.8%	1.8%	No
41	Oakington Road, between Dry Drayton and A14	2.4%	-3.0%	-0.3%	-0.3%	4.4%	3.9%	No
42	B1050, between Ramper Road/B1050 roundabout and Station Road	-1.8%	-12.4%	-7.8%	-7.8%	12.5%	12.5%	No

7.7.17 Table 7.10 demonstrates that some links on the network are forecast to experience a reduction in traffic in the Do Something scenario compared with the Do Minimum scenario and others would receive an increase in traffic. Based on the IEMA thresholds (Rule 1) an assessment should be undertaken on highway links where flows (or HGVs) increase by more than 30%. This occurs on;

- Ramper Road, just east of Swavesey during all periods (Table 7.10, Link 13);
- Ramper Road, west of Longstanton bypass in PM peak, 18 hour and daily periods (Table 7.10, Link 3);
- The local access road east of Bar Hill (part of the A14 improvement scheme) (Table 7.10, Link 27); and
- B1050 between the Bar Hill junction and the new Northstowe access roundabout during all periods (Table 7.10, Link 29).

7.7.18 Further, more detailed assessments have therefore been undertaken on all of these links, with the exception of the local access road as this is a new link as part of the A14 scheme and designed to accommodate the flows from the proposed development.

7.7.19 In addition, Rule 2 of the IEMA guidance suggests that detailed assessments should also be undertaken on other especially sensitive areas where traffic flows increase by 10% or more. The following links show increases in either traffic or HGV flows of greater than 10% (not all of these links are considered sensitive hence being stated as 'no' against the Significant column in Table 7.10.);

- Dry Drayton Road, northeast of A14 (Table 7.10, Link 2);
- B1050 Station Road, north of Cambridgeshire Guided Busway (Table 7.10, Link 4);

- B1050 Earith Road, north of Willingham (Table 7.10, Link 7);
- Boxworth End, Swavesey (just north of A14) (Table 7.10, Link 12);
- Junction 31 (Girton) - Huntingdon Road (NB) to A14 (NB) (Table 7.10, Link 39b);
- Junction 32 (Histon) On-Slips (Table 7.10, Link 40a);
- Junction 32 (Histon) Off-Slips (Table 7.10, Link 40b);
- Rampton Road, between Rampton and Willingham (HGVs only) (Table 7.10, Link 6); and
- B1050, between Ramper Road/B1050 roundabout and Station Road (Table 7.10, 42).

7.7.20 Due to the high volume of traffic flows and HGV traffic and the lack of sensitive receptors, it is not considered that Junction 31 or Junction 32 would be sensitive from an environmental perspective. The B1050 between Ramper Road and Station Road does not have any sensitive receptors. These links are considered to be of negligible sensitivity in accordance with Table 7.10 and as such the effects of the proposed development would be negligible and no further detailed assessments have been undertaken.

7.7.21 Dry Drayton Road, Rampton Road and the B1050 on Station Road / Earith Road are all considered to be of minor sensitivity as these pass through residential areas with adequate footways in accordance with Table 7.10. Further, more detailed assessments have therefore been undertaken for these links.

7.7.22 The assessment of traffic flows on the network has identified the routes where the changes in traffic flows are significant and the junction effects have not been assessed separately. On the links whereby detailed assessments have been identified and are being undertaken, consideration of the junction capacities has been undertaken as part of the effects on driver delay. Further more detailed junction assessments are included within the Transport Assessment.

7.7.23 Further assessments have been undertaken for a total of eight links as set out below.

## Severance

7.7.24 Severance is only likely to occur on highly trafficked roads and results from the perceived division that the road and traffic creates between either side. According to the IEMA Guidelines, traffic flow increases would need to increase by more than 30% in order for a 'slight' change in severance to occur. Each assessed link has been considered within Table 7.11.

### Table 7.11 Severance Effects by Link against IEMA Guidance

Link	Maximum Percentage Change in traffic flows	Potential Change in Severance (Based on IEMA scale)
Ramper Road, just east of Swavesey	64.2% (18 Hours)	Moderate
Ramper Road, west of Longstanton bypass	42.9% (18 Hours)	Slight
B1050 between Bar Hill junction and the new Northstowe access	79% (PM Peak)	Moderate
Dry Drayton Road, northeast of A14	12.9% (18 Hours)	Negligible
B1050 Station Road, north of Cambridgeshire Guided Busway	28.1% (18 Hours)	Negligible / Slight
B1050 Earith Road, north of Willingham	15.6% (18 Hours)	Negligible
Boxworth End, Swavesey (just north of A14)	13.8% (18 Hours)	Negligible
Rampton Road, between Rampton and Willingham	6.5% (18 Hours)	Negligible

7.7.25 The maximum percentage change in flows demonstrates that for the majority of links there would be a negligible impact in accordance with the IEMA guidelines. Where it is indicated that the change would be slight or moderate, these links have been considered in more detail below with regards to sensitive receptors and traffic volumes.

### Ramper Road, just east of Swavesey

7.7.26 The maximum hourly traffic flow along this link in the 2031 Do Minimum scenario is 340 vehicles during the AM peak period. This equates to an average of one vehicle every 10.6 seconds (c.5.7 vehicles per minute). The maximum hourly flow in the 2031 Do Something scenario is 495 vehicles during the AM peak period. This equates to an average of one vehicle every 7.3 seconds (c.8.2 vehicles per minute). This equates to around an additional 2.5 vehicles per minute on average across the busiest hour. As such considering the traffic flows as well as the IEMA guidance it is considered that the effect on severance resulting from the development would be minor adverse and not significant on this link.

### Ramper Road, west of Longstanton bypass

7.7.27 There are two properties along this link as well as a long distance footpath. However there are no crossing facilities or footways at present and the level of increase from the development is unlikely to lead to a significant increase in severance.

## **B1050 between Bar Hill junction and the new Northstowe access**

- 7.7.28 There are three properties along this link (Hazlewell Cottage and New Close Farm Business Park on the east side and) Noon Folly Farm on the west side of the road and a segregated cycleway and footway is proposed on one side. As such there would be minimal pedestrian movements crossing the road and any increase in vehicle flows would not lead to a severance effect on a community. Moreover the proposals involve the demolition of the Cottage and a new access to the Business Park. This section of the B1050 is considered to be of negligible sensitivity. The effect on severance resulting from the development would be of negligible significance on this link.

## **B1050 Station Road, north of Cambridgeshire Guided Busway**

- 7.7.29 The maximum hourly traffic flow along this link in the 2031 Do Minimum scenario is 1,378 vehicles during the PM peak period. This equates to an average of one vehicle every 2.6 seconds (c.23 vehicles per minute). The maximum hourly flow in the 2031 Do Something scenario is 1,632 vehicles during the AM peak period. This equates to an average of one vehicle every 2.2 seconds (c.27 vehicles per minute). This equates to around an additional 4 vehicles per minute on average across the busiest hour. This is unlikely to create a noticeable increase in severance compared to the Do Minimum.
- 7.7.30 It is considered that the effect on severance resulting from the development would be minor adverse and not significant on this link.

## **Driver Delay**

- 7.7.31 Delays to drivers are generally caused at junctions and are only likely to be significant when traffic flows on the network are close to capacity. Detailed operational assessments have been undertaken at a number of key junctions across the network, full details of which are set out in the Transport Assessment submitted with this planning application. This demonstrates that the scheme provides capacity improvements at some junctions and increases at capacity at other junctions through the re-routing of vehicular traffic across the network. The key junctions in relation to the eight links which have been identified as requiring further environmental assessment are as follows:
- Ramper Road / Boxworth End;
  - Ramper Road / Over Road;
  - B1050 / Ramper Road roundabout;
  - B1050 / Station Road roundabout;

- B1050 Station Road / Berrycroft / Over Road signal controlled junction;
- Dry Drayton Road / Cambridge Road / Water Lane / Longstanton Road signal controlled junction;
- Oakington Road / Rampton Road mini roundabout; and
- B1050 / Northstowe Access roundabout.

7.7.32 A summary of the comparison between the Do Minimum and Do Something scenarios for the junction assessments during the peak periods at these junctions is shown in Table 7.12 to Table 7.18. The tables set out mean maximum queue (MMQ) lengths and ratio of flow to capacity (RFC) for the junctions, which are key indicators of junction capacity. The new Northstowe access roundabout does not exist in the Do Minimum scenario and as such has not been included within this assessment, as it has been designed to appropriately accommodate the traffic flows on the network in the Do Something scenario.

**Table 7.12 B1050 / Ramper Road Roundabout**

Road	2031 DM				2031 DS				Difference			
	AM Peak (0800-0900)		PM Peak (1700-1800)		AM Peak (0800-0900)		PM Peak (1700-1800)		AM Peak (0800-0900)		PM Peak (1700-1800)	
	RF C	MM Q	RF C	MM Q	RF C	MM Q	RF C	MM Q	RFC	MM Q	RFC	MM Q
B1050 (e)	1.032	33	0.812	4	0.916	9	0.822	4	-0.116	-24	0.010	0
B1050 (s)	0.618	2	1.045	36	0.508	1	1.001	21	-0.110	-1	-0.044	-15
Ramper Road	0.458	1	0.443	1	0.605	1	0.473	1	0.147	1	0.030	0

7.7.33 Table 7.12 shows that the development has a slight beneficial impact on driver delay at the B1050/ Ramper Road junction with an increase in capacity and reduction in MMQ on the key arms of the B1050 with slight increases on Ramper Road which is under capacity.

**Table 7.13 Over Rd / Ramper Rd Junction**

Road	2031 DM				2031 DS				Difference			
	AM Peak (0800-0900)		PM Peak (1700-1800)		AM Peak (0800-0900)		PM Peak (1700-1800)		AM Peak (0800-0900)		PM Peak (1700-1800)	
	RF C	MM Q	RFC	MMQ	RFC	MMQ	RFC	MMQ	RFC	MMQ	RFC	MM Q
Over Road	0.606	1	0.284	0	0.704	2	0.541	1	0.098	1	0.257	1
Ramper Road	0	0	0	0	0	0	0	0	0	0	0	0

(e)												
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7.7.34 Table 7.13 shows that the development has a minimal change in capacity at the Over Road/ Ramper Road junction and it still operates within its maximum capacity. The changes in queue length would be within daily variations and would not be noticeable to existing users on the network.

7.7.35 Looking at the delay in minutes per vehicle across the peak period this would equate to 0.3 minutes (18 seconds) per vehicle on average during the AM peak in the Do Minimum Scenario and 0.4 minutes (24 seconds) per vehicle on average during the AM peak in Do Something Scenario. This equates to a 6 second increase in delay per vehicle on average from Over Road during the busiest peak period. This increase would occur to vehicles on Over Road and not those on Ramper Road.

7.7.36 As such the development is considered to have a negligible effect on driver delay at this junction.

**Table 7.14 Boxworth End / Ramper Rd / Middlewatch**

Road	2031 DM				2031 DS				Difference			
	AM Peak (0800-0900)		PM Peak (1700-1800)		AM Peak (0800-0900)		PM Peak (1700-1800)		AM Peak (0800-0900)		PM Peak (1700-1800)	
	RF C	MM Q	RF C	MM Q	RF C	MM Q	RF C	MM Q	RF C	MM Q	RFC	MM Q
Ramper Rd	0.49 0	1	0.40 6	1	0.57 3	1	0.71 1	2	0.08 3	0	0.30 5	1
Boxworth End	0.24 4	0	0.32 1	0	0.47 9	1	0.30 4	0	0.23 5	1	- 0.01 7	0

7.7.37 The development reduces the available capacity at the Boxworth End/ Ramper Road/ Middlewatch junction (as shown in Table 7.14), however it still operates well within capacity with minimal changes in queue length and therefore the effect on driver delay would be negligible.

7.7.38 The delay on Ramper Road in the Do Minimum scenario is 0.2 minutes (12 seconds) per vehicle in the AM peak increasing to 0.3 minutes per vehicle (18 seconds) in the Do Something period. This equates to a six second increase in delay per vehicle on average from Ramper Road during the busiest peak period.

7.7.39 As such it is considered that the development would have a negligible effect on driver delay at this junction.

**Table 7.15 Oakington Rd / Rampton Rd / mini roundabout**

Road	2031 DM				2031 DS				Difference			
	AM Peak (0800-0900)		PM Peak (1700-1800)		AM Peak (0800-0900)		PM Peak (1700-1800)		AM Peak (0800-0900)		PM Peak (1700-1800)	
	DoS	Q	DoS	Q	DoS	Q	DoS	Q	DoS	Q	DoS	Q
High Street	108.60 %	63	112.30 %	61	116.1 %	90	97.7 %	28	7.5%	27	-14.6 %	-33
Berrycroft	103.90 %	18	105.30 %	20	113.4 %	33	107.4 %	23	9.5%	15	2.1%	3
Station Road	67.80 %	11	101.40 %	34	70.1 %	12	113.6 %	79	2.3%	1	12.2 %	45
Over Road	72.20 %	4	108.90 %	21	79.4 %	5	111.1 %	20	7.2%	1	2.2%	-1

Note: DoS is Degree of Saturation and Q refers to queue length in vehicles

7.7.40 The Oakington Road/ Rampton Road junction (Table 7.15) operates over a maximum capacity of 0.85 in both the morning and evening peak periods in the Do Minimum scenario and the development results in minimal changes with some increases and some reductions in capacity / queuing.

7.7.41 The queuing delay across the entire AM peak period on all arms of the junction in the Do Minimum Scenario is 0.43 minutes per vehicle (26 seconds). This changes to 0.47 minutes per vehicle in the Do Something scenario (28 seconds). The average increase to vehicle delay at the junction in the AM peak is 2 seconds.

7.7.42 The queuing delay across the entire PM peak period on all arms of the junction in the Do Minimum Scenario is 2 minutes per vehicle (120 seconds). This changes to 1.81 minutes per vehicle in the Do Something scenario (109 seconds). The average decrease to vehicle delay at the junction in the PM peak is 11 seconds.

7.7.43 It is therefore considered that the development would have a negligible effect on driver delay at this junction.

**Table 7.16 High Street / Station Road / Berrycroft Rd / Over Road**

Road	2031 DM				2031 DS				Difference			
	AM Peak (0800-0900)		PM Peak (1700-1800)		AM Peak (0800-0900)		PM Peak (1700-1800)		AM Peak (0800-0900)		PM Peak (1700-1800)	
	RF C	MM Q	RFC	MMQ	RFC	MMQ	RFC	MMQ	RFC	MMQ	RFC	MM Q
Station Road (e)	0.98 4	19	0.83 9	5	0.862	6	0.86 5	6	-0.12 2	-13	0.02 6	1
Station Road (s)	0.21 8	0	0.19 3	0	0.163	0	0.14 4	0	-0.05 5	0	-0.04 9	0



Road	2031 DM				2031 DS				Difference			
	AM Peak (0800-0900)		PM Peak (1700-1800)		AM Peak (0800-0900)		PM Peak (1700-1800)		AM Peak (0800-0900)		PM Peak (1700-1800)	
	RF C	MM Q	RFC	MMQ	RFC	MMQ	RFC	MMQ	RFC	MMQ	RFC	MM Q
B1050 (w)	0.69 5	2	1.02 9	33	0.743	3	0.94 0	11	0.04 8	1	- 0.08 9	-22

7.7.44 The High Street/ Station Road/ Berrycroft Road/ Over Road junction in Willingham operates significantly over its maximum capacity in the Do Minimum scenario and the development increases the queue lengths and capacity issues during both peak periods, as shown in Table 7.16.

7.7.45 The through movement on the B1050 from Station Road to High Street (north) forms part of the network which is being assessed from an environmental perspective. The average delay for each vehicle entering the junction from High Street in the AM peak period in the Do Minimum Scenario is 203 seconds. In the PM peak the delay is 267 seconds. In the Do Something Scenario, during the AM peak this increases to 312 seconds but reduces to 79 seconds in the PM peak.

7.7.46 The average delay for each vehicle entering the junction from Station Road (south) in the AM peak period in the Do Minimum Scenario is 23 seconds. In the PM peak this is 75 seconds. In the Do Something Scenario, during the AM peak this increases to 24 seconds and increases to 187 seconds in the PM peak.

7.7.47 The development is not the cause of the capacity issues as this junction is already over capacity, however it does exacerbate the situation and increase delay to drivers.

7.7.48 As such it is considered that the development would have a moderate adverse effect on driver delay at this junction.

**Table 7.17 Station Rd / B1050 roundabout**

Road	2031 DM				2031 DS				Difference			
	AM Peak (0800-0900)		PM Peak (1700-1800)		AM Peak (0800-0900)		PM Peak (1700-1800)		AM Peak (0800-0900)		PM Peak (1700-1800)	
	RF C	MM Q	RFC	MMQ	RFC	MMQ	RFC	MMQ	RFC	MMQ	RFC	MM Q
Station Road (e)	0.98 4	19	0.83 9	5	0.862	6	0.86 5	6	- 0.12 2	-13	0.02 6	1
Station Road (s)	0.21 8	0	0.19 3	0	0.163	0	0.14 4	0	- 0.05 5	0	- 0.04 9	0
B1050 (w)	0.69 5	2	1.02 9	33	0.743	3	0.94 0	11	0.04 8	1	- 0.08 9	-22

7.7.49 Table 7.17 shows that the development leads to an improvement in overall capacity at the Station Road/ B1050 junction and as such is considered to have a negligible effect on driver delay in this location.

**Table 7.18 Dry Drayton Rd / Longstanton Rd**

Road	2031 DM				2031 DS				Difference			
	AM Peak (0800-0900)		PM Peak (1700-1800)		AM Peak (0800-0900)		PM Peak (1700-1800)		AM Peak (0800-0900)		PM Peak (1700-1800)	
	DoS	Q	DoS	Q	DoS	Q	DoS	Q	DoS	Q	DoS	Q
Water Lane	76.9 %	15	63.3 %	10	76.6 %	15	59.9 %	10	- 0.3%	0	- 3.4%	0
Cambridge Road	80.0 %	11	91.2 %	14	82.2 %	11	96.5 %	18	2.2%	0	5.3%	4
Dry Drayton Road	84.8 %	14	95.0 %	24	91.8 %	17	94.4 %	24	7.0%	3	- 0.6%	0
Longstanton Road	83.6 %	11	52.5 %	7	88.9 %	11	85.5 %	9	5.3%	0	33.0 %	2

7.7.50 The main effect on driver delay at the Dry Drayton Road/ Longstanton Road junction (shown in Table 7.18 is on Longstanton Road in the PM peak, however this is broadly a limitation in the modelling as all traffic into Oakington has been assumed to use this link, whereas a proportion would access this area via the alternative junction to the north (the link to which is not included within the model). The level of traffic on this link would reduce due to the closure of Longstanton Road to through vehicle movements which would reduce rat running movements between Longstanton and Oakington.

7.7.51 On the main ahead link from Dry Drayton Road to Water Lane the level of capacity increases slightly in some periods and reduces slightly in others. There are minimal changes in queue length and the junction operates broadly at the same level of capacity (between 90% and 100% Degree of Saturation).

7.7.52 The average delay for each vehicle entering the junction from Water Street in the AM peak period in the Do Minimum Scenario is 36 seconds. In the PM peak the delay is 33 seconds. In the Do Something Scenario, during the AM peak this remains at 36 seconds and reduces to 29 seconds in the PM peak.

7.7.53 The average delay for each vehicle entering the junction from Dry Drayton Road (south) in the AM peak period in the Do Minimum Scenario is 35 seconds. In the PM peak this is 46 seconds. In the Do Something Scenario, during the AM peak this increases to 45 seconds but reduces to 43 seconds in the PM peak.

7.7.54 Only during one period is there an increase in delay per vehicle (of 10 seconds on average) on Dry Drayton Lane from the south.

7.7.55 As such it is considered that the development would have a minor adverse effect on driver delay at this junction.

7.7.56 A summary of the effect of driver delay by each assessed link has been summarised below.

### **Ramper Road, just east of Swavesey**

7.7.57 The effect on driver delay on this link would mainly be a consequence of the impact of the development on the Boxworth End / Ramper Road junction (specifically on the Ramper Road arm). The analysis demonstrates that the development would have negligible effect at this junction. As such the effect on driver delay resulting from the development would be of negligible significance on this link.

### **Ramper Road, west of Longstanton bypass**

7.7.58 The effect on driver delay on this link would mainly be a consequence of the impact of the development on the Ramper Road / B1050 roundabout and the Ramper Road / Over Road junction (specifically on the Ramper Road arms). The analysis demonstrates that the development would have negligible or beneficial effect at these junctions. As such the effect on driver delay resulting from the development would be of negligible significance on this link.

### **B1050 between Bar Hill junction and the new Southern Access Road (West)**

7.7.59 The effect on driver delay on this link would be a consequence of the new roundabout access to Northstowe and this is being designed to accommodate the traffic flows associated with the development. Specifically the roundabout would incorporate a slip road which would allow ahead movements from the south to travel straight ahead without stopping at the roundabout. Introducing an additional junction on the existing route would have some effect on existing traffic movements. There is however a slight reduction in flows forecast at the existing roundabout to the north so there would be a beneficial effect at this junction whereby the effect of the new junction in terms of delay would be reduced.

7.7.60 As such considering the traffic flows as well as the IEMA guidance it is considered that the effect on driver delay resulting from the development would be minor adverse and not significant on this link.

### **Dry Drayton Road, northeast of A14**

7.7.61 The effect on driver delay on this link would mainly be a consequence of the impact of the development at the signal controlled crossroads of Dry Drayton Rd / Longstanton Rd (specifically on the Dry Drayton

Road / Water Lane arms). The analysis demonstrates that the development would have a slight adverse effect at this junction. As such the effect on driver delay resulting from the development would be minor adverse and not significant on this link.

### **B1050 Station Road, north of Cambridgeshire Guided Busway**

- 7.7.62 The effect on driver delay on this link would mainly be a consequence of the impact of the development at the signal controlled crossroads of High Street / Station Road / Berrycroft Rd / Over Road (specifically on the B1050 arms). The analysis demonstrates that the development would have a moderate effect at this junction. As such the effect on driver delay without mitigation resulting from the development would be moderate adverse and significant on this link.

### **Boxworth End, Swavesey (just north of A14)**

- 7.7.63 The effect on driver delay on this link would be as a result of delays to right turning traffic at the junction of Ramper Road (i.e. from Boxworth End). The junction analysis demonstrates that there would be a negligible impact on driver delay. As such the effect on driver delay without mitigation resulting from the development would be negligible and not significant on this link.

### **Rampton Road, between Rampton and Willingham**

- 7.7.64 The effect on driver delay on this link would mainly be a consequence of the impact of the development at the mini roundabout of Rampton Road and Oakington Road (specifically on the Rampton Road west arm). The analysis demonstrates that the development would have a negligible effect at this junction. As such the effect on driver delay without mitigation resulting from the development would be negligible and not significant on this link.

### **Pedestrian Delay**

- 7.7.65 Delay to pedestrians in terms of road traffic is generally a function of being able to cross the road. Studies have shown that pedestrian delay is perceptible or considered significant beyond a lower delay threshold of 10 seconds, for a link with no crossing facilities. A 10 second pedestrian delay in crossing a road broadly equates to a two-way link flow of approximately 1,400 vehicles per hour.
- 7.7.66 The effects of pedestrian delay have been considered by link below.

### **Ramper Road, just east of Swavesey**

- 7.7.67 The 2031 Do Minimum two-way traffic flow along Ramper Road is 347 vehicles per hour during the peak movement period (17:00-18:00). The maximum traffic flow on Ramper Road during the 2031 Do Something period would be 473 vehicles per hour.
- 7.7.68 On the basis that 1,400 vehicles per hour equates to a pedestrian crossing delay of 10 seconds, 347 vehicles per hour (2031 Do Minimum peak) equates to an approximate crossing delay of 2.48 seconds, and 473 vehicles per hour (2031 Do Something) equates to an approximate crossing delay of 3.38 seconds. This represents an increase in delay of 0.9 seconds which is unlikely to be noticeable.
- 7.7.69 It is considered that pedestrian delay as a result of vehicular traffic is not perceptible and unlikely to change as a result of the development and therefore the potential effect on pedestrian delay as a result of the development would be of negligible significance on this link.

### **Ramper Road, west of Longstanton bypass**

- 7.7.70 The 2031 Do Minimum two-way traffic flow along Ramper Road west of the bypass is 632 vehicles per hour during the peak movement period (17:00-18:00) and increases to 837 with the development. This equates to an approximate crossing delay of 4.5 seconds in the Do Minimum and 6 seconds in the Do Something. This increase in pedestrian delay is unlikely to be perceptible.
- 7.7.71 It is therefore considered that the potential effect on pedestrian delay as a result of the development would be of negligible significance on this link.

### **B1050 between Bar Hill junction and the new Northstowe access**

- 7.7.72 The B1050 between Bar Hill and the new Northstowe access does not currently have footways and has minimal pedestrian movements or crossing movements and as such the effects of the development on pedestrian delay would be of negligible significance.

### **Dry Drayton Road, northeast of A14**

- 7.7.73 The 2031 Do Minimum two-way traffic flow along Dry Drayton Road is 1,284 PCUs per hour during the peak movement period (17:00-18:00). The maximum traffic flow on Ramper Road during the 2031 Do Something period would be 1,408 vehicles per hour. This equates

to an approximate crossing delay of 9.17 seconds in the Do Minimum and 10.06 seconds with the development. Whilst this is slightly over the threshold, the increase in delay is only 0.89 seconds which is unlikely to be noticeable on this link. In addition, pedestrian crossings are provided at the signal controlled junction of Longstanton Road / Water Lane / Cambridge Road and the timing of the crossings would not be affected by the development traffic (the signal timing stages and cycle time would remain the same).

- 7.7.74 It is therefore considered that the potential effect on pedestrian delay as a result of the development would be of negligible significance on this link.

### **B1050 Station Road, north of Cambridgeshire Guided Busway**

- 7.7.75 The 2031 Do Minimum two-way traffic flow along this link is 1,378 PCUs per hour during the peak movement period (17:00-18:00). The maximum traffic flow on Ramper Road during the 2031 Do Something period would be 1,638 vehicles per hour. This equates to an approximate crossing delay of 9.84 seconds in the Do Minimum and 11.7 seconds with the development. This represents an increase in delay of 1.86 seconds which may have a minimal impact on delay during the peak period. Pedestrian crossings are provided at the signal controlled junction of Over Road / B1050 / Berrycroft and the timing of the crossings would remain the same with the Do Minimum and Do Something scenarios (the signal timing stages and cycle time would remain the same). However, there would also be pedestrian crossing demand along the length of the road within the residential area of Willingham informally away from the formal crossings.

- 7.7.76 As such the potential effect on pedestrian delay as a result of the development would be minor adverse and not significant on this link.

### **B1050 Earith Road, north of Willingham**

- 7.7.77 The 2031 Do Minimum two-way traffic flow along this link is 1,546 PCUs per hour during the peak movement period (17:00-18:00). The maximum traffic flow on Ramper Road during the 2031 Do Something period would be 1,580 vehicles per hour. This equates to an approximate crossing delay of 11.04 seconds in the Do Minimum and 11.29 seconds with the development. This represents an increase in delay of 0.25 seconds which would have a negligible impact on delay during the peak period.

- 7.7.78 As such the potential effect on pedestrian delay as a result of the development would be of negligible significance on this link.

### **Boxworth End, Swavesey (just north of A14)**

- 7.7.79 There is a slight reduction in maximum hourly flow in the Do Something Scenario in comparison with the Do Minimum Scenario and as such the potential effect on pedestrian delay as a result of the development would be of negligible significance on this link.

### **Rampton Road, between Rampton and Willingham**

- 7.7.80 There is a slight reduction in maximum hourly flow in the Do Something Scenario in comparison with the Do Minimum Scenario and as such the potential effect on pedestrian delay as a result of the development would be of negligible significance on this link.

### **Pedestrian Amenity**

- 7.7.81 Each link has been considered in relation to the effects on pedestrian amenity in relation to thresholds identified in Table 7.1 as well as a qualitative analysis of the pedestrian environment to establish the effect on the overall pleasantness of the journey.

### **Ramper Road, just east of Swavesey**

- 7.7.82 The 2031 Do Minimum 18 hour flows on this link are 4,129 total vehicles, which equates to an average traffic flow per hour of 229 vehicles. With the 2031 Do Something scenario this increases to 6,780 total vehicles which equates to an average traffic flow per hour of 377 vehicles. This is well below the threshold of 600-1,200 vehicles per hour required for a moderate effect on fear and intimidation to occur as a result of traffic flows.
- 7.7.83 The number of HGVs over an 18 hour period in the 2031 Do Minimum is 61 HGVs, reducing to 55 HGVs in the Do Something scenario. This is also well below the threshold of 1,000 to 2,000 vehicles over an 18 hour period to create a moderate effect.
- 7.7.84 This link has footways on both sides of the carriageway within the residential area and the composition of traffic in terms of HGV content is reducing. As such it is considered that the effect on pedestrian amenity from the development would be of negligible significance.

### **Ramper Road, west of Longstanton bypass**

- 7.7.85 The 2031 Do Minimum 18 hour flows on this link are 7,560 total vehicles, which equates to an average traffic flow per hour of 420 vehicles. With the 2031 Do Something scenario this increases to 10,806 total vehicles which equates to an average traffic flow per hour of 600 vehicles. This is at the lower end of the threshold of 600-

1,200 vehicles per hour required for a moderate effect on fear and intimidation to occur as a result of traffic flows.

- 7.7.86 The number of HGVs over an 18 hour period in the 2031 Do Minimum is 140 HGVs, reducing to 134 HGVs in the Do Something scenario. This is also well below the threshold of 1,000 to 2,000 vehicles over an 18 hour period to create a moderate effect and the level of HGV traffic would reduce in the Do Something scenario.
- 7.7.87 This link does not have footways although it is designated as a long distance footpath. There is already existing HGV vehicular traffic using this link (and the flows are higher in the Do Minimum than the Do Something scenario) and as such it already accommodates large vehicles. Pedestrians who walk along this route would therefore already be used to large vehicles passing and are likely to have a higher threshold than average in terms of pedestrian amenity. Nonetheless the increase in vehicles would have some impact on pedestrian amenity given that it is a public right of way with no footways. It is therefore considered that the potential effect on pedestrian amenity would be moderate adverse and significant on this link.

### **B1050 between Bar Hill junction and the Southern Access Road (West)**

- 7.7.88 The 2031 Do Minimum 18 hour flows on this link are 20,775 total vehicles, which equates to an average traffic flow per hour of 1,154 vehicles. With the 2031 Do Something scenario this increases to 36,340 total vehicles which equates to an average traffic flow per hour of 2,018 vehicles. The development therefore increases the threshold of effect on fear and intimidation from a moderate to an extreme degree of hazard as a result of traffic flows.
- 7.7.89 The number of HGVs over an 18 hour period in the 2031 Do Minimum is 645 HGVs, increasing to 1,312 HGVs in the Do Something scenario. The development therefore moves the hazard from below a moderate threshold to a moderate threshold.
- 7.7.90 This link does not have footways and has minimal pedestrian movements. There is already existing HGV vehicular traffic using this link and as such it already accommodates large vehicles. Pedestrians crossing to Bar Hill would not have a choice other than to walk on the carriageway and those who walk along this route would therefore be used to large vehicles passing and any who use it are likely to have a higher threshold than average in terms of pedestrian amenity.
- 7.7.91 The proposal includes a segregated footway and cycleway with a verge to separate pedestrian movements from the carriageway. It is therefore considered that the impacts of increased traffic would be largely off-set by the segregated provision. The potential effect on



pedestrian amenity on this link would therefore be minor adverse and not significant.

### Dry Drayton Road, northeast of A14

- 7.7.92 The 2031 Do Minimum 18 hour flows on this link are 12,548 total vehicles, which equates to an average traffic flow per hour of 697 vehicles. With the 2031 Do Something scenario this increases to 14,165 total vehicles which equates to an average traffic flow per hour of 787 vehicles. The link is already within the threshold of 600-1,200 vehicles per hour required for a moderate effect on fear and intimidation to occur as a result of the do minimum traffic flows and the development remains within this moderate level.
- 7.7.93 The number of HGVs over an 18 hour period in the 2031 Do Minimum is 443 HGVs, increasing to 476 HGVs in the Do Something scenario. This is well below the threshold of 1,000 to 2,000 vehicles over an 18 hour period to create a moderate effect.
- 7.7.94 This link has a narrow footway to the west of the carriageway linking Oakington to some residential properties to the south of Oakington. Within the village there is a footway provided on the eastern side of the carriageway. To the south of the properties there are no footways provided and likely to be minimal pedestrian movements.
- 7.7.95 There is existing HGV vehicular traffic using this link and as such it already accommodates large vehicles. Pedestrians who walk along this route would therefore already be used to large vehicles passing and are likely to have a higher threshold than average in terms of pedestrian amenity.
- 7.7.96 Any pedestrians who chose to walk along the route would be aware of the traffic levels and composition and its surroundings, therefore it is considered that any fear and intimidation effects would be limited to a small number of pedestrians. The majority of pedestrians would already have high thresholds for fear and intimidation as they would be used to walking with a similar composition of HGVs.
- 7.7.97 It is therefore considered that the potential effect on pedestrian amenity on this link would be minor adverse and not significant.

### B1050 Station Road, north of Cambridgeshire Guided Busway

- 7.7.98 The 2031 Do Minimum 18 hour flow on this link is 12,923 total vehicles, which equates to an average traffic flow per hour of 718 vehicles. With the 2031 Do Something scenario this increases to 16,555 total vehicles which equates to an average traffic flow per hour of 919 vehicles. The link is already within the threshold of 600-1,200 vehicles per hour required for a moderate effect on fear and

intimidation to occur as a result of the do minimum traffic flows and the development maintains this moderate level.

- 7.7.99 The number of HGVs over an 18 hour period in the 2031 Do Minimum is 628 HGVs, decreasing to 617 HGVs in the Do Something scenario. This is well below the threshold of 1,000 to 2,000 vehicles over an 18 hour period to create a moderate effect and the development reduces the HGV content on this link.
- 7.7.100 This link has a shared footway / cycleway routeing on the east side of the carriageway linking Longstanton to Willingham. There is existing HGV vehicular traffic using this link and the level of HGV traffic will reduce when the development is built out. As such it already accommodates large vehicles and pedestrians who walk along this route are used to large vehicles passing and have a higher threshold than average in terms of pedestrian amenity.
- 7.7.101 It is therefore considered that the potential effect on pedestrian amenity on this link would be of negligible significance.

### **B1050 Earith Road, north of Willingham**

- 7.7.102 The 2031 Do Minimum 18 hour flows on this link are 13,597 total vehicles, which equates to an average traffic flow per hour of 755 vehicles. With the 2031 Do Something scenario this increases to 15,716 total vehicles which equates to an average traffic flow per hour of 873 vehicles. The link is already within the threshold of 600-1,200 vehicles per hour required for a moderate effect on fear and intimidation to occur as a result of the do minimum traffic flows and the development remains at this moderate level.
- 7.7.103 The number of HGVs over an 18 hour period in the 2031 Do Minimum is 553 HGVs, increasing slightly to 554 HGVs in the Do Something scenario. This is well below the threshold of 1,000 to 2,000 vehicles over an 18 hour period to create a moderate effect and the HGV content remains similar on this link.
- 7.7.104 This link has footways on both sides of the carriageway within the village and to the north of this there are no footways and likely to be minimal pedestrian movements. There is existing HGV vehicular traffic using this link and the level of HGV traffic will remain the same when the development is built out. As such it already accommodates large vehicles and pedestrians who walk along this route are used to large vehicles passing and have a higher threshold than average in terms of pedestrian amenity.
- 7.7.105 It is therefore considered that the potential effect on pedestrian amenity on this link would be of negligible significance.

### **Boxworth End, Swavesey (just north of A14)**

- 7.7.106 The 2031 Do Minimum 18 hour flow on this link is 10,063 total vehicles, which equates to an average traffic flow per hour of 559 vehicles. With the 2031 Do Something scenario this increases to 11,451 total vehicles which equates to an average traffic flow per hour of 636 vehicles. The addition of development traffic has the potential for a moderate effect on fear and intimidation to occur as a result of traffic flows, albeit that on average the do something scenario would generate around 1 vehicle per minute extra in comparison to the Do Minimum.
- 7.7.107 The number of HGVs over an 18 hour period in the 2031 Do Minimum is 156 HGVs, slightly increasing to 160 HGVs in the Do Something scenario. This is also well below the threshold of 1,000 to 2,000 vehicles over an 18 hour period to create a moderate effect.
- 7.7.108 This link has a footway on one side of the carriageway within the residential area in Boxworth End to the west of the carriageway and to the south of the residential area there are no footways provided and likely to be minimal pedestrian movements.
- 7.7.109 There is existing HGV vehicular traffic using this link and as such it already accommodates large vehicles. The change in HGV content is negligible. Pedestrians who walk along this route would therefore already be used to large vehicles passing and are likely to have a higher threshold than average in terms of pedestrian amenity.
- 7.7.110 It is therefore considered that the potential effect on pedestrian amenity on this link would be minor adverse and not significant.

### **Rampton Road, between Rampton and Willingham**

- 7.7.111 The 2031 Do Minimum 18 hour flows on this link are 5,828 total vehicles, which equates to an average traffic flow per hour of 324 vehicles. With the 2031 Do Something scenario this increases to 6,204 total vehicles which equates to an average traffic flow per hour of 345 vehicles. This is well below the threshold of 600-1,200 vehicles per hour required for a moderate effect on fear and intimidation to occur as a result of traffic flows.
- 7.7.112 The number of HGVs over an 18 hour period in the 2031 Do Minimum is 160 HGVs, increasing to 187 HGVs in the Do Something scenario. This is also well below the threshold of 1,000 to 2,000 vehicles over an 18 hour period to create a moderate effect. Over an 18 hour period this would equate to 1.5 additional HGVs per hour on average which would be imperceptible to pedestrians.
- 7.7.113 This link has footways on both sides of the carriageway within the residential area and the levels of traffic are significantly below the

thresholds of hazard significance. As such it is considered that the effect on pedestrian amenity from the development would be of negligible significance.

## Accidents and Safety

- 7.7.114 The obtained Personal Injury Accident data for the five year period between 1st December 2008 and 30th November 2013 from Cambridgeshire County Council has been used to assess the level of personal injury accidents on the key links.
- 7.7.115 The number of personal injury accidents has been cross referenced with the number of vehicle kilometres to calculate observed accident rates. This observed injury accident rate has been compared with national averages for similar road types to establish whether the preferred route has a low, average or high accident rate. The observed injury accident rate has also been used to estimate the number of injury accidents that could occur in the 2031 Do Minimum scenario in comparison with the 2031 Do Something scenario.
- 7.7.116 The length of the link has been estimated based on the distance between two key junctions or between where other link counts have been provided. The links have been split into rural and urban dependent on whether they are within residential areas or not and then compared against national averages accordingly based on the road type. The two-way base traffic flows over the five year period have been based on the 2011 flows.
- 7.7.117 The analysis has been carried out using the Department for Transport publication on road casualties in Great Britain. Table RAS10002 'Reported accidents and accident rates by road class and severity, Great Britain, 2005-09 average, 2005-2012' from this publication has been used to provide a comparison of national average accident rates with the observed accident rates seen on each link. The national average rates have been obtained by averaging the available reported statistics rates from within the same period as the obtained PIA statistics (2010-2012). The comparable data is not yet published for 2013. The resultant summary comparison of the observed accident rates and the observed accident rates in comparison with national averages has been set out in Table 7.19 and Table 7.20.
- 7.7.118 In addition, the number of accidents by link which would be generated over a one year period in the 2031 Do Minimum Scenario and the 2031 Do Something Scenario on each link, assuming the observed accident rates remain the same in the future years, has been set out to provide an estimation of the changes in the likely number of accidents on each link with the development. This analysis is shown in Table 7.21.

**Table 7.19 Observed injury accident rates**

Ref	Link	Injury accidents on link	2011 AADT flows	Length of link (km)	Observed vehicle km (over 5 years)	Observed million vehicle km (over 5 years)	Observed injury accident rate (per million vehicle kms)
1a	Ramper Road, just east of Swavesey (60 mph rural section)	5	1978	2.4	8665042.0	8.7	0.58
1b	Ramper Road, just east of Swavesey (30 mph urban section)	0	1978	0.2	722086.8	0.7	0.00
2	Ramper Road, west of Longstanton bypass	0	4844	0.17	1502903.1	1.5	0.00
3	B1050 between Bar Hill junction and the new Northstowe access	3	13940	0.55	13992411.8	14.0	0.21
4a	Dry Drayton Road, northeast of A14 (60 mph rural section)	3	11814	1.4	30184254.6	30.2	0.10
4b	Dry Drayton Road, northeast of A14 (30 mph urban section)	3	11814	0.3	6468054.6	6.5	0.46
5	B1050 Station Road, north of Cambridgeshire Guided Busway	8	9258	1.9	32101155.7	32.1	0.25
6a	B1050 Earith Road, north of Willingham (60 mph rural section)	0 *	11467	0.6	12556386.9	12.6	0.00
6b	B1050 Earith Road, north of Willingham (30 mph urban section)	0 *	11467	0.4	8370924.6	8.4	0.00
7a	Boxworth End, Swavesey (just north of A14) (60 mph rural section)	2	6326	0.6	6927394.8	6.9	0.29
7b	Boxworth End, Swavesey (just north of A14) (30 mph urban section)	4	6326	1.3	15009355.4	15.0	0.27
8	Rampton Road, between Rampton and Willingham	11	4511	5	41162181.4	41.2	0.27

\* Data was not obtained on this link as it was outside the original study area.

**Table 7.20 Observed accident rates compared with national averages**

Ref	Link	Injury accidents on link	Observed million vehicle km (over 5 years)	Observed injury accident rate (per million vehicle kms))	National statistics average by road type (per million vehicle kms))	Predicted accidents on link based on national averages (between 2008-2013 - 5 years)	Percentage difference
1a	Ramper Road, just east of Swavesey (60 mph rural section)	5	8.7	0.58	0.327	2.83	176.7%
1b	Ramper Road, just east of Swavesey (30 mph urban section)	0	0.7	0.00	0.505	0.36	0.0%
2	Ramper Road, west of Longstanton bypass	0	1.5	0.00	0.327	0.49	0.0%
3	B1050 between Bar Hill junction and the new Northstowe access	3	14.0	0.21	0.327	4.57	65.6%
4a	Dry Drayton Road, northeast of A14 (60 mph rural section)	3	30.2	0.10	0.327	9.86	30.4%
4b	Dry Drayton Road, northeast of A14 (30 mph urban section)	3	6.5	0.46	0.505	3.27	91.8%
5	B1050 Station Road, north of Cambridgeshire Guided Busway	8	32.1	0.25	0.505	16.21	49.3%
6a	B1050 Earith Road, north of Willingham (60 mph rural section)	0 *	12.6	0.00	0.327	4.10	0.0%
6b	B1050 Earith Road, north of Willingham (30 mph urban section)	0 *	8.4	0.00	0.505	4.23	0.0%
7a	Boxworth End, Swavesey (just north of A14) (60 mph rural section)	2	6.9	0.29	0.327	2.26	88.4%
7b	Boxworth End, Swavesey (just north of A14) (30 mph urban section)	4	15.0	0.27	0.505	7.58	52.8%
8	Rampton Road, between Rampton and Willingham	11	41.2	0.27	0.327	13.44	81.8%

**Table 7.21 Comparison between Do Minimum and Do Something number of accidents based on observed rates**

Ref	Link	Observed injury accident rate (pmvk)	Do Minimum AADT	Do Minimum Observed million vehicle km (over 1 year)	Do Minimum Predicted Accidents	Do Something AADT	Do Something Observed million vehicle km (over 1 year)	Do Something Predicted Accidents	Difference in Accidents per year
1a	Ramper Road, just east of Swavesey (60 mph rural section)	0.58	4177	3.659	2.1	6850	6.001	3.5	1.4
1b	Ramper Road, just east of Swavesey (30 mph urban section)	0.00	4177	0.305	0.0	6850	0.500	0.0	0
2	Ramper Road, west of Longstanton bypass	0.00	7654	0.475	0.0	10929	0.678	0.0	0
3	B1050 between Bar Hill junction and the new Northstowe access	0.21	21068	4.229	0.9	36845	7.397	1.6	0.7
4a	Dry Drayton Road, northeast of A14 (60 mph rural section)	0.10	12712	6.496	0.6	14344	7.330	0.7	0.1
4b	Dry Drayton Road, northeast of A14 (30 mph urban section)	0.46	12712	1.392	0.6	14344	1.571	0.7	0.1
5	B1050 Station Road, north of Cambridgeshire Guided Busway	0.25	13110	9.092	2.3	16770	11.630	2.9	0.6
6a	B1050 Earith Road, north of Willingham (60 mph rural section)	0.33 *	13805	3.023	1.0	15936	3.490	1.1	0.1
6b	B1050 Earith Road, north of Willingham (30 mph urban section)	0.51 *	13805	2.015	1.0	15936	2.327	1.2	0.2

Ref	Link	Observed injury accident rate (pmvk)	Do Minimum AADT	Do Minimum Observed million vehicle km (over 1 year)	Do Minimum Predicted Accidents	Do Something AADT	Do Something Observed million vehicle km (over 1 year)	Do Something Predicted Accidents	Difference in Accidents per year
7a	Boxworth End, Swavesey (just north of A14) (60 mph rural section)	0.29	10196	2.233	0.6	11591	2.538	0.7	0.1
7b	Boxworth End, Swavesey (just north of A14) (30 mph urban section)	0.27	10196	4.838	1.3	11591	5.500	1.5	0.2
8	Rampton Road, between Rampton and Willingham	0.27	5924	10.811	2.9	6299	11.495	3.1	0.2

\* Based on national averages due to lack of accident data on this link



- 7.7.119 The tables above demonstrate that seven of the eight assessed links have a lower than average accident rate along the link with just the rural section of Ramper Road having a higher than the national average rate compared with similar road types (the urban section had no accidents).
- 7.7.120 The estimated increase in accidents resulting from the development would be less than 1 per year on all links with the exception of Ramper Road, just east of Swavesey whereby there is a predicted increase of 1.4 accidents across an annual period as a result of changes in traffic flows. Due to the higher than average accident rate on this route, the narrow width of the carriageway and the increase in predicted accidents being 1.4 accidents per annum it is considered that the potential effect on accidents and safety on this link without mitigation would be moderate adverse and significant.
- 7.7.121 The estimated increase in accidents as a result of the development on the B1050 north of Bar Hill would be 0.7 accidents per annum and on the B1050 north of Cambridgeshire Guided Busway would be 0.6 accidents per annum. It is considered that this would be a minor increase in accidents on these links. The links demonstrated lower than national average accident rates and as such are not considered to be accident blackspot routes. It is considered that the effect on accidents on safety on these links would be minor adverse and not significant.
- 7.7.122 In addition, a cluster of accidents with a similar pattern were observed on Rampton Road, so although the entire link demonstrated a low accident rate, there is a potential issue in one specific location along the link between Rampton and Cottenham. Although the traffic survey has been undertaken between Rampton and Willingham, the entire link between Willingham and Cottenham has been considered. As such it is considered that the effects on safety without suitable mitigation would therefore be moderate adverse and significant.
- 7.7.123 The effects on all remaining links are considered to be of negligible significance.

## Summary

- 7.7.124 A summary of the significance of the potential environmental effects against each of the assessment criteria on the key links has been set out in Table 7.22.

**Table 7.22 Summary of Potential Transport Effects by Criteria**

<b>Link</b>	<b>Visual Effects</b>	<b>Severance</b>	<b>Driver Delay</b>	<b>Pedestrian Delay</b>	<b>Pedestrian Amenity</b>	<b>Accidents and Safety</b>	<b>Hazardous Loads</b>
Ramper Road, just east of Swavesey	Negligible (Not significant)	Minor Adverse (Not significant)	Negligible (Not significant)	Negligible (Not significant)	Negligible (Not significant)	Moderate Adverse (Significant)	Negligible (Not significant)
Ramper Road, west of Longstanton bypass	Negligible (Not significant)	Negligible (Not significant)	Negligible (Not significant)	Negligible (Not significant)	Moderate Adverse (Significant)	Negligible (Not significant)	Negligible (Not significant)
B1050 between Bar Hill junction and the new Northstowe access	Negligible (Not significant)	Negligible (Not significant)	Minor Adverse (Not significant)	Negligible (Not significant)	Minor Adverse (Not significant)	Minor Adverse (Not significant)	Negligible (Not significant)
Dry Drayton Road, northeast of A14	Negligible (Not significant)	Negligible (Not significant)	Minor Adverse (Not significant)	Negligible (Not significant)	Minor Adverse (Not significant)	Negligible (Not significant)	Negligible (Not significant)
B1050 Station Road, north of CGB	Negligible (Not significant)	Minor Adverse (Not significant)	Moderate Adverse (Significant)	Minor Adverse (Not significant)	Negligible (Not significant)	Minor Adverse (Not significant)	Negligible (Not significant)
B1050 Earith Road, north of Willingham	Negligible (Not significant)	Negligible (Not significant)	Negligible (Not significant)	Negligible (Not significant)	Negligible (Not significant)	Negligible (Not significant)	Negligible (Not significant)
Boxworth End, Swavesey (just north of A14)	Negligible (Not significant)	Negligible (Not significant)	Negligible (Not significant)	Negligible (Not significant)	Minor Adverse (Not significant)	Negligible (Not significant)	Negligible (Not significant)
Rampton Road, between Rampton and Willingham	Negligible (Not significant)	Negligible (Not significant)	Negligible (Not significant)	Negligible (Not significant)	Negligible (Not significant)	Moderate Adverse (Significant)	Negligible (Not significant)

- 7.7.125 Four of the assessed links have potential significant effects on at least one of the criteria. These are Ramper Road - just east of Swavesey, Ramper Road, west of the Longstanton Bypass, the B1050 Station Road – north of the CGB and Rampton Road. Mitigation measures will need to be put in place to reduce the residual effect of the development of these links.

### Effects on Public Transport

- 7.7.126 The Transport Assessment provides a detailed assessment of the forecast level of trips by local bus services and the CGB. This sets out the number of bus services which would be required in order to meet the predicted demand. The assessment predicts that to accommodate the additional demand for bus services from future Northstowe Phase 2 residents (once fully built out) the typical frequency of additional buses would need to be one every 50 minutes for the local bus service and one every 20 minutes for the CGB.
- 7.7.127 The Transport Assessment sets out a transport strategy which forms a part of the Northstowe Phase 2 development. The busway forms an integral part of the development and the Transport Assessment (Section 7.3) sets out the proposals for accommodating the demand for public transport (and encouraging its use). The initial proposals are subject to viability calculations and negotiations but include the provision of a new service on the CGB from Longstanton Park and Ride to Cambridge with a frequency of 20 minutes. In addition, an extension to the Citi 5 service, with enhancements to the frequency into Northstowe and Longstanton is proposed.
- 7.7.128 There will be a need to balance early provision of services, to establish high levels of bus use, with requiring revenue support for long periods when services are not viable.
- 7.7.129 The provision of the proposed additional services (subject to viability calculations and negotiations) would accommodate the demand predicted by the Northstowe site and as such it is considered that the effect on existing public transport services from the development would be of negligible significance.

### Effects on Cycling

- 7.7.130 The Transport Assessment provides a detailed assessment of the forecast level of trips by cycling. The proposed Northstowe Phase 2 development provides a number of new cycling routes and enhancements to existing routes which improve the cycling network and infrastructure surrounding the site. The enhancements to the cycle network surrounding the site as a result of the Northstowe Phase 2 development would provide a benefit to existing users as well as potential future residents of Northstowe.

- 7.7.131 The proposed busway through the site will provide cycle parking at the bus stops and as such demand for cycle parking at the existing Longstanton park and ride is likely to be minimal. Due to ease and proximity cyclists are likely to access the services routing through the Main Phase 2 site and utilise the closest bus stop. As such it is considered that the effect on existing cycle parking at Longstanton Park and Ride resulting from the development would be of negligible significance.
- 7.7.132 It is considered that the development would have a minor beneficial effect on cycling due to the enhancements to the cycle network resulting from the Main Phase 2 development.

### Mitigation and enhancement

- 7.7.133 A number of mitigation and enhancement measures form part of the proposed Northstowe Phase 2 development and these form an integral part of the scheme. These mitigation measures have been considered within the potential effects (for example the improvements to walking and cycling links to Bar Hill) and as such the mitigation measures set out here relate to further mitigation required to address the identified potential effects from this assessment.
- 7.7.134 Traffic calming/ walking and cycling measures and appropriate signage will be provided on Ramper Road to the west of the B1050 Longstanton bypass and east of Swavesey to reduce the level of development traffic using this route to access the A14 and encourage the use of alternative routes (B1050 and Bar Hill junction), as well as assist vulnerable road users. This will reduce the number of vehicles using this link and improve conditions for walkers and cyclists to reduce the impact of vehicles on this route, particularly on accidents and safety.
- 7.7.135 In order to improve capacity at the junction of the B1050 Station Road/ Over Road/ Berrycroft junction, there is potential to improve the signal staging, with the Over Road and Berrycroft arms running simultaneously with right turning movements giving way to ahead/left movements from the opposite arm. This would require some minor changes to surface markings in the centre of the junction. Additional pedestrian crossings could also be provided to the south of the junction to ease pedestrian movement across the B1050 and reduce the effect on driver and pedestrian delay. Appropriate provisions will require agreement with Cambridgeshire County Council (CCC).
- 7.7.136 It is recognised that there is a need for some improvements at the accident cluster location on Rampton Road to reduce vehicle speeds. Appropriate measures will require agreement with CCC but could include for example traffic calming, traffic regulation orders or signage and a contribution, to be discussed and agreed with CCC, would be provided towards such measures.

- 7.7.137 A CTMP would be implemented to minimise the effects of road traffic during the construction phase and would incorporate:
- Identification of appropriate safe routes for the proposed development traffic to and from the site (via the new Southern Access Road (West) when built out);
  - Where possible the development would try and utilise raw materials from local sources to reduce the vehicular traffic impact;
  - Staff travelling to work would be encouraged to car-share, walk, cycle and travel via public transport and appropriate vehicle constraint targets will be set out within the CTMP;
  - Full staff welfare facilities will be provided as part of the compound construction to reduce the requirement to travel off-site on lunch breaks and encourage sustainable travel;
  - Frequent inspections and monitoring to confirm the required measures are being implemented.
  - There would be designated and adequate onsite parking facilities for site workers who travel by car, or other vehicles, to ensure that vehicles are not parked on the highway;
  - The contractor would implement cleaning measures, such as wheel washing or wash-down facilities, which would serve to minimise the spread of dust, mud and other materials on to the roads; and
  - Regular sweeping of roads would be undertaken, both on and off the site to reduce the spread of mud.
  - Further more detailed measures in relation to construction vehicles have been suggested within the Air Quality chapter in Table 5.18 and in the Noise chapter.

## Residual Effects

- 7.7.138 Residual effects are those that remain after mitigation has been put in place. The residual effects have been assessed as follows.

## Site enabling and construction residual effects

- 7.7.139 The potential effects of construction traffic are considered to be of negligible significance and the construction traffic management plan and other on-site measures (welfare facilities, parking provision, vehicle controls etc) would minimise these effects still further.

## Operational residual effects

### Ramper Road (Accidents and Safety and Pedestrian Amenity)

- 7.7.140 The potential residual effect resulting from the proposed development has been identified as an increase in accidents on Ramper Road east of Swavesey by 1.4 accidents per annum in comparison with the Do minimum scenario. This has not been considered against the potential accident reductions on other parts of the network where traffic flows will reduce. Nevertheless, it is proposed to provide traffic calming measures and signage on Ramper Road to the west of the Longstanton bypass to encourage vehicles to use alternative and more appropriate routes (the B1050 and/or the new Northstowe SW access road). A reduction in AADT traffic flow in the Do Something scenario of 15% would reduce the increase in accidents to less than one per annum on this link based on observed accident rates. It is considered that this level of increase would reduce the effect on this link from moderate adverse and significant to minor adverse and not significant on accidents and safety. A reduction in traffic flow at this level in the Do Something scenario could be realistically achieved through the provision of traffic calming measures and signage which would encourage vehicles to use alternative and more suitable routes.
- 7.7.141 In addition, there is a potential residual effect on Ramper Road west of the Longstanton Bypass on pedestrian amenity resulting from an increase in traffic on a route which is a long distance footpath with no footways. The inclusion of improvements for walkers and cyclists should minimise this effect.

### Rampton Road (Accidents and Safety)

- 7.7.142 The potential residual effect resulting from the development was an issue with accidents and safety at one specific point on the link. It is proposed to provide a contribution towards safety improvements at this location which would be discussed and agreed with CCC. In addition, it should be noted that the increase in daily and peak traffic flows was below the 10% significance level, and the detailed assessment was due to the increase in percentage of HGV movements (which equated to around just one HGV per hour on average over a 24 hour period). As such the improvements agreed with CCC would provide a safety benefit at this location and, it is considered that this would reduce the effect on this link from moderate adverse and significant to minor adverse and not significant on accidents and safety.

## B1050 Station Road, north of CGB (Driver delay)

7.7.143 A potential moderate adverse effect on driver delay has been identified on this route, mainly due to the capacity issues at the signal controlled junction within Willingham. The mitigation measures set out potential improvements to the junction operation as well as a new crossing for pedestrians. The resultant operation of the junction with the new improvements has been set out in Table 7.23 in comparison to the 2031 Do Minimum situation to demonstrate the change in delay and capacity resulting from the proposed changes.

7.7.144 This junction operates significantly over its maximum capacity in the Do Minimum scenario and the development including the efficiency improvements at the junction reduces the queue length and capacity issues significantly during both peak periods. The junction has been assessed assuming that the pedestrian stage runs every other cycle which may affect pedestrian delay at this point. However, as part of the mitigation it is proposed to contribute towards new pedestrian crossings away from the junction to ease movement.

**Table 7.23 High Street / Station Road / Berrycroft Rd / Over Road**

Road	2031 DM				2031 DS				Difference			
	AM Peak (0800-0900)		PM Peak (1700-1800)		AM Peak (0800-0900)		PM Peak (1700-1800)		AM Peak (0800-0900)		PM Peak (1700-1800)	
	DoS	Q	DoS	Q	DoS	Q	DoS	Q	DoS	Q	DoS	Q
High Street	108.60 %	63	112.30 %	61	87.1 %	24	74.6 %	17	- 21.5%	-39	- 37.7%	-44
Berrycroft	103.90 %	18	105.30 %	20	85.0 %	11	86.3 %	10	- 18.9%	-7	- 19.0%	-10
Station Road	67.80 %	11	101.40 %	34	53.9 %	10	87.0 %	24	- 13.9%	-1	- 14.4%	-10
Over Road	72.20 %	4	108.90 %	21	31.4 %	3	46.0 %	5	- 40.8%	-1	- 62.9%	-16

7.7.145 The delay for vehicles is therefore significantly reduced at this junction (and therefore on the link), and as such it is considered that the residual effect on driver delay on this link would be of negligible significance.

## Cumulative Effects

7.7.146 The transport modelling using the CSRMM includes an agreed list of developments across the County, with each of the district authorities. As such the Do Minimum and Do Something scenarios both include the traffic levels resulting from all developments already built (included in the base year traffic), with consent or planned with a degree of certainty. The list of developments included is set out in the Technical Note: CSRMM Northstowe Modelling Report prepared by WSP and included as Appendix D1.

## Limitations and Assumptions

### Limitations

- 7.7.147 The Personal Injury accident data did not cover the entire study area and as such an assessment of accidents on the B1050 north of Willingham could not be undertaken. It is considered that the assessment of the other links on the network and of the network of a whole provided a robust overview of the existing situation and the likely effects of the development.
- 7.7.148 The CSRМ modelling has been undertaken by CCCs consultants (WSP and Atkins). Assessments are based on the understanding that the modelling has been benchmarked against the observed monitoring data for the Northstowe. Discussions have been held on a continuing basis with CCC, WSP and Atkins with regards to both the inputs and outputs of the model to ensure that the outputs reflect the expected traffic flows on each link as expected.
- 7.7.149 The base year data from CSRМ is from 2011 and therefore not directly comparable with the 2014 surveys which have been undertaken as part of the capacity modelling exercise. The 2014 surveys have however been compared to the queue length analysis so that the base models reflect what is occurring on the ground and these models have then been used in the future year analysis.
- 7.7.150 The CSRМ model only provided one link into Oakington to the west of Dry Drayton Road, the modelling of the crossroad junction was therefore undertaken as a robust assessment whereby all traffic uses Longstanton Road, when in reality some vehicles would use other access points. As such the assessments undertaken are considered to be a worst case.

### Assumptions

- 7.7.151 The traffic forecasts used in the assessment are derived from the CSRМ modelling work. The assumptions within this work are set out in the Transport Assessment.

### Assessment Summary Matrix

- 7.7.152 The assessment summary matrix set out within Table 7.24 sets out a summary of the potential effects, mitigation and subsequent residual effects associated with the development.



**Table 7.24 Assessment Summary Matrix**

<b>Assessment Summary Matrix</b>				
<b>Description of Effects</b>	<b>Significance of Effects:</b>	<b>Description of Mitigation Measures and Enhancement</b>	<b>Description of Residual Effects</b>	<b>Significance of Effects</b>
Visual Effects	Negligible	N/A	Visual Effects	Negligible (Not significant)
Severance	Minor -ve, Not Significant, LT, D, P	N/A	Severance	Minor -ve, Not Significant, LT, P
Driver Delay	Moderate -ve, Significant, LT, D, P	Junction improvements at Willingham crossroads and new pedestrian crossings on B1050	Driver Delay	Minor -ve, Not Significant, LT, P
Pedestrian Delay	Minor -ve, Not Significant, LT, D, P	N/A	Pedestrian Delay	Minor -ve, Not Significant, LT, P
Pedestrian Amenity	Minor -ve, Not Significant, LT, D, P	N/A	Pedestrian Amenity	Minor -ve, Not Significant, LT, P
Accidents and Safety	Moderate -ve, Significant, LT, D, P	Traffic Calming on Ramper Road Safety Improvements on Rampton Road	Accidents and Safety	Minor -ve, Not Significant, LT, P
Hazardous Loads	Negligible	N/A	Hazardous Loads	Negligible (Not significant)
Public Transport Services	Negligible	N/A	Public Transport Services	Public Transport Services
Cycling	Minor +ve, Not Significant, LT, D, P	N/A	Cycling	Cycling
<i>Key: +ve (beneficial), -ve (adverse), D (direct), InD (indirect), ST (short term), MT (medium term), LT (long term), P (permanent), R (reversible)</i>				

## 8 Socio-Economics

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### 8.1 Introduction

- 8.1.1 This chapter assesses the socio-economic effects of the proposed Northstowe Phase 2 development.
- 8.1.2 Economic benefits, in the form of net Full Time Equivalent (FTE) employment gains and the Gross Value Added (GVA) to the economy that employment would support, are quantified in this assessment.
- 8.1.3 Social benefits and adverse effects have been assessed using current government guidelines, modelling and professional judgement. The assessments have incorporated the findings of consultations with local stakeholders and through evidence gathered in the baseline.
- 8.1.4 In assessing the potential socio-economic effects, this study also considers the findings of other ES chapters, which have some relevance to understanding the effects on communities in the socio-economic assessment. Relevant ES chapters include: Chapter 5: Air quality; Chapter 6: Noise and vibration Chapter 7: Traffic and transport; Chapter 9: Archaeology and cultural heritage; Chapter 12 Hydrology and flooding; and Chapter 14: Landscape and visual effects.

### 8.2 Review of Proposed Development

- 8.2.1 A description of the proposed Northstowe Phase 2 development is given in Chapter 3 of this ES. This section describes those aspects of the project that are of particular relevance to socio-economic impacts.
- 8.2.2 The proposed Northstowe Phase 2 development would comprise the delivery of circa 3,500 dwellings and the mix of housing provision, supporting an estimated population of circa 8,575 (based on an assumption of 2.45 people per dwelling metric).
- 8.2.3 The delivery of the proposed Northstowe Phase 2 will require a large construction and project management workforce in close proximity to the site. Workforces may be sourced locally or through wider contracting from across the UK. In either case, there would be an inflow of on-site workers and the provision of temporary associated supporting infrastructure may be required to support the construction workforce. Some of the Northstowe Phase 1 supporting infrastructure may be used for this.
- 8.2.4 There would also be a significant supply of construction materials required for the proposed Northstowe Phase 2 development and the

procurement of goods and services would be required to source and develop supply chains from within and outside the study area. Local procurement activity may have a medium-term positive impact on local sub-regional and regional market performance during the construction phase, but the movement of goods may also generate potential disturbance to communities proximate to the proposed development.

- 8.2.5 The operational phase would begin once residents and businesses have moved into Main Phase 2 development area and there would be a permanent occupation of new dwellings and business space which would generate an increase in jobs and GVA within the local and sub-regional economy.
- 8.2.6 An increased population will bring with it the need for greater service provision in the local area. This may increase the services on offer for wider communities, and result in increased spending by residents for goods and services.
- 8.2.7 There may also be effects on the local composition of the demographic. Certain types of housing delivered, together with a mix of market access and demand for housing and jobs in the vicinity, can drive changes in populations moving into an area - which may have some bearing on the composition of the population in terms of age, gender and skills mix.

### 8.3 Approach and methods

- 8.3.1 A desk-based review of existing evidence has been taken from a range of national and locally derived sources to inform the baseline. The baseline itself has been driven by the potential sources of socio-economic effects from the proposed Northstowe Phase 2 development, and has been refined by the outcomes of consultations with local communities and key stakeholders as part of wider ES preparations.
- 8.3.2 The baseline presents both the relevant current socio-economic characteristics of the study areas and projected future economic and labour market conditions in the absence of proposals - the counterfactual position, from which effects have been measured.
- 8.3.3 In understanding any adverse socio-economic effects, the outcome of consultations have informed the assessment of impacts. Where concerns have been raised over a particular issue, this has been further explored - although the consultation response has been overwhelmingly positive.
- 8.3.4 To determine the socio-economic benefits of delivering the proposed Northstowe Phase 2 development, three economic models have been developed to calculate the economic benefits up to 2031 - in line with the South Cambridgeshire Local Plan:

- The first model takes an estimated construction cost and converts this into FTE job estimates during the construction stage using current turnover per job estimates in the construction sector within the East of England. The downstream employment gain and GVA that construction employment would support is then quantified.
- The second model takes the quantum of planned housing development for the Main Phase 2 development area and converts this into gross and working-age population and workforce estimates and then utilises metrics from the *Northstowe Town Centre and Local Centres Retail Floorspace Capacity Assessment (Final Report, Deloitte, 2014)* to identify the spending power that residents would bring to the local area and the downstream employment and GVA effects that this would bring to the Study Areas.
- The third model takes the quantum of planned commercial development and uses established floorspace per job benchmarks to determine the potential employment space gains (and ultimately the number of jobs and GVA) that the delivery of Northstowe Phase 2 could support.

8.3.5 A range of conversion factors have been applied to each of the models to determine the net beneficial impacts in the construction and operational phase of the proposals - these include considerations for leakage from the study areas and displacement within the study area.

8.3.6 In bringing the models together to determine an overall economic benefit during the operational stage of the proposed Northstowe Phase 2, discount factors have been used to avoid double-counting within the stated overall economic benefits.

8.3.7 Finally, the present value to society of the proposals is measured based on HM Treasury Green Book guidelines<sup>36</sup>. This approach applies an annual discount factor to economic costs and benefits arising from the proposed Northstowe Phase 2 development proposals to present the current value of such benefits to society.

## Legislation and guidance

8.3.8 A number of local, county and national policy documents have informed our assessment of socio-economic impacts including:

- Additionally Guide (HCA, Fourth edition, 2014);
- Cambridgeshire Education Organisation Plan 2013-2014 (Cambridgeshire County Council);
- Cambridge Sub-Regional Strategic Housing Market Assessment 2013 (SHMA, draft consultation);

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<sup>36</sup> The Green Book: Appraisal and Evaluation in Central Government, HM Treasury, July 2011

- Cambridgeshire Joint Strategic Needs Assessment, Housing and Health 2012/13 (2013)
- Employment Densities Guide (HCA, 2nd Edition, 2010);
- The Green Book: appraisal and evaluation in central government (HM Treasury, July 2011 Update); and
- Northstowe Phase 2 Town Centre and Local Centres Retail Floorspace Capacity Assessment (Final Report, Deloitte, 2014).

## Study Area

8.3.9 Two study areas are included within the assessment. These comprise a Primary Study Area that includes all wards within a five mile radius of the planning application red line boundary. The seven wards that collectively constitute the Primary Study Area comprise:

- Bar Hill;
- Cottenham;
- Girton;
- Histon and Impington;
- Longstanton;
- Swavesey; and,
- Willingham and Over.

8.3.10 A Secondary Study Area has been set as Greater Cambridge, comprising the local authority areas of South Cambridgeshire and the City of Cambridge. This is in line with the functional economic market area within which the proposed Northstowe Phase 2 development sits. Both areas share significant economic and labour market links and so the economic dynamics of South Cambridgeshire cannot readily be understood without the inclusion of the City of Cambridge. Figure 8.1 identifies the study areas.

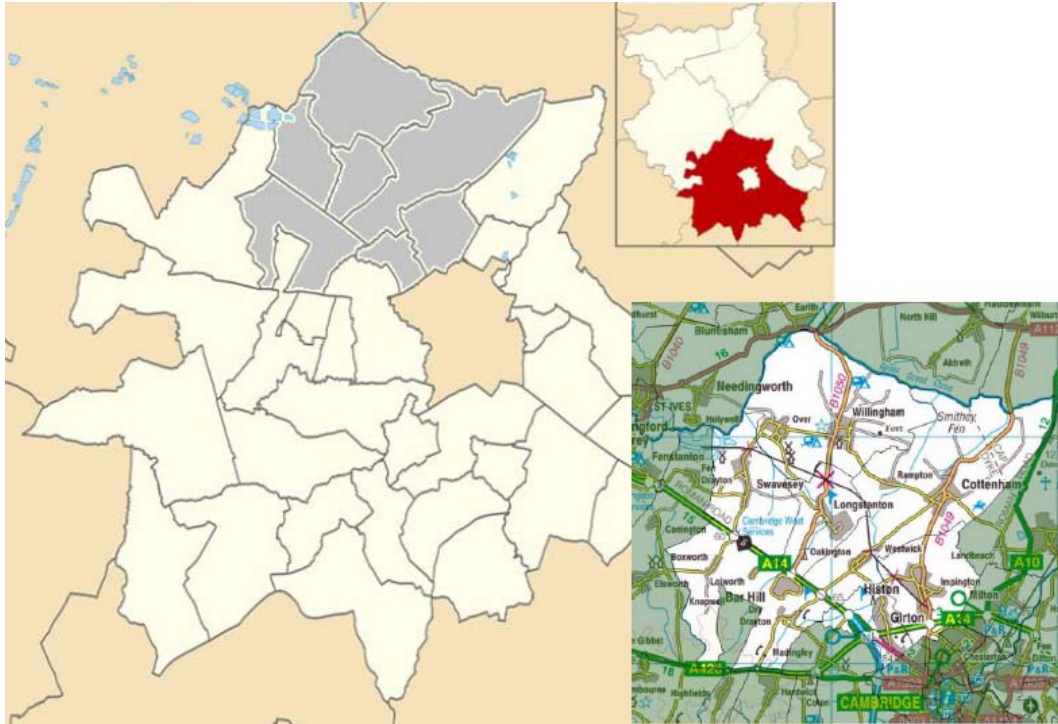


Figure 8.1 Study Area Maps

## 8.4 Methodology

### Baseline approach

- 8.4.1 The baseline uses a range of evidence sourced from national data sets (e.g. ONS, DCLG, Census) alongside regional and locally obtained evidence from CCC's Research and Performance team. This has been collected for both study areas, and at national level, for comparison. For the Primary Study Area, where some ward-level data has not been available, equivalent geographies have been derived from Lower Super Output Area (LSOA, 2003 and 2011) geographies, collated from the ONS Guide to UK Geography.
- 8.4.2 In setting the forecast baseline projection for likely future performance, economic and labour market evidence has been obtained from the *East of England Forecasting Model (EEFM, Spring 2013 forecasts)*. This has been supported by evidence in existing reports (such as the *Cambridge Sub-Region Strategic Housing Market Assessment (SHMA 2013, consultation draft)*) and through wider national forecast models – *Interim 2011-Model Based Household Projections (DCLG)* and *Sub-National Population Projections (ONS)*. From this, the counterfactual position has been set which presents the likely socio-economic conditions of both study areas in the absence of the Northstowe Phase 2 development now and in the future.
- 8.4.3 Further baseline setting has been undertaken following the results of consultations with local communities. Local stakeholders were

consulted in Spring 2014 and the potential effects on existing communities from the proposals were considered and analysed. This approach has allowed for a greater understanding of the potential impacts of the proposed Northstowe Phase 2 development, exploring particular socio-economic issues of relevance which are considered in this assessment.

## Impact assessment approach - Beneficial effects

### Construction phase

- 8.4.4 The principal socio-economic benefit arising from the construction of the proposed Northstowe Phase 2 development would be in employment and the GVA that these jobs generate. To arrive at employment estimates, labour co-efficients for construction activity have been used to derive an estimated number of direct construction jobs. These use estimates from BIS Business Demography (2013) which indicates that £134,991 of turnover in the construction sector generated one direct job in construction in the East of England in 2012.
- 8.4.5 Estimated expenditure for constructing proposed Northstowe Phase 2 development is assumed to be £700m to £800m cost assumptions developed internally.
- 8.4.6 Turnover per job in the construction sector in Cambridgeshire is £134,991 (BIS, Business Demography 2013) and this has been used as a multiplier for understanding the levels of direct construction employment that the estimated construction expenditure could support. As per Green Book guidelines, annual job estimates in the construction sector have been divided by 10 to arrive at an estimate for FTE employment gains.
- 8.4.7 Induced employment gains have then been quantified using Type II Input-Output multipliers (Scottish Government, 2009), which state that one direct construction job supports an additional 1.8 indirect and induced jobs in the wider economy.
- 8.4.8 The value of such employment to the economies of the study areas has then been quantified using GVA per worker data for the construction sector across Cambridgeshire (£79,524 - ONS Regional Accounts and ONS, Workforce Jobs, 2013). Induced GVA generated from such employment has been measured using Type II Input-Output multipliers (Scottish Government, 2009), which states that every £1 generated in GVA directly from the construction of buildings generates a further £1.40 in GVA to the wider economy through indirect and induced gains.

## Operation phase

- 8.4.9 Two Economic Benefit Models have been developed for the operational phase to understand (a) the levels of employment that could be supported through commercial development in the proposed Main Phase 2 development area and the value this brings to the economy; and (b) the economic impact of the spending of residents in Phase 2 housing, expressed as additional job and GVA gains.
- 8.4.10 The first model measures the economic benefits arising from the employment within commercial developments in the proposed Main Phase 2 development area. Employment densities from *HCA Employment Densities Guide (2<sup>nd</sup> Edition, 2010)* have been applied to the mix of commercial development in the planning application. This method estimates that average Gross Internal Area (GIA) or Net Internal Area (NIA, 15-20% lower than GIA) required to support a job across the following relevant use classes:
- *Convenience Retail* – 17sq.m NIA supports one Full-Time Equivalent FTE job.
  - *Comparison / Service Retail* – 19sq.m NIA supports one FTE job.
  - *Food and Drink* – 18sq.m NIA supports one FTE job.
  - *Office* -10sq.m NIA supports one FTE job.
  - *Light Industrial* – 36sq.m GIA supports one FTE job.
  - *Leisure* – 70sq.m GIA supports one FTE job.
  - *Health, Community and Fitness Centre* – 65sq.m GIA supports one FTE job.
  - *Youth Facility* – 90sq.m GIA supports one FTE job.
  - *Place of Worship* – 36sq.m GIA supports one FTE job.
- 8.4.11 The second model estimates the effects of Northstowe Phase 2 residents spending patterns within the local economy. This model applies estimates from Northstowe Phase 2 Town Centre and Local Centre Retail Floorspace Capacity Assessment (Final Report, Deloitte, 2014) and applies these to a developed population profile for the proposed Northstowe Phase 2 development. This has been estimated based on a housing construction and occupancy profile that is consistent with current estimates being used in wider planning circles. The model uses the following metrics/conversions:
- *Construction profile* – a 10 year housing construction period with first occupancy in 2019 and an 11 year town centre construction period with first occupancy in 2020
  - *Population* – a ratio of 2.45 people per dwelling. This also considers the potential under-occupancy of dwellings within the Main Phase 2 development area, using Baseline Variant Occupancy Ratios for South Cambridgeshire (EEFM 2013).



- *Working age population* – 73.0% of total population, based on current levels of people aged 16-74 in the Primary Study Area (ONS, Census 2011).
- *Direct Employment (jobs)* – 73.0% of working-aged population, based on current employment rates (16-74, ONS, Census 2011) across the Primary Study Area.
- *Indirect and Induced Employment (jobs)* – Type I and Type II Input-Output multipliers (Scottish Government, 2009) have been used to calculate employment generated indirectly from earnings of direct employees. A broad multiplier for measuring indirect and induced employment has been derived. This assumes that for each job created directly, there would be 0.8 jobs generated in indirect and induced employment. This is consistent with cross-sector estimates in the Input-Output tables.
- *Gross Value Added* – the GVA generated from employment gains has been based on an average GVA of £51,700 per annual job for South Cambridgeshire (EEFM 2013) applied to direct, indirect and induced jobs.

8.4.12 Gross outputs from both Economic Benefit Models have then undergone a series of net conversions to account for the following economic effects:

- *Leakage* – Economic benefits that occur outside the defined area of impact and therefore need to be deducted from the analysis of gross project benefits. A proportion of jobs would be taken by residents within the Primary Study Area but a greater proportion would be taken by residents in the Secondary Study Area. A containment rate of 60% has been included in the model in the Primary Study Area rising to 80% containment in the Secondary Study Area. This is based on commuter flows in the 2001 Census (and checked with emerging findings in the 2011 Census for resident and workday populations) and on assumptions drawn from an emerging vision for Northstowe (derived as part of wider Economic Development Strategy work).
- *Displacement* – The proportion of outputs/outcomes accounted for by reduced outputs/outcomes elsewhere within the area of impact. A 15% reduction in the Primary Study Area and a 25% reduction in the Secondary Study Area have been adopted in line with benchmark guidance for levels of displacement in the *HCA Additionality Guide*.

8.4.13 The Net Present Value (NPV) of the jobs and GVA have been calculated because, as a whole, society prefers to defer costs to future generations (and to receive goods and services sooner rather than later). Present values are calculated using a discount rate of 3.5% applied to overall net benefits. This is based on *HM Treasury Green Book Guidance*.

8.4.14 Finally, both models have been brought together to quantify and estimate net overall benefit from operational activity once Phase 2 is

delivered. This includes a discount factor to avoid double-counting within the stated benefits for the anticipated effects of resident spending within the local economy – a proportion of which would take place within commercial development delivered through Phase 2 and is therefore already assessed though induced benefits in the commercial development model.

#### Impact assessment approach - Adverse effects

- 8.4.15 The assessment of adverse effects has used qualitative findings from consultations with local stakeholders. The possible adverse effects identified through consultation have been further explored, to allow for a greater understanding of the likely scale and significance of such impacts.
- 8.4.16 Following this assessment, possible mitigation measures have been identified through discussions with stakeholders.

### Significance criteria

- 8.4.17 There are no industry standard significance criteria relevant to socio-economic effects, consequently significance criteria have been developed based on experience of similar projects and use of professional judgement. These are shown in Table 8.1.

**Table 8.1 Definitions of Sensitivity**

Level of Sensitivity	Definition of Sensitivity Examples
High	Sub-regional and/or local socio-economic characteristics are subject to major change(s) due to impacts: total population, demographic mix, labour market performance, business stock, service provision.
Medium	Sub-regional and/or local socio-economic characteristics are subject to major change(s), but market responds and adapts to effect(s) in a quantifiable and/or qualifiable way: total population, demographic mix, labour market performance, business stock, service provision.
Low	Sub-regional and/or local socio-economic characteristics are subject to minimal change. Social and economic markets respond in a minimal way, or not at all, to effect(s) such that only minor, or no, changes are detectable.

- 8.4.18 The magnitude of the effect on the baseline is then assessed considering the scale, extent of change, nature and duration of effect.
- 8.4.19 Table 8.2 below provides the definitions of magnitude used for the purposes of this socio-economic assessment.

**Table 8.2 Definitions of Magnitude**

Level of Magnitude	Definition of Magnitude
High	Major alteration to key characteristics of the baseline (current and forecast future) conditions such that post-development character of current and future baseline will be fundamentally changed.
Medium	Partial alteration to one or more key characteristics of the baseline (current and forecast future) conditions such that post-development character of current and future baseline will be partially changed.
Low	Minor alteration to one or more characteristics. Change arising will be discernible but underlying character of the current and future baseline condition will be similar to existing trends.
Negligible	Very minor alteration to one or more key characteristics of the baseline (current and forecast future) conditions. Change barely distinguishable, approximating to the "counterfactual" situation.

8.4.20 Using these definitions, a combined assessment of sensitivity and magnitude has been undertaken to determine how significant an effect is, as demonstrated in Table 8.3 below. Where effects are considered significant in EIA terms, they have been shaded: Effects can be either beneficial or adverse.

**Table 8.3 Significance Matrix**

		SENSITIVITY		
		Low	Medium	High
MAGNITUDE	High	Moderate	Major / Moderate	Major
	Medium	Minor / Moderate	Moderate	Major / Moderate
	Low	Minor	Minor / Moderate	Moderate
	Negligible	Negligible	Negligible	Negligible

## 8.5 Consultation

8.5.1 Consultation with SCDC was through the Scoping Report submitted in March 2014 and which included a suggested focus and approach for this assessment of socio-economic effects. The Scoping Responses received were broadly in line with the proposed approach and have also informed the development of an Economic Development Strategy submitted with this planning application. A core socio-economic issue raised by SCDC was the need to produce a Health Impact Assessment (HIA). An HIA has been submitted as part of the wider planning application material.

8.5.2 Public consultation was held at a series of community group sessions and events with local residents and with representatives of the local community at two Economic Development Strategy workshops (for further information please refer to Appendix B of the Economic Development Strategy submitted as part of this application). These sessions were supported by a range of prepared materials outlining

the detailed proposals and a number of pre-emptive questions/points for discussion with residents (including those regarding the potential socio-economic impacts arising from the proposals).

- 8.5.3 Consultation questions were prepared prior to the sessions and a review of the findings of these consultations is provided in the Stakeholder and Community Engagement Report submitted with this planning application.
- 8.5.4 Comments relating to the socio-economic assessment have been overwhelmingly positive and most residents supported the development. Of the 107 questionnaire returns, only one respondent was absolutely against the principle of Northstowe. Most comments received related to ensuring a good quantum of development in the Main Phase 2 development area with an emphasis on providing a good balance and mix of community assets within the development to help foster a sense of community and improve overall wellbeing. Responses from a survey questionnaire highlighted the desire of existing residents for library, arts and music facilities in town, alongside retail and food service provision. This has led to the inclusion of an active town centre space that allows for cultural events, festivals and exhibitions.
- 8.5.5 Above all, a number of consultees highlighted the opportunity to provide mixed-use, mixed-function uses for community assets that offer the flexibility to support the development of a self-sustaining town and reduce the effects of any increased transport congestion. Concern was also raised regarding limited parking space provision resulting in overspill in Rampton Drift.
- 8.5.6 Concern was also raised regarding the potential timing of construction activity and it was suggested that disturbance to residents living adjacent to construction activity could be minimised through careful planning of construction activity. Phasing issues are addressed in Chapter 3 of this ES and in the outline CEMP. The construction strategy allows for early phasing of landscaping buffers to reduce the impact of construction activities on local residents.

## 8.6 Baseline conditions

- 8.6.1 This section provides a current overview of baseline conditions in the Primary and Secondary study areas (See Figure 8.1), using secondary data published by Government (via Office for National Statistics (ONS)) and reported by CCC.
- 8.6.2 To understand the projected future conditions of both study areas in the baseline, forecasts and projections have been taken from various models published by CCC. These outline expected socio-economic changes in the vicinity over the coming years in the absence of the proposed Northstowe Phase 2 development. In some instances, the Northstowe development in its entirety has been considered within

the models, in others it has not. Where required, additional modelling has been undertaken to subtract or include aspects of the proposed new town from forecasts.

- 8.6.3 Housing construction is anticipated to start in 2016, with a 12 year construction window. The first residents moving into Main Phase 2 development area housing are expected in 2019, with an assumed 9 month construction lag-time (this represents the start of the Operational phase in the base case). Further details of the proposed phasing and the programme for Northstowe Phase 2 are set out in Chapter 3: Proposed Development. For commercial developments, construction is planned for 2017 and would run till 2031, with delivery dependant on a number of market demand factors.

### Current socio-economic baseline conditions

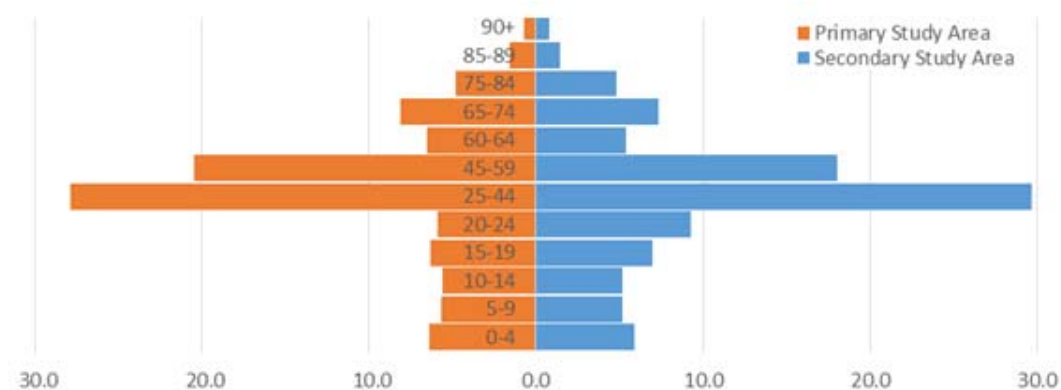
#### Settlement distribution and demography

- 8.6.4 The main settlements of the Primary Study Area are the villages of Bar Hill, Boxworth, Cottenham, Dry Drayton, Girton, Histon, Impington, Knapwell, Lolworth, Longstanton, Oakington, Over, Rampton, Swavesey, Westwick and Willingham. There are various outlying hamlets and single residential properties. The main urban settlement in the Greater Cambridge area is the City of Cambridge itself.
- 8.6.5 The population of the Primary Study Area in 2012 was 40,760, which was 27.3% of South Cambridgeshire's population and 14.7% of Greater Cambridge. The population of the Primary Study Area increased by 19% between 2001 and 2012, which was a higher rate than Greater Cambridge (15%) over the period. Nominally, there was a net increase of 5,690 residents in the Primary Study Area over the period, through a combination of natural change and a net positive internal migration. Population growth within the Primary Study Area accounted for around a sixth of total population growth over the period in Greater Cambridge over the period.
- 8.6.6 At ward level, Longstanton (as the ward within which Northstowe Phase 2 sits) saw the highest levels of population growth between 2001 and 2012 (+1,130 people), although this was from a low base population. Table 8.4 shows the population, change and density by ward in the study area.
- 8.6.7 The Primary Study Area is relatively sparse, with just 3.4 residents per hectare in 2012. This was however a slightly higher density than the Greater Cambridge average, with 2.9 people per hectare. This is largely the product of vast areas to the west of Cambridge having a particularly low population, offsetting a high population density within the city itself. At ward level, Histon, Impington and Girton have the highest population density.

**Table 8.4 Population, change and density by ward and Study Area**

	2001	2011	2012	Change 01-12	Change 11-12	Area (ha)	Pop./ hectare 2012
Bar Hill	5,180	5,050	5,000	-3%	-1%	2,480	2.0
Cottenham	7,390	8,070	8,110	10%	0%	4,366	1.9
Girton	3,750	4,560	4,580	22%	0%	717	6.4
Histon and Impington	8,390	10,600	10,920	30%	3%	1,448	7.5
Longstanton	1,700	2,660	2,830	66%	6%	1,125	2.5
Swavesey	2,480	2,460	2,420	-2%	-2%	1,611	1.5
Willingham and Over	6,180	6,880	6,900	12%	0%	3,396	2.0
Primary Study Area	35,070	40,280	40,760	19%	1%	15,143	3.4
Secondary Study Area	239,000	272,700	275,800	15%	1%	94,239	2.9

8.6.8 Although both study areas have a broadly similar age profile to the average for England by major group (young, working age, elderly), there are some slight differences in age breakdowns between the two study areas. The Primary Study Area has a lower proportion of people aged 25-44 compared to the Secondary Study Area, but this is offset by a higher share of later stage working age residents in the Primary Study Area, compared to the Secondary Study Area. There is also a significantly lower proportion of those aged 15-24 in the Primary Study Area - this is likely to be the effects of University provision in Cambridge rather than a shortfall in younger residents.

**Figure 8.2 Age profile, 2012 – Primary and Secondary Study Areas**

### Housing and Market Conditions

8.6.9 At the 2011 Census there were 16,642 dwellings in the Primary Study Area which represents 15.1% of total housing stock in South Cambridgeshire and Cambridge (110,012) (Census 2011, via NOMIS).

8.6.10 The Primary Study area contains a high proportion of privately owned homes (72.5%) - this is 12.3% higher than the proportion in Greater Cambridge and 9.2% higher than England. The Primary Study Area

has low levels of social and private rental homes, compared to wider averages (Table 8.5).

**Table 8.5 Dwellings by tenure, % (Census, 2011; via NOMIS)**

	Owned	Shared ownership	Social rented	Private rented	Living rent free
Primary Study Area	72.5	2.3	12.6	11.4	1.2
Secondary Study Area	60.3	1.7	18.3	18.2	1.5
England	63.3	0.8	17.7	16.8	1.3

8.6.11 In 2012 the median selling price of a home in South Cambridgeshire was £248,000 and in City of Cambridge it was £285,000, considerably higher than the average for England (£190,000). Decade increases in sales prices in South Cambridgeshire were lower than increases experienced across the County and nationally, although the City of Cambridge saw slightly higher increases over the period.

**Table 8.6 Median selling prices of homes in the Secondary Study Area (Housing Live Table 582, DCLG 2014)**

	Median selling price Q4 2002	Median selling price Q3 2012	Decade change	
South Cambridgeshire	£175,000	£248,000	£73,000	41.7%
Cambridge	£179,950	£285,000	£105,050	58.4%
Cambridgeshire	£136,000	£212,500	£76,500	56.3%
England	£122,500	£190,000	£67,500	55.1%

8.6.12 More current values within the Primary Study Area show an average home value of £312,624. This is well above the median selling price of homes in the Secondary Study Area and across England. There are significant variations between villages within the Primary Study Area.

**Table 8.7 House prices in the largest settlements in the Primary Study Area (Zoopla Zed Index, accessed March 2014)**

Settlement	Zed Index value (March 2013, £)	Zed Index value (March 2014, £)	Change	
Bar Hill	196,633	205,551	£8,918	4.3%
Boxworth	404,860	423,217	£18,357	4.3%
Cottenham	216,418	228,953	£12,535	5.5%
Dry Drayton	407,421	425,896	£18,475	4.3%
Girton	390,346	408,044	£17,698	4.3%
Histon	295,776	309,188	£13,412	4.3%
Impington	334,106	349,257	£15,151	4.3%
Knapwell	419,673	438,702	£19,029	4.3%
Lolworth	467,333	488,522	£21,189	4.3%

Settlement	Zed Index value (March 2013, £)	Zed Index value (March 2014, £)	Change	
			£	%
Longstanton	251,449	262,856	£11,407	4.3%
Oakington	289,473	302,600	£13,127	4.3%
Over	287,291	300,318	£13,027	4.3%
Rampton	307,941	321,904	£13,963	4.3%
Swavesey	259,362	271,124	£11,762	4.3%
Westwick	261,877	270,059	£8,182	3.0%
Willingham	260,023	271,815	£11,792	4.3%

### Labour Market dynamics

8.6.13 There are high levels of economic activity and labour market engagement in both study areas, particularly the Primary Study Area. At the 2011 Census, 75 percent of the working age population (aged 16-74) were economically active, compared to around 70 percent in the Secondary Study Area and England.

8.6.14 Of all economically active people, a greater proportion of the working age population were in employment in the Primary Study Area (73.0%) than in either the Secondary Study Area (67.9%) or England (65.5%).

8.6.15 Unemployment levels have been low in both study areas this century and unemployment is currently half the national average in the Primary Study Area. There are also low levels of Jobseeker's Allowance claimants.

**Table 8.8 Economic activity, employment and unemployment levels, March 2011 (Census 2011; via NOMIS)**

	Working age population (16-74)	Economically active		Employment		Unemployed	
		Number	%	Number	%	Number	%
Primary Study Area	30,015	22,555	75.1 %	21,905	73.0 %	650	2.2%
Secondary Study Area	206,062	144,965	70.4 %	139,825	67.9 %	5,140	2.5%
England	-	-	69.9 %	-	65.5 %	-	4.4%

**Table 8.9 Percentage of people of working age (16-64) claiming Jobseeker's Allowance (NOMIS 2014)**

	Jan 08	Jan 09	Jan 10	Jan 11	Jan 12	Jan 13	Jan 14
Primary Study Area	0.7	1.3	1.6	1.4	1.4	1.4	0.9
Secondary Study	1.1	1.5	2.0	1.7	1.7	1.6	1.2



Area							
England	2.0	3.1	4.0	3.6	4.0	3.8	2.9

### Occupation

8.6.16 Both study areas are characterised by high levels of employment in higher order occupations, with more than half of working residents employed across three broad occupation groups (Managers, directors and senior officials, Professionals and Associate professional and technical occupations). Levels in these groups are 10% higher in the Primary Study Area than the average for England. Such employees tend to have higher qualifications and often have longer commutes to places of employment.

**Table 8.10 Proportion of working age residents in employment by higher order occupation, 2011 (Census 2011; via NOMIS)**

	Primary Study Area	Secondary Study Area	England
Managers, directors & senior officials	11.8%	10.8%	10.9%
Professional occupations	26.8%	31.6%	17.5%
Associate professional & technical occupations	13.1%	12.3%	12.8%
Higher order occupations (SOC 1 - 3)	51.7%	54.7%	41.1%

### Employment

8.6.17 The greatest number of jobs in the Primary Study Area are in wholesale and retail (2,039, 15.0%), which broadly reflects the national picture (16.2%). Jobs in Manufacturing are also strongly represented in the Primary Study Area (1,611, 11.8%) - notable in particular because it is a sector which is marginally underrepresented in the Secondary Study Area compared to the average for England.

8.6.18 In both study areas, there are key specialisms in Education, ICT, and professional, scientific and technical activities - all of which employ a greater proportion of the workforce than wider averages.

8.6.19 Although still large contributors to overall employment, human health and social work activities have relatively low levels of employment in the Primary Study Area - in part reflecting greater provision in the City itself, but also lower than average levels of acute health issues (discussed below). This suggests that there are lower levels of demand for healthcare provision in the Primary Study Area.

**Table 8.11 Employment sectors employing over 5% of all employees, location quotient (LQ vs. England) comparisons, 2012 (BRES, 2012: via NOMIS)**

	Primary Study Area			Secondary Study Area		
	Count	%	LQ	Count	%	LQ
Wholesale & retail; vehicle repair	2,039	15.0	0.9	20,050	12.7	0.8
Manufacturing	1,611	11.8	1.4	11,461	7.2	0.9
Professional, scientific & technical activities	1,512	11.1	1.4	22,723	14.4	1.8
Education	1,484	10.9	1.2	27,088	17.1	1.9
Human health & social work activities	1,076	7.9	0.6	18,979	12	0.9
ICT	1,007	7.4	1.8	12,090	7.6	1.9
Accommodation & food services	855	6.3	0.9	9,868	6.2	0.9
Other sections	4,035	29.6	-	35,869	23	-
<b>Total</b>	13,619			158,128		

### Business Stock and Employment Sites

8.6.20 In 2013 there were a total of 13,600 businesses (units) operating in the Secondary Study Area. The size profile of these businesses closely reflects the national trend, with the vast majority of companies employing fewer than 50 people (96.1% in the study area; 96.7% in England). The proportion of small businesses is marginally higher in the Secondary Study Area, and micro-businesses marginally lower.

**Table 8.12 Percentage of business units in size bands by number of employees (ONS, UK Business Counts, 2013)**

	Micro (0-9)	Small (10-49)	Medium (50-249)	Large (250+)
Secondary Study Area	81.8	14.3	3.2	0.3
England	82.9	13.8	2.9	0.4

8.6.21 The main locations of employment within the Primary Study Area are:

- Bar Hill Business Park - large-scale development of general industrial, warehousing and office buildings;
- Buckingham Business Park, Swavesey - 80,000 sq. ft. of business and office accommodation in 10 buildings;
- Cygnus Business Park, Swavesey - 11 bespoke small offices and studio spaces;
- Over Industrial Park, Over - medium-scale development of light industrial units.
- Tesco Extra, Bar Hill;
- Premier Foods factory, Histon;
- Vision Business Park, Histon - large-scale development of office and business premises.

8.6.22 The largest number of businesses in the Secondary Study Area are in Professional, Scientific and Technical industries - 2,620 business units accounting for 19.3% of the total. Wholesale/retail/vehicle repair and construction businesses also contribute towards a considerable share of the secondary areas overall business stock, although the levels of business stock in these sectors is similar to the national average.

**Table 8.13 Industries accounting for more than 5% of total business stock (units) in the Secondary Study Area (ONS, UK Business Counts, 2013)**

	Secondary Study Area		England	
	Count	%	Count	%
Professional, scientific & technical activities	2,620	19.3	340,960	15.3
Wholesale & retail; vehicle repair	2,015	14.8	413,965	18.5
Construction	1,215	8.9	227,870	10.2
Administrative and support services	925	6.8	156,490	7.0
Accommodation and food services	795	5.8	138,820	6.2
Other industries	6,030	44.3	956,215	42.9
Total	13,600		2,234,320	

#### Health and Wellbeing

8.6.23 At the time of the 2011 Census, some 2,200 people in the Primary Study Area indicated that their day-to-day activities were limited to some degree from a long-term health problem or disability. This represented 13.9% of the area's resident population and was in line with averages for the Secondary Study Area (36,792, 13.5%) but significantly lower than averages for England (17.6%). Such health problems generally require some form of paid care.

8.6.24 Self-assessed general health is a good measure of wellbeing. The 2011 Census asked people whether their health was very good, good, fair, bad or very bad. This assessment is not based on a person's health over any specified period of time, but reflects a person's opinion on their general state of health.

8.6.25 86.5% of people living in the Primary Study Area self-assessed their health as being good or very good in 2011, which was slightly above levels in wider geographies - 86.5% in the Secondary Study Area and 81.4% in England.

8.6.26 At the other end of the scale, a lower proportion of residents in the Primary Study Area (3.1%) self-assessed their health as being bad or very bad in 2011, compared to 3.4% in the Secondary Study Area and 5.5% across England.

**Table 8.14 Self-assessed general health**

	Very Good health	Good health	Fair health	Bad health	Very bad health
Primary Study Area	52.4%	34.1%	10.4%	2.4%	0.6%
Secondary Study Area	53.5%	32.9%	10.2%	2.7%	0.7%
England	47.2%	34.2%	13.1%	4.2%	1.2%

### Deprivation

8.6.27 A good measure of household deprivation is via the Census 2011. The following analysis is based on dimensions of deprivation which classify households based on four characteristics. A household is deprived in a dimension if they meet one or more of the following conditions:

- *Employment*: any member of a household not a full-time student is either unemployed or long-term sick;
- *Education*: no person in the household has at least level 2 education (see highest level of qualification), and no person aged 16-18 is a fulltime student;
- *Health and disability*: any person in the household has general health 'bad or very bad' or has a long term health problem; and
- *Housing*: Household's accommodation is ether overcrowded, with an occupancy 56.9% of households in the Primary Study Area did not fall into any deprivation dimensions, compared to 49.1% in Cambridgeshire, 46.7% in the LEP and 42.5% of households in England.

8.6.28 Similarly, South Cambridgeshire had a lower proportion of households falling within two or more deprivation dimensions in 2011 - 2.1% of households compared to 3.5% in Cambridgeshire, 3.9% in the LEP and 5.7% of households in England.

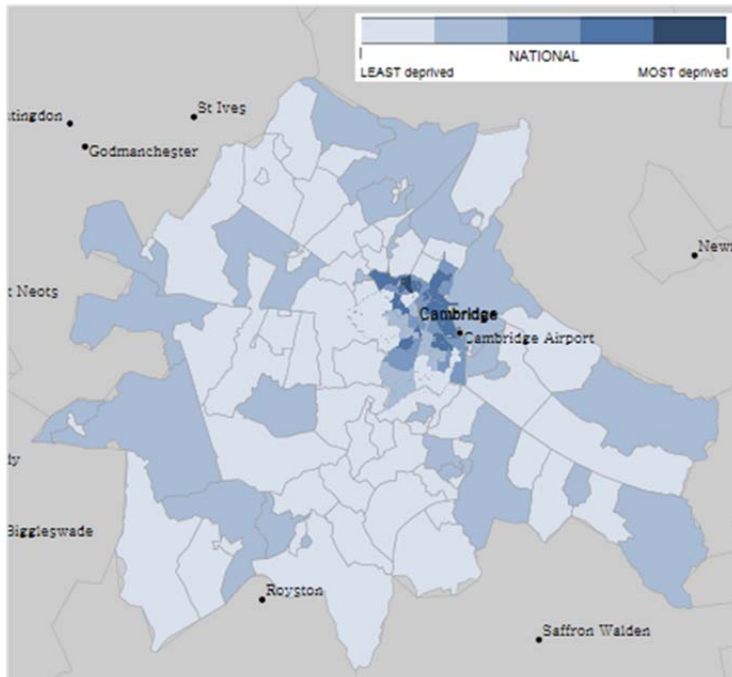
**Table 8.15 Households experiencing dimensions of deprivation**

	No deprivation	One dimension	Two dimensions	Three dimensions	Four dimensions
Primary Study Area	56.9%	29.0%	0.1%	1.8%	0.1%
Secondary Study Area	52.9%	30.7%	0.1%	2.8%	0.3%
England	42.5%	32.7%	0.2%	5.1%	0.5%

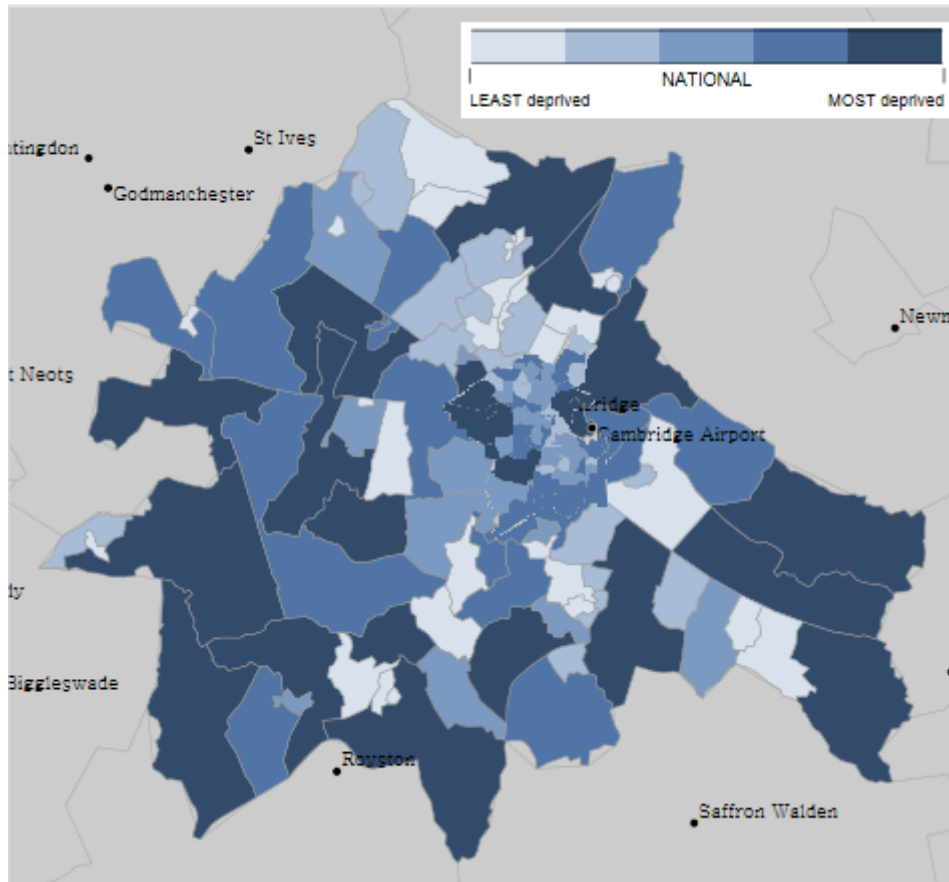
8.6.29 The English Indices of Deprivation are a leading source of measuring pockets of relative deprivation in England, ranking each Lower Super Output Area (LSOA) in England against each other based on each areas performance across six sub-domains.

- 8.6.30 The map below shows the performance of the Secondary Study Area compared to the national average. All LSOAs in South Cambridgeshire are among the least deprived 40% of national LSOAs, and the majority of LSOA's are among the least deprived 20% of national LSOAs and most LSOAs in the Primary Study Area fall within this 20% band. There were pockets of relatively high deprivation present within Cambridge itself, which is largely the result of particularly high house prices, leading to the city scoring highly on the barriers to housing domain.

#### Indices of Deprivation 2010 - Overall rankings



- 8.6.31 The city itself has a number of LSOAs that score relatively highly on the Barriers to Housing and Services, Health Deprivation and Disability, Crime and Living Environment sub-domains, which contribute to the city's higher overall ranking.
- 8.6.32 Conversely, South Cambridge's LSOAs generally performed well in all subdomains, with the exception being Barriers to Housing and Services. The rural surrounds of the area means that there are significant barriers to provisioning services across the local area, as highlighted by the map below.

**Indices of Deprivation 2010 - Barriers to Housing and Services subdomain****Crime**

- 8.6.33 In 2012 the crime rate in Cambridgeshire was below the national average. The number of recorded crimes was 61 for every 1,000 people, compared to 67 across England and Wales (Crime in England and Wales, ONS, 2013). Recorded crime is thought to represent around 60% of all crime.
- 8.6.34 Northstowe Phase 2 falls within the Histon community policing area, which includes the entire Primary Study Area and three additional wards (Milton, Papworth and Elsworth, and Waterbeach). In the year up to January 2014 there were 3,020 reported crimes in this area, out of a total of 7,127 across South Cambridgeshire. The rate of reported crime was 54 per 1,000 people, and 48 across the local authority (Reported crime data, police.uk, 2014; 2011 Census population, NOMIS; own analysis).
- 8.6.35 Reported and recorded crime data are not directly comparable. Not all reported incidents are ultimately pursued as criminal offences, and not all pursued criminal offences have been reported to the police. Nevertheless, the difference between a national recorded crime rate of 67 and a local reported rate of 54 suggests that crime levels are lower in the Primary Study Area than across wider geographies

- 8.6.36 This trend is supported by evidence from the 2010 Index of Multiple Deprivation, in which only one ward (Histon and Impington) was ranked amongst the 40 percent most deprived wards in the country with respect to crime (IMD 2010, via Cambridgeshire RPT).

### Service Provision - Education, health, social care, leisure and policing

- 8.6.37 Education provision in the Primary Study Area is outlined below, taken from the Cambridgeshire Education Organisation Plan 2013-2014 (Cambridgeshire County Council). This outlines existing pressures on education provision within the Primary Study Area, in the Cottenham and Swavesey wards. The Plan also discusses the provision of 630 primary places at a primary school to be built in Northstowe by 2015 (in the Phase 1 Planning Application), run by the Diocese of Ely to provide services for the town's first residents. The Plan surmises that further provision would be delivered in the town to meet increased levels of demand for education as the town grows. In terms of secondary education, the Plan outlines plans for a 1,600 place secondary school to be built in three phases - included in the proposed Northstowe Phase 2 application.

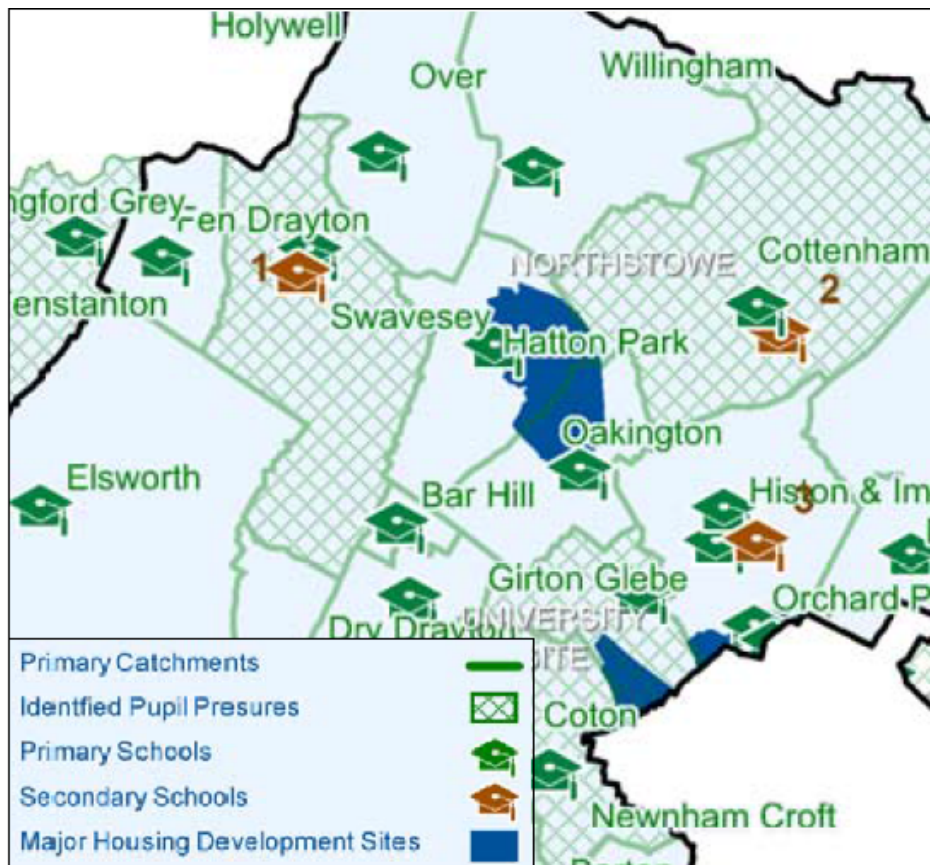


Figure 8.3 Education provision and pupil pressures

- 8.6.38 There are 115 schools across the Secondary Study Area, providing a mix of early years, primary and secondary provision. Post-16 provision is offered at most secondary schools and through colleges.

Nine secondary schools and colleges are offering post-16 education provision and some Higher Education provision. Higher Education provision is delivered through various colleges that form the Cambridge and Anglia Ruskin Universities. Figure 8.3 shows the distribution of education provision in the study area.

- 8.6.39 To aid its forecasting for new housing developments, CCC has adopted assumptions for provision requirements, based on the number of children by age range that are likely to live in 100 dwellings. These are as follows:
- 25-35 pre-school aged pupils per 100 dwellings;
  - 25-35 primary children per 100 dwellings; and
  - 18-25 secondary pupils per 100 dwellings
- 8.6.40 The provision of health and social care across both study areas is delivered by a range of organisations operating from key centres and providing outreach support. CCC leads on the provision of health and social care across both Study Areas. There is provision of GP and dental care in Longstanton as well as in Bar Hill, Cottenham, Swavesey, and Histon.
- 8.6.41 The Cambridgeshire Joint Strategic Needs Assessment (JSNA) (2013) <sup>37</sup> highlights that housing can affect human health in terms of:
- Access in and around the home, particularly for vulnerable and disabled groups of the community.
  - Provision of adequate spaces for living and playing in and around the home, including the importance of front and back gardens or common public spaces.
  - Quality of existing and new homes, including construction, internal environments and design quality.
- 8.6.42 Through broad discussions in 2013 (and evidenced in the JSNA), County Council officers and a range of agencies identified the housing requirements for Northstowe (in its entirety) would meet the needs of future residents. Discussions concluded that the town should also include provision for:
- A spacious five-bed bungalow or house with through-floor lifts for four service to support the needs of profound and multiple disabilities;
  - Individual move-on properties in a cluster for six to eight people with physical disabilities;
  - Eight to ten flats in a cluster (two of which should be two-bedroom properties) with an office space to provide provision for those with mental health issues;

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<sup>37</sup> NHS Cambridgeshire and Peterborough Clinical Commissioning Group and CCC



- 60 flats (minimum) to support frail older people as an alternative to residential care; and
- Residential or nursing home provision for a 100 bedded unit to meet the needs of the frailest and to provide short-term respite care.

8.6.43 Cambridgeshire Constabulary is charged with policing both Study Areas with a mission of creating a safer place to live in, work in and visit. The constabulary employs around 1,400 officers and 200 Police Community Support Officers (PCSO's), policing an area of over 3,500 km<sup>2</sup> and a resident population of around 700,000. Cambridgeshire's population is one of the fastest growing in England and this provides a variety of challenges for the force.

8.6.44 The South Cambridgeshire Crime and Disorder Reduction Partnership has been established to work collaboratively in the delivery of a range of community crime prevention services across the County (including local crime and anti-social behaviour). The partnership includes SCDC, CCC, Police, Fire and Rescue Service, NHS and Probation Service

#### **Service provision - Leisure and Retail**

8.6.45 The dominant retail facilities in Northstowe's surrounding area are at Bar Hill, consisting of a large Tesco store retailing convenience and comparison goods, including stationery, health and beauty (with pharmacy), clothing and footwear, sportswear, entertainment, and electrical products; and a row of seven units including Next and Choices.

8.6.46 Other than at Bar Hill, existing retail provision is in the form of village centres. There are village facilities at Longstanton, Willingham, Over, Swavesey, Cottenham, Girton, and Histon / Impington. Facilities within these villages include village stores / sub post offices / newsagents, plus, depending on the size of the village, other facilities (including butcher, baker, hairdresser, and a cycle shop). Histon / Impington have a Tesco Express and Co-op store. Planning permission was granted in July 2011 for a convenience store plus four small retail or commercial units at Nelson's Crescent Longstanton. It is understood that a small Co-op store is now proposed on the site.

8.6.47 There are nearby community meeting facilities in Longstanton, Oakington and Westwick. In addition to existing facilities, as per the existing Framework Masterplan, Northstowe Phase 1 development will provide:

- A three-from entry primary school;
- Sports hub and community facilities;
- Household recycling centre;

- Green space for recreation and habitat creation;
- A range of employment uses;
- A local centre with varied retail uses.

## Future socio-economic conditions

- 8.6.48 This section considers the likely future socio-economic conditions of the study areas in the absence of Northstowe Phase 2. It draws heavily on evidence published by *Cambridgeshire County Council's Research and Performance team, and the East of England Forecasting Model (EEFM) (Oxford Economics, Spring 2013 Baseline Forecasts)*. Projected change in the EEFM for South Cambridgeshire or Greater Cambridge has been used to project comparable evidence in the current baseline (as above) within the study areas.
- 8.6.49 This section only includes projections for population, employment and GVA - this is because these are important considerations for understanding the net beneficial economic effects of the proposed Northstowe Phase 2 development. It has not been used to consider beneficial social or adverse effects. These have been assessed through established ES approaches for assessing the socio-economic effects of planned development which follow the same approaches for assessing effects in wider ES methodologies - i.e. by identifying sensitivity of receptors and the magnitude of socio-economic effect that they experience.
- 8.6.50 The EEFM is a "top-down" forecasting model that takes macro-economic trends and applies these at a local level. It therefore does not include considerations for local level variations in economic and labour market performance, including the effects of the proposed Northstowe Phase 2 development (or planned development for the wider town) within the modelling - the model therefore sets the counterfactual position against which the impacts of Northstowe Phase 2 can be measured.
- 8.6.51 Applying the EEFM projected population growth trend for South Cambridgeshire (24.2%), the population of the Primary Study Area would grow by 10,191 by 2031, an average annual increase of around 600 people. The population of the Secondary Study Area is projected to grow by 60,895 people - or 21.5% - over the same period.

**Table 8.16 Projected population to 2031 (EEFM 2013; Census 2011; GENECON modelling)**

	Population 2014	Population 2031	Net change 2014-31	% Change 2014-31	Ave. annual change 2014-31
Primary Study Area	42,199	52,390	10,191	24.2	+ 599
Secondary Study Area	283,280	344,176	60,895	21.5	+ 3,582

8.6.52 At a slightly lower rate than forecast demographic change, employment is also projected to grow in both study areas, with a year-on-year increase from 2014 to 2031 (following a marginal decline between 2012 and 2013). By 2031 total employment is set to grow by 18.1% in the Primary Study Area to reach 16,171 and 17.8% across the Secondary Study Area.

**Table 8.17 Projected total employment to 2031 based on BRES 2012 (EEFM 2013; BRES 2012; GENECON modelling)**

	Total employment 2014	Total employment 2031	Net change 2014-31	% Change 2014-31	Ave. annual change 2014-31
Primary Study Area	13,688	16,171	2,483	18.1	+ 146
Secondary Study Area	160,716	189,302	28,586	17.8	+ 1,682

8.6.53

8.6.54 Table 8.18 shows, the overall value of goods and services is projected to grow significantly in both study areas. By 2031 the projected total annual GVA of the Primary Study Area is £2.1bn and GVA in the Secondary Study Area is projected to grow to £14.6bn.

8.6.55 Percentage growth in total annual GVA in the Primary Study Area (24.2%) is slightly greater than in the Secondary Study Area (21.5%), reflecting stronger growth projected for South Cambridgeshire than City of Cambridge in the EEFM.

8.6.56 This trend is also evident in the analysis of projected GVA per head (Table 8.19) . By 2031 the average GVA per head of the population in the Primary Study Area is projected to grow by 43.0% to £40,352, compared to a growth of 42.2% to £42,324 across the Secondary Study Area.

**Table 8.18 Projected total GVA to 2031 (EEFM, 2013; GENECON modelling)**

	Total GVA 2014	Total GVA 2031	Change 2014-31	Average annual change
Primary Study Area	£1,191m	£2,114m	£923m	77.5%
				£54.3m

	Total GVA 2014	Total GVA 2031	Change 2014-31		Average annual change
Secondary Study Area	£8,431m	£14,567m	£6,136m	72.8%	£361.0m
UK	£1,326,150m	£2,083,391m	£757,251m	57.1%	£44,543.6m

**Table 8.19 Projected GVA per head to 2031 (EEFM, 2013; GENECON modelling)**

	GVA per head 2014	GVA per head 2031	Change (2014-31)		Average annual change
Primary Study Area	£28,224	£40,352	£12,128	43.0%	£713.4
Secondary Study Area	£29,761	£42,324	£12,563	42.2%	£739.0
UK	£20,500	£29,400	£8,900	43.4%	£523.5

## 8.7 Design mitigation

- 8.7.1 As a recognised strategically significant development, from the outset the design of Northstowe Phase 2 has taken place within the wider spatial planning and economic development context of the local sub-regional and county-wide economy.
- 8.7.2 A range of site options have been explored that include consideration for the levels of types of housing and commercial development that may be brought forward through the proposals. This has included various obligations set out in the Local Plan incorporated into the design (such as levels of affordable housing and service provisions) and within the recognised contribution of the development towards economic development agendas.
- 8.7.3 Efforts have been made to ensure that the design of the site includes provisions that serve not only eventual Northstowe Phase 2 residents, but which also provide a service for residents living in the remainder of the planned town and those living in its outlying villages. This has required various design drafts being considered with a range of stakeholders and potential user groups.
- 8.7.4 Consultees have been involved in discussions surrounding the design of the proposed Northstowe Phase 2 development from the outset, inputting into discussions and suggesting ways to include mitigation into the design. This has served two purposes - (1) to avoid potential disturbance effects and (2) to ensure that the benefits of Northstowe Phase 2 delivery are spread to wider communities. This iterative process has resulted in a number of changes to the design to improve the design of the site and to mitigate against potential adverse effects.

## 8.8 Potential effects

- 8.8.1 The potential beneficial and adverse socio-economic effects of the proposed Northstowe Phase 2 development are considered below. These include consideration for the following:
- 8.8.2 Beneficial effects to the local labour market arising from employment opportunities within the construction sector, downstream economic effects through procurement activity and the value added to the economy from construction activity.
- 8.8.3 Adverse effects on local communities during the construction stage, arising from a combination of increased activity on-site, the movement of materials and increased provision need from temporary workforces.
- 8.8.4 Population increases stemming from the supply of new housing, leading to an increased need to local service provision, with consideration to planned service provision through the delivery of Northstowe in its entirety.
- 8.8.5 The creation and take-up of employment space providing direct and wider labour market gains and the benefits this brings to the economy.

### Site establishment and construction effects

#### Construction employment effects

- 8.8.6 The principal economic impacts arising from the construction of the proposed Northstowe Phase 2 development would be local employment effects in the construction sector. The assessment of employment effects is based on established labour co-efficients for construction activity relating to construction (expressed as turnover per construction job using BIS estimates), which are applied to capital expenditure estimates for the proposed works. The estimated employment effects arising from construction activity for the proposed Northstowe Phase 2 development are set out below.

**Table 8.20 Northstowe Phase 2 development construction employment effects**

	Primary Study Area	Secondary Study Area
Estimated Northstowe Phase 2 construction cost (£m)	£800,000,000	
Labour co-efficient (turnover per construction job, East of England Average)	£134,991	
Gross direct construction job years	5,926	
FTE direct construction jobs (FTE equivalent to 10 annual job years)	593	

	Primary Study Area	Secondary Study Area
Leakage & Displacement	55%	45%
Indirect and induced multiplier	1.8	
Net FTE construction job years (direct, indirect and induced)	747 jobs	913 jobs
GVA per direct construction job (£m, South Cambs average)	£79,524	
<b>GVA generated during construction (£m)</b>	<b>£59.4m</b>	<b>£72.6m</b>

8.8.7 It is therefore estimated that the construction of the Northstowe Phase 2 development would generate 747 net additional direct full time equivalent (FTE) jobs within the economy of the Primary Study Area. At current prices such employment gains would generate £59.4m in GVA to the local economy during the construction phase. This is considered to be a moderate beneficial effect.

8.8.8 Within the Secondary Study Area, Northstowe Phase 2 construction would generate an estimated 913 net additional FTE jobs. At current prices this would generate £72.6m in GVA to the sub-regional economy.

8.8.9 On-site employment would likely fluctuate over the planned construction stage, in line with the focus on different aspects of proposals. Over the 16-year planned construction timeframe for Northstowe Phase 2, temporary accommodation may need to be provided for contracted workforces from outside of the study areas, which may have a net beneficial impact to local accommodation and leisure providers and retailers. The indirect impact of such temporary increases in service provision needs arising from workforce population, are considered to be a medium term, minor adverse effect.

8.8.10 At this stage the levels of construction workforces and construction materials that would be sourced locally are unclear. However, through cost efficiencies, it is likely that there would be local contract opportunities for materials and jobs. Consequently, indirect positive effects in terms of increasing local supplier activity are considered to be a moderate beneficial effect.

8.8.11 The effects of construction would be likely to provide a short-medium term boost to the local construction sector, although the impacts of such activity would be temporary.

### Disturbance effects to local communities

8.8.12 There would be some temporary disruption to local communities during the construction stage, particularly to those residents within the adjoining settlements. While consultation with local residents has

highlighted a high level of support for Northstowe Phase 2, 73 out of the 92 (79%) comment sheet returns received during consultation raised concern for the potential disturbance to local communities during the construction of Northstowe Phase 2.

- 8.8.13 Concerns raised were almost exclusively regarding the impacts of increased traffic - with consultees raising concerns over the suitability and capacity of the existing road network to handle increased traffic volumes for moving construction materials to the site. Residents suggested that a number of mitigation measures could be incorporated into construction planning which could help reduce the effects of increased traffic volumes, including the construction of access roads that avoid existing settlements and avoiding the supply of material to the site during peak traffic flow times and during unfavourable hours. These should be considered within the context of existing plans in place for Northstowe Phase 1.
- 8.8.14 Such effects are considered within the Transport chapter (Chapter 7). Additional potential amenity effects on local communities are also considered in Chapter 5: Air quality; Chapter 6: Noise and vibration; Chapter 9: Archaeology and cultural heritage; Chapter 12 Hydrology and flooding; and Chapter 14: Landscape and visual effects, which identify the residual significant effects arising from the project.
- 8.8.15 The Northstowe Phase 2 Site-Wide Construction Environmental Management Plan (CEMP)<sup>38</sup> includes a package of measures that will help reduce the disturbance effects of construction activities. Such measures will help mitigate any potential effects to local communities from construction activities.

## Operational effects

### Employment effects - commercial development

- 8.8.16 The assessment below considers the potential levels of employment that could be generated through occupied commercial floorspace delivered through the Main Phase 2 development area.
- 8.8.17 The Main Phase 2 development area would provide a range of employment opportunities and would unlock capacity for 57,500 sq.m. Gross Internal Area (GIA) within the town centre and an additional 21,200 sq.m GIA in employment sites.
- 8.8.18 The town centre would provide a mix of retail, food and beverage, health centre, civic hub, community meeting space, place of worship, youth facilities, crèche and library facilities, and a town square. The employment sites beyond the town centre have been provisionally allocated for a mix of offices, research and development and light industrial uses.

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<sup>38</sup> Homes and Communities Agency/Hyder, 2014

8.8.19 The assessment of gross operational employment effects is based on established floorspace per job benchmarks (produced by the HCA, 2014) for the employment uses anticipated to occupy the allocated development. As per HCA guidance, 15% increase to floorspace benchmarks has been applied for Office and Retail developments to convert reported NIA to GIA benchmarks within the figures stated below.

8.8.20 Net additional jobs impact is derived by making adjustments to reflect the fact that some jobs would be relocations from within the local economy (displacement effects) and some jobs would be taken by people living outside of the Primary and Secondary study areas (leakage effects). Based on existing levels of leakage and displacement adjustments to gross estimates of -55% to the Primary Study Area and -45% to the Secondary Study Area have been made for displacement and leakage effects.

8.8.21 The estimated employment effects arising from the new commercial floorspace in the Main Phase 2 development area are set out in Table 8.21.

**Table 8.21 Employment supported through Northstowe Phase 2 commercial development**

Commercial Use	GIA (sq.m)	Floorspace per FTE job benchmark	Gross jobs estimate	Net jobs estimate	
				Primary Study Area	Secondary Study Area
Convenience Retail	10,000	225	500	125	275
Comparison/Service Retail	25,000	511.2	1,136	284	625
Food and Drink	3,500	75.15	167	42	92
Office	16,200	607.5	1,350	338	743
Light Industrial	5,000	62.55	139	35	76
Leisure	10,000	64.35	143	36	79
Health/Community Centre	6,000	41.4	92	23	51
Youth Facility	2,000	9.9	22	6	12
Place of Worship	1,000	12.6	28	7	15
Sports Hub	Estimate		10	5	6
Primary School x2	Estimate		60	27	33
Secondary School	Estimate		150	68	83
<b>Total</b>			<b>3,797</b>	<b>1,709</b>	<b>2,088</b>

8.8.22 Northstowe Phase 2 is therefore estimated to bring forward employment space provision with capacity to accommodate 3,797 gross jobs. Of these it is anticipated that around 1,709 would be net additional (new jobs generated) to the Primary Study Area and that



2,088 jobs would be net additional (new jobs generated) to the Secondary Study Area.

- 8.8.23 In addition, the new jobs would generate downstream employment effects through the indirect and induced effects of additional wages and supply-chain impacts (multiplier effects). The leading source for measuring sector based multiplier effects in the UK in recent years has come from the Scottish Government. Based on its Input-Output Multipliers for the whole economy, a multiplier of 1.8 has been used to determine the downstream employment effects. The overall operational employment effect is therefore estimated to be in the order of 3,076 net additional FTE jobs within the Primary Study Area and 3,759 net additional FTE jobs within the Secondary Study Area.
- 8.8.24 Based on a GVA per job estimates of £51,700 per job for South Cambridgeshire (EEFM, 2013), it is anticipated that employment gains through commercial development in Northstowe Phase 2 would bring £159.0m in GVA in the Primary Study Area in 2031 and £194.3m in GVA in the Secondary Study Area by 2031. At present value, this would bring £776.7m in GVA up to 2031 in the Primary Study Area and £949.3m in GVA up to 2031 in the Secondary Study Area.

### Housing supply effects

- 8.8.25 The Main Phase 2 development area would see the development of approximately 3,500 dwellings that could support a population of 8,575. Based on the current demographic and labour market composition for the Primary Study Area, the population residing in the Main Phase 2 development area housing would include 6,260 residents of working age (16-74) and of these, 4,570 would be in employment (either as employees or self-employed). The positive impact of this increase in resident population is considered to be major and permanent.

**Table 8.22 Northstowe Phase 2 housing employment effects by 2031**

	Primary Study Area	Secondary Study Area
Number of dwellings	3,500	
<b>Population size</b>	<b>8,575</b>	
Working-age population size	6,260	
<b>Labour Market participation by 2031</b>	<b>4,570</b>	
Gross expenditure by 2031 (convenience/comparison goods)	£72.3m	
Gross expenditure by 2031 (other services)	£18.1m	
<b>Gross Northstowe Phase 2 resident expenditure by 2031</b>	<b>£90.4m</b>	
Retained after leakage (variable) and displacement (30%)	£26.4m	£28.5m

	<b>Primary Study Area</b>	<b>Secondary Study Area</b>
Retained after discounting of benefits claimed elsewhere	£18.7m	£20.1m
<b>Total net expenditure</b>	<b>£18.7m</b>	<b>£20.1m</b>
Turnover per job (East of England average)	£126,222	
<b>Net additional employment gains by 2031</b>	<b>148</b>	<b>160</b>
Annual GVA generated through employment gains by 2031	£7.7m	£8.2m
<b>GVA generated up to 2031 (£m, at present value)</b>	<b>£42.5.0m</b>	<b>£46.9m</b>

- 8.8.26 To understand the spending power of Northstowe Phase 2 development residents we have used evidence from the *Northstowe Phase 2 Retail and Local Centres Capacity Assessment (Final, Deloitte, 2014)*. The “Core Zone” retail catchment area in the assessment mirrors the Primary Study Area in this assessment and the “Secondary Zone” has been used as a proxy for the Secondary Study Area.
- 8.8.27 Taking profiled annual expenditure per head of the population estimates for the Primary Study Area and applying these to the profiled Phase 2 population estimates has allowed for estimates for gross annual spending on convenience and comparison goods for Phase 2 residents within each of the Study Areas. An assumed 25% increase has been applied to account for expected expenditure on other services across both study areas. At current prices, it is estimated that by 2031, residents of the proposed Northstowe Phase 2 development would spend £90.4m per annum (at current prices) on convenience and comparison goods and other services within the economy.
- 8.8.28 In determining the “net” expenditure, we have assumed that 30% of gross expenditure would be displaced from within both study areas - this is a higher level of displacement than we would anticipate in the assessment of commercial floorspace take-up as it is likely that a higher proportion of residents moving into the Main Phase 2 development area housing would come from within the local area than businesses.
- 8.8.29 Leakage of expenditure from the both Study Areas has been derived from smoothed spending pattern estimates for convenience and comparison goods within the Retail Assessment - for both areas this assumes that leakage would decrease over time as commercial development in Northstowe comes forward.
- 8.8.30 Finally, expenditure by Northstowe Phase 2 residents within Main Phase 2 development area commercial development has already been accounted for through induced GVA estimates in the assessment of economic benefits for commercial developments. Using smoothed estimates from the Retail Assessment, we have

discounted a proportion of spend taking place in Northstowe from residents of the Primary Study Area - this avoids double counting of GVA gains within the overall assessment of economic impact.

- 8.8.31 Taking account of these economic factors, it is anticipated that £18.7m would be spent in the Primary Study Area and £20.1m would be spent in the Secondary Study Area by residents of Northstowe Phase 2 in 2031 (at current prices), on top of additional expenditure effects considered in the assessment of economic effects arising from commercial development in Northstowe Phase 2.
- 8.8.32 Net expenditure has then been converted to net additional FTE jobs using a turnover per job figures of £126,222 (BIS, Business Demography 2013) to arrive at estimates for the number of jobs this would support in each of the study areas - 148 jobs by 2031 in the Primary Study area and 160 jobs by 2031 in the Secondary Study Area.
- 8.8.33 Using a GVA per job figure for the Secondary Study Area (£51,700 per job, EEFM 2013), the effects of employment gains from the proposed Northstowe Phase 2 housing development in 2031 is anticipated to generate £7.6m in GVA in the Primary Study Area and £8.2m in GVA in the Secondary Study Area. The net present value up to 2031 is measured as £42.5m in GVA in the Primary Study Area and £46.9m in GVA in the Secondary Study Area.

### Overall economic impacts - Operational stage

- 8.8.34 The overall economic effects impacts from the proposed Northstowe Phase 2 development housing and commercial development is outlined in the table below. This outlines the net employment and GVA gains through the operational stage of the proposed Northstowe Phase 2 development and is in addition to the net employment and GVA gains to the Primary Study Area (798 net additional FTE job generating £54.4m in GVA) and Secondary Study Area (975 net additional FTE jobs generating £66.5m in GVA) arising from activity in the construction stage.

**Table 8.23 Northstowe Phase 2 overall operational economic effects**

	Primary Study Area	Secondary Study Area
Net additional FTE employment by 2031 (commercial development)	1,709	2,088
Net additional FTE employment by 2031 (housing development)	148	160
Total net additional FTE employment gains by 2031	1,857	2,248
Net additional GVA by 2031 (commercial development)	£159.0	£194.3m
Net additional GVA by 2031 (housing development)	£7.6m	£8.2m
Net additional GVA by 2031	£166.6m	£202.5m

	Primary Study Area	Secondary Study Area
Total GVA generated up to 2031 (at present value)	£814.9m	£991.6m

8.8.35 It is anticipated that the overall net economic benefits brought about through the operational stage of Northstowe Phase 2 development would comprise:

- **1,857 net additional FTE jobs** within the Primary Study Area by 2031. At current value, this would bring about a total economic benefit of **£815m in GVA** to the local economy between 2014 and 2031.
  - This represents an **increase of +11.5% on expected future baseline** employment levels across the Primary Study Area by 2031, with an equivalent increase in annual GVA. This would have a significant long term positive effect on the local economy.
- **2,248 net additional FTE jobs** within the Secondary Study Area by 2031. At current value, this would bring about a total economic benefit of **£992m in GVA** to the local economy between 2014 and 2031.
  - This represents an **increase of +1.2% on expected future baseline** employment levels across the Secondary Study Area by 2031, with an equivalent increase in annual GVA. This would have a significant long term positive effect on the local economy.

8.8.36 These positive effects, including increases in employment floorspace, business stock, employment opportunities and increased GVA, are all considered to be major beneficial, permanent effects.

### Service provision effects

8.8.37 Changes in service provision during the operational phase would arise from a combination of the increased need for services from an expected increase in population and an increase in provision through the planned delivery of new facilities.

8.8.38 Planned service provision within Northstowe Phase 2 development would serve the wider communities of the remaining parts of the town and its surrounding villages. Increases in schooling and health provision may ease pressures on such services elsewhere within the Primary Study Area, although the impact of this would be in part offset by an increased need for such services from an inflated population. It is however anticipated that such services would serve

the wider community of the surrounding villages within the Primary Study Area.

- 8.8.39 To support those with specialist care needs, the Cambridgeshire JSNA (2013) establishes a minimum requirement for delivering housing within the town that caters for those with specialist care needs. At this stage, planning for Northstowe Phase 2 development has included some outline provision for delivering specialist households that could meet or exceed the minimum levels of need, but planning for Northstowe Phase 2 development is not yet at a stage where it can provide detail for specific housing provision. It is recommended that the provision of housing for those with specialist health and care needs for Northstowe Phase 2 development be considered within the Health Impact Assessment (HIA) and Section 106 agreement, in support of wider health and care delivery across Northstowe and the findings of the JSNA should form a key evidence consideration in future planning.
- 8.8.40 CCC's assumptions for schooling provision requirements suggest that full occupancy of Northstowe Phase 2 development housing under a "worst case" scenario would require provision for 1,120 pre-school pupils, 1,120 primary school children and 800 secondary school pupils. Current plans for Northstowe Phase 2 development including primary schooling provision for up to 600 primary pupils (in one of two planned primary schools) and provision for up to 1,600 secondary pupils.
- 8.8.41 It is therefore considered that the increased provision of services (for schooling in particular) would have a **moderate long-term beneficial effect** on existing surrounding communities of the Primary Study Area. It is anticipated that this would have a **minor long-term beneficial effect** on the Secondary Study Area, helping to ease pressures of education and health service delivery to the wider sub-region.
- 8.8.42 Northstowe Phase 2 development plans provide a varied and attractive leisure offer for existing and future residents in the Primary Study Area - this includes the provision for community and sports hubs, arts facilities, museums, libraries and places of worship etc.
- 8.8.43 Centres and open space areas, which could accommodate multiple leisure uses have been identified within the proposals and such benefits may help to develop a sense of community and have a beneficial effect to overall wellbeing. Sports facilities, supported by the planned provision for walkthrough and bicycle access routes that reduce the reliance on motorised transport, may also have a small beneficial effect in improving health outcomes.
- 8.8.44 It is therefore considered that the increased provision of services (for schooling in particular) would have a moderate long-term beneficial effect on existing surrounding communities of the Primary Study Area. It is anticipated that this would have a minor long-term

beneficial effect on the Secondary Study Area, helping to ease pressures of education and health service delivery to the wider sub-region.

- 8.8.45 The enhanced community and leisure offer for existing communities within the Primary Study Area. Such provision includes the delivery of new-build leisure facilities, a community centre and youth centre, new sports facilities (including a sports hub) and places of worship. It is anticipated that the provision of these services would help develop community cohesion and improve the offer for existing communities. For the Primary Study Area, it is anticipated that the delivery of such facilities would have a **moderate permanent beneficial** effect and for the Secondary Study Area, it is anticipated that this would have a **minor permanent beneficial effect**.

### Mitigation and enhancement

- 8.8.46 The outline CEMP sets out mitigation measures to avoid disturbance effects to existing local communities and outlying villages during the construction phase. This will be supported by phase-specific CEMPs and a Construction Traffic Management Plan (CTMP). Measures to reduce disturbance include use on internal construction haul roads and early delivery of the Southern Access Road (West) to reduce vehicular activity on the road network, agreement of specific haul routes to avoid sensitive areas and reuse of site won materials to reduce construction movements.
- 8.8.47 Landscaping buffers will developed at an early stage, to reduce visual impacts of the construction works and create a buffer between residents and the construction works that will also serve to reduce construction amenity effects relating to noise, vibration and air quality.
- 8.8.48 All construction traffic entering and leaving the site will be closely controlled. Vehicles making deliveries to the site or removing material will travel via designated routes, which have been previously agreed with CCC/SCDC. Measures will be taken to review and reduce where possible the numbers of construction vehicles accessing the site during peak hours, by adopting such measures as 'just in time' deliveries.
- 8.8.49 A construction traffic management plan will be developed once a contractor is appointed (prior to construction) to ensure there is no access to the site for construction vehicles from local roads and will set out management measures to mitigate the effects of vehicles on the highway network. A travel plan will also be developed which will set out the appropriate route to the site for construction vehicles and this will include measures to mitigate the effects of vehicles on the highway network.
- 8.8.50 The HCA would seek to utilise local supply chains where possible to ensure that the economic benefits of Northstowe Phase 2

development construction are retained within the local economy. This would also help reduce any potential adverse effects to local communities arising from increased provisions for temporary workforces.

## Residual Effects

- 8.8.51 There may be a small increase in construction workers choosing to remain in the vicinity following on from construction, although such effects are considered to be negligible. No additional residual socio-economic effects from the construction phase have been identified.
- 8.8.52 The main residual effects arising from the operational phase will be in the continued use of employment space which will continue to generate wealth in the local economy and in the additional boost to local housing stock, which will continue to provide suitable accommodation for future residents. Associated services and facilities provided will also be available for on-going use by existing and new residents.

## Cumulative Effects

- 8.8.53 Northstowe Phase 2 development is the largest planned development within the Primary Study Area. It sits within the wider development of the town. Phase 1 of the town would deliver up to 150 dwellings, alongside a 630 place primary school and community facilities. Further phases of development within the town are anticipated to come forward for planning. Based on Local Plan projections for the whole of the town, Northstowe would comprise the construction of up to 15,465 dwellings supporting a population of up to 23,275.
- 8.8.54 Northstowe Phase 2 development itself sits at the heart of the planned town, and incorporates much of the proposed development of the town's services and commercial development. It is therefore reasonable to assume that the cumulative and in combination effects of the proposals for Northstowe Phase 2 development effectively represent a continuation on Phase 1 effects, and the delivery of Northstowe Phase 2 development, and associated transport upgrades, would also act as a catalyst for future planned phases of the town.
- 8.8.55 Further cumulative socio-economic effects may arise from the delivery of the extant planning permission for residential and business park development on land west of Longstanton (ref S/0682/95/0). The development of 21 hectares of new housing and a 7.2 hectare business park, following the completion of the Longstanton bypass, will have cumulative effects alongside the Northstowe development. Similar types of impacts will be associated with this development, adding to the overall scale of impact in both the primary and secondary areas, in terms of construction and operational aspects of the scheme. The cumulative effects in terms of construction activity

may add to temporary disruption, but remaining moderate overall pre-mitigation but minor post-mitigation. Effects relating to temporary increases in service provision for construction workers will increase but remain moderate in the primary area and minor in the secondary area. Additional positive benefits will arise from increases in local supplier activity and increased GVA contribution but remaining moderate overall.

- 8.8.56 For the operational phase, the timing of the Longstanton scheme is not clear in relation to Northstowe. Overall, the scheme will generate additional positive cumulative effects alongside Northstowe, including additional resident population, increased local services, new housing and employment opportunities and associated GVA increases. The cumulative effect across these factors will remain major, potentially moving the impact in terms of increased provision of services from moderate to major given the inclusion in the Longstanton development of additional recreation and local service provision.

## Limitations and Assumptions

### Limitations

- 8.8.57 The assessment of socio-economic effects has relied on the use of evidence from national sources, Northstowe Phase 2 planning documents published to date and the findings of local consultations.
- 8.8.58 Employment site development and service provision that is not aligned to housing delivery may impact on the take-up occupancy of residents within completed housing, creating a lag-time, where the need for services outstrips planned provision.. Planning for the Northstowe Phase 2 development includes the delivery of the town centre at an early stage (starting in 2019) and it is therefore assumed that employment site delivery would align to housing delivery and that there would be no lag-time. No sensitivity analysis to assess the effects of any delays in delivery has been undertaken.
- 8.8.59 This limitation does not compromise the validity of the overall assessment, but it has meant that the assessment does not reliably report on any variations in socio-economic impacts at particular stages of delivery.

### Assumptions

- 8.8.60 A number of assumptions have been developed for the economic modelling exercise. These rely on current or forecast demographic and economic change across each of the Study Areas. Metrics developed have used Government published datasets and leading sources of economic appraisal guidance (and each has been outlined and sourced within the assessment). In some instances, assumptions used have relied on team judgements, particularly surrounding the



levels of employment taken within the town by residents moving into Phase 2 housing. The assessment meets the standards for impact assessment as outlined in HM Treasury Green Book guidance for Economic Appraisal.

## Assessment Summary Matrix

**Table 8.24: Assessment Summary Matrix**

Assessment Summary Matrix				
Description of Effects	Significance of Effects: (i.e. Major, moderate, minor negligible, +ve, -ve, D, InD, ST, MT, LT)	Description of Mitigation Measures and Enhancement	Description of Residual Effects	Significance of Effects
<b>Site enabling works and construction assessment</b>				
Increased temporary disruption for residents of the Primary Study Area	Moderate, D, -ve, MT	Outline CEMP includes measures to reduce disturbance effects.	Minor	Minor adverse (Not significant)
Temporary increase in service provision needs arising from workforce population	Moderate, Ind, -ve MT (Primary area) Minor, Ind -ve, MT (Secondary area)	Possible mitigation from sourcing local workforces	Due to uncertainty in sourcing local workforce the residual effect is minor adverse.	Minor adverse (Not significant)
Increase in local supplier activity	Moderate, Ind, +ve, MT	Possible enhancement through local procurement strategy/policies	Due to uncertainty in local procurement the residual effect is considered to be the same as the effect identified without enhancement	Moderate beneficial (Significant)
Increase in GVA from construction activities	Moderate, Ind, +ve, MT	Possible enhancement from local procurement strategy/policies	Due to uncertainty in local procurement the residual effect is considered to be the same as the effect identified without enhancement	Moderate beneficial (Significant)

<b>Operational assessment</b>				
Increased resident and workday population in Longstanton ward	Major, +ve, D, P	Possible enhancement through attracting a desired demographic through development design and employment provision	Permanent increase in the local demographic. Due to the uncertainty in the demographic, the residual effect is the same.	Major beneficial (Significant)
Increased provision of services	Moderate, +ve, D, P	Possible enhancement through developing a broad range of services to build the offer	Permanent increase in service provision to serve new communities and existing communities in outlying settlements. Due to the uncertainty relating to the final mix of services the residual effect is the same.	Moderate beneficial (Significant)
Provision of new housing, including affordable housing	Major, +ve, D, P	Enhancement through development design and the delivery of affordable housing to help ease existing housing pressures in both Study Areas	Permanent increase in housing stock in the local area	Major beneficial (Significant)
Increase in Employment space	Major, +ve, D, P	Possible enhancement through delivering a range of employment spaces to provide a range of employment opportunities	Permanent increase in employment space provision in the local area and the sub-region	Major beneficial (Significant)
Increase in Business Stock/Employment opportunities	Major, +ve, D, P	Possible enhancement through the delivery of high growth jobspace, brought about through Economic Development Strategy planning	Permanent increase in business stock and employment opportunities in the local and sub-regional labour market	Major beneficial (Significant)
Increase in GVA	Major, +ve, Ind, P	Possible enhancement through the pursuit of high growth sector uses, brought about through Economic Development Strategy planning	Permanent uplift in GVA to the local and sub-regional economy	Major beneficial (Significant)
<b>Key: +ve (beneficial), -ve (adverse), D (direct), InD (indirect), ST (short term), MT (medium term), LT (long term), P (permanent), R (reversible)</b>				

## 9 Cultural Heritage Assessment

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### 9.1 Introduction

- 9.1.1 This section considers the Archaeology and Cultural Heritage aspects of the proposed development at Northstowe. It lays out the methodology used to undertake the assessment of likely significant effects on archaeology and cultural heritage assets, presents a summary of the baseline conditions, assesses the significance of the effects resulting from the proposals and provides an overview of potential mitigation.
- 9.1.2 Archaeology and cultural heritage assets comprise both designated assets such as Listed Buildings and Scheduled Monuments as well as non-designated assets such as known archaeological remains and non-listed buildings of historic interest. Although the assessment considers the way in which the proposed development might affect the setting of designated assets it does not consider the effects on the wider landscape which are dealt with in Section 15.

### 9.2 Review of Proposed Development

- 9.2.1 Northstowe Phase 2 development is described in Chapter 3 of this ES. The aspects of the proposed development which are of particular relevance to archaeology and cultural heritage are the construction of both the core area and the southern access route where site preparation and construction activities have the potential to produce direct permanent impacts on below ground archaeological remains and historic structures. The preparatory activities include remediation of contaminated land and removal of unexploded ordnance (UXO).
- 9.2.2 Construction activities also have the potential to produce temporary effects on the setting of historic structures, Scheduled Monuments, designed landscapes and conservation areas. These effects will be mitigated by measures incorporated into the outline Construction Environment Management Plan.
- 9.2.3 Further effects on the setting of heritage assets may result from the existence/operation of the proposed development, for example where key views are affected or where assets are physically or visually isolated.

## 9.3 Approach and methods

9.3.1 This assessment conforms to the principles and objectives of the NPPF. The methodology adopted in the 2007 site wide EIA<sup>39</sup> for assessing archaeological and historic environment importance has been used in order to maintain continuity with earlier reporting for the site. The assessment considers below ground archaeological assets, listed buildings and conservation areas. Consideration has been given to potential effects during both the construction and operation phases of the development. Due to the overlap between disciplines, the assessment of the built heritage cross references the landscape and visual impact assessments (see chapter 14).

### Legislation and guidance

9.3.2 Statutory protection for archaeology is principally provided by the Ancient Monuments and Archaeological Areas Act of 1979 amended by the National Heritage Act (2002). The Planning (Listed Buildings and Conservation Areas) Act 1990 amended most recently in 2013 by the Enterprise and Regulatory Reform Act lays out the statutory position in regard to listed buildings and conservation areas.

9.3.3 The Secretary of State for Culture, Media and Sport maintains a schedule of Nationally Important sites. The criteria for such designations include the following:

- extent of survival;
- current condition;
- rarity;
- fragility;
- connection to other monuments, or group value;
- potential to contribute to our information, understanding and appreciation; and
- extent of documentation enhancing the monument's significance.

9.3.4 The NPPF, published on 27th March 2012, replaced all previous Planning Policy Statements, including Planning Policy Statement 5 (PPS 5): Planning for the Historic Environment. Guidance to help practitioners implement this policy, including the legislative requirements that underpinned it, was provided in Planning for the Historic Environment Practice Guide (June 2012) produced to support the previous PPS 5 (2010). Following an external review, ministers have published new streamlined planning practice guidance for the National Planning Policy Framework and the planning system. English Heritage is currently revising its Good Practice Advice to take

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<sup>39</sup> WSP Northstowe Planning Application Environmental Statement for English Partnerships and Gallagher Longstanton Ltd, dated December 2007.

account of developments in the NPPF and the planning practice guidance.

- 9.3.5 The NPPF, Section 12: Conserving and enhancing the historic environment, identifies the contribution to protecting and enhancing the built and historic environment that the development process can achieve. Significantly, the NPPF does not distinguish between buildings, archaeology or landscape, but treats them collectively as heritage assets.
- 9.3.6 The assessment of construction and operational effects was undertaken using professional judgement, with reference to a number of guidance documents:
- Institute for Archaeologists (IfA)(2012) Standard and Guidance for Archaeological Desk Based Assessments;
  - Highways Agency (2009) Design Manual for Roads and Bridges Volume 11, Section 3, Part 2 (DMRB);
  - English Heritage (EH) (2011) The Setting of Heritage Assets.
- 9.3.7 The SCDC Local Plan contains the following policy which is relevant to the cultural heritage assessment:
- Policy NH/1: Conservation Areas
  - Policy NH/14: Heritage Assets
- 1) Development proposals will be supported when:
- a) They sustain and enhance the special character and distinctiveness of the district's historic environment including its villages and countryside and its building traditions and details;
  - b) They create new high quality environments with a strong sense of place by responding to local heritage character including in innovative ways.
- 2) Development proposals will be supported when they sustain and enhance the significance of heritage assets, including their settings, particularly:
- c) Designated heritage assets, i.e. listed buildings, conservation areas, scheduled monuments, registered parks and gardens;
  - d) Undesignated heritage assets which are identified in conservation area appraisals, through the development process and through further supplementary planning documents;
  - e) The wider historic landscape of South Cambridgeshire including landscape and settlement patterns;
  - f) Designed and other landscapes including historic parks and gardens, churchyards, village greens and public parks;
  - g) Historic places;

h) Archaeological remains of all periods from the earliest human habitation to modern times.

9.3.8 The Northstowe Area Action Plan adopted in 2007 contains the following Archaeology and Heritage Objectives.

- D9/a To develop an appropriate Archaeological Strategy which mitigates any adverse effects of the new settlement on the archaeological resource.
- D9/b To minimise any adverse impacts on the setting and character of Listed Buildings and Conservation Areas in the surrounding area.
- D9/c To develop an appropriate strategy which mitigates any effects of the new settlement on unlisted structures of historic interest within the RAF airfield.
- D9/d To provide an educational resource which can be used to inform the local population and the wider academic environment on the archaeological significance of the area.

## Study Area

9.3.9 The study area for this assessment comprises the land within the application boundary (see Figure 1.1) and an additional 500m beyond the application boundary to establish the presence of heritage receptors including Conservation Areas, Listed Buildings, known archaeological sites and other non-designated heritage assets.

9.3.10 In addition a search has been undertaken up to 5km from the application boundary to identify the presence of Scheduled Ancient Monuments, Registered Battlefields and Registered Parks and Gardens.

## Methodology

9.3.11 The methodology used in undertaking the archaeological assessment for the ES followed DMRB guidance in line with current best practice contained in guidelines issued by the Institute for Archaeologists, English Heritage and the Highways Agency:

- establishing known baseline conditions;
- determining the cultural heritage value of the assets identified;
- predicting the likely impacts of the development on heritage receptors within the study area and assessing the probable significance of the resulting effects;
- determining what mitigation measures (if any) are required during the design development, construction and operational lifetime; and
- evaluating the significance of the residual effects on heritage receptors after the application of mitigation measures.

- 9.3.12 Baseline conditions were established through consultation of the following sources:
- Cambridgeshire Historic Environment Record (CHER);
  - Archaeological ‘grey literature’ resulting from previous investigations within the study area;
  - RAF Oakington Operational History & Gazetteer;
  - The National Heritage List;
  - Conservation Area assessments for Longstanton, Oakington and Westwick;
  - On-line historical and mapping resources; and
  - Site walkover visit.
- 9.3.13 In determining the value of heritage assets<sup>40</sup> the methodology developed for the 2007 EIA was adopted in order to provide continuity of approach.
- 9.3.14 The criteria employed to assess cultural heritage value comprise:
- **Period** - assesses assets in terms of the period from which they date, with importance attributed in terms of our existing knowledge. The assigned importance will also depend on the number of examples within the region. For example, remains from a period where there are numerous examples in the region are considered to be of lesser importance than those where fewer examples are known;
  - **Rarity/incidence of site** - assesses assets in terms of the rarity and incidence of site type, with importance attributed in terms of our existing knowledge. Higher importance will be attributed to assets that contain elements that have the fewest comparators within and in the vicinity of the site. Archaeological features such as field boundaries or other agriculturally related remains would be considered of lesser importance as they are not only fairly common, but also usually provide little archaeological information (such as finds or environmental evidence);
  - **Associations** – assesses assets in terms of their associations based on our existing knowledge. An increased importance will be attributable where it appears that sites have spatial association with others, such that they may have been contemporary and interrelated, forming part of a wider historic landscape. Associations with major historical events would also increase the importance;
  - **Completeness/survival** – assesses assets in terms of their completeness (of a feature) and its associations, based on our

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<sup>40</sup> Heritage assets comprise a wide variety of forms – listed buildings, battlefields and planned landscapes as well as areas with sub-surface archaeological remains referred to here as ‘sites’ . In the discussion of baseline conditions and assessment of impact below known areas of archaeological remains identified in the course of evaluation works are distinguished as Site IV, Site VI etc



existing knowledge. A higher importance would be attributable to sites where the archaeological remains have been shown to be in a good state of preservation. Surface finds with no surviving associated features would be of considered of lesser importance;

- **Longevity**- assesses the identified assets in terms of their period of use, based on our existing knowledge. A higher importance would be attributed to an archaeological site where activity or settlement can be demonstrated to have continued over a long period. This would have increased importance where activity or settlement occurs spanning different time periods, for example, demonstrating the occupation from the Iron Age continuing after the Roman conquest; and
- **Potential** – assesses assets in terms of their future potential for additional finds, based on our existing knowledge and experience. A higher importance would be attributable to an archaeological site where there remains the possibility for other significant finds, features or other archaeological evidence to be present.

9.3.15 The criteria provide a number of broad indicators upon which to base the assessment of heritage importance. By using a number of criteria, the overall importance of a site can be assessed using the combined rankings, such that an asset may be judged to be of low importance for one criteria, but its combined importance may be high. Table 9.1 below provides a number of indicators for each criteria.

**Table 9.1: Cultural Heritage Importance Criteria and Indicators**

Criteria/ Importance	High	Medium	Low
Period	<ul style="list-style-type: none"> <li>• Mesolithic</li> <li>• Neolithic</li> <li>• Bronze Age</li> <li>• Post-Roman- mid-Saxon</li> </ul>	<ul style="list-style-type: none"> <li>• Iron Age</li> <li>• Roman</li> <li>• Late Saxon</li> <li>• Medieval</li> <li>• World War II</li> </ul>	<ul style="list-style-type: none"> <li>• Post-medieval</li> <li>• Modern</li> </ul>
Rarity /incidence	<ul style="list-style-type: none"> <li>• Mesolithic activity</li> <li>• Pre-Iron Age structural activity</li> <li>• Roman masonry buildings (for example shrine or villa/ farmstead)</li> <li>• Oakington pillboxes</li> </ul>	<ul style="list-style-type: none"> <li>• Iron Age enclosures</li> <li>• Romano-British settlement</li> <li>• Late –Saxon/ medieval occupation</li> </ul>	<ul style="list-style-type: none"> <li>• Field boundaries of Iron Age and later date</li> <li>• Agricultural features of medieval date</li> <li>• Standard type World War II and later RAF structures</li> </ul>
Associations	<ul style="list-style-type: none"> <li>• Inter-relationship between Iron Age enclosure sites</li> <li>• Romano-British settlement</li> </ul>	<ul style="list-style-type: none"> <li>• World War II airfield and associated features</li> <li>• Medieval agriculture</li> </ul>	<ul style="list-style-type: none"> <li>• Isolated sites of different periods</li> </ul>

Criteria/ Importance	High	Medium	Low
Completeness / survival	<ul style="list-style-type: none"> <li>Surviving structures/ earthworks/ stratigraphy</li> </ul>	<ul style="list-style-type: none"> <li>Plough damaged sites with only earth cut archaeological features</li> <li>Stratigraphic relationships indicating multi-period activity</li> </ul>	<ul style="list-style-type: none"> <li>Topsoil find scatters</li> <li>Heavily truncated sites</li> </ul>
Longevity	<ul style="list-style-type: none"> <li>Multi-period sites indicating a longevity of settlement activity (for example Romano-British sites with iron Age origins)</li> <li>Late-Bronze Age- Iron Age transition</li> <li>Romano-British – Saxon transition</li> </ul>	<ul style="list-style-type: none"> <li>Sites indicating some longevity of occupation or activity</li> </ul>	<ul style="list-style-type: none"> <li>Isolated sites with few features and short occupation period</li> </ul>
Potential	<ul style="list-style-type: none"> <li>The majority of archaeological sites at Northstowe have a high potential for hitherto unknown remains to be present</li> </ul>	<ul style="list-style-type: none"> <li>Small area sites where evaluation has indicated some features survive</li> </ul>	<ul style="list-style-type: none"> <li>Small isolated sites where evaluation has indicated few features survive</li> </ul>

9.3.16 Table 9.6 and Table 9.7 within the Baseline Conditions section below, the importance of known assets within the study area is assessed using the above criteria to provide an overall importance rating, assigned using professional judgement. The rating is based on scores for each criterion (Low – 2; Medium / Low – 3; Medium – 4; Medium / High – 5; and High – 6). The overall scores are totalled and the following ranges used to determine the overall heritage value:

- Score of 12-21 = Low heritage value
- Score of 22-28 = Medium heritage value
- Score of 29-32 = High heritage value
- Score of 33-36 = Very High heritage value

9.3.17 The assessment of heritage value is compatible with the approach taken by English Heritage to sustainable management of the historic

environment<sup>41</sup> in recognising the variety of aspects which should be considered when determining heritage value. It forms an essential initial step in determining the significance of the effects from the proposed development on heritage assets, both designated and non-designated, as required by NPPF.

## Significance criteria

9.3.18 The approach used to assess significance of effects has been determined by two variables; the heritage value of the asset, as described in paragraph 9.3.16 and the magnitude of change experienced by the asset. This takes into account the severity of impact of the proposed development, together with the sensitivity of the receptor to change.

9.3.19 Table 9.2 summarises the type of change and its magnitude, according to the DMRB methodology:

**Table 9.2: Magnitude of change**

Magnitude of Change	Description of Change
Major	Complete destruction/demolition of site or feature. Change to the site or feature resulting in a fundamental change in our ability to understand and appreciate the resource and its historical context and setting.
Moderate	Change to the site or feature resulting in an appreciable change in our ability to understand and appreciate the resource and its historical context and setting.
Minor	Change to the site or feature resulting in a small change in our ability to understand and appreciate the resource and its historical context and setting.
Negligible	Negligible change or no material change to the site or feature. No real change in our ability to understand and appreciate the resource and its historical context and setting.
No Change	No change

9.3.20 The significance of effect upon cultural heritage resources has been assessed according to the matrix approach recommended by DMRB and described in

9.3.21

9.3.22 Table 9.3. The effects may be either adverse or beneficial, depending on the nature of the impact. It should be noted that the initial assessment is made for the proposed development without mitigation; the residual effect as a result of mitigation is determined separately. Where the matrix suggested more than one likely outcome, for instance slight or moderate, professional judgement was used to arrive at an appropriate result. Where effects are usually

<sup>41</sup> For example English Heritage (2008), *Conservation Principles Policy and Guidance for the Sustainable Management of the Historic Environment*.

considered significant, they have been shaded: effects can be either beneficial or detrimental.

**Table 9.3: Significance of effect**

		MAGNITUDE OF CHANGE				
		No Change	Negligible	Minor	Moderate	Major
HERITAGE VALUE	Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate

## 9.4 Consultation

9.4.1 Section 5.9 of the EIA Scoping Report reviewed the potential for significant Archaeological and Cultural Heritage effects from the proposed development. Responses to the scoping report are presented at Appendix A. A brief overview of how scoping influenced the Archaeology and Cultural Heritage assessment is given at Table 9.4.

**Table 9.4: Summary of Scoping Report Responses**

Source (date)	Comment	Response
Cambridgeshire Historic Environment Team (25 March 2014)	The baseline study should include consideration of investigations undertaken since the previous application.	Investigations subsequent to the previous application have been considered as part of this assessment.  Only one intervention has taken place in the study area since the last application and that yielded no further evidence of archaeological remains.
	The baseline should also acknowledge that substantial and significant archaeological works are likely to proceed at Northstowe Phase 1 before implementation of mitigation for Phase 2.	Cumulative effects, including those derived from Northstowe Phase 1 are assessed at 0.

Source (date)	Comment	Response
English Heritage (04 April 2014)	The EIA will need to consider both direct and indirect impacts	The assessment considers both direct and indirect impacts.
	Undesignated heritage assets should be considered as part of the assessment.	Undesignated assets such as the WW2 airfield buildings are considered. See paragraphs 9.5.19 to 9.5.25.
	The Assessment Methodology is out of date and needs to reflect the criteria and language adopted in NPPF and that sound professional judgement can be lost in an over-reliance on matrices and scoring systems.	The methodology for assessing cultural heritage importance has been retained with the agreement of CHET in order to maintain consistency with previous reporting. Sound professional judgement remains the basis of the assessment which itself reflects the adoption of NPPF since the previous reports were prepared.
	EH is concerned that separating out visual effects into a separate section may result in inadequate consideration. All matters affecting cultural heritage should be considered in a single section.	The cultural heritage section considers the visual aspects of the proposed development noting that the wider landscape and visual effects are considered in a separate section (section 14).
Cambridgeshire County Council (02 May 2014)	CCC would suggest the establishment of a 'heritage vision and master plan' for the new town that can be supported by all parties.	See Northstowe Phase 2 Outline Heritage Strategy which is appended to the planning Statement.

9.4.2 In addition to the scoping responses noted above consultation meetings with Cambridge Historic Environment Team took place on 11 April 2014 and 6 June 2014. Meeting notes detailing the discussion at these meetings is given at Appendix E1.

## 9.5 Baseline conditions

- 9.5.1 Northstowe has been subject to a wide-ranging programme of archaeological investigation in support of a site-wide EIA prepared in 2007. Many of the investigations took place within the Northstowe Phase 2 study area. Although no further archaeological survey has taken place within the study area since 2007, a number of interventions have taken place in connection with development in the vicinity of Longstanton (see Figure 9.1). A gazetteer of all interventions, findspots, listed buildings, Scheduled Monuments and Registered Parks & Gardens within the study area can be found at Appendix E2. When discussing particular gazetteer entries in the baseline summary below reference is made to the relevant ID (for example ECB150, MCB395 or 1127279). Maps showing gazetteer entries can be found on Figures 9.1 to 9.4.
- 9.5.2 The baseline conditions discussed below have been developed as a result of the interventions and finds made to date. It is anticipated however that excavations undertaken to mitigate the effects of development at Northstowe Phase 1 commencing in mid-2014 will provide further information. It is likely that the results of this work will alter understanding of the likely conditions on the adjacent areas of Northstowe Phase 2.
- 9.5.3 When discussing baseline conditions approximate historical periods as defined by English Heritage (<http://pastscape.org.uk/TextPage.aspx>) are used (see Table 9.5)

**Table 9.5: Definition of archaeological time periods**

Period name	Date range	Additional periods, where needed
Palaeolithic	500,000 – 10,000BC	
Mesolithic	10,000 – 4,000BC	
Neolithic	4,000 – 2,200BC	
Bronze age	2,200 – 700BC	
Iron age	700BC – AD43	
Romano-British	AD43 – 410	
Early medieval (Anglo-Saxon)	410 – 1066	
Medieval	1066 - 1540	
Post-medieval	1540 - 1901	Tudor - 1485 - 1603 Elizabethan - 1558 - 1603 Stuart - 1603 – 1714 (Jacobean 1603 – 1625) Hanoverian - 1714–1837 (Georgian 1714– 830) Victorian - 1837 - 1901
20 <sup>th</sup> Century	1901 - 2000	
21 <sup>st</sup> Century	2001 - 2100	

- 9.5.4 The programme of archaeological work undertaken at Northstowe to date has identified fifteen archaeological sites<sup>42</sup> which are wholly or partially within the Phase 2 development boundary (see Table 9.6 and Figure 9.5).
- 9.5.5 Although small quantities of early prehistoric material have been encountered in the vicinity of Northstowe (see Figure 9.4 and Table 2 at Appendix E2) the earliest features encountered within the boundary of the proposed development date to the later Bronze Age or early Iron Age (1100-400BC). Site XXV<sup>43</sup> located on the line of the western access road linking the proposed development to Hatton's Road was identified in trial trenching having failed to show-up in the preceding geophysical survey (incidentally indicating the potential for archaeological remains to be present beyond the areas currently defined as 'sites'). Remains at this site comprised post holes and gullies assigned a late Bronze Age or early Iron Age date. The boundary ditches identified at Site XXXII<sup>44</sup>, located east of Rampton Drift within Oakington Barracks, were similarly assigned a late Bronze Age or early Iron Age date (although some later features were present). Features of Bronze Age date are relatively rare in the vicinity of Northstowe and as a consequence sites of this date have been assigned a higher Period importance rating – it is however worth noting that the datable material from Sites XXV and XXXII is extremely sparse and further investigation may result in re-dating of the features.

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<sup>42</sup> The sites identified in the programme of archaeological investigation were assessed in the site-wide Environmental Impact Assessment prepared in 2007 (WSP Environmental Northstowe Environmental Planning Applications Environmental Statement Chapter 9 Archaeology and the Historic Environment). The site designation (Site IV, Site VI etc) adopted in the earlier report has been retained here for the sake of clarity and consistency. One further investigation has taken place in the study area since the site-wide assessment was prepared – field walking and evaluation along the A14 Ellington to Fen Ditton. No archaeological remains were encountered within the current study area.

<sup>43</sup> See Evans et al (2006) Longstanton, Cambridgeshire: A Village Hinterland (II) pp 7,19 and 34

<sup>44</sup> Ibid pp 122-3, 127 and 192.

- 9.5.6 The majority of sites within the proposed development area (Sites IV, VI, VII, VIII, IX, XII, XIII, XV and XXXVI) are of Iron Age date. Five of these sites lie north of Rampton Road. Sites VI<sup>45</sup>, VII<sup>46</sup>, VIII<sup>47</sup> and IX<sup>48</sup> are enclosed farmsteads and Site IV<sup>49</sup> provided evidence of field ditches representing elements of a field system relating to the nearby Site VI. The farmsteads located within 200m-300m of each other were assigned a mid- to late- Iron Age date (400BC-AD43) although it was not possible to determine whether they were contemporary or represent ‘settlement creep’ across the period. Site IX underlies the substantial Romano-British settlement at Site XIX (see below) and as a result has potential to contribute to an understanding of the way in which the local landscape developed across the Iron Age – Roman transition and as a result has been assigned a high heritage value.
- 9.5.7 Sites XII<sup>50</sup> and XIII<sup>51</sup> are ditched Iron Age settlements located in the line of the western access route. Site XII lies close to Bar Hill junction and was first identified as a series of dense cropmarks on aerial photographs. The site has been subject to geophysical survey and trial trenching, and been shown to comprise an Iron Age enclosure (double-circuit ‘banjo style’ enclosure<sup>13</sup>). This form of enclosure suggests that it was a higher status site than other Iron Age enclosures in the area during this period. The enclosure was, unusually for Northstowe, overlain by early Roman activity, perhaps indicating a continuation of occupation between the late Iron Age and Roman-British periods. The possible high status nature of the Iron Age activity at Site XII coupled with potential for evidence of continuity has led to this site being assigned a High heritage value.
- 9.5.8 Two further Iron Age enclosures, Sites XV and XXXVI, lie within the former Oakington Barracks. Site XV<sup>52</sup> was identified by geophysics but not trial trenched owing to the potential presence of unexploded ordnance (UXO). Site XXXVI<sup>53</sup> comprised a series of linked enclosures of Mid-late Iron Age date underlying a much more extensive area of Romano-British activity (Site XVIII).
- 9.5.9 Two extensive areas of Romano-British settlement fall within the development boundary – Sites XVIII<sup>54</sup> and XIX<sup>55</sup>. Site XVIII is located within the area of the former Oakington barracks stretching

<sup>45</sup> See Evans et al (2004) Longstanton, Cambridgeshire: A Village Hinterland (I) pp 85, 88, 131, 147 and 186 Evans et al (2006) Longstanton, Cambridgeshire: A Village Hinterland (II) pp 7, 35, 54, 56.

<sup>46</sup> Ibid pp 85, 88 and 185.

<sup>47</sup> Ibid pp 85, 88, 129 and 185.

<sup>48</sup> Ibid pp 85, 88 and 185.

<sup>49</sup> Ibid p85.

<sup>50</sup> See Evans et al (2004) Longstanton, Cambridgeshire: A Village Hinterland (I) pp 128, 167, 176, 186-7.

<sup>51</sup> See Evans et al (2004) Longstanton, Cambridgeshire: A Village Hinterland (I) p 128, 165, 176, 186.

<sup>52</sup> Ibid pp 178 and 185.

<sup>53</sup> See Evans et al (2007) Longstanton, Cambridgeshire: A Village Hinterland (III) p8.

<sup>54</sup> See Evans et al (2004) Longstanton, Cambridgeshire: A Village Hinterland (I) pp 178, 187 and Evans et al (2006) Longstanton, Cambridgeshire: A Village Hinterland (II) pp 14, 118, 127, 131, 152, 154.

<sup>55</sup> See Evans et al (2004) Longstanton, Cambridgeshire: A Village Hinterland (I) pp 85, 87, 129, 156, 187-8.



northwards and westwards from the airfield perimeter road covering an area of up to 24 ha<sup>56</sup>. Geophysical survey revealed a major rectilinear complex which was subsequently partially tested by trial trenching<sup>57</sup>. The large size of the complex may be explained by the presence of multiple foci representing different functions. Near complete tiles and fragment of a stone column shaft recovered from a well found in one of the evaluation trenches suggested the presence nearby of a building of some significance although the general material culture from across Site XVIII reflected a series of moderately poor domestic settlements. Wood recovered from the well also demonstrated the potential to encounter local waterlogging and associated higher levels of organic preservation. Pottery recovered from Site XVIII encompassed the whole of the Roman period with a suggestion that activity peaked in the 2<sup>nd</sup>-3<sup>rd</sup> century. The large size, potential for continuity with earlier Iron Age sites and degree of preservation have led to this Site being assigned a High heritage value.

- 9.5.10 Site XIX is located north of Rampton Road and extends beyond the boundary of Northstowe Phase 2 into Phase 1 and encompasses an area of approximately 7.3 ha. The settlement represented by Site XIX appears to be unusually dense and showed evidence for the presence of a formal cemetery and a possible shrine suggesting that it differs in character from other Romano-British settlement sites in the Northstowe area.
- 9.5.11 The special characteristics of Sites XVIII and XIX have led to them both be allocated a High heritage value.
- 9.5.12 Site XXXV<sup>58</sup> is located adjacent to the former airfield perimeter road and stretches north-west towards the southern limit of the modern village of Longstanton. This site was not identified during the geophysical survey of the area, however, trial trenching revealed stratified archaeological remains of Late Saxon to Post-Medieval date, though predominantly of 12th-13th century date which suggests it was part of the settlement focus for Longstanton St. Michael's. Remains of late Saxon date are rare, coupled with the potential to investigate continuity with the modern settlement this has led to the site being assigned a High heritage value.

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<sup>56</sup> Evans suggests that Sites XV and XXXVI should be considered as a continuum across an area of 24ha rather than as separate sites. Even if considered separately Site XXXVI is still in excess of 12ha.

<sup>57</sup> Investigations in the vicinity of the airfield were curtailed by the discovery of unexploded ordnance.

<sup>58</sup> See Evans et al (2007) Longstanton, Cambridgeshire: A Village Hinterland (III) pp8, 43, 63, 65, 67, 72, 86.

9.5.13 Site XXIV<sup>59</sup> is located within Longstanton Conservation Area, to the west of Oakington Barracks. Geophysical survey has indicated the presence of a former building, which is probably of late medieval or post medieval date. This site has been assigned a Medium heritage value.

**Table 9.6: Archaeological Sites within Northstowe Phase 2.**

Site	Site Type and Date	Heritage Value						
		Period	Rarity	Associations	Survival	Longevity	Potential	Overall Score
IV	Possible Iron Age features	4	2	6	4	2	4	22 MED
VI	Iron Age Enclosure	4	6	6	4	4	4	28 MED
VII	Iron Age Enclosure	4	4	6	4	4	4	26 MED
VIII	Iron Age Enclosure	4	4	6	4	4	4	26 MED
IX	Iron Age Enclosure predating Romano-British site XIX (south)	4	4	6	4	6	6	30 HIGH
XII	Iron Age enclosure and early Roman activity	4	6	6	4	6	6	32 HIGH
XIII	Iron Age and Romano-British ditches	4	4	6	2	4	2	22 MED
XV	Iron Age Enclosure	4	4	6	4	6	6	30 HIGH
XVIII	Romano-British settlement area	4	4	6	6	6	6	32 HIGH
XIX	Romano-British settlement area	4	4	6	6	6	6	32 HIGH
XXIV	Medieval and Post-	3	2	6	4	4	4	23 MED

<sup>59</sup> See Evans et al (2004) Longstanton, Cambridgeshire: A Village Hinterland (I) pp89 and 192.

Site	Site Type and Date	Heritage Value						
		Period	Rarity	Associations	Survival	Longevity	Potential	Overall Score
	medieval remains							
XXV	Late Bronze Age or Early Iron Age activity	5	4	6	2	6	2	25 MED
XXXII	Late Bronze Age / Early Iron Age and medieval ditches	5	4	2	2	4	2	19 LOW
XXXV	Site of Late-Saxon and medieval activity	5	4	6	6	4	6	31 HIGH
XXXVI	Iron Age Enclosure	4	4	6	4	6	6	30 HIGH

### Former Oakington Airfield

- 9.5.14 In addition to the archaeological sites discussed above historic structures associated with the former Oakington airfield are also located within the Northstowe Phase 2 development site boundary.
- 9.5.15 Four of a group of eight listed<sup>60</sup> FC Construction (cantilevered or Oakington type) pillboxes<sup>61</sup> are located at the north-eastern perimeter of the development area (see Figure 9.3). These pillboxes<sup>62</sup> originally formed part of a wider airfield defence system alongside conventional hexagonal Type FW 3/22 pillboxes but now comprise the sole remaining elements within the development site.
- 9.5.16 All four examples of the FC Construction pillboxes have been partially denuded of the turf cover which would have served to conceal them when originally constructed. In addition one of the pillboxes (462 in the Francis gazetteer) has been modified by the partial bricking up of the observation slit. One pillbox (445 in the Francis gazetteer) has an associated air raid shelter to which it connected by a short length of trench.

<sup>60</sup> All eight pillboxes are listed under a single list entry 1404968.

<sup>61</sup> See Francis, P (2004) RAF Oakington: An Operational History & Gazetteer of Surviving Structures p94 ff.

<sup>62</sup> Structures 443, 444, 445 and 462 in Francis' gazetteer.

- 9.5.17 A ninth cantilevered pillbox which lies outside of the boundary of the former RAF station at the junction of Rampton Road and Long Lane has been separately listed<sup>63</sup>.
- 9.5.18 These pillboxes are of a rare type and survive in relatively good condition. They are representative of a significant period in the history of the site however their contextual value has been reduced by the demolition of the majority of the former airfield structures resulting in them being assigned an overall Medium heritage value.



**Photograph 9.1: Pillbox 445 (right of image) with associated air-raid shelter and linking trench.**

- 9.5.19 In addition to the listed pillboxes some elements of the former RAF Oakington remain following demolition of the majority of buildings on the site, these are:
- Officers' Mess & Quarters<sup>64</sup>;
  - Squash Racquets Court<sup>65</sup>;
  - Guard & Fire Party House<sup>66</sup>;
  - Station HQ Offices<sup>67</sup>; and
  - Air-Raid Shelters.
  - High level water towers

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<sup>63</sup> List entry 1404994.

<sup>64</sup> Francis Bldg 2.

<sup>65</sup> Francis Bldg 4.

<sup>66</sup> Francis Bldg 7.

<sup>67</sup> Francis Bldg 14.

9.5.20 The Officers' Mess & Quarters were built to a standardised plan based on pre-War examples adapted to account for wartime conditions. The complex incorporates a central element comprising mess facilities and kitchen with accommodation in two wings positioned either side of the central block. The Squash Racquets Court is located behind the east wing of the Officers' Mess.



**Photograph 9.2: Officers' Mess & Quarters viewed from the west showing symmetrical arrangement of accommodation wings around a central block containing mess facilities.**

- 9.5.21 The Guardroom & Fire Party House is set back to the north of the main drive a short distance from the Station HQ Offices. It is a lozenge-shaped single storey building with a central exercise yard.
- 9.5.22 The Station HQ Offices occupies a prominent position at the head of the main drive. The HQ comprises two storeys of offices with an Operations Block to the rear. The plan is an adaptation of a standard pre-War design with a flat reinforced concrete roof to provide blast protection. The Operations Block to the rear was originally surrounded by a 10 feet 7 inch high blast wall, already mostly removed by the time Francis' survey was undertaken.
- 9.5.23 The Air-Raid shelters in the main camp take the form of surface shelters formed of arch-shaped pre-cast reinforced concrete segments bolted together. The shelter entrances were protected by a brick-built blast wall and included an emergency exit through the roof at the rear of the shelter which had an overall cover of earth and turf.
- 9.5.24 The high level water towers comprise pressed steel tanks on twin open lattice steel towers located within the former Air Ministry Works Department yard.



**Photograph 9.3: Air-raid shelter south of Officers' Mess.**

- 9.5.25 Francis' report considered that none of these buildings and structures were of listable quality. Since that report was compiled the majority of buildings on the site have been demolished further reducing the group value of those structures which remain. None of the buildings are amongst those identified in the report as requiring additional recording and are considered to have low potential to contribute

further knowledge. All of these buildings and structures have therefore been considered to have Low heritage value.

## Conservation Areas

- 9.5.26 Three Conservation Areas – Longstanton, Oakington and Westwick – fall within the study area.
- 9.5.27 Longstanton Conservation Area abuts and partly overlaps the western boundary of the proposed Northstowe Phase 2 development (see Figure 9.2). The Conservation Area was initially designated as two separate areas, Longstanton All Saints and Longstanton St Michael's, in 1987. This division reflects the historic development of the village as two separate settlements.
- 9.5.28 Archaeological evidence from both outside<sup>68</sup> and inside<sup>69</sup> the proposed development suggests that the settlement in late Saxon and medieval times extended beyond the confines of the present village. It is indeed quite likely that the settlements migrated, expanded and contracted over a period of more than 500 years.
- 9.5.29 The two churches, All Saints (List Entry 1127295 Grade 1) and St Michael's (List Entry 1127298 Grade II\*) (see Figure 9.3), after which the historic settlements are named, represent the only substantial remaining buildings of medieval date although elements of timber framing at Manor Farmhouse (List Entry 1164323 Grade II) have been dated potentially as early as the 15<sup>th</sup> century.
- 9.5.30 St Michael's Church is the earlier of the two churches dating predominantly to the c1230<sup>70</sup> although the chancel was rebuilt in 1884, and is now in the care of Redundant Churches Fund. A 19<sup>th</sup> century well and wellhead (List Entry 1164289 Grade II) lies to the northwest of the church. All Saints Church dates to approximately a century later<sup>71</sup> than St Michael's with late medieval pews and monuments to the Hatton lords of the manor. A medieval churchyard cross (List Entry 1331336 Grade II) and a War Memorial of 1921 (List Entry 1392220 Grade II) are located within the burial ground to the south of the church.
- 9.5.31 Other listed buildings within Longstanton Conservation Area comprise Magdalene College Cottage of late 17<sup>th</sup> or 18<sup>th</sup> century date (List Entry 1127297 Grade II); The Grange cottage, 17<sup>th</sup> century in origin but surviving elements mostly of 1787 (List Entry 1127296 Grade II); and a village pump of late 19<sup>th</sup> century date (List Entry 1331335 Grade II).

<sup>68</sup> For example work by Birmingham University Archaeological Field Unit reported on in Longstanton Archaeological Assessment (1995) and subsequent works on the western bypass (Post-excavation assessment 2007).

<sup>69</sup> Sites XXIV and XXXV.

<sup>70</sup> Pevsner N 1970 The Buildings of England: Cambridgeshire p433.

<sup>71</sup> Ibid p432.

- 9.5.32 In addition to the listed assets discussed above non-designated assets also contribute to the historic character of the village. The earthworks at Longstanton Paddocks comprise areas of ridge and furrow cultivation interspersed with hollow ways, house platforms and enclosures of the shrunken medieval villages of Longstanton All Saints and Longstanton St Michael. The earthworks which lie within the application boundary have been subject to geophysical survey<sup>72</sup>. Site XXIV lies within the Longstanton Paddocks.
- 9.5.33 The village has retained an essentially rural character despite significant expansion in the late 20th century. The heritage values assigned to Longstanton Conservation Area, the listed buildings within it and Longstanton Paddocks are summarised below in Table 9.7.
- 9.5.34 Oakington Conservation Area lies between 400m and 600m south of the road corridors connecting the proposed development with the Cambridge Guided Busway and the A14 (see Figure 9.2). Excavations in 1938 and 1993/4 uncovered a 6<sup>th</sup> century cemetery suggesting earlier Saxon origins for the settlement and by the late 11<sup>th</sup> century<sup>73</sup> already had 55 residents.
- 9.5.35 The principal medieval settlement was located around the 12<sup>th</sup> century church of St Andrew<sup>74</sup>. At least one medieval secular building<sup>75</sup> survives within the village along with others of 16<sup>th</sup> to 18<sup>th</sup> century date. The construction of RAF Oakington had a substantial impact involving the purchase of 540 acres of farmland on the north side of the village and the demolition of a windmill of medieval origin. The essentially rural character of the village has however been maintained with views over the countryside to south and east contributing to this. Views towards the former airfield are however obscured by a belt of trees.
- 9.5.36 Westwick Conservation Area<sup>76</sup> lies on the east side of the former St Ives to Cambridge railway (now Cambridge Guided Busway) a short distance south of the proposed junction connecting the busway with an access route to the proposed development site (see figure 9.2).
- 9.5.37 Westwick village has medieval origins although the majority of the buildings in the existing settlement date from between 1850 and 1939. Westwick Hall (List Entry 1127279 Grade II) was built in 1855 on the site of the medieval manor the earthworks associated with which can still be seen. Westwick Hall model farm was built north of

<sup>72</sup> Oxford Archaeotechnics, 2004, Longstanton Cambridgeshire Topsoil Magnetic susceptibility and Magnetometer (Gradiometer ) survey. Survey Ref 2900404/LOC/CAU

<sup>73</sup> <https://www.scambs.gov.uk/sites/www.scambs.gov.uk/files/documents/Oakington%20-%20Part%201.pdf>

<sup>74</sup> Pevsner N op cit p444 has most of the extant architectural details of 13<sup>th</sup> century date inserted into earlier (Norman?) fabric.

<sup>75</sup> Church Farmhouse, 56 High St a 15<sup>th</sup> century hall house with 17<sup>th</sup> century alterations – noted in Conservation Area appraisal referenced in note 32 above.

<sup>76</sup> See <https://www.scambs.gov.uk/sites/www.scambs.gov.uk/files/documents/Westwick%20-%20part%201.pdf> for Conservation Area appraisal.



the Hall c1868. Two elements of the farm, a barn (List Entry 1127280 Grade II) and the farmhouse (List Entry 1164755 Grade II) have been listed. The St Ives to Cambridge railway was a significant factor in the 19<sup>th</sup> century expansion of the village with railway workers cottages and public house clustering around the railway station forming a distinct element in the village. The former railway line forms the western limit of Westwick Conservation Area and to a degree the associated planting screens the village from the proposed development at Northstowe Phase 2. Westwick Hall is additionally set within wooded grounds which provide further screening between the Hall and the proposed development.

## Scheduled Monuments

- 9.5.38 Eight Scheduled Monuments lie within the study area (see Figure 9.2). Belsar's Hill Ringwork, (List Entry 1010368), a medieval defensive enclosure utilising in part an earlier Iron Age fortified site and overlain by traces of later medieval cultivation, lies 2.8km to the north.
- 9.5.39 Giant's Hill Castle (List Entry 1011778), an apparently unfinished motte castle of the 12<sup>th</sup> century which partly overlies remains of the earlier medieval settlement of Rampton, is located 1.7km to the north-east of the development site.
- 9.5.40 Cottenham Moated Site (List Entry 1013882) located 3.6km to the north-east of the development site is believed to be the capital messuage (chief or most important house) of the Cottenham manor of Crowland Abbey.
- 9.5.41 The Moated Site south-west of Histon Manor (List Entry 1019181) is believed to represent the manor of Histon Denny, later called Histon St Andrew, which was owned by the bishops of Lincoln from the 11<sup>th</sup> century until 1392 when it was sold to Denny Abbey. The site is located 2.3km south of the proposed development site.
- 9.5.42 Overhall Grove Moated Site (List Entry 1006890), located 4.5km south-west of the development site, comprises the impressive earthwork remains of the de Boxworth family manor which flourished in the 13<sup>th</sup> and 14<sup>th</sup> centuries. The site has pre-Conquest origins but by the 17<sup>th</sup> century was 'a scite decayed'<sup>77</sup>. The list entry includes a small motte located a short distance to the west of Overhall Grove which is thought to have been constructed in the mid-12<sup>th</sup> century<sup>78</sup>.
- 9.5.43 Castle Hill medieval earthworks at Swavesey (List Entry 1006913) are located 4.5km to the north-west of the proposed development site. The site includes two rectangular banked enclosures, a motte reduced by gravel digging, as well as traces of ridge and furrow. Also

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<sup>77</sup> Taylor, A (1997) *The Archaeology of Cambridgeshire Vol1: South West Cambridgeshire* p24.

<sup>78</sup> *Ibid* p78.

in Swavesey, a short distance north–east of the Castle Hill earthworks is the site of Swavesey Priory (List Entry 1006914). The priory at Swavesey was an ‘alien house’ in that it had been granted to the Benedictine Abbey of Saints Sergius and Bacchus at Angers<sup>79</sup> by Alan of Brittany. Transferred to the Carthusians in the early 15<sup>th</sup> century the Priory was suppressed in 1539. The priory church of St Andrew dates to the early 14<sup>th</sup> century<sup>80</sup> and remains in use as the parish church otherwise only earthworks remain of the priory buildings.

- 9.5.44 Over Windmill (List Entry 1006869 – Scheduled Monument and 1331341 – Listed building) is located 2.8km to the north of the proposed development site. The windmill is a tower windmill of c.1860 restored in the mid 20<sup>th</sup> century. Much of the original machinery remains including two pairs of grinding stones.

### Registered Parks & Gardens

- 9.5.45 There are three Registered Parks & Gardens within the study area. Childerley Hall (List Entry 1000614 Grade II\*) lies 3.5 km south-west of the development site. Childerley Hall (Grade II\*) is late 16<sup>th</sup> century in date built close to the site of an earlier moated house. The gardens at Childerley lie to the south of the Hall within a dry moated enclosure with raised circular prospect mounds at each of the two southern angles. The Hall and garden sit at the centre of a park which is divided into Great Park to the south, Grove Park to the west and Black Park to the north. Grove Park with its bank and ditch boundary represents the area of the 16<sup>th</sup> century deer park, Black Park and Great Park being taken in during the 17<sup>th</sup> century expansion of the site. In the eastern section of Great Park substantial earthworks remains of Great Childerley village survive. The buildings of Lower Farm (Grade II) and Upper Farm (Grade II) dating to 1847 lie to the east of Childerley Hall and the 17<sup>th</sup> century chapel (Grade II\*) to the west also form part of the Childerley Hall group.
- 9.5.46 Madingley Hall (List Entry 1000627), 3.2km to the south of Northstowe, is a 16<sup>th</sup> century manor house with formal gardens laid out at the beginning of the 20<sup>th</sup> century, surrounded by pleasure grounds and park landscaped by Lancelot (Capability) Brown in 1756 (Grade II). The park covers 80 ha on the west side of the village of Madingley and contains six listed buildings including Madingley Hall (Grade I), an 18<sup>th</sup> century sham bridge (Grade II) and early 20<sup>th</sup> century entrance lodge and gate piers (Grade II). A short distance to the south of entrance drive to the hall is the church of St Mary Magdalen (Grade II\*), the 12<sup>th</sup> century parish church.
- 9.5.47 The American Military Cemetery (List Entry 1001573) is located to the south-east of Madingley 4.9km south of the proposed Northstowe

<sup>79</sup> From: 'Alien houses: Priory of Swavesey', A History of the County of Cambridge and the Isle of Ely: Volume 2 (1948) pp. 315-318. URL: <http://www.british-history.ac.uk/report.aspx?compid=40030>

<sup>80</sup> Pevsner op cit p468-9.

Phase 2 Development. The main building on the site is the tall, rectangular Memorial chapel and museum room (Grade II\*). The only permanent American Second World War cemetery in Britain, designed by Perry, Shaw, Hepburn and Dean, Architects and Olmsted Brothers, landscape architects and dedicated in 1956 the cemetery is a Grade I Registered Park & Garden.

**Table 9.7: Listed Buildings, Conservation Areas, Scheduled Monuments and Registered Parks within the study area**

Asset	Asset Type and Date	Heritage Value						
		Period	Rarity	Associations	Survival	Longevity	Potential	Overall Score
9 number Cantilevered pillboxes listed as 1404968 and 1404994	Listed structure World War II	4	6	3	6	2	6	27 MED
Officers' Mess	Non-designated Heritage Asset World War II	4	2	2	6	2	2	18 LOW
Squash Court	Non-designated Heritage Asset World War II	4	2	2	6	2	2	18 LOW
Guard & Fire Party House	Non-designated Heritage Asset World War II	4	2	2	6	2	2	18 LOW
Station HQ	Non-designated Heritage Asset World War II	4	2	2	6	2	2	18 LOW
Air-raid shelters	Non-designated Heritage Asset World War II	4	2	2	6	2	2	18 LOW
High level water towers	Non-designated Heritage Asset World War II	4	2	2	6	2	2	18 LOW
Longstanton Conservation Area	Conservation Area Late Saxon to modern	4	4	6	3	6	4	27 MED
Longstanton Paddocks	Non-designated Heritage Asset World War II	4	6	6	6	4	6	32 HIGH
All Saints Church	Listed Building Medieval	4	6	6	4	6	4	30 HIGH
St Michael's Church	Listed Building Medieval	4	6	6	4	6	4	30 HIGH
Manor Farmhouse	Listed Building Post-Medieval	2	4	6	4	4	3	23 MED

Asset	Asset Type and Date	Heritage Value						
		Period	Rarity	Associations	Survival	Longevity	Potential	Overall Score
Village Pump opposite Clive Hall Drive	Listed Building Post-Medieval	2	4	6	4	4	3	23 MED
Magdalen College Cottage	Listed Building Post-Medieval	2	4	6	4	4	3	23 MED
The Grange Cottage	Listed Building Post-Medieval	2	4	6	4	4	3	23 MED
Milestone at Bar Hill	Listed Building Post-Medieval	2	4	6	4	4	3	23 MED
Village pump at Striplands Farm	Listed Building Post-Medieval	2	4	6	4	4	3	23 MED
Oakington Conservation Area	Conservation Area Saxon to modern	4	4	6	4	6	4	28 MED
Westwick Conservation Area	Conservation Area Post-medieval to modern	2	4	6	3	4	4	23 MED
Westwick Hall	Listed Building Post-Medieval	2	4	4	6	2	4	22 MED
Westwick Hall Farmhouse	Listed Building Post-Medieval	2	4	4	6	2	4	22 MED
Westwick Hall farm barn	Listed Building Post-Medieval	2	4	4	6	2	4	22 MED
Milestone at Bar Hill	Listed Building Post-Medieval	2	4	4	6	2	4	22 MED
Village Pump near Stricklands Farm	Listed Building Post-Medieval	2	4	4	6	2	4	22 MED
Belsar's Hill Ringwork	Scheduled Monument Iron Age and Medieval	4	6	4	6	6	6	32 HIGH
Giant's Hill Castle	Scheduled Monument Medieval	4	6	6	6	4	6	32 HIGH
Cottenham Moated Site	Scheduled Monument Medieval	4	6	4	6	4	6	30 HIGH

Asset	Asset Type and Date	Heritage Value						
		Period	Rarity	Associations	Survival	Longevity	Potential	Overall Score
Moated Site south-west of Histon Manor	Scheduled Monument Medieval	4	6	6	6	4	6	32 HIGH
Overhall Grove Moated site	Scheduled Monument Medieval	4	6	6	6	6	6	34 HIGH
Castle Hill Earthworks Swavesey	Scheduled Monument Medieval	4	6	6	4	4	6	30 HIGH
Priory Earthworks Swavesey	Scheduled Monument Medieval	4	6	6	4	4	6	30 HIGH
Over Windmill	Scheduled Monument and Listed Building Medieval	2	6	4	6	2	6	26 MED
Childerly Hall Registered Park	Registered Park & Garden and Listed Buildings Medieval and Post-medieval	4	6	6	6	6	6	34 HIGH
Madingley Hall	Registered Park & Garden and Listed Buildings Post-medieval	2	6	6	6	6	6	34 HIGH
American Military Cemetery	Registered Park & Garden and Listed Building 20 <sup>th</sup> century	2	6	2	6	2	2	20 MED

9.5.48 There are no Registered Battlefields within the study area.

## 9.6 Environmental design/Design mitigation

9.6.1 Mitigation through design modification of potentially significant effects on heritage assets has occurred in two areas – in the proposed waterpark and in the green separation zone between the proposed Main Phase 2 development area and the village of Longstanton.

9.6.2 The zone assigned to the waterpark (see Figure 3.6) encompasses all of the four listed Oakington type pillboxes which fall within the Main Phase 2 development area development boundary. The waterpark will require ground works including excavation in places to a depth of

2m below current ground levels (see Parameter Levels Plan). Design development has removed any requirement for these structures to be demolished and has resulted in their incorporation into a public space which arguably enhances their setting and provides an opportunity for public access, appreciation and understanding which does not currently exist.

- 9.6.3 The area of green separation will see minimal sub-surface interventions and preserves in situ the medieval and later remains identified at Site XXIV. The treatment of this area will also serve to minimise the effect from the proposed development on the immediate setting of Longstanton Conservation Area and the Listed Buildings within it<sup>81</sup>.
- 9.6.4 Three archaeological sites are known to lie within the southern access route corridor – Sites XII, XIII and XXV. The southern access road has been aligned within the route corridor in order to avoid all known sites and associated drainage and landscaping have likewise been located to avoid known sites (Figure 9.6).

## 9.7 Potential effects

### Site establishment and construction effects

- 9.7.1 An outline Construction Environmental Management Plan has been developed. This includes embedded mitigation measures in respect of archaeological sites and built heritage assets where significant effects are predicted.
- 9.7.2 At an early stage in site establishment and prior to construction, removal of UXO and remediation of contaminated land will take place. Detail of the proposed activities is laid out in the Geo Environmental Assessment and Outline Remedial Strategy. This outline strategy envisages localised 'hotspot' removal and the introduction of a cover layer in areas of soft landscaping. Removal of hotspots has the potential to affect buried archaeology. Known hotspot areas fall on or near to areas of known archaeology at Site XXXV and Site XVIII. The risk of encountering unexploded ordnance (UXO) was demonstrated by the discovery of four unexploded bombs during the course of trial work in the vicinity of Brookfield Farm in 2005. A subsequent assessment of UXO risk<sup>82</sup> showed that the proposed development area had a history of activities likely to result in UXO risk. Risk from unexploded bombs were identified within the proposed town centre area close to Sites XV, XVIII, XXXII and XXXVI.
- 9.7.3 The methodology for identifying and dealing with UXO include non-intrusive survey followed by targeted excavation. If UXB are

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<sup>81</sup> See sections 14.6 and 14.7 for further discussion of the design mitigation and potential effects in this area.

<sup>82</sup> Zetica UXO desk study and risk assessment.

encountered they may be disposed of in-situ or in a purpose built fixed EOD facility. The fixed EOD facility would comprise a 2m deep stepped trench lined with 1 tonne sandbags and surrounded at ground level with a blast wall composed of ISO shipping containers covered with further sandbags. If there was a risk of vibration damage resulting from a UXB which had to be dealt with in-situ a protective trench would be employed between the UXB and the area to be protected. In areas where small arms ammunition (SAA) is expected a topsoil strip may take place. Effects on buried archaeological remains could result from the excavations to uncover UXB, the construction of a fixed EOD facility, the excavation of vibration protection trenches, topsoil stripping or the in-situ detonation of UXBs. The scale of impact on archaeological remains from digging to uncover UXBs would be limited by the degree to which the ground in the vicinity had already been disturbed.

- 9.7.4 Within the application boundary for Northstowe Phase 2 the areas where effects on buried archaeological deposits are likely to be greatest are in the zones assigned to the waterpark, the town centre, schools and residential areas. The effects will be derived from earthworks associated with the construction of works compounds, roads, foundation construction, tree planting, landscaping (including the creation of the waterpark) and trenching for utilities. Indicative long and cross-sections of proposed landscaping are shown in the Landscape Plan (see Figure 3.5). Across the majority of the core development area the overall effect of the development will be to raise the ground level by up to 500mm. At the north-eastern boundary of the site the ground will be raised by approximately 1m<sup>83</sup>. Excavation for the ponds within the waterpark will be approximately 2m in depth. A series of swales will carry surface water from the residential and town centre areas to the waterpark. These changes in levels will impact on archaeological deposits, resulting in a fundamental change to the deposits even where they do not result in complete destruction. The magnitude of change has therefore been assessed to be Major in these areas.
- 9.7.5 Where the proposed land use envisages greenways or sports hubs the magnitude of the likely impact on archaeological remains will be less substantial as sub-surface activities will be limited to pitch preparation and planting. The impacts are however still likely to result in an appreciable change in the condition of archaeological remains. The magnitude of change has therefore been assessed to be Moderate in these areas.
- 9.7.6 An area of green separation is proposed along the boundary between the proposed development and Longstanton village. Sub-surface impacts in this area will be very limited and the resulting magnitude of change has been assessed as Negligible.

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<sup>83</sup>It is assumed however that construction will be preceded by topsoil stripping which will expose archaeological deposits even in areas where the ground level will subsequently be raised.

- 9.7.7 The southern access road will be formed of a mixture of single and dual carriageway construction with a link into the existing Cambridge Guided Busway. Construction includes highway drainage ditches, footways, verges and, in the case of the dual sections, a central reservation, in addition to the carriageways themselves.
- 9.7.8 Additional works include a bridge to be constructed at the western end of the access corridor in order to provide a north – south cycleway link, attenuation ponds and landscaping. (see Figure 7.3 and Figure 3.6). The construction effects within the Southern Access Route will be derived from the excavations for attenuation ponds and landscaping. None of the proposed works within the Southern Access Route fall within areas of known archaeology.
- 9.7.9 The existing perimeter road will in part be retained as a construction road. Once construction is complete the road will be retained as a cycleway.
- 9.7.10 The archaeological sites likely to be affected by the proposed construction are summarised in Table 9.8 below. All effects would be permanent and adverse.

**Table 9.8: Archaeological Sites and construction effects**

Site	Heritage Value	Proposed Land Use	Magnitude of Change	Significance of Effect
IV	MED	Sports Hub	Moderate	Moderate
VI	MED	Residential	Major	Large
VII	MED	Residential	Major	Large
VIII	MED	Residential	Major	Large
IX	HIGH	Residential	Major	Very Large
XII	HIGH	Southern Access Road (West)	No Change	Neutral
XIII	MED	Southern Access Road (West)	No Change	Neutral
XV	HIGH	Residential	Major	Very Large
XVIII	HIGH	Town Centre, Residential, School and Sports Hub	Major	Very Large
XIX	HIGH	Residential	Major	Very Large
XXIV	MED	Green Separation	Negligible	Neutral
XXV	MED	Southern Access Road	No Change	Neutral
XXXII	LOW	Residential	Major	Moderate
XXXV	HIGH	Southern	No Change	Neutral



Site	Heritage Value	Proposed Land Use	Magnitude of Change	Significance of Effect
		Access Road – construction road		
XXXVI	HIGH	School	Major	Large or Very Large

- 9.7.11 It is intended that the former Officers' Mess and Guardroom will, subject to establishing viable uses for them, be retained in the proposed development.
- 9.7.12 It is not intended to retain the Station HQ building and Air-Raid Shelters. Where detailed design requires demolition of these structures the magnitude of impact would be major and the overall significance of effect **moderate adverse**.
- 9.7.13 Temporary effects on setting of built heritage assets, scheduled monuments, registered parks & gardens from construction will be principally derived from increased noise, vibration, odour and dust created by construction vehicles. These effects will be confined to assets within or immediately adjacent to the proposed development and the construction access routes.

### Operational effects

- 9.7.14 This assessment considers that there will be are no direct effects on archaeological sites or other heritage assets from the operation of the proposed development.
- 9.7.15 Indirect operational effects on the settings of heritage assets may however result from the existence of the proposed development.
- 9.7.16 The setting of the four listed Oakington-type pillboxes located within the application boundary will be affected by the proposed development. The pillboxes formed part of a defensive scheme which laid a premium on interlocked fields of fire from multiple points and a wide, unobscured, field of view. The setting of the pillboxes has been to a certain extent compromised by the demolition of the majority of the associated airfield structures including the FW 3/22 pillboxes which were another major element in the airfield defensive system. The presence of the waterpark in close proximity to the pillboxes will result in a change in their immediate setting from open grassland to one with greater topographical variation, permanent and temporary areas of open water as well as shorter fields of view broken up by small stands of vegetation. This change does not however substantially affect the viewer's ability to understand the pillboxes as defensive structures and arguably represents a small enhancement in that the structures will be located within a public area which will

encourage greater accessibility. The effect from the existence of the proposed scheme has therefore been assessed to be **slight beneficial** in overall effect on the pillboxes within the application boundary.



**Photograph 9.4: Oakington-type pillbox 444 from the south.**

9.7.17 Of the remaining five Oakington-type pillboxes which lie outside of the application boundary three are located to the west of the proposed development and will be screened from it by the proposed green separation zone between Northstowe and Longstanton. The remaining two pillboxes are located on the eastern and southern perimeter of the former airfield and are separated from the urban core of the proposed development by between 750m and 1000m. Any setting effects at this degree of separation will be negligible and will result in a **slight adverse** overall effect.

9.7.18 Effects on the settings of Longstanton, Oakington and Westwick Conservation Areas from the proposed development are considered in detail in the Landscape and Visual Impact Assessment (Chapter 15). Although each of the conservation areas represents a major component in its respective Local Character Area (LCA) none of the LCAs are coterminous with conservation areas and the assessed effects presented in Chapter 15 are not limited to the conservation areas and the heritage assets within them.

9.7.19 The majority of heritage assets within Longstanton Conservation Area are screened from the proposed development by mature trees or intervening buildings. The exceptions are Manor Farm (List Entry 1164323) and the village pump opposite Clive Hall Drive (List Entry 1331335) which are both located on the eastern fringe of the village

with views across the open ground toward the proposed Main Phase 2 development area. The proposed area of green separation will form a buffer between these assets and the proposed urban core of the Main Phase 2 development area reducing the magnitude of change to a negligible level.

9.7.20 Westwick Hall and Westwick Hall Farm are located more than 1km from the urban core of Northstowe. The former is surrounded to the north and west by an avenue of mature trees and formal gardens which will screen views towards Northstowe. Although the latter has more open views an intervening belt of trees lining the Beck Brook partially blocks the view and will reduce the magnitude of change to a negligible level.

9.7.21 None of the remaining designated assets, Scheduled Monuments and Registered Parks & Gardens, lie sufficiently close to the urban core of the proposed development for any setting effects to result.

**Table 9.9: Heritage assets where operational effects will occur**

Heritage Asset	Heritage Value	Operational Effect	Magnitude of Change	Significance of Effect
Oakington-type pillboxes within application boundary	High	Changes to immediate setting of the asset	Negligible	Slight
Oakington-type pillboxes to south and east application boundary	High	Changes to distant setting of the asset	Negligible	Slight
Manor Farm	Medium	Changes to distant setting of the asset	Negligible	Slight
Village pump opposite Clive Hall Drive	Medium	Changes to distant setting of the asset	Negligible	Slight
Westwick Hall Farm	Medium	Changes to distant setting of the asset	Negligible	Slight

## Mitigation and enhancement

9.7.22 Any significant effects on known archaeological sites within the development footprint will be mitigated through the implementation of a programme of archaeological works resulting in preservation by record.

9.7.23 The programme of archaeological works will conform to the Northstowe Phase 2 Outline Heritage Strategy for Northstowe Phase 2<sup>84</sup>.

<sup>84</sup> See Northstowe Phase 2 Planning Statement

- 9.7.24 The works to be carried out in respect of sites within the outline application boundary will be laid out in an over-arching Historic Environment Management Plan. As subsequent detailed applications are brought forward site specific Written Schemes of Investigation will be produced.
- 9.7.25 Archaeological investigations will take place prior to construction and, where necessary, co-ordinated with remediation activity.
- 9.7.26 Non-designated built heritage assets such as the air-raid shelters which will be lost as a result of the proposed development will be preserved by record prior to demolition.
- 9.7.27 Where non-designated heritage assets such as the former Officers' Mess, Guard & Fire Party House and Station HQ are converted to new uses any elements of the fabric which will be lost or obscured will be preserved by record.
- 9.7.28 Understanding and appreciation of the historic environment of Northstowe will be enhanced by the following measures:
- Implementation of a programme of community involvement with the archaeological investigations undertaken in connection with the proposed development;
  - Support for the establishment, subject to securing appropriate funding, of a Heritage Centre which will provide a long term focus for community engagement with all aspects of the heritage of Northstowe; and
  - Historic environment information boards at selected locations (for example at Oakington-type pillbox 445).

### **Residual Effects**

- 9.7.29 Residual effects are those that remain after mitigation has been put in place. The residual effects have been assessed as follows:

#### **Site enabling and construction residual effects**

- 9.7.30 No significant construction effects following mitigation.

#### **Operational residual effects**

- 9.7.31 No significant operational effects remain following mitigation.

## Cumulative Effects

- 9.7.32 The following developments have the potential to produce cumulative effects on the archaeological and cultural heritage assets within the study area:
- Northstowe Phase 1
  - A14 Cambridge to Huntingdon Improvement Scheme
- 9.7.33 Northstowe Phase 1 is coterminous with the northern boundary of Phase 2 and the area of archaeological remains at Site XIX extends across the boundary between the two developments.
- 9.7.34 The southern access route will meet the A14 Cambridge to Huntingdon Improvement Scheme corridor at a point on the B1050 Hatton's Road in the vicinity of Hazelwell Court. Site XII extends across the boundary of the two schemes.
- 9.7.35 The elements of Site XIX which lie to the north of the boundary with Phase 2 will be excavated as part of a programme of archaeological mitigation required by the conditions placed on the grant of planning permission to Northstowe Phase 1. The proposed mitigation for the Phase 1 works will ensure that the effects from that development will not be significant. Similar mitigation is proposed for the Phase 2 works in the southern portion of Site XIX. On completion of Phase 2 all of Site XIX will have been archaeologically excavated resulting in preservation by record of all of the remains. The proposed mitigation will result in no significant cumulative effect.
- 9.7.36 The intended works associated with the A14 Improvement Scheme include provision of a new junction with the B1050 at Bar Hill. This junction will overlie the southern and western limits of Site XII. In addition the area to the north and east of the new junction will be used as a (temporary) soil storage area. The A14 works are likely to have a more significant effect on the remains at Site XII than the proposed Northstowe southern access route works which have been designed to avoid known remains in this area. The way in which the southern access route and the A14 proposals will interact are however at an early stage of development and the cumulative effects will be reviewed when more fully developed.

## Limitations and Assumptions

### Limitations

- 9.7.37 Assessment of the archaeological value of the identified sites within the application boundaries has been dependant on archaeological work carried out prior to 2007. The non-intrusive surveys (aerial photographic analysis, field walking and geophysical survey) were

very comprehensive and only limited by the extant buildings then present on site.

- 9.7.38 The archaeological model developed from the non-intrusive surveys was tested by trial trenching which in some cases demonstrated that remains were present in areas which appeared blank in non-intrusive surveys.
- 9.7.39 In some areas of the former Oakington airfield the potential presence of unexploded ordnance limited the extent to which it was possible to confirm the results of non-intrusive survey by trenching.
- 9.7.40 These limitations mean that in some cases archaeological remains may be present beyond the mapped extent of known sites or, where confirmation by trenching was not possible, may be of a different character and quality to that presented in the baseline survey.
- 9.7.41 It is not considered that these factors present a substantial limitation on the validity of the assessment as sufficient investigation has taken place to understand in broad terms the character, quality and extent of remains within the application boundary<sup>85</sup>.
- 9.7.42 Assessment of the interior arrangements of these structures has been dependant on the survey carried out by Francis in 2004.
- 9.7.43 The remaining built heritage assets are robust structures with few if any fragile components of any heritage value and it is not considered likely that the lack of access to their interiors presents a significant limitation on the assessment.

## Assumptions

- 9.7.44 It has been assumed that no substantial change to the condition of archaeological remains has occurred since the completion of the latest investigations on the site in 2007. This assumption is based on the current use of the site for non-damaging uses such as grazing and haymaking. In addition it appears that where demolition has taken place this has been limited to above ground elements with floor slabs and foundations remaining in place.

## Assessment Summary Matrix

- 9.7.45 Table 9.10 provides a summary of the likely effects on cultural heritage as a result of the proposed Northstowe Phase 2 development.

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<sup>85</sup> This view has been endorsed by CHET, see responses to consultation above.

**Table 9.10: Assessment Summary Matrix**

<b>Assessment Summary Matrix</b>				
<b>Description of Effects</b>	<b>Significance of Effects:</b>	<b>Description of Mitigation Measures and Enhancement</b>	<b>Description of Residual Effects</b>	<b>Significance of Residual Effects</b>
<b>Site enabling works and construction assessment</b>				
Impact on buried archaeological remains at Site IV from construction of sports hub	Moderate, -ve, D, P	Programme of archaeological works to preserve by record	No significant residual effects	Neutral (Not significant)
Impact on buried archaeological remains at Sites VI, VII, VIII and XXXII from residential construction	Large, -ve, D, P	Programme of archaeological works to preserve by record	No significant residual effects	Neutral (Not significant)
Impact on buried archaeological remains at Sites IX, XV and XIX from residential construction	Very Large, -ve, D, P	Programme of archaeological works to preserve by record	No significant residual effects	Neutral (Not significant)
Impact on buried archaeological remains at Site XVIII from town centre/sports hub/residential construction	Very Large, -ve, D, P	Programme of archaeological works to preserve by record	No significant residual effects	Neutral (Not significant)
Impact on buried archaeological remains at Site XXIV from establishment of green separation	No effect	None proposed		
Impact on buried archaeological remains at Site XII, XII and XXV from construction of southern access road	No effect	None proposed		
Impact on buried archaeological remains at Site XXXV from construction of southern access road (construction road)	No effect	None proposed		
Impact on buried archaeological remains	Very Large, -ve,	Programme of archaeological	No significant residual effects	Neutral (Not

<b>Assessment Summary Matrix</b>				
<b>Description of Effects</b>	<b>Significance of Effects:</b>	<b>Description of Mitigation Measures and Enhancement</b>	<b>Description of Residual Effects</b>	<b>Significance of Residual Effects</b>
<b>Site enabling works and construction assessment</b>				
at Site XXXVI from school construction	D, P	works to preserve by record		significant)
Impact on non-designated water towers, air raid shelters, station HQ and squash court from construction of residential areas and town centre	Moderate, -ve, D, P	Programme of building recording to preserve by record	No significant residual effects	Neutral (Not significant)
<b>Operational assessment</b>				
Impact on immediate setting of listed Oakington-type pillboxes within application boundary	Slight, +ve, InD, P	None proposed		Slight, +ve, InD, P (Not significant)
Impact on distant setting of listed Oakington-type pillboxes outside application boundary	Slight, -ve, InD, P	None proposed		Slight, -ve, InD, P (Not significant)
Impact on distant setting of listed buildings at Manor Farm, Westwick Hall Farm and Longstanton village pump	Slight, -ve, InD, P	None proposed		Slight, -ve, InD, P (Not significant)
<i>Key: +ve (beneficial), -ve (adverse), D (direct), InD (indirect), ST (short term), MT (medium term), LT (long term), P (permanent), R (reversible)</i>				



## 10 Ecology

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### 10.1 Introduction

10.1.1 This chapter has been undertaken to determine the likely significant effects of the proposed Northstowe Phase 2 development on the ecology of the study area. The assessment considers the effects on the ecological resources during the site preparation and construction and operational stages of the proposed development.

10.1.2 The assessment comprises:

- A description of relevant aspects of the proposed development;
- A review of the survey and Ecological Impact Assessment (EclA) assessment methodologies;
- A description of the legislative context and relevant national, regional and local ecological planning policy requirements;
- A review of consultation undertaken and how the responses have influenced the EclA;
- A description of the baseline conditions and an assessment of the site's ecological importance with regards to specific ecological receptors;
- A review of embedded ecology measures (EEM) that have been incorporated into the design of the proposed development;
- An assessment of the potential effects on ecological receptors and additional mitigation and enhancement measures;
- An assessment of the residual and cumulative effects;
- A review of the limitations and assumptions; and
- An assessment summary matrix, which reviews the potential and residual effects on ecological receptors.

10.1.3 The chapter considers potential effects on European Protected Sites located within 15km of the site. This review identifies no potential effects and concludes that screening for Habitats Regulations Assessment is not necessary.

10.1.4 This chapter should be read in conjunction with Appendix F: Ecology, particularly with respect to the description of the baseline conditions.

### 10.2 Review of proposed development

10.2.1 The following provides a review of relevant elements of the proposed development, which should be read in conjunction with the Design and Access Statement, Landscape Typologies and Interfaces and Surface Water Drainage Strategy, all of which have been submitted in support of the planning application. These elements are relevant to

conclusions drawn in the assessment, in terms of compensating for habitat loss associated with site clearance works.

## Drainage strategy

- 10.2.2 A waterpark is proposed in the eastern part of the site to provide flood alleviation. This would cover an area of 19.63ha. The proposed development would discharge surface water into two large attenuation ponds via swales. The water would be discharged at a controlled rate, depending on water levels outside the site. The water levels would vary, depending on the pumping arrangement; if the water levels in the receiving watercourses are too high, the storage ponds would retain water on the site until the levels subside. The waterpark would be surrounded by a riparian zone, with a series of paths proposed to allow access to pedestrians, while also keeping key areas for wildlife undisturbed by human activity. The waterpark would connect to the informal greenways, which are described below.
- 10.2.3 Small ponds are proposed around the periphery of the two attenuation ponds. These ponds would not be pumped directly, to ensure that they retain water as the main waterbodies are drained, although they might occasionally dry out during hot weather. They have been designed to maximise biodiversity and provide suitable breeding habitat for great crested newt. They would be planted with bankside and aquatic vegetation, but maintaining open areas and ensuring they are not too shaded, particularly on the south side. The ponds would be sized to ensure their suitability for great crested newt, with suitable vegetation encouraging good populations of invertebrates and other amphibians. The ponds would be clustered, ensuring connectivity between the ponds via suitable terrestrial habitat. This would include riparian vegetation, including native sedges and reeds, rough grassland, tall ruderal vegetation, scrub and trees within the waterpark and informal greenways. Hibernacula would also be created close to the ponds, within the waterpark and informal greenways, comprising rubble and log piles and earth banks. Deadwood would be retained in these areas and areas of woodland in the southern part of the barracks. The future development of the southern part of the barracks would ensure connectivity between these habitats and further attenuation ponds and greenways.
- 10.2.4 Engineered swales would be integrated into the greenways and along some of the streets. Naturalistic swales are proposed, planted with riparian vegetation, particularly within the informal greenways.

## Green separation

- 10.2.5 A green separation is proposed in the western part of the site, which would provide a buffer between the proposed development and Longstanton. The total area is 16.88 ha. The fields, hedgerows and trees, including along both side of Long Lane, would be retained and protected during the course of the proposed development.

Hedgerows, orchards and community gardens are also proposed at the eastern edge.

## Greenways

- 10.2.6 The green separation would be connected to the waterpark via informal greenways running east-west across the site, which are characterised by an open parkland landscape. Three informal greenways are proposed, comprising a total area of 4.36 ha. Rampton Road would become an informal greenway, with the others being located along the northern and southern boundaries of the built development. The northern informal greenway would link with similar landscaping along the southern boundary of Phase 1.
- 10.2.7 Planted buffers are proposed between the built development and informal greenways, comprising lines of trees and planted beds, which would lead into open grassland interspersed with scattered trees. These would supplement existing trees, which would be retained where possible. Swathes of open, rough grassland would be interwoven with meadows, sporadic tree clusters, shrubs and pedestrian and cycle ways. Grazing would be managed to allow certain areas to grow long, while also preventing scrub and trees from encroaching into open grassland areas. Hedgerows, ponds and ha-has would be employed to manage the movements of grazing animals.
- 10.2.8 A series of formal greenways would provide further linkages across the site, totalling 4.22 ha. These would be managed open spaces defined by distinct linear tree, shrub and hedgerow features. These would be varied, including areas of paving, lawns, wildflower meadows, footpaths and cycle ways.

## Rampton Drift

- 10.2.9 The built development would be set back 20m from Rampton Drift, with a green buffer proposed in between. Many of the existing trees would be retained, which would be supplemented with additional woodland trees, orchards and hedgerows.

## Built development

- 10.2.10 Green roofs are proposed on the public buildings. Roof gardens are proposed over parking decks within apartment buildings around the town centre, while office buildings within the town centre, the school buildings and the sports hub could also support green roofs. However, these have not yet been fixed into the design. These have therefore not been considered in the assessment and would be considered at reserved matters stage.

- 10.2.11 The majority of the town square would be paved, although the edges would be vegetated, incorporating specimen trees, low shrubs and perennial planting. The edges of the school fields would be left to grow long, to widen buffer zones wherever possible and provide cover for wildlife.

### Southern Access Road (West)

- 10.2.12 Hedgerows are proposed along the road and on the embankment of the bridleway bridge, with those along the road incorporating trees. These would include species such as blackthorn *Prunus spinosa*, goat willow *Salix caprea*, hawthorn *Crataegus monogyna*, elder *Sambucus nigra* and hazel *Corylus avellana*. Elm *Ulmus* sp. would also be incorporated, particularly English elm *Ulmus procera* and wych elm *Ulmus glabra*, to target notable white-letter hairstreak *Satyrrium w-album* and white-spotted pinion moth *Cosmia diffinis*, which both occur on the site and rely on these species. Lighting is only proposed at the junctions at the northern and southern ends of the road.
- 10.2.13 Additional areas of tree and shrub planting are proposed, also comprising native species such as lime *Tilia* sp., oak *Quercus robur*, field maple *Acer campestre*, hornbeam *Carpinus betulus*, blackthorn and hawthorn. Rough grassland is proposed elsewhere. Existing trees will be retained where possible.
- 10.2.14 Sustainable Drainage Systems (SUDS) would be implemented to manage run-off. Attenuation ponds are proposed immediately to the south of Longstanton Road and along the proposed road. These would be enhanced through marginal planting, incorporating native species such as great willowherb *Epilobium hirsutum*, common reed *Phragmites australis*, sedges *Carex* sp. and rushes *Juncus* sp. Run-off will be treated and discharged into the local ditch network. Refer to Chapter 12: Hydrology, Flooding and Drainage for further details.

## 10.3 Approach and methods

- 10.3.1 The standard approach applied in the UK to EclA is that developed by the Institute of Ecology and Environmental Management (IEEM)<sup>86</sup>. This method has been used to evaluate existing features and to assess the significance of the ecological impacts on these features that may arise as a result of the construction and operation of the proposed development.

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<sup>86</sup> Institute of Ecology and Environmental Management (2006); 'Guidelines for Ecological Impact Assessment.' IEEM.

## Legislation and guidance

- 10.3.2 The principal pieces of legislation relating to ecology and nature conservation are as follows:
- Wildlife and Countryside Act 1981<sup>87</sup> (as amended) (WCA) - comprises the primary means of protecting wildlife in the UK, including all wild birds and their nests, certain animals and plants;
  - The Conservation of Habitats and Species Regulations 2010<sup>88</sup> (as amended) (Habitats and Species Regulations) – provides protection for European Protected Species (EPS) and their habitats;
  - Countryside and Rights of Way (CROW) Act 2000 - strengthens the WCA in relation to threatened species and demands the publication of a list of living organisms and habitat types considered to be of principal importance in conserving biodiversity (the UK Biodiversity Action Plan) and that Government Departments have regard for the conservation of biodiversity; and
  - Natural Environment and Rural Communities (NERC) Act 2006<sup>89</sup> - requires the publication of a list of organisms and habitat types considered to be of principal importance in conserving biodiversity in consultation with Natural England (the Section 41 list) and extended the requirement to have regard for conserving biodiversity to all public authorities.
- 10.3.3 The Protection of Badgers Act 1992<sup>90</sup> is also relevant to the assessment. This act makes it an offence to wilfully kill, take, possess or cruelly ill-treat a badger, or attempt to do so; interfere with a sett by damaging or destroying it; obstruct access to, or any entrance of, a badger sett; or disturb a badger when it is occupying a sett.
- 10.3.4 The Wild Mammals (Protection) Act 1996<sup>91</sup> makes it an offence to intentionally cause wild mammals' any unnecessary suffering by certain methods, including crushing and asphyxiation.
- 10.3.5 The Hedgerow Regulations 1997<sup>92</sup> includes criteria for the identification of important hedgerows, the removal of which requires approval from the local planning authority. A hedgerow is important if it has existed for 30 years or more; and satisfies at least one of the criteria listed in the regulations. This includes archaeology and history and wildlife and landscape criteria, the latter of which is relevant to this report. These relate to the presence of protected species, as well as woody and woodland species within the hedgerow.

<sup>87</sup> Her Majesties Stationary Office (HMSO), (1981); 'Wildlife and Countryside Act 1981.'

<sup>88</sup> HMSO, (2010); 'The Conservation of Habitats and Species Regulations 2010.'

<sup>89</sup> HMSO, (2006); 'Natural Environment and Rural Communities Act.'

<sup>90</sup> HMSO, (1992); 'Protection of Badgers Act 1992 (c. 51).'

<sup>91</sup> HMSO, (1996); 'Wild Mammals (Protection) Act 1996.'

<sup>92</sup> HMSO, (1997); 'The Hedgerows Regulations 1997'

## UK Biodiversity Action Plan

10.3.6 Although the UK Post-2010 Biodiversity Framework and UK<sup>93</sup> superseded the UK BAP<sup>94</sup> in July 2012, the lists of priority species and habitats continue to provide valuable reference sources with respect to priorities for conservation while a National Biodiversity Strategy and/or Action Plan is being produced. The former UK BAP is relevant in the context of Section 40 of the NERC Act 2006, meaning that priority species and habitats are material considerations in planning. The following UK BAP priority habitats are of relevance to the site, with priority species being discussed later in the chapter:

- Ponds;
- Arable field margins;
- Hedgerows;
- Lowland mixed deciduous woodland; and
- Coastal and floodplain grazing marsh.

## East of England Biodiversity Delivery Plan 2008-2015

10.3.7 The East of England Biodiversity Delivery Plan<sup>95</sup> has been produced by the East of England Biodiversity Forum. This document includes an action to secure green infrastructure through supporting the delivery of high quality green infrastructure in and around the region's towns and cities, and engage communities and key stakeholders in planning this infrastructure.

## Cambridgeshire and Peterborough Biodiversity Action Plan

10.3.8 The Cambridgeshire and Peterborough Biodiversity Partnership formed in 1996 and a set of BAPs were launched in 2000<sup>96</sup>; they are being reviewed on a regular basis and guide the work that partners are pursuing. The following Habitat Action Plans are relevant to the site:

- Arable field margins;
- Brownfield sites and the built development;
- Domestic gardens;
- Floodplain and grazing marsh;

<sup>93</sup> JNCC and Defra (on behalf of the Four Countries' Biodiversity Group), (2012); 'UK Post-2010 Biodiversity Framework.'

<sup>94</sup> UK Biodiversity Partnership, (2011); 'UK Biodiversity Action Plan.' Available at: <http://jncc.defra.gov.uk/page-5705>.

<sup>95</sup> Government Office for the East of England, (2008); 'East of England Plan.'

<sup>96</sup> Cambridgeshire and Peterborough Biodiversity Partnership, (2014); 'Library'. Available at: <http://www.cpbiodiversity.org.uk/downloads>

- Hedgerows;
- Managed greenspaces;
- Ponds, lakes and standing water;
- Urban umbrella; and
- Woodland.

## Section 41 List

- 10.3.9 The Secretary of State has published a list of living organisms and habitats of principal importance for the purpose of conserving biodiversity, as required under Section 41 of the NERC Act 2006. This is referred to as the Section 41 list<sup>97</sup> and includes the priority species and habitats listed under the former UK BAP. Section 41 also states that the Secretary of State must take such steps as appear to be reasonably practicable to further the conservation of the living organisms and types of habitat included in the list, or promote the taking by others of such steps.

## Birds of Conservation Concern

- 10.3.10 A total of 246 bird species have been assessed against a set of objective criteria to place each on one of three lists indicating an increasing level of conservation concern, as described below<sup>98</sup>. In the UK, there are 52 species on the red list, 126 on the amber list and 68 on the green list:
- Red List - Species that are globally threatened, whose breeding population or breeding range has declined rapidly in recent years or the longer term, whose non-breeding population range has declined rapidly in recent years or the longer term, or which have declined historically and not substantially recovered;
  - Amber List - Species whose breeding and non-breeding population or breeding range has declined by between 25% and 50% in 25 years; or which have declined historically but substantially recovered recently; rare breeders; those with internationally important populations in the UK; those with localised populations; and those with an unfavourable conservation status in Europe; and
  - Green List - No identified threat to the population's status. This list includes those species listed as recovering from Historical Decline in the last review, undertaken in 2002, that have continued to recover and do not qualify under any of the other criteria.

<sup>97</sup> Secretary of State, (2010); 'Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 - Habitats and Species of Principal Importance in England.'

<sup>98</sup> Eaton M. A., Brown A. F., Noble D. G., Musgrove A. J., Hearn R., Aebischer N. J., Gibbons DW, Evans A and Gregory RD, (2009); 'Birds of Conservation Concern 3: the Population Status of Birds in the United Kingdom, Channel Islands and the Isle of Man.' British Birds 102, pp296–341.

## Invertebrates

10.3.11 The rarest and most threatened species are given one of the Red Data Book (RDB) statuses<sup>99</sup>. Species which do not qualify as RDB but are nonetheless uncommon are given one of the Nationally Scarce statuses:

- RDB1 - Endangered: Species which have shown a rapid continuous decline over the last 20 years and now exist in 5 or fewer 10km squares;
- RDB2 - Vulnerable: Species likely to qualify as RDB1 in the near future, as most populations are declining throughout their range;
- RDB3 - Rare: Species with small populations which are localised or thinly scattered, but do not at present qualify under RDB1 or RDB2 criteria;
- RDBI - Indeterminate: Species considered to be either Endangered, Vulnerable or Rare but with insufficient information to say which; and
- Nationally Scarce (Notable): Species have been recorded in 16 to 100 10km squares and are further subdivided into Notable A species (recorded in 16 to 30 10km squares) and Notable B species (recorded in 31 to 100 10km squares).

10.3.12 For butterflies, dragonflies, water beetles and some other groups, the most up-to-date conservation statuses are based on the International Union for Conservation of Nature (IUCN) Red List categories and criteria<sup>100</sup>. This system places less emphasis on rarity and more on factors that suggest a risk of extinction (such as severe declines in range or population):

- Critically Endangered (CR): Facing an extremely high risk of extinction in the wild;
- Endangered (EN): Facing a very high risk of extinction in the wild;
- Vulnerable (VU): Facing a high risk of extinction in the wild;
- Near Threatened (NT): Close to qualifying for one of the above categories in the near future;
- Least Concern (LC): Does not qualify for any of the above categories. Widespread and abundant taxa are included in this category; and
- Data Deficient (DD): Inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status.

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<sup>99</sup> Shirt, D.B. (ed.) (1987); 'British Red Data Books: 2. Insects.' Peterborough: Nature Conservancy Council.

<sup>100</sup> International Union for Conservation of Nature (IUCN) (2001); 'IUCN Red List Categories and Criteria: Version 3.1.' Prepared by the IUCN Species Survival Commission. Gland, Switzerland: International Union for Conservation of Nature.



- 10.3.13 The Community Conservation Index (CCI) score<sup>101</sup> was used to classify freshwater invertebrates according to their scarcity and nature conservation value in England. The scores range from 1 to 10, with 1 being very common and 10 being endangered. These classifications relate closely to the categories in the RDB.

## Planning Policy Context

### National Planning Policy Framework (NPPF)

- 10.3.14 The NPPF<sup>102</sup> states that the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible and 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.

### South Cambridgeshire Local Development Framework

- 10.3.15 Objective ST/i within the Core Strategy<sup>103</sup> aims to “ensure that any new development results in appropriate provision for the protection and enhancement of native biodiversity in order to contribute towards biodiversity gain, whilst having regard to the site's current biodiversity value.”
- 10.3.16 The Development Control Policies Development Plan Document (DPD)<sup>104</sup> outlines objectives relating to the Natural Environment, including protecting and enhancing biodiversity and ensuring that developments consider the effects of climate change.
- 10.3.17 Policy NE/6: Biodiversity states that “... development must aim to maintain, enhance, restore or add to biodiversity. Opportunities should be taken to achieve positive gain, for example through creating, enhancing and managing wildlife habitats” and networks. Biodiversity should also be integrated within the built development. Habitat creation should assist in the achievement of targets in the BAPs.
- 10.3.18 “The District Council will refuse development that would have an adverse significant impact on the population or conservation status of protected species or priority species or habitat unless the impact can be adequately mitigated or compensated for by measures secured by planning conditions or obligations.” Furthermore, an adequate level of survey information is required, where there is a potential for development to impact protected or notable species.

<sup>101</sup> Chadd, R and Extence, C (2004). ‘The Conservation of Freshwater Macroinvertebrate Populations: a Community Based Classification Scheme.’ *Aquatic Conservation: Marine and Freshwater Ecosystems*. 14: 597-624

<sup>102</sup> Department for Communities and Local Government, (2012); ‘National Planning Policy Framework.’

<sup>103</sup> SCDC, (2007); ‘Local Development Framework (LDF). Core Strategy.’

<sup>104</sup> SCDC, (2007); ‘LDF. Development Control Policies. Development Plan Document.’

- 10.3.19 Policy NE/7: Sites of Biodiversity or Geological Importance states that “planning permission will not be given for proposals that may have an unacceptable adverse impact, either directly or indirectly, on a Site of Biodiversity ... Importance.” “In determining any planning application affecting international, national or non-statutorily protected sites, the District Council will ensure that the intrinsic natural features of particular interest are safeguarded or enhanced ...”.

### **South Cambridgeshire Local Plan**

- 10.3.20 Policy NH/4: Biodiversity of the Submission Local Plan<sup>105</sup> echoes Policy NE/6 within the LDF DPD. Further to the details outlined in paragraphs 10.3.17 and 10.3.18, the Local Plan also states that habitat creation should aid delivery of the Cambridgeshire Green Infrastructure Strategy<sup>106</sup>. This Policy also clarifies that survey information and the associated site assessment are required prior to the determination of a planning application. Initiatives should be considered that reduce the impact of climate change on biodiversity.
- 10.3.21 Policy NH/5: Sites of Biodiversity or Geological Importance echoes Policy NE/7 within the Local Plan.
- 10.3.22 Policy NH/6: Green Infrastructure states that “the Council will aim to conserve and enhance green infrastructure within the district.” Proposals that reinforce, link, buffer and create new green infrastructure will be encouraged. “All new developments will be required to contribute towards the enhancement of the green infrastructure network within the district. These contributions will include the establishment, enhancement and the on-going management costs.” Proposals that cause loss or harm to this network will not generally be permitted.

### **Northstowe Area Action Plan**

- 10.3.23 The Northstowe Area Action Plan<sup>107</sup> outlines objectives relating to biodiversity, including:
- To achieve and maintain a thorough understanding of the existing biodiversity of the site before, during and after construction;
  - To minimise any adverse impact on the existing species and habitats of particular biodiversity importance;
  - To maximise the biodiversity value of the green spaces that either remain or are created as a result of development;
  - To maximise the biodiversity of the urban areas;
  - To establish a high degree of connectivity between green areas associated with the development of the town and the wider countryside;

<sup>105</sup> South Cambridgeshire District Council (SCDC), (2014); ‘South Cambridgeshire Local Plan Proposed Submission.’

<sup>106</sup> Green Infrastructure Forum, (2011); ‘Cambridgeshire Green Infrastructure Strategy.’

<sup>107</sup> SCDC, (2007); LDF. Northstowe Area Action Plan Development Plan Document.’

- To ensure the maintenance and funding of the resources for biodiversity;
- To make use of existing features of ecological value to contribute to the creation and retention of key habitats within the new development; and
- To develop an appropriate management strategy to ensure high quality, robust and effective implementation, adoption, monitoring and maintenance of the biodiversity areas.

10.3.24 Policy NS/16: Existing Biodiversity Features states that "... a full programme of ecological survey and monitoring is required prior to the commencement of construction. This work should conclude by proposing a strategy for the protection and enhancement of biodiversity..." during and after construction, and Biodiversity Management Plans, with further ecological surveys being undertaken during and after construction. A Biodiversity Management Strategy is also to be developed. Existing features including trees, tree plantations and the lake in the southern section of the airfield should be retained.

10.3.25 Policy NS/17: New Biodiversity Features states that the Eastern Water Park will be "... managed to enhance the biodiversity of Northstowe by providing an extensive wetland habitat and to maximise its value to key species." Green corridors should be established through the town to connect where possible to biodiversity features and corridors beyond the town. Also, every opportunity should be taken to incorporate wildlife habitats within the town.

### **Biodiversity Supplementary Planning Document**

10.3.26 The Biodiversity Supplementary Planning Document (SPD) <sup>108</sup> provides guidelines relating to the consideration of biodiversity in a planning application. This includes: undertaking a site survey and assessment for priority species and habitats; protecting existing biodiversity and enhancing habitats; mitigating against disturbance; compensating for unavoidable impacts on priority species and habitats; and undertaking post-construction monitoring.

10.3.27 The SPD outlines certain biodiversity issues that will be considered in determining planning applications. This includes: protection, enhancement, creation, restoration and management of biodiversity habitats; biodiversity site protection; mitigation and compensation; planning obligations; protection of wildlife corridors; biodiversity provision in the design of new buildings; provision of green roofs and walls; and maximising the biodiversity potential of agricultural land.

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<sup>108</sup> SCDC, (2009); 'LDF Biodiversity Supplementary Planning Document (SPD).'

### **Trees and Development Sites Supplementary Planning Document**

- 10.3.28 The Trees and Development Sites SPD<sup>109</sup> states that comprehensive site surveys are required in accordance with the British Standards<sup>110</sup>, which will allow key components of a site to be retained and will ensure that, where appropriate, new trees can be incorporated and existing trees protected.

### **Landscape in New Developments Supplementary Planning Document**

- 10.3.29 The Landscape in New Developments SPD<sup>111</sup> identifies encouraging biodiversity as one of the key factors in delivering a high quality landscape. It states that “the applicant should consider the existing and proposed transport routes, green corridors and watercourses within and around the site as opportunities to increase biodiversity.” These features should be “... multi-functional, offering habitats for badgers, bats, birds and other wildlife ...”. Schemes should include native tree, shrub or herbaceous planting. The SPD also encourages the inclusion of green walls or roofs. Nest boxes, wildlife shelters and improved access routes and links should be provided, for example through the provision of gaps beneath garden fences for mammals.
- 10.3.30 The first priority should be to protect biodiversity and, if this is not possible, either mitigate against damage or compensate for the loss of habitat. Compensation should be on a ‘like for like’ basis and usually within the site; if this not possible, new off-site habitat must be provided.

### **Open Space in New Developments Supplementary Planning Document**

- 10.3.31 The Open Space in New Developments SPD<sup>112</sup> states that “it is vital that open space provision, as part of the landscape scheme, maximises the biodiversity of the site by the inclusion of native species and the creation and retention of a variety of habitats.”

### **Cambridgeshire Green Infrastructure Strategy**

- 10.3.32 The strategy identifies four objectives, including reversing the decline in biodiversity. This relates to conserving and enhancing biodiversity, through the protection and enhancement of habitats and wildlife sites and the linkage of key habitats. The strategy recognises that the protection of existing resources and the potential for enhancement should be a priority.

<sup>109</sup> SCDC, (2009); ‘LDF Trees and Development Sites SPD.’

<sup>110</sup> British Standards Institute, (2010); ‘BS5837:2012 Trees in Relation to Design, Demolition and Construction - Recommendations.’

<sup>111</sup> SCDC, (2010); ‘Landscape in New Developments SPD.’

<sup>112</sup> SCDC, (2009); ‘Open Space in New Developments SPD.’

- 10.3.33 The strategy also identifies opportunities for improving green infrastructure, which includes “creating ‘bigger, better and joined-up’ networks of biodiversity...” and protecting and enhancing existing habitats. Gateways are identified as a means to “... link strategic projects with areas of need and opportunity”; they can radiate from urban locations and join up green infrastructure. These gateways should be incorporated within developments.
- 10.3.34 The Strategic Network provides a county-wide framework upon which to provide or enhance Green Infrastructure in Cambridgeshire up to and beyond 2031. The site is located within the Strategic Network, within Strategic Area 6: Cambridge and surrounding areas. “Large-scale housing growth, economic development and associated infrastructure provision are key issues for the area and Green Infrastructure has both a key role in supporting this sustainable growth and benefiting from it.” Habitat enhancement and creation are priorities for the area, often with associated flood alleviation. The proposed development is identified as a target area for delivering the objectives of the Green Infrastructure Strategy. The strategy states that “future development of the site must retain species and provide the opportunity to create new habitats appropriate to the new landforms.”

### Study area

- 10.3.35 The study area comprises the site, in addition to up to a 15km area surrounding the site with respect to designated sites that could be impacted by the proposed development. The survey area encompasses the site and certain areas surrounding the site that could be accessed.
- 10.3.36 The site is referenced in this chapter as follows:
- Northstowe Phase 2 development – for the combined application area, which is hereafter referred to as the ‘site’;
  - Main Phase 2 development area - for the outline application area; and
  - Southern Access Road (West) – for the detailed application area.

### Methodology

#### Document review

- 10.3.37 Historic reports relating to the site and surrounding area were reviewed in May 2013, to identify requirements for further survey work:
- Ecology and Nature Conservation chapter<sup>113</sup> and appendices<sup>114</sup> of

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<sup>113</sup> WSP Environmental Ltd, (2007); ‘Environmental Statement Chapter 10: Ecology and Nature Conservation.’

the outline planning application for Northstowe new town, dated December 2007;

- Natural Heritage chapter<sup>115</sup> and appendix<sup>116</sup> of the Environmental Statement for the outline planning application for Phase 1 of Northstowe new town (planning application reference S/0388/12/OL), dated February 2012; and
- Phase 1 Ecology Report (Appendix F3) and Protected Species Report (Appendix F4) prepared by URS following the completion of survey work during 2012.

10.3.38 The results of this document review are outlined in the Ecology Scoping Report, contained in Appendix F5.

### Desk study

10.3.39 In May 2012, a desk study was undertaken for the site and its immediate surrounds to a 2km radius and 5km for bats involving an ecological data search for information on statutory and non-statutory sites and notable and protected species records held by Cambridgeshire & Peterborough Environmental Records Centre (CPERC). The data search was centred at OS national grid reference TL410665. Only records of protected and notable species dated from within the last 10 years were considered.

10.3.40 The data search was extended to 15km with respect to European Protected Sites, specifically Special Protection Areas (SPAs) and Special Areas of Conservation (SACs). This data was obtained through of review of relevant websites<sup>117; 118</sup>.

### Survey summary

10.3.41 Ecology surveys were carried out on the site between July 2003 and June 2014. Baseline ecological information was derived from surveys conducted in September 2006, January to February 2007 and between April 2012 and June 2014, as well as the data search. Other survey work has since been superseded. Surveys that form the baseline conditions described in this chapter are identified in Table 10.1.

<sup>114</sup> WSP Environmental Ltd, (2007); 'Environmental Statement Appendix 10.'

<sup>115</sup> Terence O'Rourke, (2012); 'Northstowe Phase 1 ES Chapter 6: Natural Heritage.'

<sup>116</sup> Terence O'Rourke, (2012); 'Northstowe Phase 1 ES Technical Appendix C.'

<sup>117</sup> Natural England, (2013); 'Magic'. Available at: <http://magic.defra.gov.uk/>

<sup>118</sup> Joint Nature Conservation Committee(JNCC), (2014); 'JNCC'. Available at: <http://jncc.defra.gov.uk/Default.aspx>.

**Table 10.1: Ecology Surveys**

Survey Type	Dates
Water vole and otter survey	September 2006
Bat inspection survey	January to February 2007
Extended Phase 1 habitat survey	April to July 2012 and August 2013
Bat scoping and inspection survey	July to November 2013
Bat activity and automated survey	May to September 2013
Bat tree climbing survey	April 2014
Bat emergence and return surveys	May and June 2014
Badger scoping survey	May to July 2013
Badger bait-marking survey	March and April 2014
Water vole and otter survey	May and August 2012
Breeding bird survey	May and June 2012, May and June 2013 and March and April 2014
Great crested newt survey	May 2012, May and June 2013 and April and May 2014
Common toad survey	March 2014
Reptile survey	July to September 2012 and August and September 2013
Invertebrate surveys	June to October 2012, July and August 2013 and April 2014
Hedgerow Regulations survey	June 2013

10.3.42 A summary of the methods employed during these surveys is provided below. Full details are provided in Appendices F1 to F4, F6, F8 and F10.

### Extended Phase 1 habitat survey

10.3.43 An extended Phase 1 habitat survey was carried out within the site between April and July 2012 (refer to Appendix F3) and on 23<sup>rd</sup> August 2013 (refer to Appendix F6), in accordance with the JNCC guidelines for Phase 1 habitat survey<sup>119</sup>. The habitats were classified according to the Phase 1 habitat survey methodology. The survey was 'extended' to include an assessment of the potential of the site to support notable and protected species.

### Bat surveys

#### Inspection survey 2007

10.3.44 The buildings were inspected externally and internally between 29<sup>th</sup> January and 1<sup>st</sup> February 2007. The surveys were undertaken by two

<sup>119</sup> Joint Nature Conservation Committee (JNCC), (1993); 'Handbook for Phase 1 Habitat Survey: A Technique for Environmental Audit, revised reprint 2003.' JNCC. Peterborough.

surveyors from WSP under Natural England licence number 20063162. All floors, walls and exposed surfaces of buildings and suitable built structures were checked both internally and externally for signs of use by bats. The majority of the buildings within the Phase 2 development area that were inspected have since been demolished, with the exception of the buildings at Larksfield Nursery, Brookfield Farm and some of the buildings at the barracks.

### Scoping and inspection survey 2013

- 10.3.45 A bat scoping and inspection survey was conducted across the site on 8<sup>th</sup>, 9<sup>th</sup>, 24<sup>th</sup> and 31<sup>st</sup> July, 30<sup>th</sup> September and 25<sup>th</sup> and 26<sup>th</sup> November 2013. This excluded the trees along Long Lane and around the fields to the west of Long Lane, as this part of the site would be retained and protected as a buffer for the proposed development within the Green Separation.
- 10.3.46 The trees were inspected from the ground and the buildings were inspected externally. Where the buildings were deemed to have a potential to support roosting bats, they were also inspected internally by a licensed bat worker (Natural England licence number 20123625) and an Arup ecologist experienced in conducting internal inspections.
- 10.3.47 The trees and buildings were assessed for their suitability to support roosting bats based on the current Bat Conservation Trust (BCT) Good Practice Guidelines<sup>120</sup> as follows, with the Categories relating to trees:
- Negligible potential/Category 3 - No features that could be used by bats (for roosting, foraging or commuting);
  - Low potential/Category 2 – A small number of potential roosting features, isolated habitat that could be used by foraging bats, e.g. a lone tree or patch of scrub but not parkland and an isolated site not connected by prominent linear features (but if suitable foraging habitat is adjacent it may be valuable if it is all that is available);
  - Moderate potential/Category 1 - Several potential roosting features, habitat could be used by foraging bats e.g. trees, shrub, grassland or water and the site is connected with the wider landscape by linear features that could be used by commuting bats e.g. lines of trees and scrub or linked back gardens;
  - High potential/Category 1\* – Features of particular significance for roosting bats, habitat of high quality for foraging bats e.g. broadleaved woodland, tree-lined watercourses and grazed parkland and the site is connected with the wider landscape by strong linear features that would be used by commuting bats e.g. river/stream valleys or hedgerows, site is close to known roosts; and
  - Confirmed roosting - Evidence indicates that roosting bats are present, e.g. bats seen roosting or observed flying from a roost or

<sup>120</sup> Bat Conservation Trust (BCT), (2012); 'Bat Surveys; Good Practice Guidelines. Second Edition'



freely in the habitat; droppings, carcasses, feeding remains, etc. found; and/or bats heard 'chattering' inside on a warm day or at dusk and bats recorded/observed using an area for foraging or commuting.

### **Activity survey**

- 10.3.48 Bat activity surveys were undertaken on the site between June 2012 and September 2013. With reference to the BCT guidelines, the site was considered to be large and of medium habitat quality and, as such, monthly surveys were undertaken. This comprised dusk activity surveys, in addition to a dawn activity surveys in August 2012 and 2013. The transect routes were defined to encompass key areas of the site that may provide important commuting and foraging habitat. The surveys were carried out in line with the BCT guidelines. The bat data was analysed using BatSound and the Anabat data using Analook, with reference to current guidelines<sup>121</sup>.

### **Automated survey**

- 10.3.49 In conjunction with each activity survey, SM2BAT+ and Anabat SD2 bat detectors were located on the site to record bat passes. In accordance with the requirements of the BCT guidelines with respect to large sites of medium habitat quality, two automated devices were employed along each transect. Up to five nights of data from each automated device were analysed using Analook.

### **Bat tree climbing survey**

- 10.3.50 Scattered trees assessed as having a potential to support roosting bats (Category 1\* and 1 trees) that could be impacted by the proposed development were subject to a detailed aerial inspection on 14<sup>th</sup> to 16<sup>th</sup> April 2014 by tree climbers in possession of Class 1 and 2 bat licences. This comprised a total of 48 trees, with an additional two trees assessed as not being safe to climb.
- 10.3.51 Trees were climbed and cavities were subject to a close detailed inspection using a torch and endoscope. Any evidence of bat activity was searched for. The potential of the trees to support roosting bats was reassessed.

### **Bat emergence and return surveys**

- 10.3.52 Bat emergence and return surveys were conducted in between 6<sup>th</sup> May and 11<sup>th</sup> June 2014 on the following features, which are shown in Figure 10.3 and Figure 10.4:
- One scattered tree that could not be climbed (T52);
  - Category 1 and 1\* trees located within the woodland blocks; and
  - Low and moderate potential buildings and the building supporting a confirmed roost.

<sup>121</sup> Jon Russ, (2012); 'British Bat Calls. A Guide to Species Identification.' Pelagic Publishing.

- 10.3.53 Building (B) 22 was surveyed by AECOM to inform a planning application for the A14 improvement works (refer to Appendix F9).
- 10.3.54 The surveys were undertaken in line with the BCT guidelines, although the full set of repeats were not undertaken in this tranche of work. A single emergence or return survey was carried out on the Category 1 and 1\* trees, moderate potential buildings and confirmed roost. A single survey was undertaken on the low potential buildings, generally comprising a dusk and dawn survey within the same 24 hour period. This provided an indication of the current roost status of each feature, to be updated with further repeat survey work in the future.

## Badger surveys

### Scoping

- 10.3.55 On 30<sup>th</sup> and 31<sup>st</sup> May, 4<sup>th</sup> and 11<sup>th</sup> June and 30<sup>th</sup> July 2013, a badger survey was carried out, which focussed on re-assessing the setts recorded during previous surveys carried out by URS Infrastructure & Environment UK Limited (URS) in 2012 and WSP Environmental Ltd. (WSP) between November 2003 and February 2007. Any signs to indicate the presence of badgers were recorded, including sett entrances, hairs, latrines and tracks and the setts were classified in accordance with Harris *et al.* (1989)<sup>122</sup>.

### Bait-marking

- 10.3.56 A badger scoping survey was conducted on 5<sup>th</sup> and 6<sup>th</sup> March 2014 to verify the status of the setts and record the locations of dung pits and latrines.
- 10.3.57 The badger bait-marking survey was carried out during March and April 2014 in accordance with Scottish Natural Heritage (SNH)<sup>123</sup> guidelines. Eight setts within and surrounding the site were baited with a mixture of peanuts and golden syrup laced with different coloured pellets for 14 days from 10<sup>th</sup> March. These setts were either main setts or potential main setts. In conjunction with laying bait, the dung pits and latrines were checked for the presence of coloured pellets, including droppings containing more than one colour of pellet, for a total of 19 days. The survey was carried out over 22 days, with the last check being carried out on 8<sup>th</sup> April.

## Water vole and otter survey

- 10.3.58 Longstanton Brook was surveyed for otter *Lutra lutra* and water vole *Arvicola amphibious* in September 2006 in accordance with the Water

<sup>122</sup> Harris, S., Cresswell, P. and Jefferies, D. (1989); 'Surveying Badgers.'

<sup>123</sup> Scottish Natural Heritage (SNH), (no date); 'Best Practice Badger Survey Guidance Note.'

Vole Conservation Handbook (2006)<sup>124</sup> and Otters and River Habitat Management (Environment Agency, 1999)<sup>125</sup>. This survey was updated on 22<sup>nd</sup> May 2012 and 9<sup>th</sup> August 2012. The waterbodies at the barracks were surveyed in May, with this area and Longstanton Brook surveyed in August. The banks of the waterbodies were walked to search for signs, which were recorded on a scale map of the site.

- 10.3.59 The ditches within the site were not suitable for otter, on account of the lack of connectivity to larger waterways, steep banks, the presence of dense scrub and lack of aquatic vegetation. As such, these ditches were not surveyed specifically for otter.

### Breeding bird survey

- 10.3.60 Breeding bird surveys were carried in 2012, 2013 and 2014. Three surveys were undertaken by URS within the barracks and land north of Rampton Road on:

- 1<sup>st</sup> and 2<sup>nd</sup> May;
- 22<sup>nd</sup> and 23<sup>rd</sup> May; and
- 19<sup>th</sup> June 2012.

- 10.3.61 Four surveys were undertaken by Arup within the Southern Access Road (West) and adjacent areas and land to the west of Long Lane on:

- 10<sup>th</sup> and 11<sup>th</sup> March 2014
- 15<sup>th</sup> and 16<sup>th</sup> April 2014
- 29<sup>th</sup> May and 3<sup>rd</sup> and 4<sup>th</sup> June 2013; and
- 24<sup>th</sup> and 25<sup>th</sup> June 2013;

- 10.3.62 In addition, areas previously surveyed by URS in June 2012 were surveyed on 17<sup>th</sup> and 18<sup>th</sup> June 2013, as a repeat of the survey carried out by URS when the weather conditions were suboptimal.

- 10.3.63 The general principles of the Common Bird Census (CBC) methodology<sup>126</sup><sup>127</sup> were employed. Set transect routes were walked by an experienced ornithologist, with the surveyor able to walk to within at least 10m of all areas, ensuring all birds present could be seen and/or heard. Each survey was split into transects and carried out over more than one morning, commencing shortly after dawn.

<sup>124</sup> Strachan R. and Moorehouse, T., (2006); 'The Water Vole Conservation Handbook (Second Edition).' Wildcru, Oxford.

<sup>125</sup> Environment Agency, (1999); 'Otters and River Habitat Management (Second Edition).' Bristol.

<sup>126</sup> Marchant, J. H., (1983); 'BTO Common Birds Census Instructions.' British Trust for Ornithology, Tring.

<sup>127</sup> Bibby C J, Burgess N D, Hill D A, Mustoe S (2000); 'Bird Census Techniques.' Second Edition. RSPB, BTO, Birdlife International, Ecoscope Applied Ecologists. Academic Press.

- 10.3.64 Four barn owl *Tyto alba* 'pole boxes' were erected across the barracks in December 2005 to mitigate for the loss of nest sites associated with the demolition of the disused aircraft hangers and other buildings. Three of these have since become unusable. An inspection of the boxes was conducted on 24<sup>th</sup> June 2013 by a licensed surveyor (Natural England Licence Number: 20122018). An additional box located at Brookfield Farm (Target Note 1, Figure 10.2) was not inspected, as this box was recorded subsequently during the extended Phase 1 habitat survey (on 23<sup>rd</sup> August 2013).
- 10.3.65 In conjunction with the assessment of individual species according to the criteria set out in Table 10.3, the conservation importance of the assemblage of breeding birds at the site was evaluated in accordance with Fuller (1980)<sup>128</sup>:
- National Importance: 85+ species;
  - Regional Importance: 70-84 species;
  - County Importance: 50-69 species; and
  - Local Importance: 25- 49 species.

## Great crested newt surveys

### Habitat Suitability Indices

- 10.3.66 In conjunction with the great crested newt presence/absence survey described below, the ponds (refer to Figure 10.7) were assessed for their potential to support great crested newt in accordance with Oldham *et al.* (2000)<sup>129</sup>. The ponds were scored under ten categories. These categories each have a bearing on the suitability of waterbodies to support great crested newt. The scores were translated into Suitability Indices that were used to calculate a Habitat Suitability Index (HSI) for each pond.

### Presence/absence survey

- 10.3.67 Great crested newt presence/absence surveys were undertaken on the ponds by a licensed surveyor and an assistant, with reference to the Great Crested Newt Mitigation Guidelines<sup>130</sup>. At least three methods were employed, selected from bottle trapping, egg search, torching and netting.
- 10.3.68 All of the ponds shown on Figure 10.7 were surveyed with the exception of Pond 8, which was dry throughout the survey periods. Table 10.2 identifies the ponds that were surveyed each year. The surveys were repeated in 2013, as six surveys were not conducted on ponds recorded as positive for great crested newt in 2012. Additional

<sup>128</sup> Fuller, R.J. (1980). 'A Method for Assessing the Ornithological Importance of Sites for Nature Conservation. *Biological Conservation* 17: 229-239.

<sup>129</sup> Oldham, R.S., Keeble, J., Swan, M.J.S. & Jeffcote, M. (2000); 'Evaluating the suitability of habitat for the great crested newt (*Triturus cristatus*).' *Herpetological Journal* 10 (4), pp 143 – 155.

<sup>130</sup> English Nature, (2001); 'Great Crested Newt Mitigation Guidelines Version: August 2001.'

ponds were surveyed in 2014, in addition to ponds recorded as positive for great crested newt in 2012 and 2013, due to the late commencement of surveys in 2013.

**Table 10.2: Ponds subject to Presence/Absence Great Crested Newt Surveys**

Survey Periods	Ponds Surveyed
May 2012	1 to 5
May and June 2013	1 to 6
April and May 2014	1, 2, 4, 5, 7 and 9

### Common toad survey

10.3.69 Adult toads were counted shortly after sunset using a high-powered torch at Pond 3 on 13<sup>th</sup>, 17<sup>th</sup>, 24<sup>th</sup> and 27<sup>th</sup> March 2014, in accordance with the Herpetofauna Workers' Manual<sup>131</sup>. Pond 3 is shown on Figure 10.2. The minimum temperature recorded was 4°C, with no rain noted during any of the surveys.

10.3.70 The population size was estimated based on the peak count recorded, with a count of less than 100 individuals being associated with a low population and a count between 100 and 1000 representing a good population.

### Reptile survey

10.3.71 Seven reptile survey visits were conducted between 18<sup>th</sup> June and 20<sup>th</sup> September 2012, which provided adequate data to determine the presence or likely absence of reptiles on the site. To inform population estimates, a further four reptile surveys were undertaken between 17<sup>th</sup> and 30<sup>th</sup> September 2013. These surveys were completed in accordance with current guidelines<sup>132</sup>.

10.3.72 Squares of bituminous roofing felt were laid at the site and then left for at least two weeks before being checked; the surveyor was also vigilant to record reptiles in other areas. Natural refugia such as logs and sheets of wood were also inspected during each survey. For consistency and where feasible, the reptile mats were generally laid in approximately the same locations in 2012 and 2013, in addition to an area of long grassland and scrub in the northern part of the Main Phase 2 development area.

<sup>131</sup> Gent, A. H., and Gibson, S. D., eds. (1998); 'Herpetofauna Workers' Manual.' Peterborough, JNCC.

<sup>132</sup> Froglife, (1999); 'Froglife Advice Sheet 10; Reptile Survey. An Introduction to Planning, Conducting and Interpreting Surveys for Snake and Lizard Conservation.'

## Invertebrate surveys

### Aquatic invertebrates survey

- 10.3.73 Habitats considered to have a potential to support rare and notable aquatic invertebrates were sampled on 25<sup>th</sup> June and 8<sup>th</sup> August 2012, comprising the southern ditch along the eastern boundary of the Main Phase 2 development area (refer to Figure 10.2). Sampling methods were based on the Environment Agency's and National Pond Survey's 3-minute "kick" or "sweep" protocols<sup>133 134</sup>.

### Butterfly survey

- 10.3.74 A walkover survey was carried out in 2012 to identify areas of the site that provide suitable habitat for butterflies and moths, but that also reflected the overall habitat within the site. A total of 19 transect routes were then planned; those relevant to the site are shown in Figure 10.9.

- 10.3.75 Each transect was walked slowly three times between 13<sup>th</sup> June and 1<sup>st</sup> September 2012 and all butterflies and moths on either side of the transect line were identified and recorded. Where possible, all butterflies were identified to species level. When this was not possible, species were grouped together. Moths were recorded by family, rather than to species level on site, but, where possible, specimens were netted and fully identified later.

### White-letter hairstreak butterfly survey

- 10.3.76 Two survey visits were made on 11<sup>th</sup> and 12<sup>th</sup> July 2013. White-letter hairstreak *Satyrrium w-album* was surveyed at hedgerows and woodland containing elm *Ulmus* sp., including the following locations considered relevant to the proposed development, as shown on Figure 10.9:

- Hedgerows 43, 47, 48 and 49 around pasture fields to the west of the barracks;
- Hedgerow 53 along the southern boundary of the barracks; and
- Hedgerow 46 could be viewed through binoculars from distance.

- 10.3.77 The survey was conducted to ascertain the presence or likely absence of white-letter hairstreak in accordance with advice on the White-letter Hairstreak Recording Project website<sup>135</sup>. The surveyor searched for adult butterflies flying around the tops of elms and other prominent trees in warm, sunny weather with little or no wind.

<sup>133</sup> Environment Agency (2008). 'Technical Reference Material: Freshwater Macroinvertebrate Sampling in Rivers.'

<sup>134</sup> Biggs J, Fox G, Nicolet P, Walker D, Whitfield M, and Williams P (1998). 'A Guide to the Methods of the National Pond Survey.' Pond Action, Oxford.

<sup>135</sup> Butterfly Conservation, (2009); 'White-letter Hairstreak Project 2007-2009.' Available at: <http://www.hertsmiddx-butterflies.org.uk/w-album/index.php>

### White-spotted pinion moth survey

- 10.3.78 Two nights of moth trapping were undertaken on 21<sup>st</sup> to 22<sup>nd</sup> and 28<sup>th</sup> to 29<sup>th</sup> August 2013 to ascertain the presence or likely absence of white-spotted pinion moth *Cosmia diffinis*. Light-traps with 125W mercury-vapour bulbs were employed, including at the three locations shown in Figure 10.9, adjacent to the elm trees, along hedgerows 47 and 48 west of Long Lane.

### Further invertebrate survey

- 10.3.79 A survey visit was carried out on 29<sup>th</sup> April 2014, covering the area indicated in Figure 10.11, to survey for the presence of grizzled skipper *Pyrgus malvae*, along with habitats identified during the surveys in 2014 has having a potential to support notable invertebrates:

- Weedy disturbed ground, a habitat which yielded four Nationally Scarce insects on the 2013;
- Pasture habitat with herbivore dung, targeting dung-associated invertebrates including the Red Data Book rove-beetle *Oxytelus piceus*, and
- Arable margins, targeting the Section 41 and RDB ground beetle *Harpalus froelichii*.

- 10.3.80 The herb-rich cattle pasture adjacent to the CGB appeared to be potentially suitable for grizzled skipper; a walkover survey was conducted in this part of the site. The southern cattle pasture (with cattle present) adjacent to the CGB was sampled, targeting dung invertebrates. The diverse areas of weedy, disturbed ground and abandoned gardens around the barracks buildings and around the areas used for storage of straw bales were sampled by beating, sweeping and ground-searching. Finally, some arable margin habitats in the northern part of the site were reconnoitred.

### Hedgerow Regulations survey

- 10.3.81 All important hedgerows within the site boundary were surveyed on 6<sup>th</sup> June 2013 by an experienced botanist. The hedgerow methodology employed by WSP during 2004 was used during 2013 in order to facilitate a better comparison between survey findings from different years. The hedgerow section numbers used by WSP were adopted during the 2013 survey.

- 10.3.82 The hedgerow survey was undertaken in accordance with the Hedgerow Survey Handbook<sup>136</sup> and the Wildlife and Landscape criteria of The Hedgerows Regulations 1997. The location, length, adjacent land use, associated features (including the presence of

<sup>136</sup> Bickmore, C J. (2002); 'Hedgerow Survey Handbook: A standard procedure for local surveys in the UK Department for Environment, Food and Rural Affairs, London.'

bank and/or ditch), shape, average height, average width, intactness and plant species composition of the hedgerows within the site boundary were confirmed.

- 10.3.83 With respect to each hedgerow, a 30m length was randomly selected as a quadrat location to record all 'woody species' as well as ivy *Hedera helix* and bramble *Rubus fruticosus* agg. and non-native trees and shrubs. The abundance of species in the quadrat recorded using the DOMIN scale. Located within this quadrat were two smaller (2m x 1m) quadrats in which the herbaceous flora associated with the hedge was recorded.
- 10.3.84 The hedgerows were evaluated for importance in accordance with the following:
- Wildlife or Landscape criteria of The Hedgerow Regulations 1997;
  - Section 41 List of the NERC Act 2006;
  - Local BAP; and
  - Within the site context.

## Significance criteria

### Determining the value of ecological resources

- 10.3.85 The criteria for determining the value of ecological features is provided in Table 10.3, using Valuation Categories provided by IEEM<sup>137</sup>.

**Table 10.3: Ecological Features Evaluation Table**

Importance	Ecological Feature
National	<p>A habitat or species cited as a reason for the designation or proposed designation of a National Nature Reserve (NNR), National Park or Site of Special Scientific Interest (SSSI).</p> <p>Any area of priority habitat listed in Annex 1 of the EC Habitats Directive that has potential to support typical species diversity.</p> <p>A viable population of a regularly occurring species that occurs in 15 or fewer 10km squares of the Ordnance Survey national grid (e.g. a Nationally Rare species or one that is listed in a RDB).</p> <p>A bird species with a British breeding or wintering population of &lt;200 individuals.</p>
Regional	<p>A viable population of a regularly occurring species that occurs in 16 to 100 10km squares of the Ordnance Survey national grid (e.g. a Nationally Scarce species or a Nationally Notable Na and Nb Insect Species).</p> <p>A priority habitat listed in the former UK BAP that is stable, viable and in favourable condition with typical species diversity.</p> <p>A bird species with a British breeding or wintering population of 200 to 999 individuals.</p>

<sup>137</sup> Institute of Ecology and Environmental Management (IEEM), (2006); 'Guidelines for Ecological Impact Assessment.' IEEM.



Importance	Ecological Feature
County	<p>A site designated or proposed for designation as a Local Wildlife Site (LWS), Biological Notification Site (BNS), a Local Nature Reserve (LNR) or Ancient Woodland Inventory site in a favourable condition.</p> <p>A stable and viable extent of habitat listed in the local (L) BAP that is in favourable condition that supports typical species diversity.</p> <p>A viable population of a regularly occurring species found in less than 10% of the 1km squares of the Ordnance Survey national grid within the county (e.g. a County Rare species or a species listed in a County Red Data Book).</p> <p>Invertebrate species which, whilst fairly common and not qualifying as Nationally Notable, have been recorded from over one hundred, but less than three hundred, ten-kilometre squares of the UK National Grid (e.g. a Nationally Local species).</p> <p>A stable and large population of a species of conservation concern as indicated by legal provisions designed to prevent population decline, listing in the NERC Act 2006 as a species of principal importance, or an active management plan within the former UK BAP.</p> <p>A bird species with a British breeding or wintering population of 1,000 to 24,999 individuals.</p>
District	<p>A LWS, BNS, LNR or Ancient Woodland Inventory site in an unfavourable condition, or a small area of favourable habitat that meets the criteria for designation as one of these sites.</p> <p>A habitat listed in the LBAP that is either small in extent or is in unfavourable condition that supports or has potential to support typical species diversity.</p> <p>A bird species with a British breeding or wintering population of 25,000 to 49,999 individuals.</p> <p>A small population of a species of conservation concern as indicated by legal provisions designed to prevent population decline, listing in NERC Act 2006 as a species of principal importance, or an active management plan within the former UK BAP.</p> <p>A stable and large population of a species of conservation concern as indicated by an active management plan within the LBAP.</p>
Parish	<p>A small population of a species of conservation concern as indicated by an active management plan within the LBAP.</p> <p>A bird species with a British breeding or wintering population of 50,000 to 4 million individuals.</p> <p>Any extent or condition of semi-natural habitat listed in the former UK BAP or LBAP.</p>
Site	<p>A regularly occurring native species or habitat which may or may not be listed in the former UK BAP or LBAP but is widespread and common throughout the UK.</p> <p>A bird species with a British breeding or wintering population of &gt;4 million individuals.</p>
Negligible	<p>An invasive species (including all species listed as non-native invasive species within Schedule 9 of the WCA), affecting an ecological merit e.g. the removal Japanese knotweed to enable a localised area of native plants to flourish.</p>

10.3.86 Section 10.4 Baseline Conditions includes a review of the future baseline. This assessment assumes that the habitats at the site would continue to be managed as they are currently, including the farming practices associated with the arable fields and pasture.

## Determination of significant effects

- 10.3.87 Potentially significant ecological effects, both beneficial and adverse, are characterised with reference to the following factors:
- Magnitude and extent;
  - Duration;
  - Reversibility; and
  - Timing and frequency.
- 10.3.88 An effect is considered to be significant if it is:
- ‘An impact (either adverse or beneficial) on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographical area.’*
- 10.3.89 Site integrity is defined as:
- ‘The coherence of a site’s ecological structure and function, across its whole area, which enables it to sustain the habitat, complex of habitats and/or levels of populations of the species for which it was classified.’*
- 10.3.90 Conservation status is defined as:
- ‘The habitats’ long-term distribution, structure and functions.’*
- ‘The long-term distribution and abundance of the species’ populations.’*
- 10.3.91 Wherever possible, maintaining favourable conservation status has been determined by reference to literature, including the former UK BAP and LBAP objectives and targets, and by professional judgement in the absence of clear guidance. An effect is considered ‘beneficial’ if it helps to deliver conservation policy, or ‘adverse’ if it is contrary to conservation policy.
- 10.3.92 The scale at which the significant effect matters is determined according to the value of the feature. Thus a significant effect at a national scale would be a material consideration for a nationally important scheme, and a significant effect at a local scale should be a material consideration for a planning application considered within a parish or district setting. As features of less than Parish importance would not be a material consideration for the proposed development, only features of Parish or higher importance have been considered in this assessment.

## Mitigation and enhancement

- 10.3.93 Mitigation measures have been proposed or developed to avoid, reduce or compensate for adverse ecological effects. Enhancement

measures have also been described as appropriate, where these are considered to provide a net gain in biodiversity in accordance with the NPPF.

- 10.3.94 Certain mitigation and enhancement measures have been incorporated into the design of the proposed Northstowe Phase 2 development as EEMs. These measures are described, but it is assumed within the assessment that these would be implemented.

### Residual and cumulative effects

- 10.3.95 The assessment is repeated taking into account the implementation of the proposed mitigation measures to determine the residual effects. This assessment considers the likely success of the mitigation, given knowledge of the tolerance or adaptability of the resource or feature to environmental change.

- 10.3.96 A cumulative assessment has also been undertaken, which considers whether any of the cumulative developments described in Chapter 2 have a potential to alter the significance of residual effects as a result of the proposed development.

### Consultation

- 10.3.97 A request for a scoping opinion was sought from SCDC. An initial email response was received from Rob Mungovan, the Ecology Officer at SCDC, on 1<sup>st</sup> April 2014. He stated that he was 'generally satisfied with the scope of the surveys. The document has pulled together the extensive range of the surveys undertaken over nearly 10 years and presented it in a clear manner with direction as to what further surveys are required and when they are to take place.'

- 10.3.98 However, he suggested that further reptile survey work should be carried out along the boundary of the Main Phase 2 development area that meets Phase 1. This is because around 650 common lizards *Zootoca vivipara* have been translocated from the Phase 1 site, indicating that a larger population of common lizards could be present on the site than that indicated by the surveys carried out in 2012 and 2013. These surveys indicated that a good population was present within the Main Phase 2 development area.

- 10.3.99 The HCA met with Ross Holdgate at Natural England on 28<sup>th</sup> March 2014 to discuss the proposed masterplan and the scope of the ecology surveys. Natural England clarified that there are no SSSIs close enough to the site to be potentially affected by the proposed development. Also discussed was Natural England's reduced level of advice pertaining to protected species, with the exception of advice relating to licence applications.

- 10.3.100 Natural England encouraged the connectivity of green spaces within the proposed development and with adjacent habitats. These should be at least 40-50m wide in order to provide functional corridors for wildlife. It was also recommended that the proposed development is assessed against the ANGSt<sup>138</sup>, the Accessible Natural Greenspace Standards.
- 10.3.101 A meeting was held with the Rob Mungovan from SCDC on 15<sup>th</sup> April 2014 to further explore the scope of ecology surveys. This included consultation on a reduction in the bat and invertebrate survey effort compared to that outlined in the Scoping Report. It was proposed that some of the invertebrate and bat survey work would be carried out post-application, which would allow the work to be spread out throughout the survey season and closer to the time of effect, particularly given the changeable status of bat roosts. It was agreed that it would be possible to reduce the bat and invertebrate survey effort pre-application, pending a clear strategy for this work to be carried out in the future.
- 10.3.102 Arup also discussed the scope of reptile survey work undertaken in 2012 and 2013 and explained that the specific areas of land that border Phase 1 are mainly short-grazed pasture, which are therefore less suitable for reptiles than the rough grassland habitats within the adjacent Phase 1 area. Taking this into consideration, it was agreed that further reptile survey work would not be necessary. Positive feedback was provided regarding the layout of the masterplan and landscape strategy.

## 10.4 Baseline conditions

- 10.4.1 This section outlines the baseline conditions on the site and attributes a value to the features in accordance with Table 10.3. Full details regarding the results of the surveys that were used to inform the following information are contained in Appendices F1 to F4 and F6 to F9. Features of site value or less have not been considered further in the assessment.

### Designated sites

- 10.4.2 The following sections review designated sites located within 15km of the site with respect to European Protected Sites and 2km with respect to non-statutory sites. For the reasons set out in Sections 0, 0 and 0 below, it is not considered necessary to carry out screening for Habitats Regulations Assessment. There is no potential for impact on European Protected Sites; as such these have been scoped out of the assessment.

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<sup>138</sup> Natural England, (no date); 'Accessible Natural Greenspace Standard (ANGSt).' Available at: [http://www.naturalengland.org.uk/regions/east\\_of\\_england/ourwork/gi/accessiblenaturalgreenspacestandardangst.aspx](http://www.naturalengland.org.uk/regions/east_of_england/ourwork/gi/accessiblenaturalgreenspacestandardangst.aspx)

## Ouse Washes

- 10.4.3 The nearest European Protected Site is Ouse Washes Ramsar site, Special Area of Conservation (SAC) and Special Protection Area (SPA), which is located approximately 8km to the northwest of the nearest boundary of the site. It is the largest area of washland (grazing pasture that floods in the winter) in the UK.
- 10.4.4 Ouse Washes SPA is designated as it supports important populations of hen harrier *Circus cyaneus*, tundra swan *Cygnus columbianus bewickii*, whooper swan and ruff *Philomachus pugnax* over the winter and northern shoveler *Anas clypeata*, mallard *Anas platyrhynchos*, garganey *Anas querquedula*, gadwall *Anas strepera* and black-tailed godwit *Limosa limosa* during the breeding season. This site also supports an internationally important assemblage of birds during the breeding season and over the winter.
- 10.4.5 It is designated as a Ramsar site as it supports nationally scarce plants, a diverse assemblage of nationally rare breeding waterfowl and an internationally important assemblage of waterfowl over the winter. Internationally important populations of Eurasian wigeon *Anas penelope*, gadwall, *Anas strepera*, Eurasian teal *Anas crecca*, Northern pintail *Anas acuta* and shoveler *Anas clypeata* also occur over the winter, in addition to tundra and whooper swan listed above.
- 10.4.6 Ouse Washes is designated as an SAC as it supports the following Annex II species: spined loach *Cobitis taenia*; bullhead *Cottus gobio*; and otter.
- 10.4.7 The site does not provide the diversity and extent of habitats required by the qualifying species detailed above. The data search also revealed that no key waterbird roost sites have been recorded within 1km of the site. None of the other qualifying species have been recorded at the site during breeding surveys or noted as incidental species records during site visits during the non-breeding season. The habitats on site would not support the numbers and diversity of waterbird species which the Ouse Washes is given special protection for. The site is also a sufficient distance away to ensure there is no potential for disturbance due to noise, lighting or activity, or indirectly through increased recreational pressure. As such, this designated site is not considered further in the assessment.

## Eversden and Wimpole Woods

- 10.4.8 Eversden and Wimpole Woods SAC is an area of broadleaved woodland located approximately 12.3km southwest of the site. It is designated as it supports a maternity roost of 11-50 barbastelle *Barbastella barbastellus* bats.
- 10.4.9 Low numbers of barbastelle bat passes have been recorded by automated bat detectors in 2012 (low numbers in the southern area) and 2013 (three passes in the northeast corner of the site). However,

it is considered that these relate to passes over the site, rather than regular foraging within the site. This species is typically associated with mature broadleaved woodlands that are not present within the site. A radio trapping study undertaken at the SAC by Cambridgeshire Bat Group recorded barbastelle commuting up to 11km from the site, but normally around 6km<sup>139</sup>. The Biodiversity SPD identifies an area of importance for barbastelle bat, which comprises key foraging areas that are currently believed to be integral to the species' long-term survival within the district. This area is located, at the closest, approximately 7.4km to the south of the site. The evidence indicates that the site does not provide important habitat for barbastelle. There is also no potential for disturbance due to the distance of this SAC from the site. As such, this SAC is not considered further in the assessment.

### Fenland

- 10.4.10 Fenland SAC comprises an area of fen meadow located approximately 13.2km northeast of the site. It supports two Annex I habitats: *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*); and calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*.
- 10.4.11 It is one of the most extensive examples of the tall herb-rich East Anglian type of M24 *Molinia caerulea* – *Cirsium dissectum* fen-meadow, with large areas of calcareous fens. The site also supports Annex II qualifying species: spined loach; and great crested newt.
- 10.4.12 The site supports great crested newt, but it is not considered that impacts on this species would have a potential to impact the SAC; great crested newt typically commutes up to 500m from breeding ponds and usually within 250m<sup>140</sup>. There is also no potential for disturbance due to the distance of this SAC from the site.

### Non-statutory sites

- 10.4.13 There are no non-statutory designated sites within 2km of the site. However, Over Railway Cutting County Wildlife Site (CWS) is located approximately 2.6km northwest of the site at OS grid reference TL383687. A south facing slope of a disused railway, consisting of scrub and unimproved calcareous grassland. It is considered to be potentially relevant to the proposed development in terms of informing the scope of survey work, as this site supports a strong colony of grizzled skipper. However, potential impacts have been scoped out due to the distance of this CWS from the site.

<sup>139</sup> Cambridgeshire Bat Group, (2014); 'Barbastelles in Cambridge.' Available at: <http://www.cambsbats.co.uk/research.html>

<sup>140</sup> English Nature, (2001); 'Great Crested Newt Mitigation Guidelines Version: August 2001.'

## Habitats

- 10.4.14 No records of rare or scarce plant species or plant communities were obtained during the field surveys or desk review. The habitats recorded on the site are mapped in Figure 10.2 and described below.
- 10.4.15 It is assumed that the site would continue to be farmed as it is currently, which would be expected to prevent significant changes to the habitats prior to the commencement of works associated with the proposed development. It is likely that, as trees mature, these may become more suitable for roosting bats, as they become larger and further features are created through flaking bark and additional woodpecker and rot holes. However, in a general sense, this may be balanced by works to manage trees at the site, as these become unsafe or in order to provide more light through the canopy of woodlands. Trees may also fall naturally, particularly as they become over mature, or possibly due to lightning strike. Damage to buildings may lead to the creation of suitable access to habitat for bats or birds, although the buildings that have been retained are generally in a good condition, meaning that deterioration such that would alter their suitability is unlikely. It is therefore unlikely that any changes to the habitats would alter the baseline conditions prior to works commencing.

### Improved grassland

- 10.4.16 This habitat was low in plant species diversity, dominated by perennial rye grass *Lolium perenne*, false-oat grass *Arrhenatherum elatius*, cocksfoot *Dactylis glomerata*, Yorkshire fog *Holcus lanatus*, common bent *Alopecurus pratensis* and white clover *Trifolium repens*. It was grazed by sheep and cattle and was therefore generally kept short, although areas of rough grassland were noted. However, as an exception, the field in the northwest corner of the site is typically left to grow long during the spring and summer and was cut for hay and silage.
- 10.4.17 The improved grassland in the eastern part of the main Phase 2 development area is defined as coastal and floodplain grazing marsh under the former UK BAP and Section 41 list. This habitat type is also listed under the LBAP. However, it is not considered that this habitat fulfils the criteria for listing under the former UK BAP and LBAP, lacking suitable habitat for breeding waders, including lapwing *Vanellus vanellus*, and wintering wildfowl such as whooper swan *Cygnus cygnus*; this part of the site has not been seen to flood during survey work at the site, even while extensive flooding occurred over the winter of 2013 to 2014.
- 10.4.18 Although lacking in species diversity, the value of this habitat is increased as it supports notable and protected species. It provides foraging habitat for badgers, with improved pasture being of particular

value as a foraging resource for badgers<sup>141</sup>. The improved grassland also provides a foraging and nesting habitat for farmland birds, including skylark *Alauda arvensis* and barn owl. The grassland areas are bordered or punctuated by scrub, long grassland and tall ruderal vegetation; when in association with such habitats that provide cover, the areas of improved grassland also provide basking habitat for reptiles. Brown hare *Lepus europeaus* has also been recorded in improved grassland near to the site, and potentially also occurs within the site. This habitat also has a potential to support notable invertebrates, such as *Oxytelus piceus*, and provides suitable habitat for grizzled skipper.

- 10.4.19 Considering the value of this habitat for notable and protected species, it is considered that this habitat is of **parish** value.

#### **Neutral semi-improved grassland**

- 10.4.20 Discrete areas of semi-improved grassland are managed by grazing or comprise tall, un-grazed swards. The differences in substrate and management are reflected in the sward structure and diversity. Meadow foxtail *Alopecurus pratensis*, red fescue *Festuca rubra*, smooth meadow grass *Poa pratensis*, birdsfoot trefoil *Lotus corniculatus*, germander speedwell *Veronica chamaedrys*, creeping thistle *Cirsium arvense*, common vetch *Vicia sativa* and agrimony *Agrimonia eupatoria* were recorded. These areas of habitat, in particular those that are not managed by grazing, provide foraging and nesting habitat for notable bird species and refugia and foraging opportunities for reptiles. Brown hare is also likely to occur in areas of semi-improved grassland within the site. Considering that this habitat is of higher species diversity than improved grassland, also its value to notable and protected species, this habitat is considered to be of **parish** value.

#### **Arable**

- 10.4.21 The northwest corner of the main Phase 2 development area and the majority of the Southern Access Road (West) comprises arable land that had been sown with cereals, legumes or potatoes at the time of extended Phase 1 habitat survey. Arable field margins is a former UK BAP and LBAP habitat, applying only where herbaceous strips or blocks around arable fields are managed specifically to provide benefits for wildlife. This is not considered to be the case at the site. The crops were generally sown up to the field boundaries with few headlands or marginal features; few arable weeds were recorded, which limits the ecological value of this habitat.
- 10.4.22 The arable fields were, however, found to provide important foraging and nesting habitat for a variety of farmland bird species, including skylark and grey partridge *Perdix perdix*. Other species nest in adjacent scrub and trees and utilise this habitat for foraging, including

<sup>141</sup> SNH, (2007); 'Best Practice Guidance – Managing Land as a Foraging Resource for Badgers.'



linnet *Carduelis cannabina* and yellowhammer *Emberiza citrinella*. Brown hare has also been noted. Considering the value of the arable fields to notable bird species, this habitat has been assessed to be of **parish** value.

#### **Broad-leaved plantation woodland**

10.4.23 Strips of plantation of woodland fall within the road route in the southern part of the Main Phase 2 development area, with a small plantation also located along the Southern Access Road (West). The trees were typically mature or semi-mature and mainly comprised willow *Salix* sp. and hybrid black poplar *Populus x canadensis*. The trees have been densely planted and, as such, the ground flora was generally sparse, with cattle poaching within the Main Phase 2 development area creating some areas of bare ground. However, bramble *Rubus fruticosus*, cow parsley *Anthriscus sylvestris*, cleavers *Galium aparine* and stinging nettle *Urtica dioica* were recorded.

10.4.24 Mature trees within these woodlands have a potential to support roosting bats, with one of these trees located adjacent to the road supporting a common pipistrelle *Pipistrellus pipistrellus* roost (tree (T) 158). The woodland edges also provide commuting and foraging habitat for pipistrelle bats. The woodlands provide a foraging resource for badgers and potentially also refugia, hibernacula and foraging habitat for reptiles and amphibians, including great crested newt. The value of this habitat is recognised under the former UK BAP and LBAP; the belts of broadleaved woodland are listed as a priority habitat under the former UK BAP (deciduous woodland) and LBAP (woodland). The habitat is therefore considered to be of **parish** value.

#### **Broadleaved scattered trees**

10.4.25 Numerous scattered trees occurred across the site, including around the former barracks buildings and Rampton Drift and along the road route in the southern part of the Main Phase 2 development area. Scattered trees were also noted along Wilson's Road, along the Southern Access Road (West). Key groups of scattered trees included horse chestnut *Aesculus hippocastanum* trees along the northern boundary of the barracks and an avenue mixed with lime along the access road into the barracks. A line of poplar *Populus* sp. was also noted through and around the field edge to the east of the former barracks buildings. Scattered across the southern part of the Main Phase 2 development area, including within the road route, are mature oak *Quercus* sp. trees. A wide variety of other species were recorded across the site, especially around the former barracks buildings within the Main Phase 2 development area, including Norway maple *Acer platanoides*, silver birch *Betula pendula*, apple *Malus* sp. and wild cherry *Prunus avium*.

10.4.26 The scattered trees provide nesting habitat for birds and potential roosting habitat for bats. Considering the diversity of tree species at the site and their importance to birds and potentially bats, this habitat is of **parish** value.

### Standing water

- 10.4.27 There are two ponds within the site; in the northeast corner of the site in an area of scrub and semi-improved grassland adjacent to arable fields (Pond 7); and on an arable field boundary and the end of a wet ditch (Pond 6). Pond 6 was flanked by dense scrub on the southern edge, with riparian vegetation, mainly great willowherb *Epilobium hirsutum*, along the northern edge. Rushes *Juncus* sp. were also recorded within the pond. Pond 7 was a smaller pond, appearing as a man-made trench, lacking in bankside or aquatic vegetation. These ponds support common amphibians (common frog *Rana temporaria* and smooth newt *Lissotriton vulgaris*). Ponds are listed on the former UK BAP and LBAP.
- 10.4.28 There are ditches within the site, along the field boundaries within the Southern Access Road (West) and at the eastern boundary of the Main Phase 2 development area. These were generally less than 1m wide, with steep banks and containing shallow water (less than 50cm in depth). Some emergent vegetation was recorded along those within the southern road route, including species such as great willowherb, common reed *Phragmites australis*, yellow iris *Iris pseudacorus* and bulrush *Typha angustifolia*. The ditches within the Main Phase 2 development area contained no aquatic vegetation and in places were shaded by bramble and hawthorn hedgerows. The ditches have not been found to support notable or protected species, such as water vole or breeding birds.
- 10.4.29 Considering that the waterbodies at the site have not been found to support notable or protected species, the standing water within the site is of **site** value.

### Scrub

- 10.4.30 Scattered and dense scrub was recorded across the Main Phase 2 development area. Bramble, hawthorn, blackthorn, goat willow and elder were dominant. In some areas, the scrub formed continuous blocks of dense vegetation. This habitat provides foraging and nesting opportunities for birds, including whitethroat and dunnock; they also provide cover for small mammals, amphibians and reptiles. This habitat type is of **site** value.

### Tall ruderal

- 10.4.31 This habitat was recorded within the Main Phase 2 development area and along field boundaries along the Southern Access Road (West). With respect to the former, these areas represent an early successional, transient plant community with a diverse range of plants interspersed with areas of bare ground. The dominant plant species were teasel *Dipsacus fullonum*, bristly ox-tongue *Picris echioides*, prickly sow thistle *Sonchus asper*, curled dock *Rumex crispus* and creeping thistle. With respect to the latter, there were patches of tall ruderal vegetation in areas of unmanaged land along ditches and tracks, including stinging nettle and creeping thistle. Tall

ruderal vegetation provides habitat for reptiles, invertebrates and small mammals and foraging opportunities for birds. It is considered to be of **site** value.

### **Amenity grassland**

- 10.4.32 Small patches of amenity grassland were recorded, comprising a low diversity of plant species, including perennial rye-grass, annual meadow grass *Poa annua*, daisy *Bellis perennis*, dandelion *Taraxacum* sp. and hoary plantain *Plantago media*. This grassland is of **site** value and has therefore not been considered further in the assessment.

### **Hedgerows**

- 10.4.33 The hedgerows are mapped in Figure 10.2, with important hedgerows recorded in Figure 10.10. Mature species-poor hedgerows formed field boundaries north of Rampton Road, west of Long Lane and within the southern road route. They were dominated by hawthorn, but some areas had a higher diversity and also contained dog rose *Rosa canina*, elder, bramble and blackthorn and occasionally mature trees. A species-rich hedgerow was also recorded along the western side of Long Lane (hedgerow 43, Figure 10.10), which qualifies as 'important' under the Hedgerow Regulations 1997, because it supports seven 'woody' species.
- 10.4.34 Hedgerows were recorded that fulfil criteria under the former UK BAP and Section 41 list and LBAP. Hedgerows were also noted that were of value at a site context. The hedgerows facilitate species dispersal across the site and to adjacent semi-natural habitats. Of particular note are the two hedgerows along Long Lane (42 and 43), which provide an important foraging habitat for common and soprano pipistrelle *Pipistrellus pygmaeus*, Leisler's bat *Nyctalus leisleri* and noctule *Nyctalus noctula*. They also provide nesting habitat for birds and cover for reptiles and small mammals.
- 10.4.35 White-spotted pinion moth (hedgerow 47 and 48) and white-letter hairstreak (hedgerows 43 and 47 to 49) have been recorded along hedgerows to the west of Long Lane, where elm species *Ulmus* sp. were dominant (43 and 47) or recorded to some extent.
- 10.4.36 The hedgerows at the site are collectively considered to be of **district** value.

### **Buildings**

- 10.4.37 There are residential and farm buildings at Brookfield Farm (building (B) 55 to B79), along with horticultural and residential buildings at Larkfield Nursery (B80 to B90). The Main Phase 2 development area contains disused brick buildings and pillboxes (B1 to B6 and B10 to B14). Three small buildings were recorded in arable and pasture fields (B25 to B27) within the Southern Access Road (West). A two storey brick residential house was also recorded adjacent to Hatton's

Road (B22). A full description of the buildings labelled on Figure 10.2 and Figure 10.3 is provided in Appendix F6.

- 10.4.38 The majority of the buildings are of **negligible** value, with the exception of those that provide habitat for roosting bats or nesting birds:
- Buildings B2, B55 and B56 have been found to support roosting bats. B56 also likely support nesting starlings *Sturnus vulgaris*. These buildings are considered to be of **district** value, although the value of B55 is provisionally elevated to **county** value, as the survey results indicate that this building supports a brown long-eared bat roost;
  - B5 has a potential to support roosting bats and is therefore provisionally of **district** value; and
  - B25 and buildings at Brookfield Farm support nesting swallows *Hirundo rustica*, which are of **parish** value.
- 10.4.39 B13 may have been used as a feeding perch for bats, but no signs of an active roost were recorded. This building has therefore been assessed to be of **negligible** value.
- 10.4.40 The buildings at Larksfield Nursery have not been assessed since 2007 due to the lack of access. B80 was defined as a likely roost, due to the presence of old droppings in the roof void, and is therefore provisionally assessed to be of **county** value. Based on aerial photography, B81 to B88 are horticultural buildings that are unlikely to provide habitat for bats or birds and are therefore of **negligible** value. B89 and B90 have been provisionally assessed to be of **district** value, as these are pitched roof buildings that could offer habitat for bats and/or birds.

### Other habitats

- 10.4.41 Patches of introduced shrub were recorded around the former barracks buildings within the Main Phase 2 development area, comprising non-native ornamental species including roses *Rosa* sp. Areas of bare ground and hardstanding were recorded, comprising roads and tracks. The introduced shrub and bare ground are of **negligible** value.

## Bats

### Roosts

- 10.4.42 All bat species are fully protected under the WCA and the Habitats and Species Regulations, which make it an offence to intentionally or deliberately capture, kill or injure or disturb bats (whether in a roost or not), and intentionally or recklessly damage, destroy or obstruct access to their roosts. Certain bat species are listed under the former UK BAP and Section 41 list (see below), with all bats being listed

under the LBAP.

- 10.4.43 Bat boxes have been erected on trees across the site, some of which were found to contain old bat droppings: T21; T59; and T130 (refer to Figure 10.3 and Appendix F8). No evidence was recorded to indicate the presence of an active roost, although it is possible that these features could be utilised again in the future. Butterfly wings were recorded in B13, but no signs were recorded to indicate the presence of an active roost. The bat boxes and B13 are therefore currently assessed to be of **site** value to bats.
- 10.4.44 The following provides a summary of bat roosts recorded within the main Phase 2 development area, with these details also summarised in Figure 10.4:
- B2 – During the internal inspection undertaken during the winter of 2007, small fresh droppings potentially from a bat were recorded on a window. The window slot immediately above was cobweb free, suggesting that this may support a hibernating bat. This building was identified as a likely hibernation roost. One common pipistrelle bat was seen returning to a gap in the brickwork on the northern façade on 4<sup>th</sup> June 2014. This bat could be roosting in a narrow crevice in the brickwork, or it is possible that the hole in the brick leads into a wall void or any number of crevices within the building itself;
  - B55 - Less than ten old small droppings were recorded at scattered locations throughout the roof space during the internal inspection in 2007. At least 50 medium-sized fresh bat droppings and feeding remains characteristic of brown long-eared bat *Plecotus auritus* were recorded within the roof void, below the ridge beam, on 25<sup>th</sup> November 2013. A brown long eared bat was seen flying towards B55 during the survey of B56 on 21<sup>st</sup> May 2014, one hour and 20 minutes prior to dawn. This species was also recorded during the survey of B64 and B66 on 30<sup>th</sup> May 2014, at 03:45, an hour before dawn, but was not seen. It is likely that this building supports a brown long-eared bat roost, but the status of this roost is to be confirmed;
  - B56 - One common pipistrelle bat was seen flying below the eave on the southwest façade prior to dawn on 21<sup>st</sup> May 2014 and then flying northwest away from the building. Although this bat was not seen to return to this building, the behaviour of the bat indicated that it had investigated and/or roosted in this building in the past and likely utilises a number of different roost sites. The roost is accessed via a hole in the wooden cladding below the eave, which is likely to lead to a void within the pitched roof of the extension to this building;
  - Woodland block (WB) 4 (T158) - One common pipistrelle bat was seen circling T158 soon after sunset and flying southwest on 12<sup>th</sup> May 2014. Although this bat was not seen to emerge, this is thought likely to be the case, considering the timing of this call (22 minutes after sunset) and since this bat was seen to circle T158,

rather than fly from another location. It is also possible that this bat emerged from a tree nearby, within WB4.

- 10.4.45 It is considered that buildings B2, B56 and T158 each support a small roost of one or two male or non-breeding female bats; the survey results indicate that these buildings support roosts of low conservation importance. Common pipistrelle is widely distributed across the UK, with an estimated population of 2,430,000. Based on field survey results, there is a significant positive trend in population since 1999, equivalent to an annual increase of 3.7%<sup>142</sup>, contrary to a significant adverse trend based on roost counts, amounting to an annual decrease of 5.4%. These roosts are considered to be of **district** value.
- 10.4.46 The status of building B55 is uncertain based on the available survey data; further survey effort is required to confirm the type of roost that is present and time of year that bats utilise this building, as well as the number of bats that are typically present. Brown long-eared bat is also widely distributed across the UK, with the exception of some exposed islands, but the population size is comparably less, estimated at 245,000. This species is also on the former UK BAP and Section 41 list. There is no significant trend based on roost counts or hibernation surveys. This roost is provisionally assessed to be of **county** value, partly on account of the conservation status of this species, but also since the roof void could support numerous bats.
- 10.4.47 The following provides a summary of possible bat roosts recorded in buildings and trees at or near to the site:
- B5 - One common pipistrelle bat seen flying along the southwest façade 28 minutes before sunrise during the survey on 7<sup>th</sup> May 2014. This bat flew out of the line of sight, meaning that it could not be confirmed as to whether this bat returned to the building;
  - Brookfield Farm agricultural buildings – Signs of roosting bats were recorded in some of these buildings during the inspection in 2007. The old disused dog kennels had scatterings of old medium and small bat droppings (<10) and occasional butterfly wings. There were occasional gaps in the otherwise cobwebbed beams which may provide roosting opportunities. Two old medium sized droppings were found in the equipment store which had a metal roof with wooden joists. Four old medium sized droppings were recorded in a breeze block shed with a metal roof at the south east of the yard immediately before the hay storage sheds. Based on the presence of suitable roosting features, as well as droppings, indicated that these three buildings supported likely roosts. None such signs were recorded during the inspection carried out in 2013 and similarly no bat activity was recorded such as to indicate the presence of any roosts in addition to B55 and B56. It is therefore likely that these buildings no longer support active roosts;

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<sup>142</sup> BCT, (2013); 'National Bat Monitoring Programme Annual Report 2013.' Available at: [http://www.bats.org.uk/pages/nbmp\\_annual\\_report.html](http://www.bats.org.uk/pages/nbmp_annual_report.html)

- B80 - Four scattered, small, old bat droppings were recorded within the roof space during the inspection in the winter of 2007. The beams were heavily cobwebbed and the cavity walls were all filled. The presence of suitable roosting features as well as droppings made this a likely roost. As fresh droppings were not recorded, it is not possible to determine the type of roost. Access has not been obtained to update this survey work; and
- WB9 – During the survey on 3<sup>rd</sup> June 2014, soprano pipistrelle was recorded at 21:23, nine minutes after sunset, but was not seen at this time. A common pipistrelle was also observed flying within the woodland at 21:31. It is considered likely that these bats emerged from a tree or different trees within the woodland and then foraged along the woodland edges.

10.4.48 Should B5 and/or WB9 support roosting bats, the survey results indicate that these would only support a low number of male or non-breeding female bats, comprising roosts of low conservation importance. These roosts would be of **district** value. Further survey work is required to determine the status of any roost in B80, meaning that this possible roost is assessed to be of **district** value. The Brookfield Farm agricultural buildings are assessed to be of **negligible** value, due to the lack of signs to indicate the presence of roosting bats during surveys in 2013 and 2014.

10.4.49 There is a potential for the baseline conditions, with respect to bat roosts at the site, to change during the course of the proposed development. Changes in local conditions may prompt bat activity to shift, while activity naturally changes throughout the year and year upon year. The status of roosts can also change. For example, a temporary feeding roost could become a more permanent roost if the conditions are suitable.

#### **Foraging and Commuting Activity**

10.4.50 Certain areas of the Main Phase 2 development area provide important foraging habitat for bats; this activity is summarised in Figure 10.4 and below:

- Long Lane - The most intense foraging activity was noted in this part of the site, where common and soprano pipistrelle, noctule, Leisler's bat and probable Daubenton's bat *Myotis daubentonii* were recorded. A possible serotine *Eptesicus serotinus* pass was also recorded. Brown long-eared bat was also recorded by a static detector (SD10). The dark corridor flanked by trees along both sides provides sheltered foraging habitat for bats;
- Land west of Long Lane – Common and soprano pipistrelle and Leisler's bat were recorded foraging over grassland;
- The barracks – Common pipistrelle was recorded foraging along the access road into the barracks and around the former barracks buildings;
- Plantation woodland edges – Common, soprano and Nathusius'

pipistrelle *Pipistrellus nathusii* bats were recorded foraging and commuting along the edges of the woodland blocks in the southern part of the barracks;

- Brookfield Farm - The track through Brookfield Farm provides foraging and commuting habitat for common pipistrelle, with at least two bats observed at any one time during surveys in 2014;
- Lake at the barracks – Located adjacent to the site, common and soprano pipistrelle, probable Daubenton's bat, brown long-eared bat and noctule were recorded foraging over the water during the activity surveys in 2012 and 2013. Leisler's bat was also recorded by the static detector in 2013 (SD6).

- 10.4.51 Furthermore, common pipistrelle foraging activity was recorded along Wilson's Road and the parallel line of trees within the Southern Access Road (West), although the static detector recorded little activity (SD12) (refer to Figure 10.4).
- 10.4.52 Serotine has also been recorded within 5km of the site, which supports the probable record from an automated detector along Long Lane (SD6). Whiskered bat *Myotis mystacinus* has also been recorded within 5km, but has not been noted during any of the surveys.
- 10.4.53 Notable foraging and commuting activity has been recorded within the site. This was primarily common pipistrelle, although a greater diversity of species have been recorded in key areas, most notably at the lake and along Long Lane. This comprised soprano pipistrelle (1,300,000, significant downward trend from roost counts), Nathusius' pipistrelle (16,000), noctule (50,000), Leisler's bat, and probable Daubenton's bat (560,000), with associated population data provided in brackets<sup>143</sup>. Records of Nathusius' pipistrelle have increased in recent years and it is possible this species has been mistaken for common pipistrelle. Nathusius' pipistrelle is widespread but rare across the UK, with a peak in numbers during the late summer/early autumn migration period. Population data is lacking for Leisler's bat; this is a rarer bat species with the restricted distribution in the south of Britain and north Ireland. Brown long-eared bat, soprano pipistrelle and noctule are listed on the former UK BAP and Section 41 list.
- 10.4.54 Of particular note is serotine (15,000), which is an uncommon species that is distributed south from the Wash across to South Wales. In addition to a possible pass along Long Lane in 2013, this species was also recorded around the former barracks buildings within the Main Phase 2 development area in 2012. However, the low level of activity recorded indicates that the site does not provide important habitat for this species. As referenced previously with respect to Eversden and Wimpole Woods SAC (refer to paragraph 10.4.9), barbastelle has also been recorded during surveys in 2012 and 2013, with the latter

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<sup>143</sup> BCT, (2013); 'National Bat Monitoring Programme Annual Report 2013.' Available at: [http://www.bats.org.uk/pages/nbmp\\_annual\\_report.html](http://www.bats.org.uk/pages/nbmp_annual_report.html)



being associated with three passes in the northeast corner of the site. Considering the low number of passes recorded, and only by automated detectors, the site is also not thought to provide important habitat for barbastelle.

10.4.55 Considering that the site provides important foraging habitat for a variety of bat species, as well as the presence of roosts, in conjunction with the conservation and legal status of bats, it is thought that foraging and commuting bats are of **district** value. It is unlikely that bat activity at the site would change significantly prior to works commencing, based on the assumption that the habitats continue to be managed in the same way.

10.4.56 Collectively, bats are considered to be of parish to county value, with potential roosts provisionally being classified as district to county value.

#### **Otter**

10.4.57 There are no records of otters within 2km. However, evidence of otter (spraints and prints) was identified along Longstanton Brook during the survey in 2006. No holts were recorded. No otter signs were recorded during the survey in 2012. It is concluded that this species may occasionally utilise Longstanton Brook for commuting between more ideal habitats, such as the River Great Ouse. It is also possible that changes to their habitat or disturbance outside the site have affected their activity or populations, such that this corridor is no longer used.

10.4.58 Otter is fully protected under the WCA and Habitats and Species Regulations 2010, which make it an offence to intentionally or deliberately capture, kill or injure or disturb otters and intentionally or recklessly damage, destroy or obstruct access to their holts. Otter is also listed under the former UK BAP and Section 41 list. The site is located, at the closest point along Hatton's Road, approximately 120m to the south of Longstanton Brook. Considering the distance of the brook from the site and since the survey results indicate that the brook does not provide important habitat for otter, it is not thought that this species has a potential to be affected by the proposed development and has therefore not been considered further.

#### **Water Vole**

10.4.59 Water vole has been recorded approximately 2km to the east, near to Cuckoo Lane and a second record is close to the site boundary at Longstanton. Evidence of water vole (prints, burrows and feeding signs) were identified along Longstanton Brook during surveys in 2006 and 2012.

10.4.60 Water vole is fully protected under the WCA, which makes it an offence to deliberately, capture, injure or kill water voles or to damage, destroy or obstruct places of shelter or protection (i.e.,

burrow systems) and to disturb water voles whilst they are using such a place. Water vole is also listed on the former UK BAP, LBAP and Section 41 list.

10.4.61 Considering the distance of Longstanton Brook from the Southern Access Road (West) (at the closest point, approximately 120m), it is not thought that there is a potential for this species to be disturbed by works associated with the proposed development, or by the operation of the road. Furthermore, water vole signs have not been recorded along the entire length of Longstanton Brook, with the closest record (old feeding station), being located approximately 240m north of the site.

10.4.62 Appropriate measures have been incorporated into the proposed development to avoid potential adverse effects associated with pollution and changes to run-off rates and water levels in Longstanton Brook. This includes the incorporation of SUDS and standard pollution prevention measures within the CEMP. As such, this species has not been considered further in the assessment.

### **Badger**

10.4.63 CPERC indicated that there are several records of badgers within the 10km square that the site lies within. Badger signs recorded during the scoping surveys are shown in Figure 3, with the territories mapped in Figure 5 of the Confidential Badger Appendix (Appendix F7). High levels of badger activity were recorded during the surveys, although much of this activity was located outside the boundary of the site. Badger setts recorded within the site or within 30m of the site are described below:

- Sett 21 – Outlier with one entrance hole, a latrine and fresh spoil;
- Sett 22 – Main sett. Ten entrance holes were recorded along a bank covered with dense scrub. Nine of these were active, with fresh bedding and spoil present, as well as a latrine and prints. It is possible that there are additional entrance holes within the dense scrub or under rubble, with some pathways noted along the bank that disappear into impenetrable scrub;
- Sett 27 – Subsidiary with fresh bedding and large spoil heap. Entrance hole immediately adjacent to the site;
- Sett 28 – Subsidiary with two entrance holes, fresh spoil and bedding material; and
- Sett 36 – Outlier with one entrance hole and a latrine.

10.4.64 One main badger sett has been recorded within the Main Phase 2 development area (sett 22), which is associated with the grey clan. The territory of the grey clan extends across the central part of the Main Phase 2 development area, from the northern extent of the barracks to beyond the boundary of the built development to the south, including across the proposed road and temporary access road within the Main Phase 2 development area. Much of the territory

of the grey clan comprises arable land and improved grassland, with most latrines being recorded in patches of scattered scrub and semi-improved grassland. Although the bait-marking survey indicated that sett 21 is not located within the territory of the grey clan (refer to Figure 3 of confidential Appendix F7), it is considered likely that sett 21 is associated with this clan.

- 10.4.65 Strong territorial activity was recorded along the northern border of the grey clan, to the south of Brookfield Farm. Badger signs were noted to the north of Rampton Road; as such it is considered that the territory of another badger clan lies within the northern part of the site. Two active setts were recorded in this part of the site (setts 27 and 28, Figure 3 of Appendix F7).
- 10.4.66 The grey clan borders the yellow clan to the east, which extends into part of the proposed built development. The main sett of the yellow clan is located outside the boundary of the site, in an area of broadleaved plantation woodland to the southeast, east of the proposed temporary access road. The territory of the yellow clan also crosses the proposed temporary access road, the southern road route and part of the 'northern road' connecting the built development with Longstanton Road. Most activity was recorded around the semi-improved grassland surrounding the woodland and outside the boundary of the site.
- 10.4.67 The blue and orange clans cross the proposed road in the southern part of the barracks within the Main Phase 2 development area, as well as the proposed busway. The main sett of the blue clan is located in the southeast part of the barracks outside the site, in broadleaved plantation woodland. Most activity was recorded around the edges of the woodlands and fields of semi-improved and improved grassland surrounding the sett, although this clan also crosses Longstanton Road to the south and roams around the southern-central part of the barracks. The northern border of the territory forms the southern border of the orange clan, where strong territorial activity was recorded. The main sett is located along the eastern boundary of the site, adjacent to the CGB. This clan forages over the improved grassland in the eastern part of the site.
- 10.4.68 Badgers are protected under the Protection of Badgers Act 1992, but this species is not rare in the UK and is not of particular conservation concern, not being listed on any BAPs or the Section 41 list. Taking this into consideration, as well as the levels of activity recorded within the site (including one main sett), badger has been assessed to be of **parish** value.
- 10.4.69 The statuses of setts are likely to change prior to works commencing in various areas of the site and it is likely that new setts would be created. Depending on the nature of works undertaken for Phase 1 of Northstowe, it is possible that badgers could be displaced into the site from the north. It is already thought likely that part of the territory associated with a clan to the north of the site falls within the site,

although, it is possible that this may become more extensive, or there could be increased territoriality along the northern border of the grey sett. Apart from this, continued grazing at the site would be expected to maintain the short grasslands that provide important foraging habitat for badger, meaning that territories are unlikely to change significantly.

### Brown Hare

10.4.70 Brown hare has been incidentally recorded in the arable habitats in the north western part of the main phase 2 development area, east and west of the track towards the sewage works. This species has also been noted in other areas of the barracks outside the site, particularly the improved and semi-improved grasslands. Of particular note, 12 individuals were recorded displaying breeding behaviour within the rough grassland just outside the boundary of the site during the reptile survey undertaken in April 2007 by WSP. They were recorded at approximate grid reference TL 40543 66091. Otherwise, only one or two individuals have been recorded at any one time.

10.4.71 Brown hare is listed under the former UK BAP, LBAP and Section 41 list. This species is also protected from unnecessary harm under the Wild Mammals Protection Act 1996. This species is common in Cambridgeshire, as it is throughout most of Britain, but has undergone a substantial decline in numbers since the early 1960s<sup>144</sup>. Brown hare is therefore of **parish** value. It is unlikely that brown hare activity at the site would change prior to works commencing, assuming that the grasslands continue to be managed through grazing.

### Wild Mammals

10.4.72 Signs of rabbit *Oryctolagus cuniculus* and red fox *Vulpes vulpes* have been recorded across the site during other surveys, including burrows and earths. These species are considered to be abundant at the site. The same applies to grey squirrel *Sciurus carolinensis*, which was recorded in trees during the bat inspection surveys. Although not specifically recorded, it is likely that a wide range of other wild mammals occur within the site, including hedgehog *Erinaceus europaeus*, which is listed under the former UK BAP and Section 41 list, common shrew *Sorex araneus* and short-tailed vole *Microtus agrestis*. All wild mammals receive protection under the Wild Mammals Protection Act 1996, however collectively they are considered to be of **site** value.

### Birds

10.4.73 The following provides a review of bird species that could be impacted by the proposed development, including those recorded adjacent to the site. This includes bird species recorded at the lake, due to its proximity to the proposed access road within the Main

<sup>144</sup> Cambridgeshire and Peterborough Biodiversity Partnership, (2003); 'Brown Hare (*Lepus europeus*) Local Species Action Plan for Cambridgeshire.'

Phase 2 development area. Territories of Schedule 1 and red list species are shown in Figure 10.5 and amber list species in Figure 10.7.

- 10.4.74 A total of 73 species of bird were recorded, of which 62 were either confirmed as breeding or were considered as probably breeding on the site. A further four species were thought to be possibly breeding at the site. The remaining seven species were thought to be non-breeding and were utilising the site in other ways, including for roosting and/or foraging.
- 10.4.75 A total of 29 notable and/or protected species were found to hold breeding territories. Table 10.4 lists these species and indicates their likely breeding status and the estimated number of territories. Their value is also assessed in accordance with Table 10.3.
- 10.4.76 All birds, their active nests and eggs are protected under the WCA. This legislation makes it an offence to kill, injure or take any wild bird or to take, damage or destroy the nest of any wild bird while that nest is in use or being built. Special penalties are given for these offences when related to birds listed on Schedule 1 (including barn owl, hobby and quail), making it illegal to intentionally disturb any wild bird listed in Schedule 1 while it is building a nest or is in, or near a nest containing eggs or young or to disturb the dependent young. Bird species listed under the former UK BAP, Section 41 list and red and amber lists are of particular conservation concern.

**Table 10.4: Key Bird Species**

Common Name	Scientific Name	BoCC Category	Other Designations	Breeding Status	Estimated Territories	Value
Greylag goose	<i>Anser anser</i>	Amber	-	Confirmed	6	Parish
Mallard	<i>Anas platyrhynchos</i>	Amber	-	Confirmed	2	Parish
Grey partridge	<i>Perdix perdix</i>	Red	Section 41, UK BAP, LBAP	Probable	2	Parish
Quail	<i>Coturnix coturnix</i>	Amber	WCA Schedule 1	Probable	1	County
Kestrel	<i>Falco tinnunculus</i>	Amber	-	Confirmed	2	Parish
Hobby	<i>Falco subbuteo</i>	Green	WCA Schedule 1	Confirmed	1	County
Lapwing	<i>Vanellus vanellus</i>	Red	Section 41, UK BAP	Possible	2	Parish
Snipe	<i>Gallinago gallinago</i>	Amber	-	Probable	2	Parish
Stock dove	<i>Columba oenas</i>	Amber	-	Confirmed	9	Parish
Turtle	<i>Streptopel</i>	Red	Section 41, UK	Probable	2	District

Common Name	Scientific Name	BoCC Category	Other Designations	Breeding Status	Estimated Territories	Value
dove	<i>Columba palumbus</i>		BAP			
Barn owl	<i>Tyto alba</i>	Amber	WCA Schedule 1	Confirmed	2	County
Swift	<i>Apus apus</i>	Amber	-	Probable	1	Parish
Green woodpecker	<i>Picus viridis</i>	Amber	-	Confirmed	6	Parish
Skylark	<i>Alauda arvensis</i>	Red	Section 41, UK BAP, LBAP	Confirmed	22	Parish
Swallow	<i>Hirundo rustica</i>	Amber	-	Confirmed	3	Parish
Common whitethroat	<i>Sylvia communis</i>	Amber	-	Confirmed	10	Parish
Willow warbler	<i>Phylloscopus trochilus</i>	Amber	-	Probable	2	Site
Spotted flycatcher	<i>Muscicapa striata</i>	Red	Section 41, UK BAP	Probable	1	Parish
Starling	<i>Sturnus vulgaris</i>	Red	Section 41, UK BAP	Confirmed	8	Parish
Song thrush	<i>Turdus philomelos</i>	Red	Section 41, UK BAP, LBAP	Confirmed	3	Parish
Dunnock	<i>Prunella modularis</i>	Amber	Section 41, UK BAP	Confirmed	12	Site
House sparrow	<i>Passer domesticus</i>	Red	Section 41, UK BAP	Confirmed	4	Site
Yellow wagtail	<i>Motacilla flava</i>	Red	Section 41, UK BAP	Confirmed	7	District
Meadow pipit	<i>Anthus pratensis</i>	Amber	-	Confirmed	5	Parish
Linnet	<i>Carduelis cannabina</i>	Red	Section 41, UK BAP	Confirmed	8	Parish
Bullfinch	<i>Pyrrhula pyrrhula</i>	Amber	Section 41, UK BAP	Probable	1	Parish
Yellowhammer	<i>Emberiza citrinella</i>	Red	Section 41, UK BAP	Confirmed	11	Parish
Reed bunting	<i>Emberiza schoeniclus</i>	Amber	Section 41, UK BAP	Confirmed	1	Parish
Corn bunting	<i>Emberiza calandra</i>	Red	Section 41, UK BAP	Confirmed	1	County

- 10.4.77 Twenty of the key species were confirmed as breeding, eight probably bred and one possibly bred. Three Schedule 1 species (quail, hobby and barn owl) held breeding territories within the site. Barn owl was recorded nesting in barn owl boxes located within and near to the site boundary. Hobby was confirmed to have bred at the site and quail was thought to be probably breeding. A total of 12 BoCC red list species were recorded, along with 16 that are included on the amber list. Fifteen species listed on Section 41 and the former UK BAP were recorded. Three LBAP species were also recorded. House sparrow, willow warbler and dunnock are of site value and have therefore not been considered further in the assessment.
- 10.4.78 The site provides a diverse range of habitats which are beneficial to a significant number of bird species. Some of the habitats, for example the areas of open and largely undisturbed rough grassland, are scarce elsewhere in the local area. Additionally, scrub and hedgerows mature trees around boundary areas, for example along Rampton Road to the north of the site, were particularly important for many bird species. Twenty species were confirmed as breeding, increased to 28, including species that probably bred, indicating that the assemblage of breeding birds is collectively of local value.
- 10.4.79 In addition to the species listed above, the following species of birds listed on Schedule 1 of the WCA, have also been recorded within 2km: kingfisher *Alcedo atthis*; fieldfare *Turdus pilaris*, merlin *Falco columbarius*, hen harrier *Circus cyaneus* and red kite *Milvus milvus*. These species have not been recorded during surveys, including within the wider survey area, and are not considered to be relevant to the site. The Cambridge Bird Club provided their 2010 annual bird report and confirmed that there were no key winter waterbird roost sites within 1km of the site.
- 10.4.80 Bird behaviour changes across the seasons, with birds often travelling long distances between different sites used for breeding, foraging and shelter with regularity. Species that are absent at the time of survey may colonise a site anew at any future time. However, it is unlikely that the baseline conditions with respect to bird activity at the site would change significantly prior to works commencing, as the habitats are expected to continue to be managed in the same way.

#### **Great Crested Newt**

- 10.4.81 CPERC returned no records of great crested newt for the search area. This species has not been recorded within the site, but has been observed in Ponds 1, 2, 4 and 5, which are located within 500m of the site. The results of the great crested newt surveys are summarised in

**Table 10.5: Great Crested Newt Survey Results**

Pond	HSI Score	Great Crested Newt Peak Counts
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		2012	2013	2014
1	Average (0.62)	3	0	0
2	Good (0.76)	1	0	0
3	Poor (0.28)	0	0	N/A
4	Average (0.68)	13	1	3
5	Good (0.72)	0	0	3
6	Poor (0.44)	N/A	0	N/A
7	Average (0.60)	N/A	N/A	0
8	Poor (0.43)	N/A	N/A	N/A
9	Below average (0.55)	N/A	N/A	0

10.4.82 The great crested newt peak count during a single visit was 13, recorded in Pond 4 on 10<sup>th</sup> to 11<sup>th</sup> May 2012. This equates to a medium population<sup>145</sup>. Since 2012, lower numbers have been recorded, with the highest peak count since being five recorded on 7<sup>th</sup> to 8<sup>th</sup> April 2014, indicating that a small population is present. No great crested newt eggs have been recorded, although the presence of a gravid female during the survey on 7<sup>th</sup> to 8<sup>th</sup> May indicates that this species breeds in ponds near to the site.

10.4.83 Ponds 1, 2 and 4 are less than 500m from the proposed access road within the Main Phase 2 development area. There is therefore considered to be a potential for great crested newt to occur within the terrestrial habitats within the site, particularly the woodlands and scrub that may provide hibernacula during the winter and foraging habitat and refugia during the active season. Great crested newt has also been recorded incidentally in terrestrial habitats during the reptile survey at the site in 2013 and badger bait-marking survey in 2014. These incidental records are shown in Figure 10.7. These records indicate the importance of the terrestrial habitats around the periphery of the barracks, outside the site, near to Ponds 1 and 2 to the southwest, as well as Ponds 5 and 4 to the southeast. The areas of less frequently grazed semi-improved grassland provide foraging opportunities, refugia and hibernacula. Great crested newt has not been recorded in terrestrial habitats within the site and it is not considered that the site provides important habitat for this species.

10.4.84 A total of 54 great crested newts were recorded in two garden ponds at The Drift during a single evening torching survey in March 2012 (Rob Mungovan; personal communication). Considering that comparably low numbers of great crested newt have been recorded within the survey area, it is possible that the population is being supplemented by breeding populations outside of the survey area. Furthermore, some of the ponds (particularly Ponds 1, 2 and 4) are disturbed by poaching.

<sup>145</sup> English Nature, (2001); 'Great Crested Newt Mitigation Guidelines Version: August 2001.'



- 10.4.85 Great crested newt is fully protected under the WCA and Habitats and Species Regulations, which together make it an offence to intentionally or recklessly capture, kill, injure or disturb great crested newts and damage or destroy a breeding site or resting place for great crested newt or intentionally or recklessly obstruct access to any structure or place used for shelter or protection. This species is also listed under the former UK BAP, the LBAP and Section 41 list. This species receives a high level of protection and is a priority for conservation due to historical pond loss (prior to 1980's) and estimated annual losses of up to 5%<sup>146</sup>. The site is not thought to provide important breeding or terrestrial habitat. As such, great crested newt is of **district** value.
- 10.4.86 It is thought likely that breeding populations outside the barracks could supplement the population, meaning that the loss of breeding ponds outside the barracks prior to the commencement of the proposed works could adversely affect the population within the barracks and potentially therefore within terrestrial habitats within the Main Phase 2 development area. Conversely, pond creation could boost the population. Otherwise, it is not expected that habitats within the Main Phase 2 development area and the barracks would alter significantly. As such, unless populations are affected outside the barracks, it is unlikely that the baseline conditions would change prior to works commencing in different parts of the site.

### Common Amphibians

- 10.4.87 CPERC returned no records of amphibians for the search area. However, peak counts of four smooth newt and one common toad *Bufo bufo* were recorded Pond 7 within the site during the great crested newt survey in 2014. Furthermore, a peak of two smooth newts was recorded in Pond 6 in 2013.
- 10.4.88 Although not within the site, higher numbers of common toad have been recorded in Pond 3, near to the proposed access road within the Main Phase 2 development area. A peak count of 88 was recorded during the common toad survey on 17<sup>th</sup> March 2014, which indicates a low population<sup>147</sup>. The belts of woodland and grassland provide suitable terrestrial habitat for common toad, which has been recorded incidentally in these habitats around the south eastern and south western edges of the barracks, outside the site.
- 10.4.89 Common amphibians are only protected from sale under the WCA. Common toad is also listed under the former UK BAP and is on the Section 41 list. Pond 7 within the site was not considered to provide important habitat for this species. However, Pond 3 provides breeding habitat, with the surrounding grassland and woodland habitats also providing refugia and foraging opportunities. As such, common toad

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<sup>146</sup> UK Biodiversity Partnership, (2010); 'Species Pages for 2007 UK BAP Priority Species; *Triturus cristatus*.'

<sup>147</sup> Gent, A. H., and Gibson, S. D., eds. (1998); 'Herpetofauna Workers' Manual.' Peterborough, JNCC.

is of **parish** value. Other common amphibians are of **site** value. It is unlikely that the breeding population of common toad at the site would change significantly prior to works commencing.

### Reptiles

- 10.4.90 Grass snake *Natrix natrix* and adder *Vipera berus* were recorded within 2km. Adder has not been recorded at the site, likely on account of the lack of suitable habitat (open heathland and dense woodland). Grass snake and common lizard have been recorded on the site. Table 10.6 and Figure 10.8 summarise the results of the reptile survey.

**Table 10.6: Reptile Survey Results**

Survey Date	Number Recorded	
	Grass Snake	Common Lizard
18/06/12		
31/08/12 – 01/09/12	1	
04/09/12 – 05/09/12		
05/09/12 and 17/09/12	1	1
18/09/12		1
19/09/12		
20/09/12	1	
17/09/13 – 18/09/13		2
19/09/13 and 25/09/13		6
25/09/13 – 26/09/13		6
30/09/13		1
Peak Count	1	6

- 10.4.91 The peak count for common lizard was 6, indicating that there is a good population at the site<sup>148</sup>. Only one common lizard was recorded in the Southern Access Road (West), on 18<sup>th</sup> September 2012. All other records relate to the north eastern part of the Main Phase 2 development area. It is likely that these populations are distinct, as Longstanton Road dissects the site, fragmenting the areas of suitable reptile habitat and limiting habitat connectivity between the north and south areas. As such, the single record would indicate a low population within the Southern Access Road (West).

- 10.4.92 The peak count for grass snake was 1, indicating a low population. A single grass snake was recorded in two areas within the Main Phase 2 development area, in the northern part of the barracks, near to Rampton Road, and west of Long Lane. Grass snake was also recorded in the south western part of the barracks, but this area is located outside the site.

<sup>148</sup> Froglife, (1999); 'Froglife Advice Sheet 10; Reptile Survey. An Introduction to Planning, Conducting and Interpreting Surveys for Snake and Lizard Conservation.'

10.4.93 Common lizard and grass snake are listed on Schedule 5 of the WCA, which makes it illegal to deliberately or recklessly injure or kill these species. Both species are listed on the former UK BAP and Section 41 list. With respect to common lizard, this is on account of recent declines associated with brownfield site loss and continuing development pressure. This species is widespread, but not common in all areas, including East Anglia<sup>149</sup>. Grass snake is threatened due to declines in habitat availability due to agricultural intensification and is common only in central southern England<sup>150</sup>. Considering their conservation and legal status, and population sizes within the site, common lizard and grass snake are of **parish** value.

10.4.94 Reptiles are being translocated from the Phase 1 site, although, it is likely that some would be displaced as works commence, which could increase the population within the site, particularly along the northern boundary.

### **Invertebrates**

10.4.95 The invertebrate assemblage sampled in the southern ditch along the eastern boundary of the Main Phase 2 development area was characterised by a low diversity (nine taxa with only 7 BMWP scoring families) and the absence of pollution sensitive taxa. Furthermore, no species of nature conservation interest were identified in the sample, which was dominated by the very common *Gammarus pulex*, *Asellus aquaticus*, Psychodidae and Chironomidae. The characteristics of the ditch (the substrate comprised silt and woody debris), as well as run off from the CGB, are likely to affect the water quality.

10.4.96 Small heath *Coenonympha pamphilus*, shaded broad-bar *Scotopteryx chenopodiata* and cinnabar *Tyria jacobaeae* were recorded during the butterfly survey in 2012, although it is uncertain as to whether these were recorded along transects within the site. These species are listed on the former UK BAP and Section 41 list. Furthermore, small heath is listed as 'Nationally Threatened' and the cinnabar and shaded broad-bar moth are listed as 'Vulnerable'.

10.4.97 Cinnabar moth caterpillar feeds on ragwort *Jacobaea* sp. and groundsel *Senecio vulgaris* and is considered to be common and widespread, but declining. Small heath has experienced a significant decline, 62% decline over 25 years (1984-2003); this species occurs in a range of habitats, including open grassland, and the caterpillar feeds of a wide variety of foodplants. Shaded broad-bar has also declined rapidly, 73% over the last 35 years, and the larvae feed on vetch *Vicia* sp. and clover *Trifolium* sp in various habitats including grasslands.

10.4.98 White-letter hairstreak butterfly and white-spotted pinion moth were

<sup>149</sup> UK Biodiversity Partnership, (2010); 'Species Pages for 2007 UK BAP Priority Species; *Zootoca vivipara*.'

<sup>150</sup> UK Biodiversity Partnership, (2010); 'Species Pages for 2007 UK BAP Priority Species; *Natrix natrix*.'

both recorded along hedges to the west of Long Lane. White-letter hairstreak caterpillars favour wych elm, while white-spotted pinion larvae prefer mature trees, including English elm and wych elm. Both species are on the former UK BAP and Section 41 list, while white-letter hairstreak is also listed as Endangered.

10.4.99 Grizzled skipper was not recorded at the site, although an area of suitable habitat was noted near to the eastern boundary of the site that could support this species (refer to Figure 10.9). This comprised an area of herb-rich grassland with scattered scrub, which appeared to provide suitable habitat for grizzled skipper, including frequent creeping cinquefoil *Potentilla reptans*, which is one of the butterfly's foodplants. Considering the presence of suitable habitat and connectivity with Over Railway Cutting CWS approximately 2.6km to the northwest of the site along the CGB, it is possible that this species occurs at the site. This is especially the case since the weather conditions were not suitable during the single visit undertaken in April 2014. This species is on the former UK BAP and Section 41 list and is listed as Vulnerable.

10.4.100 Other notable invertebrates have been recorded at the site, as summarised in Table 10.7.

**Table 10.7: Other Notable Invertebrates**

Species	Conservation Status	Details
West of Long Lane		
<i>Lygus pratensis</i> (a myriad bug)	RDB3	Widespread species that no longer merits its status. Associated with ancient woodland, open her-rich areas.
<i>Oxytelus piceus</i> (a rove beetle)	RDBK	Rare species with a scattered distribution. Specialist on herbivore dung.
<i>Cryptophagus schmidtii</i> (a beetle)	RDBK	Diverse habitats, occurrence possibly associated with pheasant feed.
<i>Longitarsus parvulus</i> (a flea beetle)	Na	Widespread species that no longer merits its status. Associated with flax.
<i>Ophonus ardosiacus</i> (a ground beetle)	Nb	Restricted to south-eastern England, associated with weedy habitats.
Square-spotted clay <i>Xestia rhomboidea</i>	Nb	Foodplants include common nettle and dog's mercury, inhabits broadleaved woodland.
<i>Enochrus quadripunctatus</i> (an aquatic beetle)	N	Scarce species of base-rich lowland fens and vegetated shallow pools, restricted to eastern England.
<i>Cercyon bifenestratus</i> (an aquatic beetle)	N	Occurs in shallow water and on wet margins.
Weedy, disturbed ground near to the former barracks buildings		
<i>Orthoperus</i>	RDB3	Nationally rare, attracted to rotten wood.

Species	Conservation Status	Details
<i>brunnipes</i> (a beetle)		
<i>Longitarsus parvulus</i>	Na	See above.
<i>Podagrira fuscipes</i> (a flea-beetle)	Na	Attracted to marsh-mallow <i>Althaea officinalis</i> .
<i>Asiraca clavicornis</i> (a planthopper)	Nb	Attracted to rough grassland.
<i>Omalium rugatum</i> (a rove beetle)	N	Uncommon but not well-recorded and could satisfy either Na or Nb status. It is attracted to decaying animal and plant material.
Barracks		
Hornet moth <i>Sesia apiformis</i>	Nb	Exit holes on mature poplars, uncertain whether recorded within the site.

10.4.101 In addition to species referenced above, wall *Lasiommata megera* butterfly has been recorded within 2km of the site. This species is listed on the former UK BAP and is on the Section 41 list. However, this species has not been recorded during surveys at the site.

10.4.102 The notable species list in Table 10.7 has been derived incidentally during the white-letter hairstreak and white-spotted pinion moth surveys in 2013 and a further day of sampling at the site in April 2014. The weedy, disturbed ground around the former barracks buildings and the pasture with herbivore dung within the Main Phase 2 development area and arable margins within this area and Southern Access Road (West), have a potential support notable invertebrate species, including grizzled skipper. Five species of note were recorded within the weedy disturbed ground and is it considered likely that the value of these habitats is greater than these records indicate. Considering this potential, alongside the notable species that have been recorded at the site, particularly white spotted pinion, white-letter hairstreak and the RDB species in Table 10.7, invertebrates are assessed to be of **county** value.

### Summary of Ecological Features

10.4.103 Ecological features that that have been considered in detail in the assessment are summarised in Table 10.8.

**Table 10.8: Ecological Features**

Ecological Feature	Importance
Arable, improved grassland, neutral semi-improved grassland and broadleaved scattered trees	Parish
Hedgerows	District
B55* and B80*	County
B2, B5*, B56, B89* and B90*	District

Ecological Feature	Importance
B25 and buildings at Brookfield Farm	Parish
Bats	Parish to county
Water vole	District
Badger	Parish
Brown hare	Parish
Quail, hobby, barn owl and corn bunting	County
Turtle dove and yellow wagtail	District
Mallard, greylag goose, grey partridge, kestrel, lapwing, snipe, stock dove, swift, green woodpecker, skylark, swallow, common whitethroat, spotted flycatcher, starling, song thrush, meadow pipit, linnet, bullfinch, yellowhammer and reed bunting	Parish
Great crested newt	District
Common toad	Parish
Grass snake	Parish
Common lizard	Parish
Invertebrates*	County

\*Precautionary assessment due to lack of survey information

10.4.104 Wild mammals fall below the threshold for assessment. The same applies to other breeding bird species not listed above. However, due to their legal protection, appropriate EEMs have been incorporated into the proposed development to ensure adherence to wildlife legislation.

## 10.5 Environmental design/design mitigation

10.5.1 Relevant elements of the proposed development are outlined in Section 10.2, which should be referred to in conjunction with the EEMs contained in the following section.

### Construction Environmental Management Plan

10.5.2 An outline Construction Environmental Management Plan (CEMP) has been produced, including the following standard measures that are considered to be relevant to the assessment.

### Wild mammals

10.5.3 Any deep holes and trenches would be covered overnight and planked escape routes provided for any wildlife that may fall in. In addition, any hazardous liquids that are held on site would be stored in a secure lock-up. To avoid unnecessary harm to wild mammals, any burrows that are encountered during site clearance works would

be excavated sensitively, using hand tools where possible. Excavation would also ideally not occur between March and May inclusive, when female red fox and cubs may be below ground. These measures are not applicable to badger setts, as activities associated with badger setts would be subject to specific mitigation, in accordance with a licence.

## Nesting birds

- 10.5.4 Clearance of potential breeding bird habitat (vegetation and structures) would ideally occur outside of the main breeding bird season (March to August inclusive). If this is not possible, as part of an ecological clerk of works role, a suitably qualified ecologist would check for the presence of breeding birds prior to the commencement of any clearance or construction activities. Where any active nests are found, a buffer zone (of at least 5m radius) would be implemented until the young have fledged and left the immediate area around the nest.
- 10.5.5 Larger buffer zones (the radius would be dependent on the species concerned and the specific factors on site at the time) would be implemented around breeding sites for Schedule 1 species, which would only be lifted when then young are independent. A suitably qualified ecologist would advise on the extent of buffer zones and define when the buffer zone may be lifted.
- 10.5.6 As nesting occurs at other times of the year, vigilance would be applied during clearance works at any time of the year.

## Tree protection

- 10.5.7 The retained trees would be protected in accordance with the British Standards<sup>151</sup>, with further details outlined in the Arboricultural areport<sup>152</sup>. Adherence to the measures outlined in these standards and arboricultural assessment would ensure the long-term preservation of retained trees.

## Pollution prevention

- 10.5.8 Standard pollution prevention measures would be employed at the site to prevent polluted runoff from entering nearby watercourses, including Longstanton Brook and Beck Brook. This includes adherence to the Environment Agency's pollution prevention guidelines<sup>153</sup>.

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<sup>151</sup> British Standards, (2012); 'BS5837:2012 Trees in Relation to Design, Demolition and Construction - Recommendations.'

<sup>152</sup> Lockhart Garrett, (2014); 'Arboricultural Report, Northstowe, Phase 2'

<sup>153</sup> Environment Alliance, (2007); 'Pollution Prevention Guidelines. Works and maintenance in or near water: PPG5.'

- 10.5.9 In addition to the measures outlined in the CEMP, detailed measures would be developed in phase-specific CEMPs to be prepared by the appointed contractor.

## 10.6 Potential effects

### Site enabling and construction

- 10.6.1 Potential effects during site enabling and construction are described below:

- Disturbance and harm from noise and vibration, lighting and the movement of people and construction machinery;
- Harm resulting from site clearance activities; and
- Permanent and temporary habitat loss associated with site clearance activities.

### Operation

- 10.6.2 Potential effects identified during the operation of the proposed development are as follows:

- Disturbance from noise, lighting and activity; and
- Increase in cat predation, particularly with respect to birds.

### Site enabling and construction effects

#### Habitats

##### Improved grassland

- 10.6.3 All of the improved grassland would be lost to facilitate the proposed development. This would result in a loss of foraging habitat for badgers and nesting and foraging habitat for farmland birds, including skylark and barn owl. The loss of this habitat would be mitigated, to an extent, through the creation of the informal greenways, although the open nature of this habitat in association with the arable land would be lost. Potential habitat for grizzled skipper would also be lost, although suitable habitat would be incorporated into the informal greenways. Considering the effects on badger and farmland birds, the likely effect on this habitat type is **significant adverse** (permanent) at a **parish** scale.

##### Neutral semi-improved grassland

- 10.6.4 The relatively small patches of neutral semi-improved grassland that provides habitat for birds, reptiles and mammals would be lost to the proposed development. However, through appropriate management,



it is considered that, in time, this habitat could be reinstated within the informal greenways. Management of grazing, allowing certain areas of grow long and avoiding regular mowing would allow a similar diversity of grasslands to develop at the site. The likely effect on this habitat type is **not significant**.

### **Arable**

- 10.6.5 The loss of arable fields that provide habitat for birds and brown hare during the course of site clearance works would not be mitigated as part of the proposed development. As such, the likely effect is **significant adverse** (permanent) at a **parish** scale. This relates to the ecological effects of habitat loss, with the agricultural implications being assessed in Chapter 11: Geology and Soils.

### **Broad-leaved plantation**

- 10.6.6 The construction of the access road within the Main Phase 2 development area and construction of the Southern Access Road (West) would result in the clearance of broadleaved plantation woodland. Fragmentation would be limited, with works generally resulting in the loss of the ends of the blocks of woodland, with the exception of the two locations where the road passes through woodland along the southern boundary of the barracks. Habitat loss has been minimised, with the access road passing through gaps between woodland blocks where possible, particularly in the southern part of the Main Phase 2 development area. However, these works would also lead to the temporary disturbance of wildlife associated with the woodlands, due to noise, lighting and the movement of vehicles and people. This could include disturbance to a common pipistrelle bat roost in T158. The likely effect on this habitat type is **not significant**, with the impact being limited to small sections of woodland.

### **Broadleaved scattered trees**

- 10.6.7 Every effort has been made during the design process to maximise retention of important trees and scattered tree assemblages wherever possible, particularly those that have a potential to support roosting bats. There is a potential for site clearance works to result in a loss of broadleaved scattered trees. Potential damage to retained trees would be mitigated through the implementation of tree protection measures, which are EEMs that form part of the CEMP; this includes damage to roots through compaction and excavation works, also to the trunk and branches due the movement of machinery.
- 10.6.8 The trees located within the informal greenways and green separation would be retained, unless they are dangerous or removal is required for infrastructure. An increase in levels of up to 0.5m is proposed across the built development, which has implications for tree retention, as it would not be feasible to retain trees where the land is being raised. However, it is proposed that trees around Rampton Drift would be retained; it is envisaged that ground levels surrounding the

existing properties would remain close to the existing levels. The same applies to the avenues of trees along the access road into the barracks and the proposed western primary school, within the Main Phase 2 development area. Trees along roads may be retained, where they fall outside development plots that need to be raised.

- 10.6.9 The Arboricultural Report identifies trees for removal and retention and those that may be retained, depending on the layout within development plots. It is proposed that 534 trees would be retained and 413 trees would need to be removed to facilitate the development. This comprises trees located within the footprint of proposed buildings and roads.
- 10.6.10 Trees would be planted within the site, including around Rampton Drift, within the town square and along the proposed section of the CGB and informal and formal greenways. A single row of trees is proposed on one or both sides of the streets, depending on space availability and visibility requirements. It is expected that tree planting would mitigate for tree removal required to facilitate the proposed development. Furthermore, disturbance is expected to be temporary. Therefore, the likely significant effect on broadleaved scattered trees is **not significant**.

### Hedgerows

- 10.6.11 Hedgerows have been incorporated into the proposed development where feasible. The hedgerows within the green separation would be retained, including important hedgerows 42, 43 and 47 (refer to Figure 10.10). Hedgerows 32, 35 and 40 would also be retained along the boundary of the site and also within the informal greenway. At least parts of hedgerow 53 (at the eastern and western ends) would be lost to facilitate the construction of the Southern Access Road (West); this hedgerow fulfils criteria for listing under the LBAP and Section 41 list. Hedgerow 34 falls within a development plot and proposed spine and would also be lost; this hedgerow fulfils the same criteria and is also valued within a site context, due to the presence of a high density of trees. Hedgerow 38 would also be removed, at least in part, as a road would connect the built development to the road outside the site to the east. Hedgerows 34, 38 and 53 are collectively approximately 965.4 metres (m) in length. Should the central section of hedgerow 53 be retained, the total loss would be 871.8m.
- 10.6.12 Hedgerows would be planted at the site, including within the formal and informal greenways and green separation. These would be planted in conjunction with the relevant phases of the proposed development, prior to or within five years of the hedgerow removal, which would compensate for hedgerows removed to facilitate the proposed development. It is considered that the likely effect is **not significant**.

### Buildings

- 10.6.13 B2, B5, B25, B55, B56, B80, B89 and B90 are ecological features

due to their value or potential value to roosting bats, with the exception of B25 that supports a swallow nest. Other buildings are Brookfield Farm support at least a further two territories. B2 would be converted into a primary school building, which would likely require the destruction of the roost. The other buildings would be demolished.

- 10.6.14 An **adverse significant** (permanent) effect at a **county** scale is likely due to the demolition of B55 and B80, which is considered as a provisional assessment. The conversion of B2 is likely to lead to an **adverse significant** (permanent) effect at a **district** scale, due to the potential of this building to support a hibernation roost. The demolition of B89 and B90 is provisionally also assessed to be **adverse significant** (permanent) at a **district** scale. B5 and B56 are considered to support, or have a potential to support, roosts of low conservation importance; therefore the effect of the demolition of these buildings is **not significant**.

## Bats

### Roosting bats

- 10.6.15 The demolition (B55 and B56) and conversion (B2) of buildings, has a potential to result in the permanent destruction of bat roosts. B5, B80, B89 and B90 have a potential to support roosting bats, therefore the demolition of these buildings could also result in the loss of bat roosts in these buildings. These works could lead to disturbance and harm to roosting bats and the displacement of these bats to other suitable habitat, likely within and outside the site. This would lead to an offence under the WCA and Habitats and Species Regulations. The likely effect on bats is analogous to that outlined in paragraph 10.6.14.
- 10.6.16 T158 would be retained and protected during the course of the proposed development. However, it is located approximately 23m to the west of the proposed access road in the southern part of the Main Phase 2 development area, meaning that it is possible that lighting, noise, vibration and activity associated with the construction of the nearby access road could cause a temporary disturbance effect. This tree is located near to the western edge of the woodland, meaning that the woodland would be expected to shield the tree from lighting. Nevertheless, it is possible that this activity may discourage bats from roosting in this tree while these works take place. However, it is likely that bats would not roost in this tree at all times, utilising different roosts depending on the weather conditions and time of year; the roost is of low importance and displacement is unlikely to result in a significant effect. These activities are not thought to have a potential to cause an offence under the Habitats and Species Regulations, whereby disturbance is likely to impair the ability of bats to survive; breed or reproduce; rear or nurture their young; or hibernate or to affect significantly the local distribution or abundance of the species. Considering that T158 would be retained and protected, as well as its distance from the proposed access road within the Main Phase 2

development area and potential for only a temporary disturbance effect, the likely effect is **not significant**.

10.6.17 There is a potential for the clearance of trees within the built development and within the woodland blocks to result in a loss of roosting habitat for bats and an offence under the WCA and Habitats and Species Regulations. The likely effect is **significant adverse** (permanent) at a **parish** scale; the surveys have not identified any roosts within these trees, but further survey effort is required.

10.6.18 There is a potential for use of the temporary construction route to disturb bats that may roost in WB 8, 9 and 10. The potential for adverse effects depends on requirements for lighting along the road. WB 9 supports a possible roost, although the likely effect is **not significant**, considering that small numbers of pipistrelle bats were recorded during the surveys.

#### **Foraging and commuting bats**

10.6.19 Lighting and habitat loss associated with the construction of the proposed development has a potential to disturb foraging and commuting bats and affect the levels of activity within the site.

10.6.20 It is unlikely that lighting associated with the construction of the access road in the southern part of the barracks, within the Main Phase 2 development area would disturb bats that forage over the lake. The woodland blocks, which would be retained to the northwest of the road, would shield the lake from lighting in this part of the site. The lake is located, at the closest point, approximately 55m west of the road. The ground also rises up towards the lake at the southeast edge, which would also shield the lake from lighting.

10.6.21 The line of trees along Long Lane would be expected to shield the lane from lighting within the adjacent development plot to the east. However, the proximity of this plot to the lane means that there is a potential for lighting to disturb foraging bats, such that levels of activity may temporarily diminish during the course of works within the adjacent plot. A temporary **significant adverse** effect is expected at a **parish** scale. A significant effect is predicted, considering the diversity of bat species recorded in this part of the site and intensity of foraging activity recorded. It is unlikely that bat activity to the west of Long Lane would be affected, partly as the trees would shield the fields beyond, but also due to the distance from the built development to these fields.

10.6.22 Lighting associated with the temporary use of the construction route has a potential to disturb bats foraging and commuting along the woodland edges adjacent to the road, also potentially discouraging bats from crossing the road. Lighting along the proposed access road within the southern part of the Main Phase 2 development area, particularly where these pass through the woodlands, would be expected to disturb bats that forage and commute along the edges of

the woodlands, potentially discouraging bats from crossing at locations where these works take place. A temporary disturbance effect is expected during site clearance and construction work within the Main Phase 2 development area, associated with lighting in this part of the site. This includes the lighting of work areas, as well as light spill into adjacent areas. The effect of disturbance associated with construction work within the Main Phase 2 development area (excluding Long Lane) is **not significant**, as these areas were only found to provide important foraging and commuting habitat for pipistrelle bats, which are adaptable and less likely to be affected by lighting. Furthermore, considering that the works would be phased, any bats that are disturbed are likely to forage in other areas of the Main Phase 2 development area.

- 10.6.23 The clearance of vegetation within the site has a potential to lead to a reduction in foraging and commuting activity. With respect to the Phase 2 site, habitat loss, particularly the clearance of hedgerows and lines of trees, is expected to affect bat activity. The demolition of buildings at Brookfield Farm would be expected to affect foraging activity along the farm track. The avenue of trees along the access road into the barracks within the Main Phase 2 development area that provides key foraging habitat would be retained. Lines and trees and hedgerows would be planted within the site, including along the informal greenways, which would be expected to provide new foraging and commuting habitat for bats. However, temporary habitat loss is expected prior to the completion of landscaping at the site. This effect is considered to be **not significant**, considering the implementation of the landscape strategy (described in Chapter 14 and the DAS) throughout the phases of the proposed development.
- 10.6.24 Part of the double line of trees along Wilson's Road would need to be cleared to facilitate the construction of the Southern Access Road (West). Habitat loss has a potential to fragment foraging habitat for common pipistrelle. However, the planting of trees and hedgerows along the road and bridge are expected to create new potential commuting and foraging corridors for bats. These new corridors will not be lit, with the proposed bridge and hedgerows guiding bats over the road. The line of trees that runs parallel to Wilson's Road would be retained, with the exception of those that fall within the Southern Access Road (West), which would be translocated. Re-grading works and associated lighting would be expected to disturb foraging and commuting bats in areas adjacent to the site, notably north of the site boundary along Wilson's Road and parallel line of trees. Only common pipistrelle was recorded foraging in this part of the site and it is unlikely that the conservation status of this species would be affected by these works. As such, the likely effect of habitat loss and disturbance is **not significant**.

## Badger

- 10.6.25 The setts that are located within the site, or within 30m, have a potential to be impacted by the proposed development. Site

preparation works are expected to result in habitat loss, including the destruction of setts and the loss of foraging habitat. There is also a potential for disturbance to badgers associated with the excavation works near to setts, lighting, noise and vibration, as well as activity near to setts. This would lead to an offence under the Protection of Badgers Act 1992. It is also possible that new setts would be created prior to the commencement of clearance activities in various parts of the site, or further holes could be located in dense scrub, which could also be affected.

- 10.6.26 The main sett of the grey clan (sett 22) is located within the footprint of the proposed primary school within the Main Phase 2 development area, which would need to be removed. There are four other active setts that fall within the site that could be impacted by the proposed development (setts 21, 27, 28 and 36). It is considered likely that setts 27 and 28 could be retained within the northern informal greenway. However, sett 36 would need to be excavated as it is located within a development plot. Sett 21 is located within a formal greenway, on the boundary with the grounds of the secondary school, and therefore could be retained within the site.
- 10.6.27 The majority of the territory of the grey clan falls within the site, therefore site preparation works would be expected to lead to a significant loss of foraging habitat for this clan. Only the southern extent of the territory is located beyond the site and would be unaffected by the proposed development. Part of the yellow clan also falls within the footprint of the built development, which also marginally extends into the Southern Access Road (West). The proposed development incorporates suitable foraging habitat for badger, within the informal greenways, the edges of the waterpark and the grounds of the secondary school. It is expected that the extent of foraging habitat would ultimately decrease, however, leading to a permanent loss of habitat. The grey clan could potentially relocate to habitats outside the site, or the size of the clan may decrease.
- 10.6.28 There is a potential for the construction of the busway in the southern part of the Main Phase 2 development area to lead to the fragmentation of the territory of the orange clan, and to a lesser extent the blue clan, preventing badgers from accessing key foraging habitats outside the site. The proposed busway crosses these territories, which could prevent the blue clan from accessing land to the north and orange clan to the south. However, the majority of the territories of the blue and orange clans would be unaffected by the proposed development. The territory of the yellow clan passes over the temporary construction route and only marginally over the Southern Access Road (West), meaning that it is unlikely that this clan would be affected by the permanent access roads.
- 10.6.29 A **significant adverse** (permanent) effect on badgers is likely at a **parish** scale, due to the permanent loss of foraging habitat. This is mainly on account of the habitat loss and disturbance associated with

the grey clan, with the majority of the territory of this clan being located within the site, including the main sett. A **significant adverse** (permanent) effect is likely due to the loss of setts and disturbance at a **parish** scale, although the effect of fragmentation is considered to be **not significant**.

### Brown hare

- 10.6.30 The clearance of arable and grassland habitats has a potential to result in a loss of habitat for brown hare and disturbance, associated with activity, noise and vibration and lighting. EEMs incorporated into the CEMP would avoid unnecessary harm during clearance and excavation works. Furthermore, rough grassland habitats would be incorporated into the informal greenways, which would be expected to provide suitable habitat for brown hare. The area of habitat being provided would not fully compensate for the loss of habitat; however the likely effect of habitat loss and disturbance is **not significant**.

### Birds

- 10.6.31 The following sections outline the likely effects to birds due to habitat loss, habitat creation and disturbance. Implementation of the CEMP would mitigate effects associated with disturbance and harm to all nesting birds, in terms of avoiding an offence under the WCA.

#### Quail

- 10.6.32 This species was probably breeding in arable fields within the site, which would be removed during site clearance works. However, this habitat type has not been incorporated into the landscape strategy and it is likely that this species would be lost as a breeding species at the site as a result. The likely effect of the loss of arable fields on breeding quail is **significant adverse** (permanent) at a **district** scale.

#### Barn owl

- 10.6.33 Barn owl was recorded nesting in barn owl boxes within and adjacent to the site. The box located near to the site would be retained during the course of the proposed development. However, there is a potential for disturbance associated with lighting, noise, vibration and the movement of people to discourage this species from breeding at this nest box, and likely within the site, during the course of site preparation and construction, particularly while works take place adjacent to the box. The effect of disturbance is **significant adverse** (temporary) at a **district** scale.
- 10.6.34 It is expected that the barn owl box at Brookfield Farm would need to be removed, which would lead to a loss of nesting habitat and a likely significant adverse (permanent) effect. The clearance of grassland would also result in a loss of foraging habitat for this species. The informal greenways would provide some foraging habitat, but the

open nature of the grassland habitats would be lost. It is not considered that the landscape strategy would fully mitigate for the loss of foraging and nesting habitat, meaning that the likely effect of habitat loss is **significant adverse** (permanent) at a **district** scale.

- 10.6.35 Disturbance associated with lighting at the site is likely to discourage barn owl from foraging at the site while works take place in adjacent areas. This temporary effect is likely to be **not significant**, as this effect would occur in conjunction with habitat loss that is considered to be of greater significance for this species.

### **Hobby**

- 10.6.36 This species nested in a mature tree along the western boundary of the site and it is likely that these trees would be incorporated into the green separation. The retention of mature trees along the informal greenways would provide further suitable breeding habitat. The lake would also continue to provide suitable foraging habitat.

- 10.6.37 There is a potential for disturbance during site preparation and construction to deter this species from breeding at the site. The likely effect of temporary disturbance associated with noise, vibration and increased activity is **not significant**, as hobby is a highly mobile species that is likely to utilise other nesting opportunities in the local area.

### **Grey Partridge**

- 10.6.38 Two grey partridge pairs were probably nesting in arable crops within the site, which would be lost during site clearance works. Arable fields have not been incorporated into the site and this species is strongly associated with arable land. The loss of arable fields would lead to a **significant adverse** (permanent) effect at a **parish** scale.

### **Lapwing**

- 10.6.39 Two pairs were recorded possibly breeding in arable fields within the Southern Access Road (West), which would need to be cleared to facilitate the construction of the access road. The site does not provide ideal nesting habitat for this species, with wet grasslands providing more ideal conditions. This species is likely to be displaced to more suitable habitats, but the effect is **not significant**.

### **Turtle dove**

- 10.6.40 It is likely that site clearance works would result in a loss of suitable breeding habitat for this species, specifically the hedgerows and open grassland with scattered scrub. However, it is expected that this loss would be mitigated by the implementation of the landscape strategy, particularly the informal greenways. The likely effect of habitat loss is therefore **not significant**.

- 10.6.41 It is expected that noise, vibration, lighting and the movement of



machinery and people would disturb foraging and nesting birds. However, site preparation and clearance works are expected to occur in phases, such that areas of the site would remain undisturbed and areas of landscaping would be created as site clearance works take place elsewhere. Therefore, it is likely that the effect of disturbance on turtle dove would be **not significant**.

### **Skylark**

- 10.6.42 Clearance works would be expected to lead to the loss of 22 skylark territories at the site, as the open nature of the improved grassland and arable habitats would be lost. Skylark requires large areas of open grassland with no trees and limited scrub. It is therefore not expected that the informal greenways would provide suitable nesting and foraging habitat for skylark. The likely effect of habitat loss on skylark is **significant adverse** (permanent) at a **parish** scale.

### **Spotted flycatcher**

- 10.6.43 It is likely that the implementation of the landscape strategy would mitigate effects of habitat loss during site clearance work. One territory was recorded along a line of mature poplars adjacent to open grassland, with similar habitat being retained and created within the informal greenways. The likely effect on this species is therefore **not significant**. Due to the phased nature of the proposed development, the likely effect of disturbance on spotted flycatcher is **not significant**.

### **Starling**

- 10.6.44 This species is often associated with urban habitats, with eight territories recorded around the barracks buildings within the Main Phase 2 development area. Mature trees would be retained at the site, which would also provide suitable nesting habitat, within tree hollows. The proposed gardens, formal and informal greenways would provide suitable foraging habitat. The likely effect of habitat loss is **not significant**, due to the retention of mature trees at the site. Due to the phased nature of the proposed development, the likely effect of disturbance on starling is **not significant**.

### **Song thrush**

- 10.6.45 The retention of mature trees within the green separation and informal greenways would provide suitable foraging and nesting habitat for song thrush. As the field boundaries that were found to support nesting birds would be retained during the course of the proposed development, the likely effect is **not significant**. Due to the phased nature of the proposed development, the likely effect of disturbance on song thrush is **not significant**.

### **Yellow wagtail**

- 10.6.46 Site clearance works would lead to a loss of field margins, arable fields and open grasslands, which would not be fully mitigated by the

landscape strategy. The informal greenways may be suitable for this species, but the lack of adjacent open grassland and arable land may result in the loss of these species from the site. The likely effect is **significant adverse** (permanent) at a **district** scale. Due to the phased nature of the proposed development, the likely effect of disturbance on yellow wagtail is **not significant**.

### **Linnet**

- 10.6.47 The clearance of arable and grassland habitats in association with hedgerows, including the line of trees along Wilson's Road, would result in a loss of nesting and foraging habitat for this species. However, the retention and creation of hedgerows associated with grasslands, scrub and swales would benefit these species. Considering the provision of suitable nesting and foraging habitat as part of the landscape strategy, the likely effect of habitat loss is **not significant**. Due to the phased nature of the proposed development, the likely effect of disturbance on linnet is **not significant**.

### **Yellowhammer**

- 10.6.48 This species is currently associated with arable habitats associated with open grasslands. However, this species is not reliant upon arable fields and, similar to linnet, the provision of suitable habitats as part of the landscape strategy would compensate for the loss of habitat. The likely effect is **not significant**. Due to the phased nature of the proposed development, the likely effect of disturbance on yellowhammer is **not significant**.

### **Corn bunting**

- 10.6.49 One confirmed breeding territory was recorded near to the site boundary. There is a potential for the proposed development to result in disturbance, but the likely effect is **not significant**.

### **Greylag goose**

- 10.6.50 There is a potential for works associated with the construction of the access road in the southern part of the Main Phase 2 development area to cause temporary disturbance to greylag goose, which was recorded nesting around the lake. Possible sources of disturbance comprise lighting, activity, noise and the movement of machinery. However, this species is robust and often associated with urban parks where there are high levels of disturbance. Considering the distance of the proposed works, it is considered that the likely effect of temporary disturbance is **not significant**.

- 10.6.51 The creation of the waterpark is expected to provide suitable nesting and foraging habitat for this species, which is expected to result in a **significant beneficial** (permanent) effect at a **parish** scale.

### **Mallard**

- 10.6.52 Similarly to greylag goose, the likely effect of disturbance to mallard nesting at the lake is **not significant**. However, it is considered that temporary disturbance would constitute a non-significant effect, considering the distance of the lake from the site and temporary nature of the works. The creation of open water and riparian habitats at the waterpark would provide suitable nesting and foraging habitat for mallard, leading to a **significant beneficial** (permanent) at a **parish** scale.

#### **Kestrel**

- 10.6.53 Site clearance works would lead to a loss of suitable foraging and nesting habitat for kestrel, particularly the removal of trees, grassland and arable field margins. However, this loss would be mitigated by the retention of mature trees within the green separation and throughout the site, as well as the implementation of the landscape strategy. The likely effect of habitat loss is therefore **not significant**. Due to the phased nature of the proposed development, the likely effect of disturbance on kestrel is **not significant**.

#### **Snipe**

- 10.6.54 This species is probably breeding in areas near to the site, comprising marshy grassland and ponds in the southern part of the barracks. There is potential for works associated with the construction of the Southern Access Road (West) to disturb nesting birds adjacent to the site boundary. However, this area of marshy grassland extends further north into the site and it is possible that this species would be unaffected, or temporary disturbance may cause this species to breed elsewhere. However, it is not considered that these works would affect the conservation status of this species. The likely effect of temporary disturbance is **not significant**.

- 10.6.55 Habitat creation associated with the proposed development, principally the swales within the informal greenways and riparian areas within the waterpark would provide new opportunities for snipe. The likely effect of habitat creation on snipe is **not significant**. Due to the levels of disturbance expected at the site, it is unlikely that this species would thrive within the site.

#### **Stock dove**

- 10.6.56 The demolition of B26 would lead to a loss of breeding habitat for stock dove. However, this species also nests in hollows in trees and the retention of mature trees at the site would ensure the maintenance of suitable nesting habitat for this species. The likely effect is therefore **not significant**. Due to the phased nature of the proposed development, the likely effect of disturbance on stock dove is **not significant**.

#### **Swift**

- 10.6.57 This species was recorded probably nesting in B91, which is located

adjacent to the Main Phase 2 development area site. The retention of this building would retain nesting habitat at the site and it is unlikely that the construction of the access road would lead to significant disturbance. The likely effect on swift is therefore **not significant**.

#### **Green woodpecker**

- 10.6.58 This species relies on mature trees with cavities, which would be retained at the site. The clearance of open grassland would lead to a loss of foraging habitat, although the informal greenways would mitigate for this loss. The likely effect is therefore **not significant**. Due to the phased nature of the proposed development, the likely effect of disturbance on green woodpecker is **not significant**.

#### **Swallow**

- 10.6.59 The demolition of the buildings at Brookfield Farm and B25 would lead to a loss of nest sites for swallow, resulting in a **significant adverse** effect at a **parish** scale.

#### **Common whitethroat**

- 10.6.60 The clearance of scrub and hedgerows would lead to a loss of nesting habitat for whitethroat, which would be mitigated through the implementation of the landscape strategy. The retention of hedgerows and provision of hedgerows and informal greenways would ensure the likely effect on whitethroat due to habitat loss is **not significant**. Due to the phased nature of the proposed development, the likely effect of disturbance on common whitethroat is **not significant**.

#### **Meadow pipit**

- 10.6.61 Clearance works would lead to a loss of habitat for meadow pipit, specifically the open grassland areas and field margins. The informal greenways are considered to provide appropriate compensation for the loss of these habitats, such that the likely effect is **not significant**. Due to the phased nature of the proposed development, the likely effect of disturbance on meadow pipit is **not significant**.

#### **Bullfinch**

- 10.6.62 A single territory was recorded along the northern boundary of the site along Rampton Road. This hedgerow would be retained within the site, with tall hedgerows providing suitable habitat. As this feature would be incorporated into the informal greenway, the likely effect is **not significant**. Due to the phased nature of the proposed development, the likely effect of disturbance on bullfinch is **not significant**.

#### **Reed bunting**

- 10.6.63 This species was recorded at the lake, which may be subject to

temporary disturbance during the construction of the access road in the southern part of the Main Phase 2 development area. The likely effect of disturbance is **not significant**. However, this species is likely to benefit from the creation of the waterpark, with the creation of riparian edges providing new foraging and nesting opportunities. The likely effect of habitat creation is **significant beneficial** (permanent) at a **parish** scale.

### Great crested newt

- 10.6.64 Site clearance activities associated with the construction of the proposed access road in the southern part of the Main Phase 2 development area would result in the loss of terrestrial habitat for great crested newt, comprising the broadleaved plantation woodlands and improved grassland. There is therefore a potential for disturbance and harm to newts in terrestrial habitats, particularly during hibernation, which would lead to an offence under the WCA and Habitats and Species Regulations.
- 10.6.65 The likely effects of disturbance and harm and the loss of terrestrial habitat are considered to be **not significant**, with the long grasslands and woodlands around the periphery of the barracks, outside the site, being considered to provide key terrestrial habitats for this species. However, the construction of the access road in the southern part of the Main Phase 2 development area has a potential to lead to the fragmentation and isolation of terrestrial and breeding habitats. Ponds 1 and 2 are located to the west of the proposed road and Ponds 4 and 5 to the west, meaning that the road could limit the movement of great crested newts between these ponds. A **significant adverse** effect on great crested newt is likely at a **parish** scale, due to the potential fragmentation of habitats in the southern part of the barracks outside the site, as well as the potential for disturbance and harm.
- 10.6.66 Ponds 1, 2, 4 and 5 that support great crested newt are located outside the site and would not be directly impacted as a result of the development, meaning that breeding habitat would not be adversely affected. However, suitable breeding habitat would be incorporated into the site around the periphery of the waterpark. It is expected that these habitats would connect to other suitable habitat within and outside the site, associated with Northstowe Phases 1 and 3. The creation of suitable breeding habitat at the site for great crested newt, in conjunction with the creation of suitable terrestrial habitats around the waterpark and along the informal greenways, could result in breeding populations being present at the site. A **significant beneficial** (permanent) effect on great crested newt at a **parish** scale is likely, due to the creation of suitable breeding ponds.

### Common toad

- 10.6.67 There is a potential for the construction of the proposed road to decrease connectivity for common toad between breeding habitat at

Pond 3 and the surrounding terrestrial habitat and also lead to an increase in mortality when toads commute to and from the pond.

- 10.6.68 The survey indicated that common toads commute to Pond 3 from the west. The existing internal road located to the west of Pond 3 would only be used during the construction of the proposed development, although increased traffic could lead to a temporary increase in mortality. This road would link to a junction to the south, although this link road would also only be used during site enabling and construction. As it is expected that the proposed development would not affect connectivity between this pond and habitats to the west and southwest and also that this pond supports a low population, the likely effect on common toad is **not significant**.

### Grass snake

- 10.6.69 There is a potential for site clearance works to result in the loss of habitat for grass snake, specifically the grasslands, scrub and woodlands. These works could also cause harm, which would lead to an offence under the WCA. Grass snake has been recorded within the green separation, which would be retained. However, all other suitable habitat for grass snake would be removed, notably in the northern part of the site where this species was also recorded.
- 10.6.70 A low population of grass snake is present within the site, with only a maximum of one snake recorded within the site during a single visit. Furthermore, the waterpark and informal greenways would provide suitable habitat for grass snake to compensate for the loss of habitat required during site clearance. Therefore, the likely effect of habitat loss and harm is **not significant**.

### Common lizard

- 10.6.71 There is a potential for site clearance works to result in the loss of habitat for common lizard, specifically the grasslands, scrub and woodlands. These works could also cause harm, which would lead to an offence under the WCA. Suitable habitat for common lizard would be removed, notably in the northern part of the site and along Wilson's Road.
- 10.6.72 A good population of common lizard is present within the Phase 2 site and a low population within the Southern Access Road (West). However, the waterpark and informal greenways would provide suitable habitat for grass snake to compensate for the loss of habitat required during site clearance. As such, the likely effect of habitat loss and harm is **not significant**.

### Invertebrates

- 10.6.73 The hedges that support white-spotted pinion moth and white-letter

hairstreak would be retained. It is likely that the effect on these species is therefore **not significant**.

10.6.74 Site clearance activities would result in a loss of habitat for other notable invertebrates, notably habitat that could support grizzled skipper. However suitable habitat for this species would be incorporated into the informal greenways, meaning that the effect is **not significant**.

10.6.75 The weedy, disturbed ground around the former barracks buildings, the pasture with herbivore dung within the Main Phase 2 development site and arable margins in this area, as well as the Southern Access Road (West) have a potential support notable invertebrate species. In time, the informal greenways are expected to compensate for the loss of the pasture with herbivore dung. However, the weedy, disturbed ground and arable margins have not been incorporated into the proposed development, leading to a loss of this habitat and associated notable invertebrates. The likely effect on invertebrates is therefore **adverse significant** at a **district** scale.

## Operational effects

### Bats

10.6.76 There is a potential for roosting, foraging and commuting bats to be disturbed by lighting during the operation of the proposed development. The layout of the built development along the boundary with Long Lane has been carefully designed to avoid disturbance to bats foraging along Long Lane. However, there is a potential for lighting along the greenways and around the waterpark to reduce the value of these areas to foraging and commuting bats. Also, the lighting of roosts has a potential to delay emergence, or lead to the abandonment of roosts<sup>154</sup>. An **adverse significant** (permanent) effect is expected on bats at a **parish** scale, due to lighting during the operation of the proposed development.

### Badger

10.6.77 There is a potential for lighting around the informal greenways and waterpark to discourage badgers from foraging in these areas. Badgers forage at night, meaning that it is unlikely that activity in these parts of the site, most pronounced during the day, would significantly affect badger activity. However, due to the potential for disturbance associated with lighting, an **adverse significant** (permanent) effect is expected on badgers at a **parish** scale.

### Birds

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<sup>154</sup> Bat Conservation Trust, (2014); 'Artificial lighting and wildlife. Interim Guidance: Recommendations to help minimise the impact artificial lighting.'

- 10.6.78 There is a potential for increased activity at the site during the operation of the proposed development to disturb nesting and foraging birds. This includes disturbance associated with residents and dogs. It is expected that there would be an increase in the cat population at the site.
- 10.6.79 The habitats at the site are not likely to support ground nesting birds such as skylark. Such sensitive species are therefore not likely to be disturbed. Dense riparian vegetation around the periphery of the waterpark would provide cover for nesting birds. The species that are likely to occupy the site during the operation of the proposed development, such as house sparrow, swift, swallow, starling, whitethroat are not likely to be disturbed, as they typically occur in built up areas. The barn owl tower would not be accessible to the public and the barn owl boxes would be integrated into the buildings, therefore avoiding the potential for disturbance. It is expected the dense scrub, hedgerows and trees would provide cover for birds, thereby minimising the potential effects of cat predation. The likely effect of disturbance during the operation of the proposed development is therefore **not significant**.

### Amphibians, Fish and Aquatic Invertebrates

- 10.6.80 There is a potential for wildlife attracted to the attenuation ponds in the water park to be harmed as water is pumped out of the ponds. The likely effect is **not significant**.

### Mitigation and enhancement

#### Species protection

##### Bats

- 10.6.81 An EPS Mitigation Licence would be issued to and approved by Natural England prior to the commencement of work. This licence would cover any works that could result in an offence under the WCA and Habitats and Species Regulations, including the destruction of and disturbance to active bat roosts (T158, B2, B55 and B56). Although it is not considered that likely effects on T158 would be significant, the licence would cover works near to this tree as a precaution.
- 10.6.82 The specific requirements for mitigation and compensation would be detailed in the EPS Mitigation Licence application. However, this may include programming the works to avoid the most sensitive times of year (which would depend on the nature of the roost), excluding bats from the roost and/or conducting a soft-strip or soft felling under the guidance of a licensed bat worker. Compensation would be provided through the installation of a bat house, bat boxes and/or features within the proposed buildings, as described in Section 0.



- 10.6.83 Further survey work would be undertaken on T158, B2, B22, B55 and B56 to confirm the status of bat roosts at the site and inform the EPS Mitigation Licence application. This would comprise further emergence or return surveys, in accordance with the BCT guidelines, as follows.
- 10.6.84 The Category 1 and 1\* scattered trees that could be affected by the proposed development would be subject to emergence and return surveys or be climbed prior to works commencing. The precise requirements for further survey work on the scattered trees would be informed by requirements for tree removal within the development plots. Tree 175 could not be climbed due to health and safety issues, meaning that emergence/return would be undertaken on this tree. The same applies to the Category 1 and 1\* trees within the woodland blocks (comprising WB 1, 2, 3, 4 and 5, Figure 10.4). Depending on requirements for lighting along the temporary construction route, further survey work may also be undertaken on WB 8, 9 and 10. Should any additional roosts be recorded in trees that could be affected by the proposed development, appropriate mitigation measures would be implemented, likely involving the inclusion of these features in the EPS Mitigation Licence application.
- 10.6.85 The bat boxes and pillboxes (B10, B11, B12 and B13) were not found to support any active roosts. The same applies to the agricultural buildings at Brookfield Farm and B5. However, some historic evidence has been noted in some of the bat boxes, the agricultural farm buildings and B13. It was not possible to inspect B10 internally and bat activity indicated that B5 could support an active roost. These features could support an active roost in the future, prior to the commencement of proposed works; as such precautionary mitigation measures would be implemented. Should any additional roosts be recorded, these features would be included in the EPS Mitigation Licence application:
- Where it is not possible to retain trees supporting bat boxes, these would be inspected by a licensed bat worker, ideally during the spring or autumn. Assuming that they do not support an active roost, they would be relocated to mature trees that would be retained and protected and not be subject to high levels of disturbance. Any damaged boxes would be repaired (or replaced) and fallen boxes reinstalled;
  - Works to the pillboxes and agricultural buildings would be preceded by an internal inspection by a licensed bat worker, to confirm the absence of roosting bats; and
  - Precautionary measures would be employed prior to and during the demolition of B5 or, to mitigate risk, further survey work would be undertaken. Precautionary measures would comprise a soft strip of features that could support roosting bats. Work would halt if roosting bats are recorded. Further survey work would comprise a return survey.

## **Badger**

- 10.6.86 An updated badger scoping survey would be undertaken prior to the commencement of site clearance activities, to inform a licence application; that is to confirm the status of setts, identify any additional setts and confirm inform a mitigation strategy.
- 10.6.87 A badger licence would be obtained from Natural England prior to works commencing at the site. This licence would cover any works that would otherwise result in an offence under the Protection of Badgers Act 1992, including closing active setts and undertaking works within 30m of an active sett that may cause disturbance, such as the use of heavy machinery, or lighter machinery within 20m. This would also cover the creation of an artificial sett, ideally within the site, to accommodate badgers associated with the closure of the main sett (sett 22).
- 10.6.88 The setts that would otherwise be destroyed during site preparation works would be closed by fitting a one-way gate to each entrance hole, with associated weld-mesh fixed to the ground. The setts would be monitored to check if any badgers remain. Sett interference would be avoided when dependant young may be present and badgers are particularly vulnerable (December to June inclusive).
- 10.6.89 Badger tunnels would be installed under proposed busway within the Main Phase 2 development area, to minimise mortality and maintain connectivity to foraging habitat. These would allow the blue and orange clans to access parts of the territories to the north and south of the spine road. The siting of these tunnels would consider the layout of the proposed Phase 3 development, to ensure they can be retained in perpetuity. Badgers would be guided to tunnels with the use of badger-proof fencing along the roads.

## **Great crested newt**

- 10.6.90 An approved EPS Mitigation Licence would be obtained prior to the commencement of clearance of works that could otherwise result in an offence under the WCA and Habitats and Species Regulations.
- 10.6.91 To avoid harm to great crested newts during clearance works, suitable terrestrial habitat, comprising the woodlands, grasslands, tall ruderal vegetation and scrub, would be cleared sensitively under an ecological watching brief. This work would be carried out between March and October, when reptiles are active. This would be undertaken in conjunction with the completion of landscaping works in other parts of the site. The informal greenways and waterpark would provide suitable habitat for great created newt. These areas would act as receptor sites for any newts displaced by works in other parts of the site, in conjunction with areas of the barracks outside the site.
- 10.6.92 Any potential hibernacula within the works area would be subject to a destructive search by a suitably qualified ecologist and the vegetation

cleared in stages to allow any great crested newts that may be present to escape. Following clearance, these areas would be managed to prevent newts from returning to the work areas, by keeping the vegetation short and avoiding the creation of suitable hibernacula, such as log and stone piles. Any great crested newts that are captured during sensitive clearance or the destructive search would be translocated to suitable habitat within the site, or the wider barracks site. This work would be combined with an ecological watching brief for common amphibians and reptiles.

- 10.6.93 In order to maintain connectivity between terrestrial and breeding habitats and therefore maintain genetic diversity and viability, amphibian tunnels would be installed beneath the proposed access road in the southern part of the Main Phase 2 development area. Suitable fencing would be installed to direct amphibians to the tunnels and away from the road.

#### **Common amphibians**

- 10.6.94 Smooth newts and/or toads were recorded in Ponds 6 and 7. Common amphibians are only protected from sale under the WCA. However, appropriate mitigation measures would be employed to avoid unnecessary harm. The ponds would ideally be drained outside the amphibian breeding season. The ecological watching brief would also include common amphibians, to avoid unnecessary harm during the clearance of terrestrial habitats. Furthermore, connectivity would be maintained between Pond 3 and terrestrial habitat to the east through the installation of amphibian tunnels below the proposed road.

#### **Reptiles**

- 10.6.95 The ecological watching brief for great crested newt would also include reptiles, to avoid harm during the clearance of suitable habitats.

#### **Invertebrates**

- 10.6.96 At reserved matter stage, further surveys would be undertaken to inform the detailed landscape strategy for the site, to ensure that appropriate plant species and micro-habitat features are selected to support notable invertebrates that have been recorded and have a potential to occur at the site. These surveys would target grizzled skipper, pasture with herbivore dung, weedy, disturbed ground and the arable margins.

#### **General mitigation**

- 10.6.97 The pumping mechanism for the waterpark would be sympathetic to wildlife attracted to the waterpark, including amphibians, fish and invertebrates. Suitable measures would be employed to prevent wildlife from being entrained or impinged during pumping. This could be achieved by pumping the water from a groundwater well that is not

accessible for most species.

## Artificial habitats

### Bats

- 10.6.98 The pillboxes would be restored as heritage features and enhanced to provide suitable roosting habitat for bats. B10 is of particular note in terms of its heritage value, therefore the other three pillboxes within the site (B11, B12 and B13) would be enhanced to provide improved roosting habitat for bats. This would involve blocking up the gaps between the concrete cap and brick walls, with the exception of narrow gaps (15mm to 20mm) that would be retained to provide access for bats. Bat boxes and crawl spaces would also be installed internally. These pillboxes would not be accessible to the public, to avoid the potential for disturbance to roosting bats. Access may only be permitted to licensed bat workers, to facilitate monitoring and maintenance.
- 10.6.99 Roosting habitat for brown long-eared bat and pipistrelle bats would be incorporated into the proposed development, comprising suitable accessible roof voids and crevices within the proposed buildings and/or bespoke purpose-built bat houses (refer to the barn owl tower discussed earlier). The bat house would ideally be sited within the northern informal greenway, near to the existing roost within B55. Features would ideally be incorporated into B2, which supports a common pipistrelle bat roost and is being converted into a primary school. Bat boxes would be installed on mature trees retained within the green separation and informal greenways. These would face a variety of directions, ensuring they receive sun for part of the day. Different box designs would be provided, including the 1FF Schwegler Bat Box, which is suited to crevice-roosting pipistrelles. The precise requirements for bat mitigation would be dependent results of further survey work and would be set out in the EPS Mitigation Licence.
- 10.6.100 Bat boxes would also be installed that suit other species recorded at the site, such as the 2F Schwegler Bat Box that provides suitable roosting habitat for hollow-roosting bats including noctule bats and *Myotis* sp. The bat boxes would be sited along a suitable flight-line, avoiding well-lit areas.

### Birds

- 10.6.101 Permanent nesting habitat for barn owl would be incorporated into the proposed development. This would either comprise a barn owl tower and at least one barn owl box, or at least two barn owl boxes. The former would be designed to provide habitat for a wide range of other species, including kestrel, bats (including for hibernation and breeding) and invertebrates<sup>155</sup>. The boxes and/or tower would be

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<sup>155</sup> The Barn Owl Trust, (2012); 'Wildlife Tower (for Barn Owls and Other Wildlife).' Available at: refer to <http://www.barnowltrust.org.uk/infopage.html?id=202>

surrounded by rough grassland for foraging, on the periphery of the development to avoid disturbance associated with human activity and lighting. The waterpark could provide a suitable location for a barn owl tower, particularly to the south, considering proximity to the current nest site. Barn owl boxes would be integrated into the façades of the proposed buildings, such as the secondary school. These would be integrated to ensure their longevity considering issues associated with vandalism and maintenance.

- 10.6.102 Nesting opportunities for other bird species would be installed into the proposed buildings. This would include swift *Apus apus* bricks and suitable opportunities for starling and house sparrow *Passer domesticus*. In addition, external nest boxes would be fitted for swallow and house martin *Delichon urbicum*.

### Off-site compensation

- 10.6.103 At reserved matters stage, options for the conversion of arable fields to semi-improved rough grassland off-site would be investigated, considering the loss of rough open grassland within the site associated with the proposed development. These grasslands would target a range of bird species currently holding territories within the site, particularly barn owl, skylark and yellow wagtail, with the aim of mitigating adverse effects associated with habitat loss. The provision of an adequate area of off-site compensation would reduce the significance of effects on improved grassland and a range of bird species. However, the provision of off-site compensation has not been defined, therefore this has not been considered in the assessment.

### Habitat enhancements

- 10.6.104 Native species would be incorporated into the landscape strategy for the Main Phase 2 development area, particularly within the informal greenway and waterpark. Native species support higher levels of biodiversity.
- 10.6.105 The retained hedgerows would be enhanced through planting sections with greater than 5% gaps with whips. Standards of native tree and shrub species that are characteristic to this part of Cambridgeshire would be planted within the proposed and existing hedgerows and informal greenways, incorporating elm species where possible, particularly English elm and wych elm, to encourage white-spotted pinion moth and white-letter hairstreak populations to spread throughout the site. Trees would be planted within the hedgerows to increase diversity. The layout of the hedgerows would be designed to link to the existing network of hedgerows, to increase connectivity and facilitate the movement of wildlife across the site.

## Lighting

- 10.6.106 During the construction and operation of the proposed development, lighting would be directed away from the informal greenways, green separation (especially Long Lane), waterpark, features installed for bats and birds and woodlands located adjacent to the access roads within the Main Phase 2 development area.
- 10.6.107 Furthermore, the following measures would be incorporated across the site to minimise the effects of lighting on wildlife, particularly including bats and insects, in accordance with the BCT guidelines<sup>156</sup>: narrow spectrum lights that emit minimal ultra-violet light and peak higher than 550nm (yellow, orange and red wavelengths) would be used where possible; flat cut-off lanterns or accessories would be used; the height of lighting columns would be considered to minimise spillage; and light levels would be as low as guidelines permit and be turned off when not required. Lights are not proposed within the green separation, to maintain these dark areas for wildlife, particularly foraging and commuting bats. The same applies with respect to the informal greenways, apart from where the roads cross.

## Monitoring and management

- 10.6.108 An Ecological Management Plan (EMP) has been produced<sup>157</sup>, which is appended to the Planning Statement and provides a framework for mitigation and management. This is a live document that would be updated during the planning process, as the proposals become more detailed, and also allows for the outcomes of monitoring work to feed into ongoing activities.
- 10.6.109 A framework for the management is outlined below, which would be developed into a full management strategy initially covering activities prior to and during the construction of the proposed development and the first five years of operation. These elements would also be incorporated into the EPS Mitigation Licence applications for bats and great crested newt and the badger licence:
- Hedgerows would be trimmed (using a tractor mounted cutter) during late winter on a three year basis enhance their biodiversity potential;
  - Grazing of the rough grasslands would be closely managed and monitored to maximise the diversity of the grasslands, including their value to wildlife, including badgers, birds, reptiles and amphibians;
  - The features installed at the site for birds and bats would be checked by a suitably qualified ecologist on an annual basis, to record any signs of use, as well as damage, and identify any

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<sup>156</sup> Bat Conservation Trust, (2014); 'Artificial lighting and wildlife. Interim Guidance: Recommendations to help minimise the impact artificial lighting.'

<sup>157</sup> Arup, (2014); 'Northstowe Phase 2 Ecological Management Plan.'

requirements for relocation;

- The badger gates and artificial badger sett would be monitored prior to, during and following construction to assess the success of works undertaken and identify any works required; and
- The ponds created within the waterpark would be monitored to ascertain the presence or likely absence of great crested newt and inform requirements for management.

## Residual effects

- 10.6.110 This section reviews the residual effects of likely significant effects on ecological features, or where a significant residual effect has been identified. The residual effects on other ecological receptors are not significant, as summarised in **Table 10.9**.

## Site enabling and construction residual effects

### Improved grassland

- 10.6.111 It is not considered that the loss of improved grassland would be fully mitigated during the implementation of the landscape strategy. Therefore, the residual effect of the loss of improved grassland is **significant adverse** (permanent) at a **parish** scale.

### Arable

- 10.6.112 The loss of arable fields would not be mitigated; therefore the residual effect of the loss of arable fields is **significant adverse** (permanent) at a **parish** scale.

### Hedgerows

- 10.6.113 The use of a variety of native species within the hedgerows, as well as the creation of a network of hedgerows that connect to the existing hedgerows, including along Long Lane and increase connectivity across the site, is expected to result in a **beneficial significant** (permanent) effect on hedgerows at a **parish** scale.

### Buildings

- 10.6.114 The residual effect on buildings is **not significant**, as appropriate roosting habitat for bats would be incorporated into the proposed development, to compensate for the loss of habitat. This work would be managed through obtaining an approved EPS Mitigation Licence, which would ensure that the proposed development is not detrimental to the conservation status of bat species recorded roosting in the buildings at the site (brown long-eared and common pipistrelle bats).

### Bats

- 10.6.115 Undertaking further survey work, prior to construction activities and

obtaining and implementing an EPS Mitigation Licence would ensure that there are **no significant** effects on roosting bats during site enabling and construction. Furthermore, incorporating lighting mitigation would ensure that the residual effect on foraging bats along Long Lane is **not significant**.

### **Badger**

10.6.116 The installation of badger tunnels below the busway within the Main Phase 2 development area would mitigate the effects of the fragmentation of the territories of the blue and orange clans. Furthermore, implementing a badger licence would ensure that works proceed in accordance with the Protection of Badger Act 1992, including the creation of an artificial sett to compensate for the closure of the main sett of the grey clan. The residual effect of fragmentation, the loss of setts and disturbance is therefore **not significant**.

10.6.117 However, it is not expected that the landscape strategy would fully mitigate for the loss of foraging habitat for badgers, with the majority of the territory of the grey clan being replaced with built development. It is possible that the grey clan may not be accommodated within the site. The loss of foraging habitat may cause the size of the territory and/or clan to decrease. This could also lead to damage to sports and school fields due to the creation of snuffle holes. It is possible that, in order to maintain this clan in perpetuity, the artificial sett would need to be created outside the site. The residual effect of habitat loss on badgers is therefore **significant adverse** (permanent) at a **parish** scale.

### **Birds**

10.6.118 The residual effect on the following species is **significant adverse** (permanent), due to habitat loss: quail (**district**); barn owl (**district**); grey partridge (**parish**); lapwing (**parish**); skylark (**parish**); yellow wagtail (**district**); and corn bunting (**district**). These effects are associated with the unmitigated loss of open grassland and arable habitats.

10.6.119 The residual effect on barn owl due to disturbance associated with the barn owl box located adjacent to the site is **significant adverse** (temporary) at a **district** scale.

10.6.120 The installation of nest boxes and incorporation of voids and crevices in the proposed buildings will provide supplementary nesting habitat for birds, as follows:

- The construction of a barn owl tower and installation of barn owl boxes will mitigate for the loss of nesting habitat for this species. While it is expected that there will be a lack of foraging habitat on the site to support this species, the provision of suitable nesting habitat could support one or two pairs that rely on grassland and arable habitats within and outside the site. The residual effect of



the loss of nesting habitat is **not significant**;

- The installation of swift bricks would lead to the creation of new nesting habitat at the site, leading to a **significant beneficial** (permanent) effect at a **parish** scale;
- The inclusion of nesting habitat for starling within the proposed buildings would mitigate for the loss of nesting habitat associated with site demolition and clearance works. This species is often associated with built-up areas and would occur in residential areas and gardens. The landscape strategy and provision of nesting habitat is likely to lead to a **non-significant** effect; and
- The installation of external nest boxes for swallow would mitigate for the loss of nest sites during site demolition. The residual effect is likely to be **not significant**.

10.6.121 A **significant beneficial** effect (permanent) is expected on greylag goose (**parish**), mallard (**parish**) and reed bunting (**parish**) as a result of the creation of new wetland habitats associated with the waterpark. The creation of open water habitats and associated riparian vegetation could attract other notable species to the waterpark, such as teal, gadwall and shoveler. Although this habitat does not provide mitigation for the loss of habitat, it is expected to increase the diversity of bird species at the site.

#### **Great crested newt**

10.6.122 Implementing an EPS Mitigation Licence would ensure that there is no detrimental effect on the conservation status of great crested newt at the Main Phase 2 development area, resulting from clearance works and fragmentation. The construction of amphibian tunnels below the proposed access road in the southern part of the Main Phase 2 development area would maintain connectivity between breeding ponds in the south western and south eastern parts of the barracks, outside the site. The residual effect of fragmentation is therefore **not significant**.

10.6.123 A **significant beneficial** (permanent) effect on great crested newt at a **parish** scale is likely, due to the creation of suitable breeding ponds within the waterpark, in conjunction with suitable terrestrial habitat, which may increase the distribution of great crested newt within the site.

#### **Invertebrates**

10.6.124 The inclusion of elm species within the proposed network of hedgerows is expected to lead to a **beneficial significant** effect on white-letter hairstreak and white-spotted pinion moth at a **parish** scale.

10.6.125 The completion of further surveys targeting grizzled skipper, the pasture with herbivore dung, weedy, disturbed ground and arable margins and the inclusion of appropriate species within the landscape

strategy to target notable invertebrates at the site means that the residual effect on other invertebrates is **not significant**.

## Operational residual effects

### Bats

- 10.6.126 Implementing lighting mitigation would ensure that the residual effect on foraging and commuting bats is **not significant**.

### Badger

- 10.6.127 The implementation of lighting mitigation would alleviate potential effects on badgers due to lighting, particularly since the informal greenways would not be lit, providing areas for badgers to forage at night. The residual effect of disturbance on badgers is therefore **not significant**.

## Cumulative effects

### Northstowe Phase 1

- 10.6.128 Northstowe Phase 1 is being constructed along the northern boundary of the site. A review of the ecology chapter has identified that significant residual impacts have been identified with respect to the loss of grassland habitat (moderate adverse), loss of arable habitat (moderate adverse), creation of new waterbodies and enhancement of Longstanton Brook (moderate beneficial) and loss of skylark habitat (moderate adverse).
- 10.6.129 The loss of arable fields, grassland habitat and skylark territories would result in an adverse cumulative effect in conjunction with the proposed development. Whilst much of the Phase 1 site consisted of short mown grass on the golf course, areas of longer grass were also present. The residual effects associated with the loss of arable fields and improved grassland and the indirect effect on skylark are **significant adverse** at a **parish** scale. It is not considered that Phase 1 of Northstowe would alter the scale at which these effects would take place.

### A14 Improvement Works

- 10.6.130 The planning application for the A14 improvement works has not been submitted, meaning that it cannot be determined whether there are any significant residual effects that could contribute to any cumulative effects.

### Home Farm, Longstanton

- 10.6.131 The baseline reports or ecology chapter are not available, meaning that it is not possible to undertake a cumulative assessment with respect to this scheme.

## Limitations and Assumptions

### Limitations

#### Access Limitations

- 10.6.132 Surveys were not carried out at Larksfield Nursery, as access was not permitted. This part of the site was assessed from aerial photography and is indicated on Figure 10.2. This poses a significant constraint, meaning that further survey work should be carried out in this part of the site, comprising an extended Phase 1 habitat and badger and bat scoping surveys, which may indicate a requirement for bat emergence and return surveys. A provisional assessment has been undertaken with respect to ecological features in this part of the site.

#### Bats

- 10.6.133 The bat scoping survey was predominantly undertaken between July and September 2013, which is not an ideal time to conduct this work as the leaves restrict the view of features that may provide roosting habitat for bats. However, it is considered that this survey provided a robust assessment of the potential of trees to support roosting bats and adequately informed requirements for further survey work. This is therefore not considered to pose a significant limitation.
- 10.6.134 Bats show great variety in their calls depending on the surrounding habitat. Also, species call parameters overlap. As such, it was not always possible to identify bats to species level.
- 10.6.135 The bat tree climbing survey was completed in April, to inform requirements for further survey work. Evidence to indicate the presence of roosting bats is most likely to be present during summer when bats are most active, meaning that signs to indicate the presence of roosting bats from the previous summer may have disintegrated or been removed by wind or rain prior to the survey. However, this survey provided a valuable insight into the potential of trees to support roosting bats and it is likely that evidence of significant roosts would have been recorded. As such, the timing of this survey was not a significant constraint.
- 10.6.136 It was recognised that the weather conditions during the survey undertaken on B22 were not ideal, due to the low temperatures (refer to Appendix F9).

#### Badger

- 10.6.137 Badger surveys should ideally be carried out within 30m of the site boundary, in order to identify any setts located outside the site that could be affected by the proposed development. This was not possible with respect to all boundaries, as access was not granted beyond the survey area. This was not considered to pose a significant constraint, as the majority of areas could be accessed. Furthermore,

the results of surveys undertaken for Phase 1 of the proposed development of Northstowe to the north of the site could be reviewed.

### **Amphibians**

10.6.138 It was also not possible to survey all ponds within 500m of the site and connected to the site via suitable habitat. This data would provide further confidence in the conclusions drawn in this chapter, but this was not considered to pose a significant constraint. The baseline data obtained was considered to be adequate to draw robust conclusions on the importance of the site for great crested newts.

10.6.139 It was not possible to conduct common toad counts at Pond 3 between 13<sup>th</sup> and 24<sup>th</sup> March, during which time it is possible that the number of toads peaked above the 62 recorded on 24<sup>th</sup> March, particularly since zero toads were recorded on 27<sup>th</sup> March. The common toad population size estimate may therefore be conservative.

### **Reptiles**

10.6.140 Artificial refugia were placed at a density of approximately three per hectare of suitable reptile habitat. Although current guidelines recommend placing 5 to 10 mats per hectare, the density of the mats was considered to be sufficient to establish the population and distribution of reptiles on the site. Areas of the site were targeted that provide the most suitable habitat for reptiles.

### **Invertebrates**

10.6.141 Where possible, the butterfly transects were walked during periods of suitable weather (warm and sunny with little or no breeze); however on occasions transects were walked in overcast and slightly breezy conditions. This was not considered to pose a significant constraint, since six surveys were undertaken, the majority of which were undertaken during suitable conditions.

10.6.142 It was overcast and raining during the survey for grizzled skipper, meaning that further survey would be required to confirm the likely absence of this species at the site. Furthermore, the assessment of the value of the arable field margins, weedy, disturbed ground and pasture with herbivore dung for invertebrates has been based on a single visit, meaning that further surveys are required to confirm the importance of these habitats for invertebrates. A precautionary approach has been taken with respect to valuing the invertebrate assemblage at the site, meaning that this is not considered to pose a significant constraint.

### **Assumptions**

10.6.143 The assessment is based on the proposed development descriptions outlined in Chapter 3 of this ES, as well as Sections 10.2 and 10.5

and implementation of mitigation measures.

### **Assessment Summary Matrix**

10.6.144 Table 10.9 is an assessment summary matrix of the ecological effects of the proposed Northstowe Phase 2 development.

**Table 10.9: Assessment Summary Matrix**

<b>Assessment Summary Matrix</b>				
<b>Description of Effects</b>	<b>Significance of Effects: (i.e. Major, moderate, minor negligible, +ve, -ve, D, InD, ST, MT, LT)</b>	<b>Description of Mitigation Measures and Enhancement</b>	<b>Description of Residual Effects</b>	<b>Significance of Residual Effects</b>
<b>Site enabling works and construction assessment</b>				
Loss of improved grassland and the creation of informal greenways	Significant –ve, parish, D, P	None	Loss of improved grassland	Significant –ve, parish, D, P
Loss of neutral semi-improved grassland and the creation of the informal greenways	Not significant	None	Loss and creation of neutral semi-improved grassland	Not significant
Loss of arable fields	Significant –ve, parish, D, P	None	Loss of arable fields	Significant –ve, parish, D, P
Loss of broadleaved plantation woodland	Not significant	None	Loss of broadleaved plantation woodland	Not significant
Loss of broadleaved scattered trees and tree planting	Not significant	None	Loss of broadleaved scattered trees and tree planting	Not significant
Loss of hedgerows and the planting of hedgerows	Not significant	Connecting planted hedgerows with existing network and using native species, including elm	Improvements to the network of hedgerows	Significant +ve, parish, D, P
Loss of buildings (B55 and B80*) and disturbance and harm to roosting bats	Significant –ve, county, D and InD, P	Further survey work, EPS Mitigation Licence and installation of roosting habitat for bats	Loss and creation of roosting habitat for bats	Not significant

Loss of buildings (B2, B89* and B90*) and disturbance and harm to roosting bats	Significant –ve, district, D and InD, P	Further survey work and EPS Mitigation Licence and installation of roosting habitat for bats	Loss and creation of roosting habitat for bats	Not significant
Loss of buildings (B5 and B56) and disturbance and harm to roosting bats	Not significant	Further survey work and EPS Mitigation Licence and installation of roosting habitat for bats	Loss and creation of roosting habitat for bats	Not significant
Disturbance to roosting bats in T158 due to lighting	Not significant	Lighting mitigation, further survey work and EPS Mitigation Licence	None	Not significant
Loss of roosting habitat for bats associated with the clearance of trees*	Significant –ve, district, InD, P	Further survey work and EPS Mitigation Licence	None	Not significant
Disturbance to foraging bats along Long Lane due to lighting	Significant –ve, parish, D, MT	Lighting mitigation	None	Not significant
Disturbance to foraging and commuting bats due to lighting within the Main Phase 2 development area (excluding Long Lane)	Not significant	Lighting mitigation	Temporary disturbance to foraging and commuting bats	Not significant
Loss of foraging and commuting habitat for bats and implementation of the landscape strategy	Not significant	None	Loss and creation of foraging and commuting habitat for bats	Not significant
Loss of foraging habitat and disturbance due to lighting associated with the construction of the access road over Wilson's Road and parallel line of trees within and adjacent to the Southern Access Road (West)	Not significant	Lighting mitigation	Loss of foraging habitat for bats	Not significant
Loss of badger setts and disturbance	Significant –ve, parish, D and InD,	Badger licence	None	Not significant

	P			
Loss of foraging habitat for badger and implementation of landscape strategy	Significant –ve, parish, InD, P	Badger licence	Loss of foraging habitat for badger	Significant –ve, parish, InD, P
Fragmentation of badger territories	Not significant	Installation of badger tunnels under the proposed busway	Maintenance of connectivity to badger territories	Not significant
Loss of brown hare habitat and creation of the informal greenways	Not significant	None	Loss and creation of brown hare habitat	Not significant
Loss of breeding habitat for quail due to the clearance of arable fields	Significant –ve, district, InD, P	None	Loss of breeding habitat for quail	Significant –ve, district, InD, P
Disturbance to barn owl such as to discourage breeding in barn owl box adjacent to the site	Significant –ve, district, D, MT	Lighting mitigation	Disturbance to barn owl such as to discourage breeding in barn owl box adjacent to the site	Significant –ve, district, D, MT
Loss of foraging habitat for barn owl due to the clearance of the grassland habitats and the creation of the informal greenways	Significant –ve, district, InD, P	None	Loss of foraging habitat for barn owl	Significant –ve, district, InD, P
Disturbance to foraging barn owl due to lighting	Not significant	Lighting mitigation	Disturbance to barn owl	Not significant
Loss of breeding habitat for barn owl	Significant –ve, district, D, MT	None	Loss and creation of breeding habitat for barn owl	Not significant
Disturbance to hobby such as to discourage breeding at the site	Not significant	Lighting mitigation	Disturbance to hobby such as to discourage breeding at the site	Not significant
Loss of breeding habitat for grey partridge due to the clearance of arable fields	Significant –ve, parish, InD, P	None	Loss of breeding habitat for grey partridge	Significant –ve, parish, InD, P
Loss of breeding habitat for lapwing due to the clearance or arable fields	Significant –ve, parish, InD, P	None	Loss of breeding habitat for lapwing	Significant –ve, parish,



				InD, P
Loss of breeding habitat for skylark due to the loss of open grassland and arable fields	Significant –ve, parish, InD, P	None	Loss of breeding habitat for skylark	Significant –ve, parish, InD, P
Loss of breeding habitat for turtle dove, spotted flycatcher, song thrush, linnet, yellowhammer, kestrel, stock dove, green woodpecker, common whitethroat, meadow pipit and bullfinch and implementation of the landscape strategy	Not significant	None	Loss and creation of breeding habitat for spotted flycatcher, song thrush, linnet, yellowhammer, kestrel, stock dove, green woodpecker, common whitethroat, meadow pipit and bullfinch	Not significant
Disturbance to nesting and foraging turtle dove, spotted flycatcher, song thrush, linnet, yellowhammer, kestrel, stock dove, green woodpecker, common whitethroat, meadow pipit, bullfinch, starling and yellow wagtail	Not significant	Lighting mitigation	Disturbance to nesting and foraging turtle dove, spotted flycatcher, song thrush, linnet, yellowhammer, kestrel, stock dove, green woodpecker, common whitethroat, meadow pipit, bullfinch, starling and yellow wagtail	Not significant
Loss of breeding habitat for starling due to the demolition of buildings	Not significant	Provision of nesting habitat for starling	Loss and creation of breeding habitat for starling	Not significant
Loss of breeding habitat for yellow wagtail due to the loss of field margins and open grassland and implementation of the landscape strategy	Significant –ve, district, InD, P	None	Loss and creation of breeding habitat for yellow wagtail	Significant –ve, district, InD, P
Loss of breeding habitat for corn bunting due to the clearance of arable fields	Significant –ve, district, InD, P	None	Loss of breeding habitat for corn bunting	Significant –ve, district, InD, P
Disturbance to breeding greylag goose, mallard and reed bunting at the lake	Not significant	Lighting mitigation	Disturbance to breeding greylag goose	Not significant
Provision of nesting and foraging habitat for greylag goose, mallard and reed bunting due to the creation of the waterpark	Significant +ve, parish, InD, P	None	Provision of nesting habitat for greylag goose, mallard and reed bunting	Significant +ve, parish, InD, P

Disturbance to breeding snipe in marshy grassland	Not significant	Lighting mitigation	Disturbance to breeding snipe in marshy grassland	Not significant
Creation of foraging and nesting opportunities for snipe associated with the waterpark and swales	Not significant	None	Creation of foraging and nesting opportunities for snipe	Not significant
Disturbance to breeding swift	Not significant	Lighting mitigation Installation of swift bricks	Creation of breeding habitat for swift	Significant +ve, parish, D, P
Loss of breeding habitat for swallow	Significant –ve, district, InD, P	Installation of nesting habitat for swallow	Loss and creation of breeding habitat for swallow	Not significant
Disturbance and harm to great crested newt, the loss of terrestrial habitat and implementation of the landscape strategy	Not significant	EPS Mitigation Licence	Loss and creation of terrestrial habitat for great crested newt	Not significant
Fragmentation of great crested newt breeding ponds	Significant –ve, parish, InD, P	EPS Mitigation Licence and installation of amphibian tunnels under proposed access road in the southern part of the Main Phase 2 development area	Maintenance of connectivity between breeding ponds	Not significant
Creation of suitable breeding ponds for great crested newt	Significant +ve, parish, D, P	None	Creation of suitable breeding ponds for great crested newt	Significant +ve, parish, D, P
Fragmentation of common toad breeding pond (Pond 3) and harm	Not significant	Installation of amphibian tunnels under proposed access road in the southern part of the Main Phase 2 development area	Fragmentation of common toad breeding pond (Pond 3) and harm	Not significant
Loss of habitat for grass snake and creation of habitat as part of the landscape strategy	Not significant	Ecological watching brief	Loss of habitat for grass snake and creation of habitat as part of the landscape strategy	Not significant
Loss of habitat for common lizard and creation of habitat as part of the	Not significant	Ecological watching brief	Loss of habitat for common lizard and creation of habitat as part of the	Not significant

landscape strategy, disturbance and harm			landscape strategy	
Retention of habitat supporting white-spotted pinion moth and white-letter hairstreak	Not significant	Inclusion of elm species within hedgerows planted across the site	Creation of suitable habitat for white-spotted pinion moth and white-letter hairstreak	Significant +ve, D, P
Loss of habitat for grizzled skipper and creation of informal greenways	Not significant	Grizzled skipper survey	Loss of habitat for grizzled skipper and creation of informal greenways	Not significant
Loss of habitat for notable invertebrates and implementation of the landscape strategy	Significant –ve, district, InD, P,	Terrestrial invertebrate survey	Loss of habitat for notable invertebrates and implementation of the landscape strategy, incorporating suitable plant species	Not significant
<b>Operational assessment</b>				
Disturbance to roosting, foraging and commuting bats due to lighting	Significant –ve, parish, D, P	Lighting mitigation	Disturbance foraging and commuting bats due to lighting	Not significant
Disturbance to foraging badger due to lighting	Significant –ve, parish, D, P	Lighting mitigation	Disturbance to foraging badger due to lighting	Not significant
Harm to wildlife attracted to the attenuation ponds	Not significant	Mitigation for pumping mechanism	None	Not significant
Disturbance to foraging and breeding birds	Not significant	Lighting mitigation	Disturbance to foraging and breeding birds	Not significant
<i>Key: +ve (beneficial), -ve (adverse), D (direct), InD (indirect), ST (short term), MT (medium term), LT (long term), P (permanent), R (reversible) *provisional assessment due to the lack of baseline survey information</i>				

## 11 Geology, Hydrogeology and Soils

### 11.1 Introduction

11.1.1 This chapter assesses the likely significant effects of the proposed Northstowe Phase 2 development in terms of geology, hydrogeology and soils. The chapter identifies key receptors and the direct and indirect impact of the proposed Northstowe Phase 2 development on these.

### 11.2 Review of Proposed Development

11.2.1 Within the construction of the proposed development, soils would be excavated and would, wherever possible, be re-used within the development. To ensure that the soils are suitable for the proposed use, an assessment against appropriate criteria would be required.

### 11.3 Approach and methods

11.3.1 The assessment considers the sensitivity at the proposed development and the surrounding area in relation to identified receptors.

11.3.2 To identify issues related to the construction and operation of the proposed development baseline conditions in relation to geology, hydrogeology and soils were established through a review of available information.

#### Legislation and guidance

11.3.3 The impact assessment has been undertaken in accordance with the current international and national legislation, and national, regional and local plans, and policies relating to geology, hydrogeology and soils in the context of the proposed development. A summary of the relevant legislation and policies are provided in Table 11.1.

**Table 11.1: Summary of legislation and policies**

Policy / Legislation	Summary of Requirements
The Environmental Protection Act 1990	The Environmental Protection Act 1990 (EPA) defines, within England and Wales and Scotland, the fundamental structure and authority for waste management and control of emissions into the environment. The Act was intended to strengthen pollution controls and support enforcement with heavier penalties. Before the Act there had been separate environmental regulation of air, water and land pollution and the Act brought in an integrated scheme that would seek the "best practicable environmental option.
The Statutory Guidance on Part IIA of the	Part IIA of the Environmental Protection Act 1990 – which was inserted into that Act by section 57 of the Environment Act 1995 – provides a regulatory regime for the identification and remediation

Policy / Legislation	Summary of Requirements
Environmental Protection Act 1990 as set out in Defra Circular 01/2006	<p>of contaminated land. In addition to the requirements contained in the primary legislation, operation of the regime is subject to regulations and statutory guidance.</p> <p>The main objective underlying the introduction of the Part IIA contaminated land regime was to provide an improved system for the identification and remediation of land where contamination is causing unacceptable risks to human health or the wider environment, assessed in the context of the current use and circumstances of the land.</p>
National Planning Policy Framework	<p>The NPPF makes reference to land contamination, whereby local policies and decisions should ensure that for new development on a site, the site should be suitable for its new use taking account of ground conditions, pollution arising from previous uses and any proposals for land remediation.</p> <p>Section 11 of the Framework deals with conserving and enhancing the natural environment. This includes a requirement that the <i>'local planning authorities should take into account the economic and other benefits of the best and most versatile agricultural land. Where significant development of agricultural land is demonstrated to be necessary, local planning authorities should seek to use areas of poorer quality land in preference to that of a higher quality.'</i></p> <p>The local planning authority should also <i>'put in place policies to ensure ...(safeguarding the long term potential of best and most versatile agricultural land and conserving soil resources) ...'</i></p> <p>The NPPF also has, as one of its core planning principles, the promotion of <i>"mixed use developments, and encourage multiple benefits from the use of land in urban and rural areas, recognising that some open land can perform many functions (such as for wildlife, recreation, flood risk mitigation, carbon storage, or food production)"</i>. The sustainable re-use of soil materials will support this objective.</p>
The Environment Agency's Model Procedures for the Management of Land Contamination	<p>Contaminated Land Report 11 (CLR 11) has been developed to provide the technical framework for applying a risk management process when dealing with land affected by contamination. The process involves identifying, making decisions on, and taking appropriate action to deal with land contamination in a way that is consistent with government policies and legislation within the UK. The document is consistent with the approach presented within the "Guidelines for Environmental Risk Assessment and Management" published by the Department of the Environment, Transport and the Regions, the Environment Agency and the Institute for Environment and Health (2000).</p>
The Water Resources Act 1991	<p>The Water Resources Act 1991 replaced the corresponding sections of the Water Act 1989. The Act sets out the responsibilities of the Environment Agency in relation to water pollution, resource management, flood defence, fisheries, and in some areas, navigation. The Act regulates discharges to controlled waters, namely rivers, estuaries, coastal waters, lakes and groundwaters.</p>
Groundwater Regulations 2009	<p>The Groundwater Regulations are an environmental protection measure which complete transposition of the Groundwater Directive (80/68/EEC) and provide enhanced protection for groundwater. Under the Regulations, the Environment Agency has responsibility for the enforcement of the Regulations and decisions of their scope and effect.</p>

Policy / Legislation	Summary of Requirements
Water Framework Directive, 2000	The Directive implements goals to improve water quality (surface water and groundwater) and drives sustainable use of water. Goals are set out in each Water Basin Management Plan.
Environmental Permitting (England & Wales) Regulations	The Environmental Permitting (England and Wales) Regulations were created to standardise environmental permitting and compliance in England and Wales to protect human health and the environment. The regulations largely replace the Environmental Protection Act 1990 on pollution prevention and control and the Waste Management Licensing Regulations 1994 on waste management. The regulations create an environmental permitting system that replaces waste licences and pollution prevention and control permits in England and Wales, without changing the operating conditions already contained in existing permits. The Environment Agency and local councils enforce the regulations in England and Wales.
CL:AIRE The Definition of Waste: Development Industry Code of Practice	<p>This Code of Practice (CoP) provides best practice for the development industry to use when assessing if materials are classified as waste, or not, and determining when treated waste can cease to be waste for a particular use. The CoP provides engineers, contractors, consultants and developers a basis upon which to demonstrate to the Environment Agency that they are following best practice with respect to the use and reuse of materials. It provides an auditable system to demonstrate that the CoP has been adhered to on a site by site basis. The development and use of the CoP is seen as a Better Regulation Approach by the EA.</p> <p>The CoP requires a normal risk assessment based approach (see CLR 11 above) to prove that materials are “suitable for use”. Where materials are not considered to be waste the Environmental Permitting Regulations (2007) need not be applied. Soils requiring treatment to allow their re-use are considered to be waste. Such treatment processes must be undertaken under an appropriate Mobile Treatment Permit. The CoP allows the user to demonstrate when wastes have been fully recovered, via treatment, and hence cease to be waste.</p> <p>The CoP requires regulatory agreement for each stage of the works. This is best achieved via a formal planning consent with appropriate conditions attached to the investigation, assessment and remediation. Approval is effectively obtained by discharge of the planning conditions that require regulatory agreement of:</p> <ul style="list-style-type: none"> <li>Remediation Strategy.</li> <li>Remediation Method Statement.</li> <li>Verification Report.</li> </ul>
Environment Agency Pollution Prevention Guidance Notes	<p>The Environment Agency has produced a range of Pollution Prevention Guidance Notes (PPGs) to provide advice on the laws and good environmental practice relevant to a number of industrial sectors and activities. These include the following:</p> <ul style="list-style-type: none"> <li>PPG1 – General guide to the prevention of pollution</li> <li>PPG2 – Above ground oil storage tanks</li> <li>PPG5 – Works and maintenance in or near water</li> <li>PPG6 – Working at construction and demolition sites</li> <li>PPG8 – Safe storage and disposal of used oil</li> <li>PPG13 – Vehicle washing and cleaning</li> </ul>

Policy / Legislation	Summary of Requirements
	PPG21 – Pollution incident response planning
SCDC's "District Design Guide: High Quality and Sustainable Development in South Cambridgeshire.	The purpose of this District Design Guide is to ensure delivery of sensitively and appropriately designed, sustainable developments. This document sets out important design principles based on recognised good practice and explains key requirements of the District Council that will be taken into account when considering planning proposals. Details are provided within the Guide on the geology, topography and historical development of the Cambridgeshire area.
A Strategy for England; Safeguarding Our Soils	<p>The Strategy for England sets out the Governments aims in relation to protecting agricultural soils and in relation to protecting the soil resource during construction and development. This includes a requirement that planning decisions take sufficient account of soil quality, particularly where significant areas of the best and most versatile (BMV) agricultural land are involved.</p> <p>The presence of BMV agricultural land is stated to be a material consideration in planning decisions, but has to be taken into account alongside other sustainability considerations including: biodiversity, the quality and character of the landscape, accessibility to infrastructure, workforce and markets and maintaining viable communities.</p> <p>Within the Strategy there is an aim of encouraging better management of soils during the construction process. Linked to this is the Construction Code of Practice for the sustainable re-use of soils on construction sites, also published by Defra to protect soil resources disturbed on construction sites. Whilst the Code is not legislatively binding, the wider benefits of following the guidance (in terms of sustainability, cost savings and waste controls) are clearly set out.</p>

11.3.4 Whilst there is no specific legislation for the protection of soils, as well as the documents listed above there are a number of relevant guidance documents. Guidance on classifying agricultural land is contained within Agricultural Land Classification (ALC) of England and Wales, Revised guidelines and criteria for grading the quality of agricultural land (MAFF, 1988)<sup>158</sup>, and this has been summarised in Natural England's TIN 049<sup>159</sup>.

11.3.5 Best practice guidance on soil handling and management during the construction phase is found in MAFF's Good Practice Guide for Handling Soils (2000)<sup>160</sup> as well as the Construction Code referenced above.

<sup>158</sup> MAFF (1988) Agricultural Land Classification of England and Wales, Revised guidelines and criteria for grading the quality of agricultural land

<sup>159</sup> Natural England (2012) Technical Information Note TIN049 (Second Edition) Agricultural Land Classification: protecting the best and most versatile agricultural land

<sup>160</sup> MAFF (2000) Good Practice Guide for Handling Soils

## Study Area

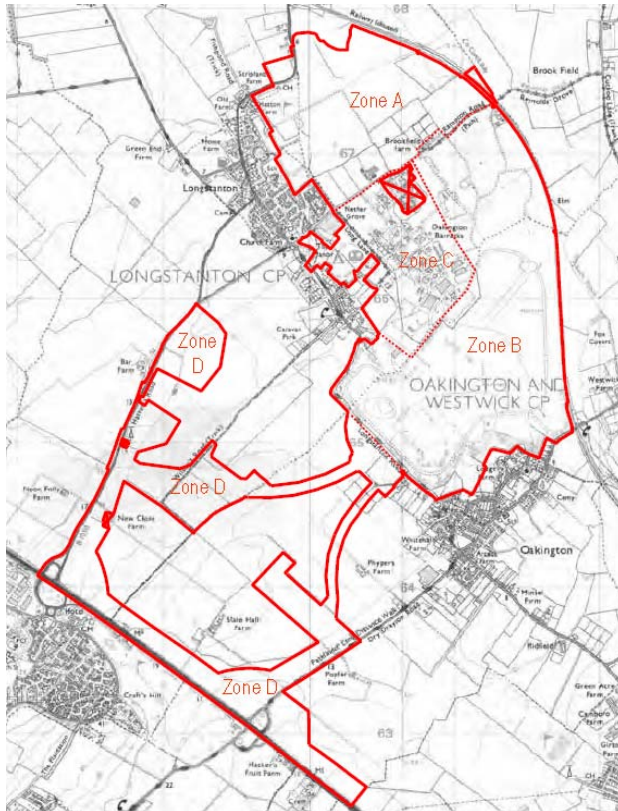
- 11.3.6 The study area is the red line boundary of the proposed Northstowe Phase 2 development (Figure 1.1), however consideration is given to activities within 500m of the boundary e.g. landfill site which may have an impact on the proposed development.

## Methodology

- 11.3.7 The assessment of potential impacts on geology, hydrogeology and soils has consisted of the following;
- Review of published and internet-based information sources such as Environment Agency (EA) database, historical maps and British Geological Survey (BGS) database, published soil and ALC (Agricultural Land Classification) maps and topographic information.
  - Information obtained from consultation with the EA and SCDC.
  - An assessment of previous site-specific Agricultural Land Classification surveys (as presented in the Northstowe Phase 1 ES, Chapter 13, 2012). The data presented in that ES remains valid and it is highly unlikely that the ALC grades will have changed. This includes the following previous work:
    - N.A. Duncan & Associates, Agricultural Land Classification - Oakington Airfield, Cambridgeshire, November 2001;
    - McRae Associates, Agricultural Land Classification – Northstowe New Town, October 2004 (please refer to Appendix 13.2);
    - DEFRA, Agricultural Land Classification of Noon Folly Farm, Bar Hill (RDS Ref 02591) (please refer to Appendix 13.3);
    - DEFRA, Agricultural Land Classification of Grange Hill Farm, Bar Hill (RDS Ref 04491) (please refer to Appendix 13.4);
    - DEFRA, Agricultural Land Classification of Slate Hall Farm, Bar Hill (RDS Ref 07089) (please refer to Appendix 13.5);
    - DEFRA, Agricultural Land Classification of Land North of the A14 (RDS Ref 03391) (please refer to Appendix 13.6);
    - Jonathan Dickins Consulting, A Report on Cambridge Golf Club, April 2004; and
    - Edafos & N A Duncan & Associates, Supplementary Agricultural Land Classification – Northstowe, May 2005.
  - An assessment of chemical analytical data obtained during previous ground investigations undertaken by WSP. The WSP investigations were undertaken across the site between 2005 and 2007. For the purpose of evaluation the site was divided into four zones as detailed below and illustrated on Plan 1 below;



- Zone A – Cambridge Golf Course and Driving Range and farmland;
- Zone B – Airfield;
- Zone C – former barracks of the airfield; and
- Zone D – open farmland between A14, Hatton's Road and Dry Drayton Road.



Plan 1: Plan showing the 4 Zones across the Northstowe Development – taken from WSP Interim Factual Report Zone A.

Please note that the red line boundary is different from the submitted application, however the extent of the study area means that the findings remain valid for the submitted application.

11.3.8 Interim Factual Reports were prepared by WSP for each zone detailing the work undertaken and providing the analytical results for each zone. The data from these factual reports has been assessed to determine the land quality risks across the proposed Phase 2 development. This is detailed within the Hyder interpretative report <sup>161</sup> which is included in the Geo Environmental Assessment and Outline Remedial Strategy (Submitted with the Planning Application). The 2007 WSP Reports are appended to this interpretative report.

11.3.9 The assessment in relation to contaminated land follows the concept of contaminant linkages (source-pathway-receptor) using current guidance such as EA Model Procedures for the Management of Land Contamination (CLR11)<sup>162</sup> and other relevant supporting guidance. This identifies if there is any potential for a link between a source of contamination and a sensitive receptor, resulting in a significant

<sup>161</sup> Hyder Consulting (UK) Limited (2014) Northstowe Phase 2 – Geo Environmental Assessment and Outline Remedial Strategy Report

<sup>162</sup> Environment Agency (2004) Model Procedures for the Management of Land Contamination (CLR11)

effect.

- 11.3.10 Receptors identified in relation to this chapter are considered to be;
- Geological and soils resources in and around the scheme;
  - Existing Residents (Rampton Drift and in surrounding area) and future Residents and /or Commercial users; and
  - Controlled Waters (groundwater beneath the site and surface water features).
- 11.3.11 Apart from the EIA Regulations, there are no legislative requirements governing the assessment of agricultural matters, and the framework of any assessment is derived from a combination of EU and national agricultural and land use policies and measures the conservation of the best and most versatile (BMV) resources of agricultural land.

## Significance criteria

### Geology and Hydrogeology significance criteria

- 11.3.12 The significance criteria for geology and hydrogeology are based on the criteria set out in the DMRB.
- 11.3.13 The significance of the identified effects are based on the sensitivity of the receptor taking into account the magnitude of the potential impact.
- 11.3.14 The assessment process comprises a number of stages. The first stage involves assigning a value to receptors identified as detailed in Table 11.2 below.

**Table 11.2: Definitions of Sensitivity**

Level of Sensitivity	Criteria / Receptor	Typical Examples
High	Feature or attribute of high quality and rarity, important at a regional, national or local scale. Human health receptors.	Examples include: geological strata that is rare and or internationally or nationally important; Principal aquifer providing a regionally or locally important resource or supporting site protected under EC and UK habitat legislation, river ecosystem, that supports a potable water supply or an industrial/agricultural abstraction of > 500m <sup>3</sup> /day Source Protection Zone (SPZ) 1 or 2. Human health receptors include residential, allotment and play areas, construction workers.
Medium	Feature or attribute of medium quality and rarity, important at a local scale. Human health receptors.	Examples include: a water feature that supports an abstraction for agricultural or industrial use of between 50 and 499m <sup>3</sup> /day; a locally important geological strata; Aquifer providing water for agricultural or industrial use with limited connection to surface water, SPZ3. Human

Level of Sensitivity	Criteria / Receptor	Typical Examples
		health receptors include users of open space or landscaped areas.
Low	Feature or attribute of low quality and rarity, important at a local scale. Human health receptors.	Examples include: a water feature that supports an abstraction for agricultural or industrial use of < 50m <sup>3</sup> /day; Geology typical of the wider area; Unproductive strata; not in an SPZ; and non-conventional/low grade materials. Human health receptors include hard surface end users e.g. industrial site, car parking.

11.3.15 The magnitude of the effect on the baseline conditions can then be assessed considering the scale, extent of change, nature and duration of effect. The characterisation of magnitude will depend on the impact type as shown in Table 11.3 which provides definitions of the magnitude used for the purposes of this assessment.

**Table 11.3: Definitions of Magnitude**

Level of Magnitude	Criteria	Typical Example
High	Results in loss of feature or attribute and/or quality and integrity of the feature or attribute.	Geology: Loss of or extensive change to nationally important strata / complete loss of mineral resource. Hydrogeology: Loss of, or extensive change to an aquifer. Potential high risk of pollution to groundwater from routine runoff or spillage. Loss of, or extensive change to, groundwater supported designated wetlands. Human Health: Significant harm is likely to arise from an identified hazard at the site without appropriate remedial action.
Medium	Results in loss of part of the feature or attribute and/or effect on the quality and integrity of feature or attribute.	Geology: Loss of or major change to regionally important strata / significant loss of mineral resource. Hydrogeology: Partial loss or change to an aquifer. Potential medium risk of pollution to groundwater from routine runoff or spillage. Partial loss of the integrity of groundwater supported designated wetlands. Human Health: It is possible that without appropriate remedial action, harm could arise to a designated receptor but it is relatively unlikely that any such harm would be severe and if any harm were to occur, it is likely that such harm would be relatively mild.
Low	Results in some measurable change to the feature or attribute quality and integrity.	Geology: Minor loss or minor change to locally important strata/ partial loss of mineral resource. Hydrogeology: Potential low risk of pollution to groundwater from routine runoff or spillage. Minor effect on groundwater supported designated wetlands. Human Health: It is possible that significant harm could arise to a designated receptor from an identified hazard but it is likely that at worst this

Level of Magnitude	Criteria	Typical Example
		harm if realised would normally be mild.
Negligible	Results in effect on feature or attribute, but of insufficient magnitude to affect the quality and integrity, or no effect.	Geology: No or insignificant effect on strata. Hydrogeology: No predicted change in quality of any type of aquifer and/or its use as a resource. Human Health: There is a low possibility that harm could arise to a receptor. In the event of such harm being realised, it is not likely to be severe.

11.3.16 Using these definitions, a combined assessment of sensitivity and magnitude can then be undertaken to determine how significant an effect is, as demonstrated in 11.4 below. Where effects are usually considered significant, they have been shaded: effects can be either beneficial or detrimental.

**Table 11.4: Table Significance Matrix**

		Low	Medium	High
		SENSITIVITY		
MAGNITUDE	High	Moderate	Major / Moderate	Major
	Medium	Minor / Moderate	Moderate	Major / Moderate
	Low	Minor	Minor / Moderate	Moderate
	Negligible	Negligible	Negligible	Negligible

### Agricultural Land significance criteria

11.3.17 In relation to agricultural land, current best practice and professional judgement are used to define significance criteria in relation to agricultural land. The relative importance or sensitivity of the agricultural land that would be affected by the development can be based on the ALC grades, as set out in Table 11.5.

**Table 11.5: Sensitivity of agricultural land based on ALC grades**

ALC Grade	Sensitivity
Grades 1, 2 and 3a	High
Grade 3b	Medium
Grades 4 and 5	Low

11.3.18 Historical and current best practice and guidance is used to define the magnitude of impacts, as set out in Table 11.6.

**Table 11.6: Magnitude of impact based on land take**

Magnitude of impact	Agricultural land take (ha)
High	>20
Medium	5-20
Low	<5

11.3.19 The significance of impact can then be calculated as shown in Table 11.7.

**Table 11.7: Significance Matrix for agricultural land**

Sensitivity of Receptor	Magnitude of change		
	High	Medium	Low
High	Major	Moderate	Minor
Medium	Moderate	Minor	Negligible
Low	Minor	Negligible	Negligible

## 11.4 Consultation

11.4.1 Consultation has been undertaken with the follow bodies:

- **Environment Agency (EA).** Correspondence was sent to EA on 29 January 2014. A response was received which is in Appendix G1, providing relevant details which has been incorporated into the baseline conditions discussed later in this chapter.
- **Cambridgeshire County Council.** A response was received from David Roberts (Waste Services) on 17 February 2014, which advised contact with South Cambridgeshire District Council or the EA for any relevant information.
- **South Cambridgeshire District Council (SCDC).** Correspondence was sent to SCDC on 10 June 2014. A response was received from Helen Bord (Scientific Officer on 23 June 2014) which is included in Appendix G1 and the information has been included within the baseline conditions discussed later in this chapter.
- A telephone conversation was had with SCDC Trading Standards (25 June 2014) to establish if they had records regarding fuel storage tanks on site. As the site was not selling fuel they would not have any records.

- A response was received from SCDC via the scoping opinion which confirmed agreement that ground contamination is a potentially significant effect and should be included in the ES.
- **British Geological Survey (BGS).** Correspondence was sent to BGS on 13 June 2014. Their response was to review the information presented on their website (<http://www.bgs.ac.uk/>). This has been undertaken and relevant information included in the baseline conditions.
- **Natural England.** Correspondence was sent to Natural England on 13 June 2014. A response was received on 23 June which is included in Appendix G1. This referred to information stored on the Magic website ([www.magic.gov.uk](http://www.magic.gov.uk)).

## 11.5 Baseline conditions

### Site History

- 11.5.1 The site history and that of the surrounding area has been researched from historical maps and photographs contained within the 2007 WSP Reports and an internet based search. The maps date from 1881 to 2014 and are included in within the 2007 WSP Reports which are appended to the Geo Environmental Assessment and Outline Remedial Strategy report , 2014 (submitted with the planning application).
- 11.5.2 It is not the intention to provide a full history of the site, but to identify those past uses on and within the vicinity of the site that could have resulted in contamination of the sub soils of the site. Table 11.8 summarises the site history.

**Table 11.8: Summary of Historical Development**

Date	Historic Development
1891 - 1939	<p>The site comprised predominantly flat low lying agricultural fields with the exception of a slightly raised area of ground towards the southern end of the site, near to a corn mill (1903-1938). Inholme Farm (1891-1927) is indicated on northern part of the site.</p> <p>Several suspected gravel and sand pits are indicated and across the site.</p> <p>The villages of Longstanton and St Michael are visible on the 1891 map to the west with the Cambridge to St Ives railway line to the east. Oakington Station is identified on the edge of the south eastern corner of the site, and Longstanton Station is present to the north.</p> <p>No evidence of the airfield is noted on the plans.</p>
1939 - 1945	<p>The Oakington Barracks and Airfield were developed in 1939. The airfield was used by medium and heavy bombers.</p> <p>Photographs from September 1940 indicate the presence of the airfield perimeter track and infrastructure in the bomb storage area (northern part of site), buildings (H type blocks) within the barracks area, aircraft hangars, store buildings and offices.</p> <p>By 1941 further development has occurred within the barracks area and hardstanding is evident on the perimeter track, runway and aircraft</p>

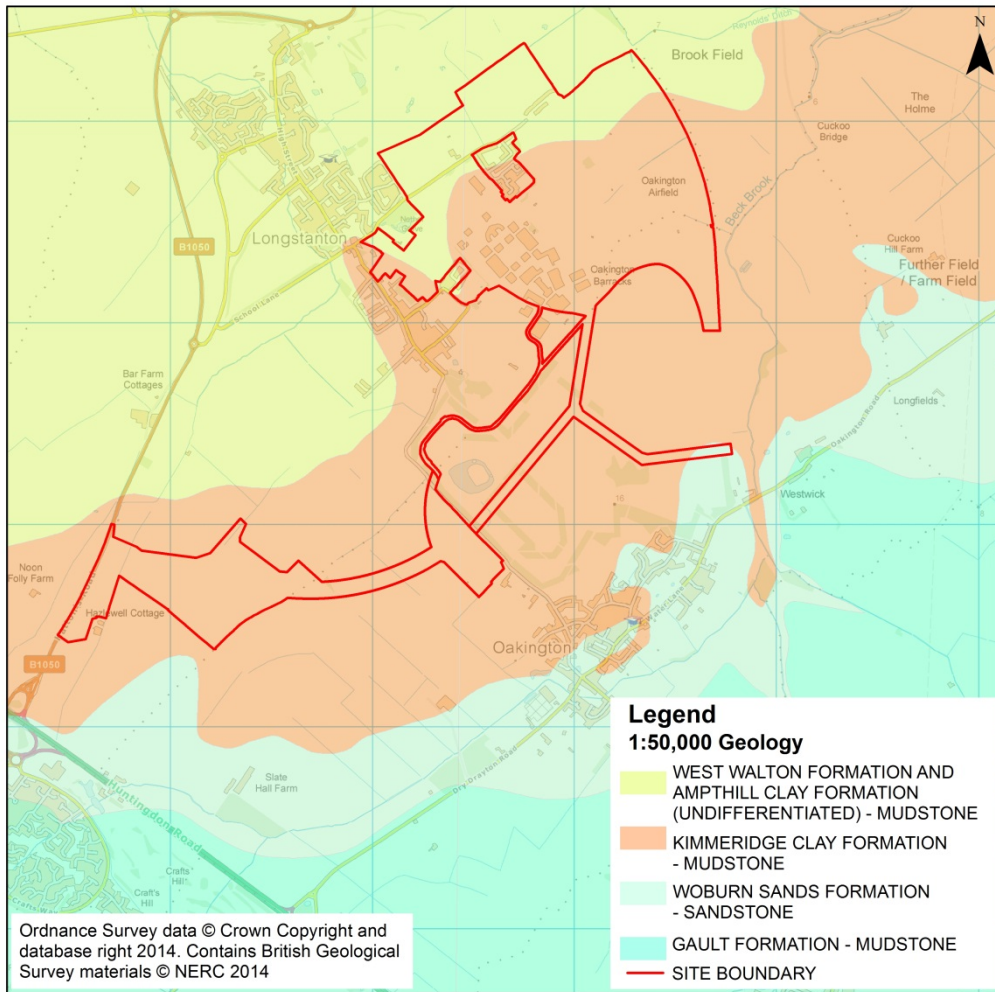
	<p>dispersals have been developed.</p> <p>In a photograph from April 1942 all three runways are completed. Further developments across the site occur throughout the war time period.</p> <p>Records show that the site was bombed on several occasions and additional evidence confirms a number of aircraft crashed on site.</p>
1945 - 1958	<p>By 1958 the airfield is evident on the maps, along with the adjacent supporting buildings.</p> <p>Further developments occur on site such as the main stores, hardstanding areas adjacent to the hangars (1953).</p> <p>Between 1955 and 1968 Rampton Drift residential housing was developed. The layouts of the bomb storage areas are also evident.</p> <p>An archaeological find is marked on the control part of the site near to the main hangers.</p> <p>After the war the RAF used the airfield initially for transport command, then as a Flight Training School and advanced Flight Training School. Aircraft movements from the airfield reached their highest numbers during the early 60's.</p> <p>The sewage works is marked in the north east corner of the site.</p>
1958 - 1999	<p>Between these dates Oakington Airfield does not change significantly from the layout identified in the 1958 maps except that a number of the runways have been shortened or removed.</p> <p>The structure of the two bomb storage and loading bays on the northern part of the site appear to have gone by 1968 and by 1973 the southwest to northeast runway had been removed.</p> <p>In 1975 the site was handed to the Army from the RAF and was used as a barracks for the Royal Anglican Regiment. The barracks was closed in 1999.</p> <p>The 1997 map identifies a man-made lake at the western side of the airfield (Military Lake).</p> <p>The residential housing of Rampton Drift expanded southwards between 1975 and 1983.</p>
2000 – 2010	<p>Part of the northwest section of the site was converted into a Home Office Immigration Centre.</p>
2000 - 2014	<p>Since the closure of the base, the site has been “mothballed” and is maintained behind a security fence. The majority of buildings have been demolished to ground floor level.</p>

## Geology

### Published Geology

- 11.5.3 From published BGS geological maps (Sheet 187, Scale 1:50,000), the geology at the site comprises superficial deposits of Alluvium and River Terrace Deposits. The Upper Jurassic clays such as Kimmeridge Clay Formation and Ampthill Clay Formation outcrop in the northern section and underlie the site as a whole at depth. Lower Greensand is present on the south-eastern boundary of the site. Figure 11.1 below shows the solid geology across the proposed development.

Figure 11.1: Solid Geology across the proposed development

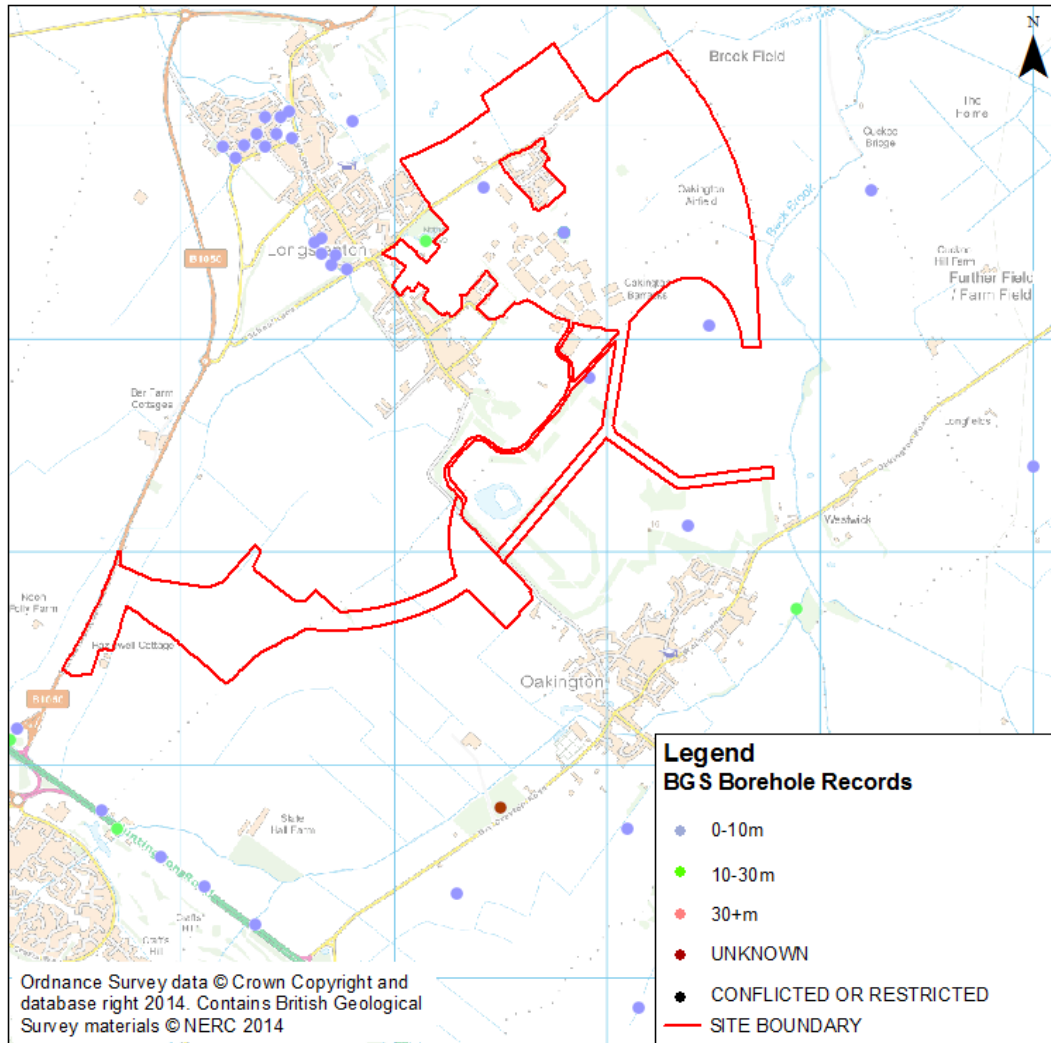




## BGS Boreholes

11.5.4 Boreholes contained on the BGS website have been reviewed to obtain additional information regarding the geology on the proposed development and surrounding area. Figure 11.2 indicates that there are a number of boreholes within the site boundary and several are within Longstanton to the east.

**Figure 11.2: Extract from BGS website illustrating the boreholes previously drilled on the proposed development**



11.5.5 The boreholes located within the site boundary were mainly drilled in 1977 (blue dots) and encountered a sequence of topsoil, River Terrace Deposits (RTD) over Kimmeridge Clay. The RTD were encountered at depths ranging from 0.8-1.4m depth and varied in consistency, consisting of sandy gravel to very clayey pebbly sand. The Kimmeridge Clay was recorded at depths between 1.7m and 7.0m. Groundwater was encountered between 7.5m and 8.5m depth, however in one location no groundwater was encountered.

- 11.5.6 The borehole (green dot) to the west of Rampton Drift was drilled in 1997 for the Cambridge Fish Preservation and Angling Society. It was drilled to 20m depth and installed with a standpipe. Groundwater was encountered at 1.8m, 5.60m and 13.0m depth. The rest water level on completion was 6.81m.

## Encountered Geology

- 11.5.7 The following section provides a summary of the ground conditions encountered in the WSP ground investigations in each zone. Full details are provided in the 2007 WSP reports (appended to the Hyder interpretative report (Submitted with the Planning Application)).

### Zone A

- Made Ground was encountered to a depth of 0.4m in BHA7 which is located on the boundary of Zone A and Zone C and in the vicinity of the area previously used for a bomb storage area (which is in the northern part of Zone B). The Made Ground comprised dark brown slightly sandy gravelly clay with brick, granite and flint gravel.
- River Terrace Deposits were encountered mainly on the eastern side of this area to 8m depth and were predominantly medium dense to dense orange brown sandy flint and chalk gravel, sand and gravel or gravelly sand with variable amounts of clay.
- Ampthill Clay was encountered beneath the River Terrace Deposits in the east or at shallow depth in the western part of this zone. A maximum depth of 8.2m was recorded but the base was not proven (thickness >6.9m). The strata was described as firm to hard grey or blue grey clay and occasionally mottled brown or orange brown with bands of siltstone in places. Slightly sandy with selenite (gypsum) at some locations and fissured.

### Zone B

- Made Ground was encountered to a maximum depth of 3.7m, which was in an earth mound (TPB108) and therefore not representative for this zone. Where made ground was encountered this was generally less than 1m in depth and was mainly associated with the former runway and infrastructure. This strata was highly variable and comprised clay with variable amounts of sand or sand with differing amounts of clay and gravel. The gravel included brick, concrete roof slate, glass, metal fragments, burnt timber. Several areas of deeper made ground (to 2.9m depth) were encountered to the south of this zone (outside the development application boundary) which were associated with the backfilling of former mineral extraction pits.
- River Terrace Deposits were encountered to depths of 7m bgl. This strata was encountered beneath the topsoil at the majority of locations. This was generally orange or brown with variable amounts of clay, sand and gravel.

- Ampthill Clay and Kimmeridge Clay was encountered beneath the superficial deposits but the depth of these strata were not proven. The Ampthill Clay was grey / blue with bands of light grey very weak to moderately strong siltstone at some locations. The Kimmeridge Clay was stiff to very stiff grey / blue clay with occasional mottled brown or yellow clay with bands of grey weak to moderately strong siltstone. Selenite crystals, pyrite and fossil shell fragments were observed.

### **Zone C**

- Made Ground was encountered to a maximum depth of 2.7m bgl. This generally comprised granular sub-base beneath hardstanding including concrete slabs or granular reworked natural strata with flint, brick, concrete, clinker, coke, tarmac and cobbles of brick.
- The River Terrace Deposits were encountered to 7m bgl. This strata was variable in nature and was occasionally clayey gravelly sand, sand and gravel or sandy gravel interbedded with grey mottled orange sandy silt or clay. Gravel was flint or chalk. Locally organic material (wood fragments, organic clays/ silts / peat) was encountered.
- Soils from the Ampthill Clay and Kimmeridge Clay were as described above in Zone B.

### **Zone D**

- Made Ground was encountered to a maximum thickness of 0.9m and comprised Soft to firm or firm dark brown sandy gravelly clay containing flint, chalk, brick and plastic sheeting or stiff reworked sandy clay
- The River Terrace Deposits were encountered to a depth of 5.0m and were highly variable in strength and colour but generally comprising clay with variable amounts of sand and flint and chalk gravel. Occasionally granular in nature comprising sand with a variable gravel and clay content.
- Gault Clay was encountered on the southern part of the site to a depth of 0.9m and was described as soft to stiff grey occasionally mottled yellow or orange clay, Pyrite crystals and fossils present at some locations.
- Lower Greensand was encountered to a depth of 7m, but in some locations the depth was not proven. Variable in colour but generally orange, dark brown to dark grey, dark green / grey or dark green / brown. The strata comprises generally fine to medium or fine to coarse glauconitic and arenitic sand or poorly cemented sandstone with variable amounts of clay and gravel. Gravel was generally found to comprise fine to medium, sub-angular to subrounded flint and quartzite.
- Soils from the Ampthill Clay and Kimmeridge Clay were encountered near to the surface in the northern part of the site and are as described above in Zone B above.

- 11.5.8 Cross sections across the zones are provided within the corresponding 2007 WSP report which are appended to the Geo Environmental Assessment and Outline Remedial Strategy (Submitted with the Planning Application).

## Hydrogeology

### Aquifer Status

- 11.5.9 The EA “What’s-in-Your-Backyard” database indicates that the bedrock underlying the site is designated as an unproductive strata.
- 11.5.10 The superficial drift deposits underlying the site are designated with Secondary A aquifer status. These are described as “permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.”
- 11.5.11 According to the EA database, the site is not located within a Groundwater Source Protection Zone.

### Hydraulic Regime

- 11.5.12 Groundwater flow across the site is thought to largely be contained within the sand and gravel lenses in the River Terrace Deposits. On the northern half of the site, groundwater flow is likely to be to the north and northeast and it is considered likely that groundwater is in continuity with Beck Brook (50m) to the east of the site.
- 11.5.13 On the southern half of the site, the groundwater flow is likely to be influenced by the presence of Oakington Brook and Longstanton Brook on the southern and north western parts of the site respectively. Groundwater flow on the south-eastern half of the site is to the east or southeast, and on the north-western half of the site it is generally to the north or northeast.
- 11.5.14 Groundwater contour maps are included in the WSP 2007 reports which are appended to the Hyder interpretative report (Geo Environmental Assessment and Outline Remedial Strategy submitted with the Planning Application).

### Groundwater Quality

- 11.5.15 Correspondence from the EA (Appendix G1) indicated that elevated hydrocarbon (TPH) contamination has been encountered from groundwater samples (sand and gravels / river terrace deposits) associated with the Phase 1 Northstowe development (Outline application S/0388/12/OL).

## Groundwater and surface water abstractions

- 11.5.16 There is one licensed groundwater abstractions present within the proposed development. This is located near to the northern boundary of the site at Larkfield, Rampton Road, Longstanton (NGR 540394, 266900). It is operated by Hayden for spray / irrigation and the groundwater is taken from the fluvial sands and gravel strata.
- 11.5.17 From correspondence with the EA there is only one further abstraction within 1km of the site. This is operated by Cambridge Golf Club on Station Road, Longstanton (NGR:539943, 267239) approximately 400m to the north west. This is used for spray / irrigation and the groundwater is abstracted from the fluvial sands and gravel strata.

## Hydrology

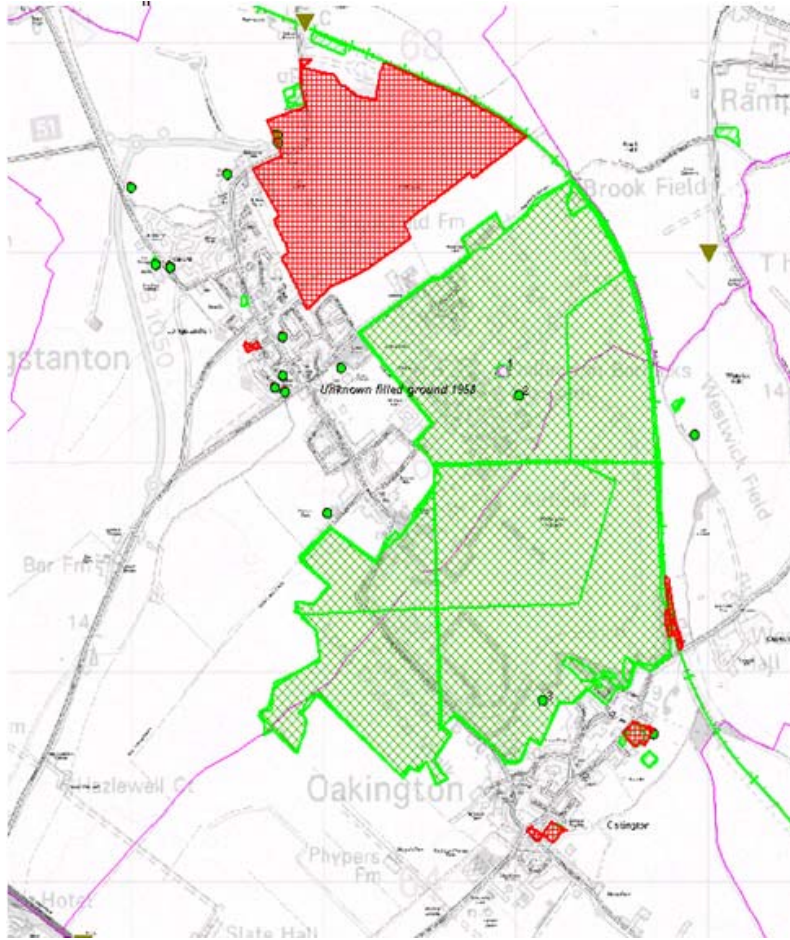
- 11.5.18 A detailed description of the baseline hydrology is contained within Chapter 12.
- 11.5.19 There are multiple surface water features on or in close proximity to the site including a large pond (Military Lake) within the southern part of Zone B (outside the proposed development), unnamed ditches, small ponds. Beck Brook is located approximately 50m to the east of the site boundary and is considered to be the main surface water receptor. Oakington Brook and Lonstanton Brook are located to the south and north western.
- 11.5.20 EA correspondence indicates that three reported pollution incidents have occurred within 1km of the site. These are detailed in table 11.9.

**Table 11.9: Reported pollution incidents within 1km of the site**

Previous Use	NGR / Distance from site	Nature / Source of Pollution	Impact	Date
Foul Sewer	541524 264897 50m south in Oakington	Containment Failure / Crude Sewage	Minor to water	09/02/2013
Stables	541098 263758 over 1km south of Oakington	Field Heap / Solid Manure	No Impact	29/05/2013
Foul Sewer	539575 266838 480m to west in Longstanton	Containment Failure / Crude Sewage	Minor to water	31/10/2012

## Landfill Sites and Waste Transfer Stations

- 11.5.21 There are no recorded landfill sites within 1km of the proposed Northstowe Phase 2 development.
- 11.5.22 Given the nature of the previous use of the site, it is possible that small areas of landfilling are present within or in close proximity to the proposed development boundary. From previous investigations across the site, it is known that made ground / landfilling (to 2.9m depth) is present to the south in areas which are understood to be previous mineral extraction pits. These are not within the application area.
- 11.5.23 Two registered waste transfer station are to the north of the site over 1km away in Longstanton. One is a small facility which is licensed to transfer <10,000 tonnes per annum of waste ferrous and non-ferrous metal. The other is licensed to handle tyres and scrap tubing.
- 11.5.24 Correspondence from SCDC indicated that there are areas of unknown filled ground as indicated by the green dots on Figure 11.3 below. This relates to potential infilled ground or quarrying dating 1958.
- 11.5.25 The points referenced 1, 2 and 3 on plan 3 below refer to unknown filled ground dated 1981, 1981 and 1951 respectively, with points 1 and 2 subject to quarrying.

**Figure 11.3: Infilling location data supplied by SCDC****Key****Unknown filled ground**

Area of the former military land and Oakington Barracks - classed as potentially contaminated land



Areas which SCDC have information for but which is outside the site boundary

**Contamination Status**

- 11.5.26 Correspondence from SCDC has indicated that a large section of the site has been identified as potentially contaminated land due to the presence of the former military land and associated Oakington Barracks. This is indicated by the green hatched area on the above plan (The red hatched area indicates where the council has information but this is not within the proposed development area.)
- 11.5.27 Extensive ground investigations have been undertaken across the proposed development site. Soil and groundwater samples from across the site have been analysed for a suite of inorganic and organic contaminants.

11.5.28 The chemical analytical results from the 2007 WSP reports have been assessed against current soil screening values (SSVs) for a residential with private garden land use (ie the most sensitive). The details of the assessment are included within the Hyder interpretative report (Geo Environmental Assessment and Outline Remedial Strategy (Submitted with the Planning Application)), along with drawings illustrating the exceedences. Plans showing the sample locations are included within the 2007 WSP Reports (appended to the Hyder interpretative report).

11.5.29 Below is a summary of the findings.

### **Soils**

#### **Inorganic Contaminants**

11.5.30 Within the application area, there are exceedances of 4 determinands. Vanadium has the most exceedances which are scattered across the application site, with 8 in the main development area and 7 within the off-site infrastructure area. Whilst these are generally within the shallow topsoil / made ground layer, some elevated results are encountered within the natural soils at depth (e.g. TPC5 at 1.4m and TPC71 at 3.4m depth) in the off-site infrastructure areas of the site. This may indicate that vanadium is naturally occurring in the soils within the area at concentrations above the SSV.

11.5.31 The maximum arsenic, lead and nickel concentrations recorded were encountered in the shallow topsoil (river terrace deposits) layer of TPB2 which is located in the north eastern corner in the vicinity of the former sewage works. There were no obvious visual signs recorded within the engineering record for this location which would indicate the elevated results however, the contamination may be associated with previous operation of the former sewage works.

11.5.32 It is noted that there are a cluster of elevated arsenic concentrations within Zone D (outside the development area). These elevations were encountered within the natural soils and therefore similarly to vanadium this may indicate that arsenic is naturally occurring in this area in concentrations above the SSV.

#### **Organic Contaminants**

11.5.33 The majority of organic contamination is located in Zone B and C. Zone C is the location of the fuel storage (including underground tanks) and where vehicle maintenance was undertaken when the base was operational. This is therefore the potential source of the organic contamination.

11.5.34 The TPH contamination encountered is generally from the heavier fractions such as C16 – 21 and C21 – 35. This would correspond



with mineral oil / lube oil which is likely to have been used with regards to vehicle maintenance.

- 11.5.35 Benzo(a)pyrene was found to be elevated across Zones B and C with approximately half of the exceedances located within the proposed development area. The maximum concentrations of PAH compounds were found in either TPB22 or TPB92. TPB22 is located in the northern part of Zone B near to the former bomb storage area, whilst TPB92 is located near to the boundary with Zone C. On review of the logs for both locations, the samples were taken from the Made Ground strata (0.3m depth). In TPB22 the Made Ground comprised of gravel of brick, and concrete. No ash material was noted in either location.
- 11.5.36 It is noted that there are several exceedances of PAH compounds where located in the south eastern corner of Zone B which is outside the application area. These are associated with a Made Ground in the areas of the infilled gravel pits.
- 11.5.37 A C4SL has been published for Benzo(a)pyrene which is 5mg/kg for a residential with plant uptake scenario. For comparison, on review of the results for this site, 26 of the 44 exceedances had concentrations below this value.
- 11.5.38 In general VOC contamination was below the limit of detection, however exceedances of some of the VOCs were detected in Zone C. These are localised around buildings.

### **Asbestos**

- 11.5.39 Soil samples from across the zones were analysed for asbestos fibres. In the following four locations fibres were detected;
- TPB1C (0.4m) – Amosite (free fibres <0.1%);
  - TPB1D (0.4m) – Crocidolite, Amosite, Chrysotile (Insulation and free fibres <0.1%);
  - TPC77D (0.4-0.5m) - Chrysotile fibres (Bitumen <0.1%);
  - WSC39 (0.2-0.6m) Chrysotile fibres (free fibres <0.1%);

- 11.5.40 The samples from TPB1C and TPB1D are within the proposed development area, whilst the other two sample are from locations outside of the main development area, but near to a proposed road within the Off- Site Infrastructure. On review of the logs, the samples from TPB1C and TPB1D were from the shallow Made Ground strata. No asbestos was recorded within the Made Ground. It is noted that an asbestos tile fragment is recorded in the Made Ground from TPB1B.
- 11.5.41 As asbestos fibres have been encountered it is likely that fibres may be present within soils across the site.

## Chemical Weapons

- 11.5.42 Ten soil samples from Zone B were analysed by BAE Systems for chemical weapon (S-Mustard) residues. All the results are recorded as below the limit of laboratory detection.
- 11.5.43 These results indicate that chemical weapon residues and in particular S-Mustards are not present at detectable concentrations within the samples and therefore are not considered to be a concern with regards to human health.

## Explosives

- 11.5.44 Soil samples from Zone B (10) and C (8) were analysed by BAE Systems for an explosive suite. All the results were below the limit of detection and therefore the risk from explosive residues do not warrant further consideration.

## Radioactivity

- 11.5.45 Two soil samples (TPB83 0.15m / TPB83 0.35m) were tested for radioactivity by Health Protection Agency (HPA). TPB83 is located on the southern boundary (within Zone B) of the proposed Northstowe Phase 2 application area and was investigated as it was identified as a small burning pit. Sandstone flagstones were located beneath the turf covering the pit which contained ash, burnt dials and metal fragments. This pit was terminated and the flagstones put back in place to reduce the risk from radiological contamination. No remediation was undertaken in this area.
- 11.5.46 The samples were analysed for the presence of the most common gamma emitting radionuclides found in thorium 232 and uranium 238 decay series using a shielded high purity germanium detector linked to a multichannel analyser.
- 11.5.47 The conclusions from the HPA indicated that the material at 0.15m may be subject to the requirements of the Ionising Radiation Regulations 1999 (IRR)<sup>163</sup> and its use should be discussed with a Radiation Protection Adviser. This is due to a positive activity result with Actinium-228 at 0.2 +/- 0.1 Bq/g and Bismuth-214 at 3.1 +/- 0.6 Bq/g. The deeper sample is not subject to the requirements of the IRR due to a lower activity recorded.
- 11.5.48 It is understood that a geophysical survey for the site was undertaken which identified other potential burning grounds across the site.

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<sup>163</sup> Health and Safety Executive (1999) The Ionising Radiations Regulations No. 3232

## UXO

- 11.5.49 During the WSP ground investigations all excavations were assessed for unexploded ordnance. Trial pits were scanned using handheld magnetometers under the supervision of an Explosive Ordnance Disposal Engineer from Bactec International Ltd and boreholes / exploratory holes were cleared using Bactec downhole intrusive magnetometer rig. Within Zone B, the following unexploded ordnance was encountered:
- a 500lb “practice bomb” prior to excavation of trial pits in the northern part of the bomb storage area (northern part of Zone B) – this was excavated and deemed safe and taken away by RAF Explosive Ordnance Division for disposal.
  - a 500lb “live bomb” which was made safe by controlled explosion. On reinstatement of blast crater, two further 1000lb “live bombs” were identified which resulted in a second controlled explosion.
  - Due to the positive identification of live ordnance within the former bomb storage area, investigation on this part of the site was terminated until further survey work was undertaken by RAF.
- 11.5.50 The HCA has employed specialist consultancy Zetica to undertake further work which is detailed below.
- 11.5.51 Zetica has produced a SiteSafe UXO Risk Mitigation Plan for the whole of the Northstowe development.
- 11.5.52 Several potential sources of UXO hazard have been considered and there is the potential for ordnance to range in size from small arms ammunitions to large unexploded bombs (UXBs). Zetica’s study suggested that any anticipated hazards are likely to be at shallow depth, resulting from munitions disposal during World War II and post war training. –Whilst the majority of the site is considered to be a low hazard level, there are specific areas which are given a moderate or a high hazard level rating.
- 11.5.53 The main findings of this report are summarised as follows;
- There are no records of bombing or military activity on the Site during World War One (WWI).
  - During World War Two (WWII), the Site was occupied by RAF Oakington, an operational bomber airfield.
  - There are 12No. recorded air raids for RAF Oakington during WWII and more than 30No. High Explosive (HE) bombs fell on the Site in low intensity raids – all bombs were accounted for.
  - For the geology of the Site, estimated average maximum bomb penetration depths vary between 2.5 metres (m) and 12.5m, depending on the exact nature of the underlying strata and weight of the bomb.

- In 1975, RAF Oakington was handed over to the Army as Oakington Barracks. Part of the Site was used as a dry training area.
- In 2005, 4No. British UXBs were discovered on the Site and disposed of by the RAF.
- Small arms ammunition, pyrotechnics and other training ordnance have been found on the Site during subsequent Explosive Ordnance Clearance (EOC) work.

11.5.54 Zetica's UXO Risk Mitigation Plan is included as a confidential Appendix of the Interpretative Report (Geo Environmental Assessment and Outline Remedial Strategy (Submitted with the Planning Application)). The purpose of this report was to discharge part a) of Planning Condition 10 on the outline planning permission (S/0388/12/OL) in order for development to commence within the Phase 1 boundary but provides details of the potential risks across the whole site and provides options in order to mitigate them. Typical UXO risk mitigation methods are detailed in Table 11.10 below.

**Table 11.10 Potential Risk Mitigation Methods**

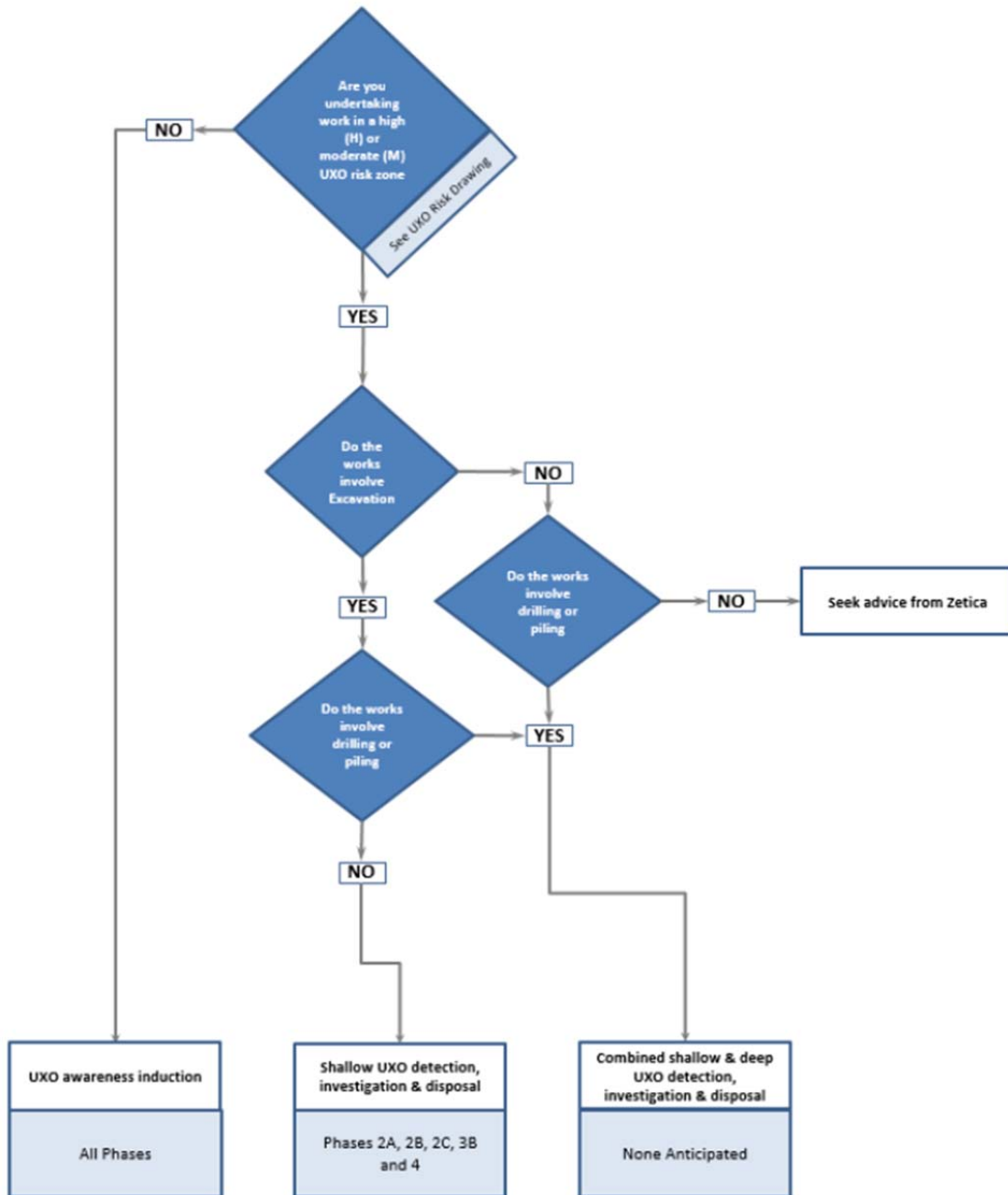
Potential UXO Hazard	Typical UXO Risk Mitigation Method
Shallow-buried UXBs	Non-intrusive magnetic survey, target investigation and EOD
Land service ammunition from disposal/Army training	Non-intrusive electromagnetic survey, target investigation and EOD
Small arms ammunition	Consideration of development layout, confidence scrape and application of cover solution, where appropriate.

11.5.55 UXO awareness inductions will be included as part of any standard site induction process throughout all Phases of the Northstowe development.

11.5.56 The flow chart provided below (Plan 1) shows the recommended approach to the risk mitigation plan for the anticipated UXO and site activities.

### **Agricultural Land Classification**

11.5.57 A review of existing ALC information for the area, as collated for the 2012 Phase 1 ES, shows that this information provides the necessary ALC data for the site as illustrated in Figure 11.4, with the exception of a small area of approximately 11.7 ha which was not surveyed (equating to approximately 5.6% of the total site area). This small area which has not been surveyed will not affect the overall assessment.



**Plan 1 UXO Risk Mitigation Plan**

- 11.5.58 The composite data from the previous surveys is shown in Figure 11.4, based on the data presented in 2012 overlain on the current red line boundary. As noted previously, it is considered that this data still remains valid and that it is highly unlikely that the soil characteristics that inform the ALC grades will have changed.
- 11.5.59 Cambridgeshire has a greater proportion of high-grade agricultural land than any other county in England and Wales (as set out in Technical Note No. TN/RP/01 TFS 846<sup>164</sup> (based on provisional ALC data). In total, Cambridgeshire has 79.3% BMV land, whilst the average for England is just 22.7%. With such a high percentage, it is likely that a higher proportion of agricultural land within the site will fall within the BMV grades (Grades 1, 2 and 3a).
- 11.5.60 The geology of site comprises superficial drift deposits of River Terrace sands and gravels overlying the Upper Jurassic Ampthill Clay Formation (which outcrops in the eastern parts of the site. The soils which have formed from these materials include:
- The Denchworth and Wicken series, developed more or less directly over the Jurassic clays;
  - The St Lawrence and Aldreth series, developed in loamy superficial drift overlying the clay; and
  - The Milton and Landbeach series, developed in loamy drift overlying sand and gravel.
- 11.5.61 The clayey Denchworth and Wicken series have impeded drainage due to slowly permeable sun-soils, whilst others are better drained. This impeded drainage is considered to place a restriction of agricultural use, and thus will affect the land grade associated with these soils.
- 11.5.62 Three distinct units of soil have been distinguished based on soil texture and soil wetness (defined in the ALC Guidelines by Wetness Classes). These are:
- Soil unit 1: highest quality soil for the most demanding end-uses, such as allotments. This soil type includes deep loamy Milton soils (Wetness Class I) and broadly correlates with agricultural land classified as grade 2;
  - Soil unit 2: good quality soil for a range of uses, such as residential gardens. This soil type comprises loamy St Lawrence, Aldreth, Milton and Landbeach soil series (Wetness Class II or I) and broadly correlates with agricultural land classified as sub-grade 3a; and
  - Soil unit 3: lower quality soil for less demanding end-uses, such as amenity grassland and general landscaping. This soil type comprises heavy (clayey) Denchworth and Wicken soil series

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<sup>164</sup> MAFF (1993) Technical Note No. TN/RP/01 TFS 846

(Wetness Class IV or III) and broadly equates to land classified as sub-grade 3b.

- 11.5.63 The available ALC data has been overlain with the red line boundary on Figure 11.4, allowing the proportions of each land grade to be calculated, as shown in Table 11.11.

**Table 11.11: Extent of each ALC grade**

ALC Grade	Area (ha)	%
Grade 1	0	0
Grade 2	23.7	11.34
Grade 3a	62.7	30.01
Total BMV land	86.4	41.35
Grade 3b	55.0	26.32
Grade 4	5.9	2.82
Grade 5	0	0

- 11.5.64 In summary, 86.4 ha (41.35%) of the site comprises BMV land (i.e. land falling into Grade 1, 2 and 3a).

### **Groundwater**

- 11.5.65 Groundwater samples from Zone A (BHA6, BHA7, BHA10) and across Zone B, C and D have been compared to appropriate Water Quality Standards (WQS) as detailed within the Hyder report (Geo Environmental Assessment and Outline Remedial Strategy (Submitted with the Planning Application)). Plans showing the sample locations are included within the 2007 WSP Reports and drawings illustrating the exceedances are included within the Hyder report.
- 11.5.66 Generally concentrations were below the WQS however a number of exceedances of inorganic and organic contaminants were detected.
- 11.5.67 Inorganic Contaminants
- 11.5.68 Copper is exceeded across the proposed development site and the majority of nickel exceedances are located in a cluster in the southern half of the site. It is noted that the majority of the exploratory holes where exceedances have been detected are in natural soils and therefore it is likely that nickel and copper concentrations in the groundwater are naturally above the stringent WQS.
- 11.5.69 Boron, Zinc and Chloride are exceeded but only in a few groundwater samples.

### **Organic Contaminants**



- 11.5.70 TPH contamination has been recorded in the groundwater across the site, however the majority of exceedances are concentrated in Zone C. This would correspond with the soil contamination that was encountered mainly within this area, which is likely to be associated with the fuel tanks present within this area.
- 11.5.71 The drawing illustrates that aliphatic hydrocarbons are encountered in the majority of locations, with aromatic hydrocarbons only elevated in a number of monitoring wells. TPH exceedances have been encountered in the eastern part of the site in BHB13 and BHB18 which does not correspond with soil exceedances. Both these monitoring wells were in natural strata and the logs did not indicate and hydrocarbon contamination present.
- 11.5.72 With regards to several TPH fractions and PAH compounds, location WWC3 has recorded the maximum concentrations. This is located on the eastern boundary of Zone C and therefore may indicate groundwater migration of contamination in a north easterly direction. In the log for this location a hydrocarbon and solvent odour was noted between 0.2-4.0m within the Made Ground (to 1m depth) and River Terrace Deposit.

### **Gas**

- 11.5.73 Gas monitoring was undertaken as part of the WSP investigations in 2007. To establish the gas regime, this data has been reviewed using current CIRIA (C665) guidance and details are provided within the Hyder report (Geo Environmental Assessment and Outline Remedial Strategy (Submitted with the Planning Application)).
- 11.5.74 Methane concentrations are generally found to be low across the proposed development area, however in one location in Zone C WWC17, high concentrations (37.5-55.5% v/v) have been recorded. It is noted that this monitoring well was only monitored on 3 occasions and on each occasion the flow rate at this well was below detection of the monitor.
- 11.5.75 Within Zone C the next maximum result recorded during the monitoring rounds was 8.2% v/v which was in WWC3. This location recorded the maximum methane result in a number of monitoring rounds (range 1.5-8.2%v/v).
- 11.5.76 Likewise for carbon dioxide in Zone C the highest reading was from WWC17(1) with the next highest reading during the same visit at 4.9% v/v in WWC4. Generally WWC3 provided the maximum carbon dioxide readings in Zone C. The carbon dioxide readings across Zone B were generally below 5% v/v with only 2 maximum readings above this value.
- 11.5.77 On review of the logs for WWC17 and WWC3, there is no potential source for such high levels of ground gases. Made Ground is present

in WWWC17 to a depth of 2.7m but comprises slightly sandy gravelly clay with gravel of brick and flint and in WWC3 Made Ground is to 1m depth and is gravelly sand with flint gravels.

- 11.5.78 It is however noted that in these locations (WWC17(1) and WWSC3) hydrocarbon odours are noted on the logs and detectable concentrations of hydrocarbons are recorded in the groundwater. The hydrocarbon concentrations may have caused false readings on the gas monitor.
- 11.5.79 Flow readings are generally low with the majority of the readings below 1l/hr. The highest rate was recorded in Zone A on one occasion.
- 11.5.80 Low levels of carbon monoxide and hydrogen sulphide have been recorded on a number of occasions but were generally found to be below the detection limit of the monitor.
- 11.5.81 The Gas Screening Values (GSVs) for methane and carbon dioxide have been calculated using available data.
- 11.5.82 In Zone A and B which is mainly open land a Green or Amber 1 scenario is calculated, however in Zone C where the highest readings were encountered a red scenario is appropriate for the methane and Amber 1 / Amber 2 for the carbon dioxide readings. It should be noted that this is not a wide spread issue and only concerns a few borehole locations where the high readings were recorded.

### Future Baseline Conditions

- 11.5.83 If the proposed development was not to occur on the site then the contamination identified on the site within soils and groundwater is likely to remain. There is a potential risk that contamination present e.g. fuel / oil could migrate into a wider area affecting soils and groundwater. This in turn could migrate off site into the wider water environment.

## 11.6 Environmental design/Design mitigation

- 11.6.1 No environmental design or design mitigation measures in relation to geology and soils have been utilised within the masterplanning exercise for the proposed Northstowe Phase 2 development.

## 11.7 Potential effects

- 11.7.1 The potential effects are to be assessed as follows:

### Site establishment and construction effects

- 11.7.2 The effect of the proposed development on identified receptors is provided below and summarised in Table 11.10 which is at the end of this chapter.

- 11.7.3 The potential effects, without mitigation, on identified receptors during the site enabling works and the construction phase, would arise from normal construction activities. These are discussed below for the identified receptors.

### Geology

- 11.7.4 The physical removal of solid and superficial geological strata during the enabling works and construction phase of the proposed development would have a negligible magnitude of impact on a geological receptor which is considered to have a low importance. The significance of effect has been assessed as Negligible.

- 11.7.5 Some areas of the proposed Northstowe Phase 2 development have not been investigated due to access constraints (for example the area of the former immigration centre) so the land quality in those areas is uncertain. During the enabling and construction phase, it is possible that unknown contamination from historic activities is spread across the site leading to the contamination of the geological strata in areas previously not contaminated. The underlying geology is considered to be of low importance and without mitigation measures it is considered this could result in a low adverse change. The significance of this effect has been assessed as Minor.

### Human Health Receptors

- 11.7.6 The impacts on human health receptors include the inhalation of airborne dust (which could include elevated contaminants) created during the site enabling and construction works. The residents of Rampton Drift are surrounded by the Phase 2 development and would therefore be in close proximity to the works. The residents have been allocated a high importance and without mitigation

measures, it is considered that this could result in high to medium adverse changes to human health. The significance of effect has been assessed as Major to Major/Moderate.

- 11.7.7 Construction workers undertaking earthworks including excavation would be exposed to contaminants including asbestos fibres, radiological and explosive contaminants and previously unidentified ordnance. Human health receptors have been allocated a high importance and without mitigation measures it is considered that this could result in a high adverse change to human health. The significance of this effect has been assessed as Major.

### Controlled Water Receptors

- 11.7.8 During the enabling and construction works there are a number of activities that have the potential to result in changes to the quality of controlled waters as detailed below;

- Removal of topsoil and earthworks including excavations associated with the construction and creation of stockpiles of soils and construction materials, with increased potential for the generation of runoff with elevated concentrations of sediment which may enter groundwater beneath the site;
- Handling and treatment of waste materials and wastewater;
- Transportation, storage and use of oils and fuels for construction plant with increased potential for surface and groundwater contamination; and
- Excavation into areas of unknown contamination causing migration of contamination into groundwater and resulting in the spread of contamination across the areas of the proposed development which were previously not contaminated.

- 11.7.9 The underlying groundwater and local surface water features (Beck Brook, ponds on site) are considered to be of low importance and without the adoption of mitigation measures it is considered that the above activities would result in a medium to low adverse change. The significance of this impact has been assessed as Minor to Minor / Moderate.

### Soils

- 11.7.10 During construction there would be a loss of agricultural land. A total of 41.35% of the site comprises BMV land (i.e. land within Grades 1, 2 and 3a). The sensitivity of the BMV land may be considered to be High; however, based on the extent of BMV land which occurs in Cambridgeshire it may be possible to reduce the importance placed on this land, and consider it to be of Medium sensitivity. This should also be taken in the context of the fact that 49.9 ha (equating to 23.88% of the total site area) of non-agricultural land would also be

developed, which is in accordance with the NPPF. The magnitude of impact would be High resulting in an effect of Moderate significance.

- 11.7.11 During construction there is a risk that poor soil handling, storage and re-use may result in damage to soil properties (soil compaction, waterlogging, nutrient flushes etc.). Best Practice methods, as outlined in existing Guidance documents, would be followed and would limit the potential for such damage to occur. It is therefore considered that the significance of this potential effect would be Negligible.

### Operational effects

- 11.7.12 Once the proposed Northstowe Phase 2 development has been completed, if mitigation measures are not adopted there is the potential for the users of the site (e.g. residents or commercial users) to come into contact with contaminated soils, groundwater or ground gases (if present). Residents of the proposed development are considered to be of high importance, whilst commercial end users have a low importance (as it is likely that this area of the development will be covered with hardstanding). It is considered that this would lead to a medium to high adverse change for residents and a medium to low adverse change to commercial users. The effect of the development proposals on resident receptors is considered to be Major to Major/ Moderate and for commercial end users the significance of effect has been assessed as Minor/ Moderate to Minor.

- 11.7.13 If remediation is not undertaken prior to construction, there is the risk that the groundwater quality would be affected by contamination remaining within the proposed development. This would (in time) lead to a reduction in surface water quality. The groundwater and surface water is considered to be of low importance and this would result in a medium to low adverse change. The significance of effect of the development proposals on groundwater is considered to be Minor/Moderate to Minor.

- 11.7.14 There are not considered to be any operational effects on the soil resource.

### Mitigation and enhancement

- 11.7.15 Appropriate measures to mitigate the contamination impacts during the construction works are outlined below.

- 11.7.16 Prior to construction of the proposed development, areas which have previously not been investigated would be investigated to determine the land quality. This would include groundwater and gas monitoring.

- 11.7.17 The results from such investigations would be assessed against current guidance to establish the remedial measures required to ensure that the site is suitable for the proposed development.
- 11.7.18 A remedial strategy would be prepared and implemented before the construction works commence on site. This strategy would be submitted for regulatory approval and would ensure that the site is suitable for the proposed development land uses and that risks to sensitive receptors are mitigated to the appropriate level. The remediation undertaken would be validated to confirm the contamination present has been reduced to acceptable levels
- 11.7.19 There are no effective measures available to mitigate the direct loss of BMV land, although the re-use and protection of soil resources within the proposed development would ensure that some of the ecosystem services provided by soils (attenuation of rainfall, food production, supporting biodiversity etc.) would be maintained.
- 11.7.20 These good practice approaches to the development of the site should be implemented to maximise the re-use of soils within the design for landscaping or biodiversity, and thus maximise the protection of the soil resource. The sustainable re-use of the soil resource affected by the proposals should be identified in line with the Code of Practice for the sustainable re-use of soil on construction sites (Defra 2009)<sup>165</sup>. This requires the development of a Soil Resources Plan identifying the soils present, proposed storage locations and handling methods and locations for re-use where possible. Measures which should be implemented include (but are not limited to):
- Completion of a Soil Resources Survey and incorporate results into a Soil Resource Plan (SRP);
  - Link SRP to the Site Waste Management Plan (SWMP);
  - Ensure soils are stripped and handled in the driest condition possible;
  - Confine vehicle movements to defined haul routes until all the soil resource has been stripped;
  - Protect stockpiles from erosion and tracking over; and
  - Ensure physical condition of the entire replaced soil profile is sufficient for the vegetation requirements.
- 11.7.21 Implementation of such mitigation would ensure that the soils used across the site are of the required characteristics and in the required condition to support a variety of specified activities. For example, surplus nutrient-poor soils (such as subsoils) would be re-used in areas of habitat creation whilst surplus nutrient-rich soils would be prioritised for areas of landscape planting. This would ensure the conservation of the soil resource, minimisation of the need to remove

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<sup>165</sup> DEFRA (2009) Code of Practice for the sustainable re-use of soil on construction sites

any soil off-site and thus a more sustainable development. It would also ensure that the benefits provided by the soils, such as rainfall attenuation, are retained and maximised.

- 11.7.22 .An outline CEMP has been prepared and would be developed into phase-specific CEMPs to ensure that best practice is employed and the environment is safeguarded. The contractor would be required to prepare detailed method statements and protocols for activities such as excavation and dewatering, storage of fuels, chemicals and oils, vehicle washing, pollution control and emergency contingency.
- 11.7.23 Pollution prevention measures would be provided. This would include the use of drip trays, bunded fuel tanks, designated areas for re-fueling of vehicles, stockpiling of materials away from surface water to reduce the risk of accidental contaminated run-off entering the water environment.
- 11.7.24 A Materials Management Plan would be produced detailing the strategy for re-use of soils within the proposed development. This would follow the approach within the CL:AIRE Development Industry Code of Practice<sup>166</sup>.

## Residual Effects

- 11.7.25 Residual effects are those that remain after mitigation has been put in place. The residual effects are assessed as follows:

### 11.7.25.1 Site enabling and construction residual effects

- 11.7.26 As there are no effective measures available to mitigate for the loss of BMV land, there would be a residual effect of Moderate significance in relation to this receptor.
- 11.7.27 No other site enabling or construction residual effects are anticipated following mitigation as long as all remedial works are carried out to best practice and in line with the remediation strategy.

### 11.7.27.1 Operational residual effects

- 11.7.28 No operational residual effects to human health and controlled water receptors are anticipated following mitigation as long as all remedial works are carried out to best practice and in line with the remediation strategy. With regards the geology of the site, assuming that the remediation is undertaken, there would be a beneficial residual effect as any significant contamination would be removed during the construction phase.

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<sup>166</sup> CL:AIRE (2011) The Definition of Waste : Development Industry Code of Practice

## Cumulative Effects

- 11.7.29 Off-site impacts would be limited through the mitigation described above and disposal to landfill would be avoided by proposed remedial works. Therefore provided that the requirements of the relevant policy and legislation relating to land contamination and remediation are adopted in design and appropriate mitigation measures are applied, it is considered that there would be no significant cumulative effects in this respect. As detailed above there is moderate significance due to the loss of BMV land.

## Limitations and Assumptions

### Limitations

- 11.7.30 The investigations undertaken by WSP date from 2005 to 2007. Whilst the results are still valid, there may have been changes on site with regards to land quality that are not reflected in the assessment undertaken.
- 11.7.31 Additional gas and groundwater monitoring would be undertaken to establish the current regimes on site.
- 11.7.32 There are areas within the development area which were not investigated previously due to access constraints. The land quality in these areas is unknown.
- 11.7.33 Subsurface ground conditions are by their nature hidden from view and no assessment can be exhaustive to the extent that all soil and groundwater conditions are fully understood. On this basis actual ground conditions at the site have the potential to be at variance to those which have been reported.

### Assumptions

- 11.7.34 The assessment undertaken within the geo environmental interpretative report (Geo Environmental Assessment and Outline Remedial Strategy (submitted with the Planning Application)), assumes that all the site is to be developed for the most sensitive land use (i.e. residential with private gardens suitable for growing vegetables). The proposed development is made up of a mixture of land uses and therefore the land quality should be re-assessed at detail design stage to determine the appropriate level of remediation for that land use.



## Assessment Summary Matrix

- 11.7.35 The assessment summary matrix in Table 11.12 describes the effects that have been identified and the significance of the effects using the criteria set out in the sections above. It then follows through the process of applying mitigation and stating residual effects, before describing offsetting and enhancement.

**Table 11.12: Assessment Summary Matrix**

<b>Assessment Summary Matrix</b>				
Description of Effects	Significance of Effects:	Description of Mitigation Measures and Enhancement	Description of Residual Effects	Significance of Residual Effects
<b>Site enabling works and construction assessment</b>				
Production of contaminated airborne dust which could affect local residents e.g. Rampton Drift.	Major to Major/Moderate, –ve, D, ST-MT	Adoption of appropriate measures such as wheel washing prior to vehicles leaving site, covering of vehicles, covering of stockpiles, damping down of dry soils to reduce creation of dust, general good site practice.	No residual effects are anticipated, if mitigation measures are adopted.	Negligible, –ve, D, ST-MT (Not significant)
Leakages of oil or fuel from tanks or vehicles into the underlying soils and migrating into the underlying groundwater.	Minor to Minor/Moderate, –ve, D, ST-MT	Designated areas for refuelling preferably on an impermeable layer, use of drip trays, general good site practice.	No residual effects are anticipated, if mitigation measures are adopted.	Negligible, –ve, D, ST-MT (Not significant)
Mobilisation of contaminants during excavation works in areas of contaminated soils – reduction of groundwater quality.	Minor to Minor/Moderate –ve, InD, ST-LT	Additional ground investigation prior to works commencing to determine areas of concern. Incorporation of a watching brief scenario within the enabling works to ensure that if contamination is encountered during this stage of the work, it is analysed and assessed to determine if it is suitable to remain on site.	No residual effects are anticipated, if mitigation measures are adopted.	Negligible, –ve, InD, ST-LT (Not significant)
Migration of contaminants from stockpiles	Minor to	Ensure that best practice is	No residual effects are anticipated, if	Negligible, –

into underlying soils and groundwater .	Minor/Moderate, –ve, D, MT-LT	adopted and that stockpiles of soils are located on an impermeable surface to ensure that vertical migration is reduced.	mitigation measures are adopted.	ve, D, MT-LT (Not significant)
Spread of contamination from historical activities across the site and entering the groundwater.	Minor to Minor/Moderate, –ve, D, ST-LT	Additional ground investigation prior to works commencing to determine areas of concern. Incorporation of a watching brief scenario within the enabling works to ensure that if contamination is encountered during this stage of the work, it is analysed and assessed to determine if it is suitable to remain on site.	No residual effects are anticipated, if mitigation measures are adopted.	Negligible, –ve, D, ST-LT (Not significant)
Exposure to site works from contaminants, ordnance, asbestos fibres, radiological and explosive contaminants.	Major –ve, D, ST-MT	Additional ground investigation prior to works commencing to determine areas of concern. Incorporation of a watching brief scenario within the enabling works to ensure that if contamination is encountered during this stage of the work, it is analysed and assessed to determine if it is suitable to remain on site.	No residual effects are anticipated, if mitigation measures are adopted.	Negligible, –ve, D, ST-MT (Not significant)
Surface run-off into surface water.	Minor to Minor/Moderate, –ve, InD, ST-LT	Ensure that best practice is adopted and that stockpiles of soils are located away from surface water and bunded. If considered necessary are covered to prevent soils / sediments entering the run off.	No residual effects are anticipated, if mitigation measures are adopted.	Negligible, –ve, InD, ST-LT (Not significant)

Loss of BMV agricultural land.	Moderate –ve, D, P	No effective measures available.	Effects remain as residual effects.	Moderate –ve, D, P (Significant)
Damage to soil condition during handling, stockpiling and re-use.	Negligible	Mitigation measures would be embedded in the design and working practices and completion of SRP and SWMP	No residual effects are anticipated if embedded mitigation are adopted.	Negligible (Not significant)
<b>Operational assessment</b>				
Contaminant concentrations within the underlying soils which would cause harm to future end users (residents, workers, recreational users) and groundwater beneath the site.	Major to Minor –ve, D/InD, ST-LT	Undertake work as detailed within the Remediation Strategy during the construction of development to ensure that the site is suitable for use and risk to water environment is reduced to an appropriate level.	No residual effects are anticipated, if mitigation measures are adopted.	Negligible, –ve, D/InD, ST-LT (Not significant)
Ground gases present within the underlying soils which would cause a risk to future end users and buildings on the proposed development.	Major to Major/Moderate, –ve, D/InD, LT	Incorporate appropriate gas protection measures within the design of the buildings.	No residual effects are anticipated, if mitigation measures are adopted.	Negligible, –ve, D/InD, ST-LT (Not significant)
If contamination remains on site there is the potential for contaminants to enter groundwater which would migrate off site into surface water.	Minor to Minor/Moderate, –ve, D / InD, ST-LT	Undertake work as detailed within the Remediation Strategy during the construction of development to ensure that the site is suitable for use and risk to water environment is reduced to an appropriate level.	No residual effects are anticipated, if mitigation measures are adopted.	Negligible, -ve, D / InD, ST-LT (Not significant)

Key: +ve (beneficial), -ve (adverse), D (direct), InD (indirect), ST (short term), MT (medium term), LT (long term), P (permanent), R (reversible)

## 12 Hydrology, Flooding and Drainage

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### 12.1 Introduction

- 12.1.1 This chapter establishes the principles and strategy of hydrology, flood risk and drainage in relation to the proposed Northstowe Phase 2 development.

### 12.2 Review of Proposed Development

- 12.2.1 The area surrounding the study area, including the existing settlement of Longstanton, is drained by two main catchments: Swavesey Drain/Longstanton Brook and the Beck Brook/Cottenham Lode. The Longstanton Brook drains directly to the Swavesey Drain and drains south to north to the west of the proposed Northstowe Phase 2 study area. The Beck Brook drains directly to the Cottenham Lode and drains south to north to the east of the Phase 2 study area.
- 12.2.2 The EA's Flood Map (2014) shows that the Northstowe Phase 2 study area is predominantly located in Flood Zone 1 (low probability of flooding) and that the site's eastern fringe lies within Flood Zone 3 (high probability of flooding). Flood Zone 1 comprises land which has been assessed as having less than 1 in 1,000 annual probability of river (i.e. a return period of 1 in 1000 years or less frequent), ignoring the presence of flood defences. The areas within Flood Zone 3 are classified as areas benefiting from flood defences. This is classified as land that may benefit from the presence of major defences during a 1% (1 in 100 year) fluvial flood event. These are areas that would flood if the defence were not present, but may not flood because the defence is present.
- 12.2.3 The EA's updated Flood Map for surface water (2014) shows that the majority of the Northstowe Phase 2 study area is at low risk of surface water flooding. The route of surface water entry into the proposed Main Phase 2 development area is from west to east and the surface water flood extent mimics the fluvial flood extent. There is a surface water flow route through the area of the Oakington Barracks. The EA mapping shows that surface water flows into the site and ponds to the eastern boundary along the CGB route.
- 12.2.4 To mitigate surface water flooding it is proposed to provide a surface water drainage system for the development incorporating Sustainable Drainage Systems (SuDS) which combined with landscaping features (e.g. the waterpark) provide an enhanced environment without increasing the rate of surface water run-off from the developed site. These SuDS facilities would be provided for the proposed Main Phase 2 development area and the Southern Access Road (West) and locally within each development parcel.

- 12.2.5 Initial construction phases would comprise the spine infrastructure and the subphase A development. The spine infrastructure incorporates the main road running through the site, including the services and drainage within it as well as adjacent SuDS features.

## 12.3 Approach and methods

- 12.3.1 Project aspirations relating to hydrology, flooding and drainage for the Northstowe Strategy, as defined in the development framework document (NAAP) focus on the main themes listed below:
- 12.3.2 **Flood Risk to Third Parties** - Although the Northstowe Phase 2 development area (including the Main Phase 2 development area and the Southern Access Road (West)) itself is not at further risk, the surrounding village of Oakington is at risk of flooding. To mitigate flood risk to Oakington and Longstanton flood storage is being proposed upstream, of the Longstanton Brook. Additional flood storage is being proposed upstream of Oakington on the Oakington Brook.
- 12.3.3 **Flood Risk to the Phase 2 Development Area** - A small section of the eastern portion of the study area is predicted to be at risk of flooding from the Beck Brook. Work undertaken for the 2007 application found that this risk is minimal due to the presence of existing defences. Development across the site would be sequentially steered to place the lower vulnerability land uses, such as the waterparks, in the area of high risk and placing more vulnerable development, such as residential units in lower risk areas.
- 12.3.4 **Proposed drainage strategy** - The drainage strategy is to drain the proposed Main Phase 2 development area to the waterpark and discharge from there to the Beck Brook and Cottenham Lode. The discharge would be pumped at a time when the Cottenham Lode is not in flood and would therefore not increase the flood risk downstream. The water park has two strategic attenuation areas connected by an open channel and would contain a pumping station. For the Southern Access Road (West) it is proposed that surface water will be discharged via roadside ditches to localised ponds where it will be stored and discharged at a controlled rate of 1 l/s/ha to the local award drains. The principles employed in the drainage strategy are to attenuate surface water discharge to within the allowable rates, whilst providing measures to improve the quality of this run off with the use of SuDS and in line with the “treatment train” philosophy whilst eliminating any risk of flooding to the site and surrounding areas.
- 12.3.5 The flood levels and flows in the Beck Brook and Cottenham Lode would be monitored using a series of new gauging stations. The new telemetry system would be integrated into both the pump control systems on the site and the stakeholders monitoring systems to allow discharge from the site to have a wider benefit to the surrounding communities.

## Legislation and guidance

12.3.6 This assessment has been undertaken in accordance with current legislation, national, regional and local plans and policies. Outlined in Table 12.1 below are those elements of current legislation, policy and guidance relevant to Hydrology, Flood Risk and Drainage in the context of this assessment.

**Table 12.1: Legislation and Guidance**

Regulatory / Planning Policy Framework	Requirements	Northstowe site response
NPPF and PPS25 Practice Guide	NPPF sets out Government policy on development and flood risk. Its aims are to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas of highest risk. Where new development is, exceptionally, necessary in such areas, policy aims to make it safe, without increasing flood risk elsewhere, and, where possible, reducing flood risk overall. The PPS25 Practice Guide is still in use to support the NPPF.	A Flood Risk Assessment (FRA) has been carried out in accordance with NPPF for the Project. The FRA concluded the application site can be developed safely, without exposing the new development to an unacceptable degree of flood risk or increasing the flood risk to third parties. The FRA is submitted with the planning application.
The Water Framework Directive (2000/60/EEC)	The Directive provides a framework for the protection of surface (fresh) water, estuaries, Coastal water and groundwater. The objectives of the Directive are to enhance the status, and prevent further deterioration, of aquatic ecosystems, promote the sustainable use of water, reduce pollution of water (especially by 'priority' and 'priority hazardous' substances) and ensure progressive reduction of groundwater pollution. Among the main features of the Directive are that all inland and coastal waters within defined river basin districts must reach at least good status by 2015.	The Project will aim to attain the highest achievable level of water quality standards. This would be achieved with the incorporation of Sustainable Drainage Systems (SuDS) into the design to improve the quality of the runoff from the proposed site.
The Flood and Water Management Act 2010	The Flood and Water Management Act 2010 will provide better, more comprehensive management of flood risk for people, homes and businesses. It will also help tackle bad debt in the water industry, improve the affordability of water bills for certain groups and individuals, and help ensure continuity of water supplies to the consumer. The Flood and Water Management Act encourages the use of sustainable drainage in new developments and re-developments. National standards for the design, construction, operation and maintenance of SuDS are currently being drafted.	A drainage strategy has been prepared for the Project which incorporates SuDS into the design. The FRA has concluded that the Project would not be exposed to an unacceptable degree of flood risk or increase the flood risk to third parties.

## Study Area

- 12.3.7 The study area considers the drainage principles for the Northstowe Phase 2 development. The study area for the assessment comprises all surface water features in hydrological connectivity with the Northstowe Phase 2 site (Figure 1.1).

## Methodology

- 12.3.8 The approach outlined below has been followed in preparing the Hydrology, Flood Risk and Drainage chapter of the ES.
- 12.3.9 The assessment of the potential for adverse environmental impact that could be associated with surface water environment has been undertaken in accordance with the Statutory Guidance listed in Table 12.1. The baseline conditions have been established through the undertaking of a desk study. The methods used to establish the baseline conditions included:
- A review of information on surface water quality, details of pollution incidents from the archives of the Environment Agency.
  - Information obtained from correspondences and the environmental database from statutory consultations with the Environment Agency.
  - An FRA to identify potential sources of flood risk in relation to the proposed development;
  - Conceptual Drainage Model. – an initial conceptual drainage model using Windes and flood risk assessment has been completed to provide a preliminary assessment of the runoff rates from the site and to inform the surface water drainage strategy.
- 12.3.10 The drainage strategy has been developed recognising the characteristics of the area and the adjacent Phase 1 development so that:
- The existing ground levels in Phase 2 are generally above the calculated flood levels and the floor levels of the homes would also be above the flood levels;
  - To ensure that the development would not be at risk of flooding from itself or surrounding watercourses, for the 1 in 200 year event including the forecast effects of climate change;
  - Not to increase the flood risk to surrounding properties and communities, particularly Oakington and Longstanton, or downstream areas;
- 12.3.11 To accommodate mitigation for the current flood risk affecting Oakington and Longstanton village. Desk study information has been obtained from the following sources:
- OS Mapping;



- Topographic Survey;
- Site plans;
- Environment Agency online data sets for water quality and pollution incidents;
- MAGIC interactive mapping; and
- Soil classifications from the Soilscales project

12.3.12 Additional information has also been requested from various sources. Table 12.2 summarises the sources of baseline information and the nature of the baseline information requested / obtained.

**Table 12.2: Hydrology and Flood Risk Assessment - Baseline Information Requests**

Source	Baseline Information Obtained
Environment Agency	Flood Zone Mapping
	Extent of Main Rivers
	Flood defence information- location, crest height, condition of defence.
	Previous modelling studies in the Northstowe area

12.3.13 This approach has been developed to assess the impacts of schemes on the water environment and involves an assessment of the relative significance of the impacts. This method comprises the following stages:

- Assessment of baseline environmental importance;
- Assessment of impact magnitude;
- Assessment of impact significance; and
- Assessment of residual effects.

## Significance criteria

12.3.14 Significance criteria relevant to the hydrology, flood risk and drainage chapter are listed below.

12.3.15 The overall baseline conditions have been assigned a value / importance based upon criteria derived from the DMRB and contained within Table 12.3:

**Table 12.3: Receptor sensitivity (HA 45/09)<sup>167</sup>**

Value / importance	Typical descriptors	Typical example	
Very High	Attribute has a high quality and rarity on a regional or national scale.	Surface Waters:	EC Designated Salmonid / Cyprinid fishery RQO River Ecosystem Class RE1. Site protected under EU or UK wildlife legislation (SAC, SPA, SSSI, Ramsar site).
		Groundwater:	Major aquifer providing a regionally important resource or supporting site protected under wildlife legislation. SPZ I.
		Flood Risk:	Flood plain or defence protecting more than 100 residential properties from flooding.
High	Attribute has a high quality and rarity on a local scale.	Surface Waters:	RQO River Ecosystem Class RE2. Major Cyprinid Fishery. Species protected under EU or UK wildlife legislation.
		Groundwater:	Major aquifer providing locally important resourced or supporting river ecosystem. SPZII.
		Flood Risk:	Flood plain or defence protecting between 1 and 100 residential properties or industrial premises from flooding.
Medium	Attribute has a medium quality and rarity on a local scale.	Surface Waters:	RQO River Ecosystem Class RE3 or RE4
		Groundwater:	Aquifer providing water for agricultural or industrial use with limited connection to surface water. SPZII.
		Flood Risk:	Flood plain or defence protecting 10 or fewer industrial properties from flooding.
Low	Attribute has a low quality and rarity on a local scale.	Surface Waters:	RQO River Ecosystem Class RE5.
		Groundwater:	Non-aquifer.
		Flood Risk:	Flood plain with limited constraints and low probability of flooding of residential and industrial properties.

12.3.16 The magnitude of the effect on the baseline can be assessed considering the scale, extent of change, nature and duration of effect. The characterisation of magnitude is dependent on the degree of change experienced by an attribute as shown in Table 12.4 which provides the definitions of magnitude used for the purposes of this assessment.

<sup>167</sup> HD 45/09 – Volume 11, Section 3, Part 10

**Table 12.4: Definitions of Magnitude (HA 45/09)**

Magnitude of Potential Impact		Criteria
Large	Adverse	Results in loss of attribute and/or quality and integrity of the attribute
	Beneficial	Results in major improvement of attribute quality.
Medium	Adverse	Results in effect on integrity of attribute, or loss of part of attribute.
	Beneficial	Results in moderate improvement of attribute quality.
Small	Adverse	Results in some measurable change in attribute's quality or vulnerability.
	Beneficial	Results in some beneficial effect on attribute or a reduced risk of negative effect occurring.
Negligible		Results in effect on attribute, but of insufficient magnitude to affect the use or integrity.

12.3.17 Using these definitions, a combined assessment of sensitivity and magnitude can then be undertaken to determine how significant an effect is, as demonstrated in Table 12.5 below. Where effects are usually considered significant, they have been shaded: effects can be either beneficial or detrimental.

**Table 12.5: Table Significance Matrix (HA 45/09)**

Sensitivity of Receptor	Magnitude of Change			
	Negligible	Small	Medium	Large
Very High	Negligible	Slight / Moderate	Moderate / Substantial	Very Substantial
High	Negligible	Slight	Moderate	Moderate / Substantial
Medium	Negligible	Negligible / Slight	Slight	Slight / Moderate
Low	Negligible	Negligible	Negligible / Slight	Slight

## 12.4 Consultation

### Drainage Technical Group

12.4.1 Consultation has been undertaken to agree a range of issues particular to the Water Environment assessment. Table 12.6 summarises the consultation undertaken.

**Table 12.6: Hydrology, Water and Drainage Chapter Consultation**

Consultee	Date of Consultation	Summary of Consultation
Anglian Water	Meeting 8 May 2014	Northstowe Phase 2 foul drainage proposals, interface with Phase 1.
Drainage Technical Group – Environment Agency Anglian Water South Cambs DC Swavesey IDB Gallagher Estates	Meeting 9 May 2014	Northstowe Phase 2 flood risk and drainage proposals, interface with Phase 1.

## 12.5 Baseline conditions

### Topography

12.5.1 The Northstowe Phase 2 development study area currently consists of pastoral and arable land and a disused infantry barracks and airfield covering 70ha (Oakington Barracks). Approximately half the barracks is covered by grass with the remaining area comprising buildings, roads, airfield tracks and bunkers (WSP, 2007). Within the site of the Oakington Barracks and airfield there are a number of manmade localised topographic features. The features include raised mounds and a manmade pond.

12.5.2 The existing study area is relatively level, with levels gradually falling to the north. Levels range from 16mAOD at the south west of the site, to approximately 5.5mAOD to the north east towards the CGB route.

### Geology and Groundwater

12.5.3 The geology underlying the proposed study area consists of River Terrace Deposits, Alluvium and Clay. A large section of the site is classified as 'unproductive strata'. These are rock layers or drift deposits with low permeability that has negligible significance for water supply or river base flow. However, a section of superficial deposit within the proposed Northstowe Phase 2 site adjacent to Longstanton is classified as a Secondary A Aquifer. A Secondary A Aquifer is defined as permeable layers capable of supporting water supplies at a local rather than strategic scale.

- 12.5.4 Ground water levels were monitored as part of previous studies between 2002 and 2006. The results of the study showed that the geology of the study area creates perched groundwater tables and shallow aquifers. Ground investigation revealed that the site comprises a shallow permeable stratum over an impermeable clay layer that creates a perched groundwater table and shallow aquifer. The level of the groundwater is seasonally variable with a typical range of between 0.2m – 2.0m below ground level. Owing to the topography of the site the aquifer under the site is almost self-contained and drains to the existing drainage outfalls that would be used for the development. This means that if the development has the impact of lowering the groundwater levels within the site the impacts to the surrounding area should not be significant (WSP, 2007).

### Surface Water Features

- 12.5.5 The main surface water bodies in the vicinity of the study area generally flow south to north, with drainage generally west to east, linking with the primary surface water bodies. Currently the Northstowe Phase 2 study area drains to the receiving watercourses through existing culvers under the CGB track (disused railway line).
- 12.5.6 The area surrounding the study area, including the existing settlement of Longstanton, is drained by two main catchments: Swavesey Drain/Longstanton Brook and the Beck Brook/Cottenham Lode. The Longstanton Brook drains directly to the Swavesey Drain and drains south to north to the west of the Northstowe Phase 2 study area. The Beck Brook drains directly to the Cottenham Lode and drains south to north to the east of the Northstowe Phase 2 study area.
- 12.5.7 Additionally there are records of a number of SCDC's award drains located within the study area. Award drains are watercourses maintained by a Local Authority and not the Environment Agency or Internal Drainage Board. Award watercourses are any watercourses for which responsibility has been transferred to the Council under Enclosure Acts. However, the current extent and status of these drains are still to be clarified by SCDC and HCA as some of these Award Drains no longer exist on site according to our knowledge as they may have been altered following the former occupation of Oakington Airfields and Barracks by the Ministry of Defence since the war times. It is recommended the presence of drains within the site is confirmed at detailed design phase.

### Drainage System

- 12.5.8 Anglian Water is the Sewerage Undertaker for the area and has responsibility for the existing and proposed surface and foul water sewerage systems, as well as the sewerage treatment facilities in the area. Foul effluent from Longstanton and the surrounding areas is pumped to existing sewage treatment works (STW) at Over and

Uttons Drove. The Over STW discharges directly into the Great Ouse, while the Uttons Drove STW discharges into the Swavesey drain system. The Environment Agency previously raised concerns regarding the impact of effluent discharge on flood risks with the Swavesey Drain system. It was previously reported that Longstanton had severe capacity issues and sewerage overloading and flooding was a frequent event due to failure of the main pumping stations.

- 12.5.9 There are no known existing public sewers crossing the proposed Northstowe Phase 2 development site. There is one foul rising main from the old married quarters in Rampton Drift that pumps up to the Longstanton foul water pumping station and then discharges to Over STW or Uttons Drove STW. Existing surface water sewers within the proposed development area are either to be abandoned or to be incorporated into the proposed surface water drainage strategy for the development.

### Water Quality

- 12.5.10 There is no known water quality data for any of the award watercourses or unnamed drainage ditches within the Northstowe Phase 2 development study area.
- 12.5.11 The Environment Agency samples for river quality at regular intervals along various rivers and canals throughout England and analyses their chemistry, biology, nitrate and phosphate content. There are however no monitoring points in the vicinity of the study area.
- 12.5.12 Water in rivers, is set to improve under measures set out in River Basin Management Plans, drawn up for river basin districts across England and Wales under the Water Framework Directive. River Basin Management Plans are plans for protecting and improving the water environment and have been developed in consultation with organisations and individuals.
- 12.5.13 The Beck Brook/Cottenham Lode is monitored approximately 5km from the study area under the Water Framework Directive. Monitoring has indicated that the brook is heavily modified. The current ecological quality of the watercourse is Moderate Potential; the current chemical quality of the river does not require assessment. The 2015 predicted ecological quality of the watercourse is Moderate Potential; the 2015 predicted chemical quality of the river does not require assessment. Overall the watercourse is classified as being 'At Risk' and the watercourse is within a Protected Area.
- 12.5.14 The Swavesey Drain/Longstanton Brook is monitored approximately 7km from the study area under the Water Framework Directive. The current ecological quality of the watercourse is Good Status; the current chemical quality of the river does not require assessment. The 2015 predicted ecological quality of the watercourse is Good Status; the 2015 predicted chemical quality of the river does not require

assessment. Overall the watercourse is classified as being 'At Risk' and the watercourse is within a Protected Area.

- 12.5.15 Protected Areas would be managed to achieve the Water Framework Directive objectives and the objectives of the existing legislation. Due to the status of the watercourse it is important that the quality of runoff from the site is considered as well as the quantity. The Water Framework Directive (WFD) requires that all inland and coastal waters within defined river basin districts must reach at least Good Status or Good Potential. The WFD requires no deterioration in the current status of the water body. It also includes an objective to 'aim to improve' any water body that is not presently at Good Status or Potential.

### Flood Risk

- 12.5.16 The EA's Flood Map (2014) shows that the proposed Northstowe Phase 2 development study area is predominantly located in Flood Zone 1 (low probability of flooding) and that the site's eastern fringe lies within Flood Zone 3 (high probability of flooding).
- 12.5.17 Previous studies have indicated that the crest level of the CGB route embankment is above the predicted flood levels and the principal flood route from the Beck Brook into the site is likely to be as a result of flood waters backing up and entering the proposed Main Phase 2 development area via the culverts located along the eastern boundary, under the CGB route embankment (WSP, 2007). The examination of the topographic survey has also confirmed that the level of the CGB route, along the entire eastern boundary of the Phase 2 site, is higher than the 1 in 100 year annual chance (1% AEP) and 1 in 200 year annual chance (0.5% AEP) flood levels for the Oakington Brook/ Beck Brook.
- 12.5.18 The EA's updated Flood Map for surface water (2014) shows that the majority of the Phase 2 study area is at low risk of surface water flooding. Mapping indicates there is a surface water flow route through the area of the Oakington Barracks. The EA mapping shows that surface water flows into the site and ponds to the eastern boundary along the CGB route, which is the basis for locating the waterpark in this location within Northstowe Phase 2 development area.
- 12.5.19 Based on the Environment Agency online groundwater mapping the risk to the proposed scheme from groundwater flooding is considered to be low, as only a small area of the site has been classified as a secondary A aquifer. This type of aquifer has low transmissivity. In other words, it transmits a limited rate of water horizontally. It is, therefore, unlikely to have the capacity to cause significant flooding problems.

- 12.5.20 However, monitored ground water levels indicated that the level of the groundwater is seasonable variable with a typical range of between 0.2m – 2.0m below ground level (WSP, 2007). Due to the potential for shallow groundwater within the site it is considered there could be a risk of groundwater flooding within the proposed Northstowe Phase 2 development area. This could also impact the performance of proposed SuDS features and also have a potential risk of introducing new flood flow routes through these during periods of high ground water level. To mitigate this, all SuDS features would have a suitable lining system to prevent water ingress and allow the feature to retain its function.
- 12.5.21 The proposed Northstowe Phase 2 development study area is considered to be at low risk of flooding from the sea and artificial sources.
- 12.5.22 For further details please refer to the Flood Risk Assessment and Drainage Strategy (ref: 5004-UA006156-01) that has been submitted with the planning application.

### Climate Change

- 12.5.23 It should be noted that the EA Flood Map outlines do not take into account the potential future impacts of flooding from changes in climate. The PPS25 Practice Guide states that “changes in the extent of inundation are negligible in well-defined floodplains” with increased flows. The EA has advised that as the flood extents do not include any allowances for climate change. Subsequently it has been recommended that a precautionary approach is taken and the 1 in 200 year (0.5% AEP) results are utilised for the future 1% levels and flows.
- 12.5.24 It is suggested in the PPS25 Practice Guide that peak rainfall intensity will increase and therefore to reduce the risk from surface water flooding, drainage systems will be designed to accommodate future increased runoff. For further details please refer to the Flood Risk Assessment and Drainage Strategy (ref: 5004-UA006156-01) that has been submitted with the planning application.

### Surface Water environment features – assessment of importance

- 12.5.25 The water environment features, identified to date are assessed in terms of their quality and importance in Table 12.7.



**Table 12.7: Water environment features – assessment of importance**

Feature	Attribute	Quality	Importance
Beck Brook/ Cottenham Lode	Dilution and removal of pollutants	The Beck Brook/Cottenham Lode dilutes and removes pollutants. The overall specific pollutants quality for the river is classified as Moderate.	Medium
	Conveyance of flow	The Beck Brook/Cottenham Lode is located outside the study area.	High
	Biodiversity	There are no known species that are important on a district, regional or national a scale supported by the watercourse.	Low
	Water quality	The water quality is considered to be important on a local scale. It is not considered that water quality in the study area would impact on the River Great Ouse.	Low
Swavesey Drain/ Longstanton Brook	Dilution and removal of pollutants	The Swavesey Drain/Longstanton Brook dilutes and removes pollutants at a local scale. The overall specific pollutants quality for the river is classified as Good.	Medium
	Conveyance of flow	The Swavesey Drain/Longstanton Brook is located outside the study area.	High
	Biodiversity	There are no known species that are important on a district, regional or national a scale supported by the watercourse.	Low
	Water quality	The water quality is considered to be important on a local scale. It is not considered that water quality in the study area would impact on the River Great Ouse.	Low
Award Watercourses	Dilution and removal of pollutants	The tributary dilutes and removes pollutants at a local scale. No water quality data is available.	Low
	Conveyance of flow	The award watercourses are located in the study area.	Low
	Biodiversity	There are no known species that are important on a district, regional or national a scale supported by the watercourses.	Low
	Water quality	The water quality is considered to be important on a local scale. It is not considered that water quality in the study area would impact on the River Great Ouse.	Low
Manmade Surface Water Pond	Biodiversity	There are no known species that are important on a district, regional or national a scale supported by the surface water ponds within the site.	Low

Feature	Attribute	Quality	Importance
Ground water	Water Supply/ Quality	The site is not located in a Source Protection Zone.	Low
	Vulnerability	Most of the superficial deposits are not designated or Secondary (A) aquifers.	Low

## 12.6 Environmental Design/Design Mitigation

- 12.6.1 Flood mitigation would be proposed to the catchments downstream of the proposed Northstowe Phase 2 development by the implementation of the water park and the proposed control mechanisms. Part of the waterpark would be constructed during the Phase 1 Gallagher application, with the remaining waterpark being part of the Northstowe Phase 2 development application (sub phase A). The waterparks would provide upstream attenuation and subsequently decrease flood risk to third parties (i.e. surrounding villages) downstream.
- 12.6.2 To mitigate against fluvial flood risk within the site it is proposed to set the level of the buildings within the proposed development above the flood level associated with the 1 in 100 year plus climate change (20%) event. The development is therefore located primarily in Flood Zone 1 having less than 1 in 1000 annual probability of river flooding in any year (< 0.1).
- 12.6.3 To manage surface water within the study area and to ensure flood risk is not increased to third parties (i.e. the surrounding village of Oakington) from the site the following mitigation measures and SuDS features have been incorporated into the design.
- 12.6.4 SuDS are water sensitive drainage systems which mimic natural catchment processes to manage urban runoff. A treatment train of various SuDS is required to capture, detain, convey and discharge water from an urban environment. The treatment train concept is fundamental to designing a successful SuDS strategy. Surface water would be managed by a combination of piped drains, open watercourses (swales and fens) and attenuation ponds. This would help to improve the water quality of the surface water run-off before it exits the site.
- 12.6.5 The attenuation ponds would consist of two new large water parks, which would be constructed to the east of the site. Surface water would be stored within the ponds and would be discharged at a controlled rate via a pumping arrangement. The pumping would occur outside of flood events, and the onsite drainage would be designed to accommodate a 1 in 200 year storm event + 30% climate change without flooding.
- 12.6.6 Please refer to the Flood Risk Assessment and Drainage Strategy (ref: 5004-UA006156-01) that has been submitted with the planning application.

## 12.7 Potential effects

### Site establishment and construction effects

- 12.7.1 The outline Construction Environmental Management Plan includes standard pollution control/embedded mitigation measures to be considered as part of the project, when assessing the construction of the drainage scheme.
- 12.7.2 This assessment has been split into two parts: water resources and flood risk
- 12.7.3 Water resource impacts are considered in terms of impacts on water quality, and their consequent habitat impact. The potential impacts, without mitigation, on water quality during the construction phase would arise from normal construction activity and the particular hazards of construction on an exposed site surrounded by a receptor (i.e. the Beck Brook, Longstanton Brook and several unnamed drains and surface water ponds).
- 12.7.4 These impacts potentially include storage and management of fuels and oils, use of cement-based products and the potential release of sediment. Additional hazards arising from construction activities would include accidental release of floatable material, plastic and plastic film for instance, and loss of material during storm events from surface water runoff. The watercourse receptors (i.e. the Beck Brook, Longstanton Brook and several unnamed drains and surface water ponds), have been classified as having 'low' importance. Without mitigation measures, it is considered that this could result in 'small adverse' changes to the characteristics of the watercourses and therefore the impact significance has been assessed as 'negligible' as the short term impact would be of insufficient magnitude to affect the use or integrity of the receptor.
- 12.7.5 The development is considered to have a low flood risk at present and is classified by the Environment Agency as Zone 1 "Low Flood Risk". Without mitigation the increase in surface water runoff could pose flood risk to the study area, and affect flood risk to the surrounding area during construction. These potential receptors are considered to be of 'high' importance. The receptor is classified as 'high' as the flood plain has constraints and a high probability of flooding. Without mitigation measures, it is considered that this could result in a 'small adverse' magnitude of change and therefore the impact significance has been assessed as 'slight' , as this short term impact could temporarily increase surface water flood risk.

### Operational effects

- 12.7.6 This impact assessment has been split into two parts: flood risk and water resources.

- 12.7.7 Surface water falling on the site could be contaminated by spills and leaks of oil and fuel, and by other materials deposited on the drained surfaces and contaminated runoff could be released into the surface water environment via this route. The potential receptors are considered to be of 'low' importance. Without mitigation measures, it is considered that this could result in a 'small adverse' magnitude of change and therefore the significance of effect has been assessed as 'negligible' over the long term lifetime of the development, due to increased flood risk of pollution to the surface water environment.
- 12.7.8 Once the proposed development has been completed and becomes occupied, a number of activities could potentially lead to adverse effects on water quality. Substances that may result in reduced water quality and therefore adverse effects on controlled waters include fuels and oils; chemicals and other substances and herbicides or pesticides resulting from field and landscaped area maintenance and light industrial processes. The geological, hydrogeological and hydrological conditions assessed at the site, it is considered that this could result in 'medium adverse' magnitude of change and therefore the significance of effect has been assessed as 'negligible' as the impact would be of insufficient magnitude to affect the use or integrity of the receptor.
- 12.7.9 The site is situated in Flood Zone 1 and is considered to be at low risk of fluvial flooding. Current flooding from groundwater, artificial and tidal sources have also been assessed as low risk. There is a history of surface water flooding on the site and the redevelopment of the site may have the potential to increase the risk of surface water flood risk to off-site locations, unless surface water managed appropriately. Without mitigation the increase in impermeable areas and subsequently surface water runoff could pose flood risk to the occupiers of the site, and affect flood risk to the surrounding area. These potential receptors are considered to be of 'high' importance. The receptor is classified as 'high' as the flood plain outside of the study area boundary has known constraints and a high probability of flooding. Without mitigation measures, it is considered that this could result in 'medium adverse' magnitude of change and therefore the significance of effect has been assessed as 'negligible' due to increased risk of pollution to the water environment.

### Mitigation and enhancement

- 12.7.10 Mitigation works would be required for the current flood risk affecting Oakington village.
- 12.7.11 The new ponds would be visually attractive, enhance the space they occupy, provide wildlife habitat and also have valuable environmental benefits by helping to remove pollution from surface water runoff.
- 12.7.12 It is anticipated that the SuDS features incorporated into the proposed development would manage the quantity of surface water runoff whilst also improving the water quality of the run-off.

- 12.7.13 This section details the mitigation of adverse effects and the effectiveness of the mitigating measures.

### Flood risk mitigation

- 12.7.14 Mitigation for these potential impacts would be provided by a robust drainage strategy, suitable finished floor levels and sequential approach that steers the proposed development away from high flood risk areas.
- 12.7.15 For the Southern Access Road (West) it is proposed that surface water will be discharged via roadside ditches to 10 localised ponds where it will be stored and discharged at a controlled rate of 1 l/s/ha to the local award drains.
- 12.7.16 With mitigation the impacts on the identified receptor is negligible and therefore the significance of effect has been assessed as negligible. It is considered that with mitigation measures the impact could have no effect over the long term lifetime of the Northstowe Phase 2 development.

### Water resources construction mitigation

- 12.7.17 The potential impacts, without mitigation, on water quality during the construction phase would arise from normal construction activity and the particular hazards of construction on an exposed site. Mitigation for these potential impacts would be provided in method statements and the contractor's phase-specific CEMP. It is essential that this management plan covers all the potential impacts that could arise at this site and that no discharge of polluting material or release of sediment occurs during construction.
- 12.7.18 A method statement for the construction of the development is not yet available but should take into consideration the following key issues:
- Creation and release of contaminated silts and sediment release into the surrounding watercourses and surface water ponds;
  - Control of any refuelling facilities, chemical and waste storage and handling areas;
  - Polluted drainage and discharges from site;
  - Management of any dewatering required for construction of foundations; and
  - Contamination of groundwater.
- 12.7.19 Further information on identification of potential hazards and management of them is provided in the literature, e.g. CIRIA 2001, EA 2010.

- 12.7.20 With mitigation the impacts on the identified receptor is ‘negligible’ and therefore the significance of effect has been assessed as ‘negligible’ over the long term lifetime of the development, due to increased flood risk of pollution to the surface water environment.

### **Water resources operational mitigation**

- 12.7.21 Surface water falling on the site could be contaminated by spills and leaks of oil and fuel, and by other materials deposited on the drained surfaces. Mitigation for the potential operational impacts would be provided by implementing a surface water drainage design which utilises Sustainable Drainage Systems (SuDS). SuDS are a means of restricting discharge rates and runoff volumes, as well as improving water quality, and providing biodiversity opportunities and amenity value.
- 12.7.22 As discussed in Section 5, the proposed drainage strategy is providing betterment on the existing surface water runoff rates. Therefore, with mitigation the impacts on the identified receptor is ‘small beneficial’ and therefore the impact significance has been assessed as ‘negligible’ over the long term lifetime of the development, due to increased risk of pollution to the surface water environment.

### **Residual Effects**

- 12.7.23 Residual effects are those that remain after mitigation has been put in place. The residual effects are as follows:

#### **Site enabling and construction residual effects**

- 12.7.24 These are construction effects that remain following mitigation.
- 12.7.25 With mitigation the site would have a low flood risk, providing a ‘negligible’ change in this attribute and a ‘negligible’ impact. The residual effects are insignificant.
- 12.7.26 The construction impacts would be managed through a phase-specific CEMP, which would include a detailed monitoring programme, and would therefore be minimal. With this mitigation in place the magnitude of any water quality impacts would be ‘negligible’ and the residual effect is ‘negligible’.
- 12.7.27 The drainage system would provide treatment for the hard-standing area which would remove solids and oil pollution. With this mitigation in place the magnitude of any post-construction water quality impacts would be ‘negligible’ and the overall impact ‘negligible’.

## Operational residual effects

- 12.7.28 These are operational effects that remain following mitigation.
- 12.7.29 With mitigation the site would have a low flood risk, providing a 'small beneficial' change in this attribute and a 'slight Beneficial' environmental impact. The residual effects are 'negligible'.
- 12.7.30 The drainage system would provide treatment for the hard-standing area which would remove solids and oil pollution. With this mitigation in place the magnitude of any post-construction water quality impacts would be 'negligible' and the overall impact 'negligible'.

## Cumulative Effects

- 12.7.31 As the site is self-contained, there are no cumulative effects for this development related to hydrology, flooding and drainage.

## Limitations and Assumptions

### Limitations

- 12.7.32 The development site has been split into three different phases. The flood risk assessment and drainage strategy addresses the requirements for the proposed Northstowe Phase 2 development and includes the other phases where appropriate.

### Assumptions

- 12.7.33 The assessment is based on an indicative masterplan so assumptions are made regarding the locations of SuDS features.

## Assessment Summary Matrix

- 12.7.34 The overall effect of implementing the principles as set out in this statement and the drainage strategy is assessed as 'negligible'.
- 12.7.35 The scheme would benefit the proposed Northstowe Phase 2 development site and surrounding areas by providing a sustainable water management strategy to reduce the impacts of flood risk. This would provide an overall 'slight beneficial' change. Flood risk to buildings would be low.
- 12.7.36 The SuDS features and proposed water parks would enhance the space they occupy, provide wildlife habitat and also have valuable environmental benefits by helping to remove pollution from surface water runoff.

**Table 12.8: Assessment Summary Matrix**

<b>Assessment Summary Matrix</b>				
<b>Description of Effects</b>	<b>Significance of Effects:</b>	<b>Description of Mitigation Measures and Enhancement</b>	<b>Description of Residual Effects</b>	<b>Significance of Effects</b>
<b>Site enabling works and construction assessment</b>				
Pollution from storage, management and use of fuels, oils and cement based products.	Negligible	Provision of Sustainable Drainage Systems (SuDS)	The drainage system would provide treatment for the hard-standing area which would remove solids and oil pollution. With this mitigation in place the magnitude of any post-construction water quality impacts would be negligible.	Negligible (Not significant)
Increase in surface water runoff could pose flood risk to the study area, and affect flood risk to the surrounding area during construction.	Slight Adverse	Mitigation for these potential impacts would be provided by the drainage strategy i.e. implementing a surface water drainage design which utilises Sustainable Drainage systems (SuDS).	With mitigation the site would have a low flood risk, providing a Small Beneficial change in this attribute and a Negligible environmental impact.	Slight Beneficial (Not significant)
Potential for impacts on water quality and consequent impact	Negligible	Mitigation for these potential impacts would be provided in the method statement and contractor's CEMP would detail how these potential environmental risks would be managed.	The construction impacts would be managed through a detailed CEMP, which would include a detailed monitoring programme, and would therefore be minimal.	Negligible (Not significant)
The Scheme is located on a Secondary A Aquifer. During construction there is the potential for the creation of pathways for contamination into gravel causing pollution of groundwater.	Slight Adverse	Mitigation for these potential impacts would be provided in the method statement and contractor's environment management plan CEMP would detail how these potential environmental risks	The construction impacts would be managed through a detailed CEMP, which would include a detailed monitoring programme, and would therefore be minimal.	Negligible (Not significant)



<b>Assessment Summary Matrix</b>				
<b>Description of Effects</b>	<b>Significance of Effects:</b>	<b>Description of Mitigation Measures and Enhancement</b>	<b>Description of Residual Effects</b>	<b>Significance of Effects</b>
		would be managed.		
<b>Operational assessment</b>				
Contamination by spills and leaks of oil and fuel and by other materials deposited on the drained surfaces and contaminated runoff could be released into the surface water environment.	Negligible	Mitigation for the potential operational impacts would be provided by implementing a surface water drainage design which utilises Sustainable Drainage Systems (SuDS).	The drainage system would provide treatment for the hard-standing area which would remove solids and oil pollution. With this mitigation in place the magnitude of any post-construction water quality impacts would be negligible.	Negligible (Not significant)
Without mitigation the increase in impermeable areas and subsequently surface water runoff could pose flood risk to the occupiers of the site, and affect flood risk to the surrounding area.	Slight Adverse		With mitigation the site would have a low flood risk, providing a Small Beneficial change in this attribute and a Slight Beneficial environmental impact.	Slight Beneficial (Not significant)
Substances that may result in reduced water quality and therefore adverse effects on controlled waters include fuels and oils; chemicals and other substances and herbicides or pesticides resulting from field and landscaped area maintenance and light industrial processes.	Negligible		The drainage system would provide treatment for the hard-standing area which would remove solids and oil pollution. With this mitigation in place the magnitude of any post-construction water quality impacts would be negligible.	Negligible (Not significant)
Without mitigation the increase in impermeable areas for the Southern	Slight Adverse	Adopted roads, including those within the spine infrastructure and residential areas,	With mitigation the site would have a low flood risk, providing a	Slight Beneficial

<b>Assessment Summary Matrix</b>				
<b>Description of Effects</b>	<b>Significance of Effects:</b>	<b>Description of Mitigation Measures and Enhancement</b>	<b>Description of Residual Effects</b>	<b>Significance of Effects</b>
Access Road (West) could increase surface water runoff. This could pose flood risk to the occupiers of the site, and affect flood risk to the surrounding area.		will utilise a number of roadside SuDS features such as swales to discharge runoff to the proposed Water Parks within the landscaped areas. It is proposed that surface water will be discharged via roadside ditches to 10 localised ponds where it will be stored and discharged at a controlled rate of 1 l/s/ha to the local award drains.	Small Beneficial change in this attribute and a Slight Beneficial environmental impact.	(Not significant)
<p><i>Key: +ve (beneficial), -ve (adverse), D (direct), InD (indirect), ST (short term), MT (medium term), LT (long term), P (permanent), R (reversible)</i></p>				

## 13 Waste

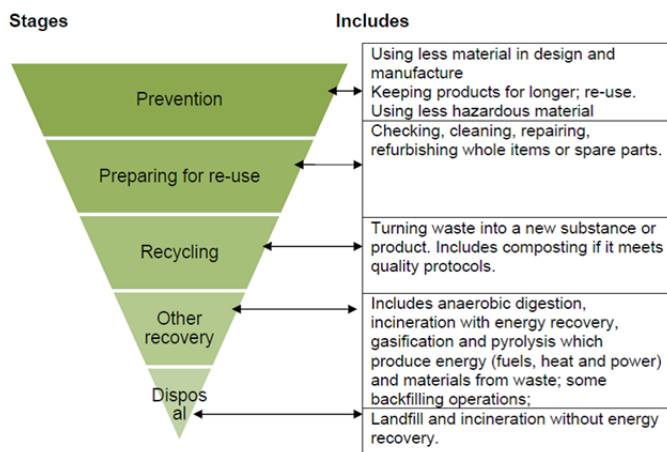
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### 13.1 Introduction

- 13.1.1 This chapter of the ES assesses the environmental effects of the waste management being proposed for the development during both construction and operation phases.
- 13.1.2 The proposed development would result in the generation of solid waste from construction, demolition and excavation (referred to in this chapter as CD&E waste), and the operation of the site due to the residential and commercial uses of the site (referred to in this chapter as operational waste).
- 13.1.3 The ultimate aim of the chapter is to select the most appropriate waste collection system for the proposed development which saves space, provides value for money, minimises greenhouse gas emissions and maximises the recycling and recovery of material.
- 13.1.4 The proposed Northstowe Phase 2 development offers a unique opportunity to embed waste management infrastructure into the fabric of the urban environment. It provides a showcase for innovation not just in terms of the solutions explored, but in the nature of the development itself and the approach adopted.

### Introduction to waste management

- 13.1.5 Waste is defined in Article 3 of the European Framework Directive on waste (2008/98/EC) as “any substance or object which the holder discards or intends or is required to discard”, where the term:
- ‘waste holder’ is defined as the waste producer or the natural or legal person who is in possession of the waste; and
  - ‘waste producer’ is defined as anyone whose activities produce waste (original waste producer) or anyone who carries out pre-processing, mixing or other operations resulting in a change in the nature or composition of this waste.
- 13.1.6 Waste can cause harm to the environment through its treatment and final disposal, and therefore, effective waste management should follow the principles of the waste hierarchy shown on Figure 13.1 below.

**Figure 13.1: Waste Hierarchy**

- 13.1.7 The assessment has considered the impact on the environment as a result of the generation of this waste and has detailed measures to mitigate these impacts.
- 13.1.8 **Demolition waste** – The existing site is largely undeveloped land, however it is anticipated that there would be a small amount of demolition of existing buildings and structures present on-site.
- 13.1.9 **Construction and excavation waste** – As the existing site is largely undeveloped land, it is anticipated that material waste likely to arise from the construction and excavation phases would consist of hard and inert materials, soils and stones, plastics, packaging (wooden and plastic), insulation material, miscellaneous metals, canteen and office waste.
- 13.1.10 **Operational waste** – As the development is predominantly residential, most waste generated during operation would be household waste, in addition to small quantities of waste from the commercial and public facilities.
- 13.1.11 Two key documents have been referred to in this chapter:

### **Preliminary Site Waste Management Plan (SWMP)**

- 13.1.12 The SWMP is used to plan, implement, monitor and review waste minimisation and management on construction sites.
- 13.1.13 As of 1 December 2013, the Site Waste Management Plans Regulations 2008 were repealed. However, the implementation of a SWMP remains industry best practice.
- 13.1.14 The SWMP is used to record how waste is reduced, reused, recycled and disposed of on a construction site. This effectively means:
- Recording decisions taken to prevent waste through concept and design;

- Forecast waste produced on-site;
- Plan how to reduce, reuse and then recover the forecast waste;
- Implement and monitor the planned activity; and
- Review the SWMP and record lessons learnt.

13.1.15 The SWMP is a live document and is updated regularly during the course of the project. Preparing a SWMP at planning stage facilitates the identification and implementation of waste minimisation at the design stage and reuse and recycling opportunities during on-site operations, reducing the quantities of construction waste sent to landfill. Preparing a SWMP also encourages the review of current waste reduction and recovery practice levels, highlighting areas where good and best practice can be achieved.

#### **Waste Strategy**

13.1.16 A Waste Strategy has been prepared to select the most appropriate waste collection system for the proposed development which saves space, provides value for money, minimises greenhouse gas emissions and maximises the recycling and recovery of material. The Waste Strategy has been submitted in support of the planning application for the Northstowe Phase 2 development.

## **13.2 Review of Proposed Development**

13.2.1 The Northstowe development is centred on the former WWII Oakington Airfield and surrounding farm land.

13.2.2 During construction the following potential sources of waste exist:

- Existing buildings and structures on site relating to the former RAF site, which would need to be demolished leading to the generation of material that may be suitable for reuse, subject to appropriate testing.
- Existing vegetation to be cleared and surplus excavated materials.
- Waste materials generated by construction activities and from the presence of on-site construction facilities.

13.2.3 During operation, the proposed Northstowe Phase 2 development would give rise to residential, commercial and industrial waste streams that would require management and may exist on existing waste provisions in the region.

## **13.3 Approach and methods**

13.3.1 This chapter assesses the likely significant impacts of the proposed development resulting from waste management and the use of resources associated with the works in the CD&E and operational

phases of the proposed development. CD&E wastes are being dealt with separately to operational wastes.

- 13.3.2 The now repealed Site Waste Management Plan Regulations 2008 were previously the only legislative requirement governing the assessment of CD&E waste matters. However, the implementation of a SWMP remains industry best practice, and is a requirement of PPS10: Planning for Sustainable Waste Management<sup>179</sup>. The framework for the assessment of operational waste is derived from a combination of national, regional and local waste and policies combined with expert judgement.
- 13.3.3 The Waste Management Plan for England, 2013 confirms the UK's commitment to meet its target under the Waste Framework Directive of recovering at least 70% by weight, of construction and demolition waste (This relates to construction and demolition waste, excluding hazardous waste and naturally occurring material falling within code 17 05 04 in Schedule 1 to the List of Wastes (England) Regulations 2005 (SI 2005/895)).

## Legislation and guidance

- 13.3.4 The framework for the assessment is derived from a combination of national, regional and local waste and policies and measures of which the key elements are:
- Meet and exceed the Landfill Directive diversion targets for biodegradable municipal waste;
  - Increase diversion from landfill of non-municipal waste; and
  - Decouple waste growth (in all sectors) from economic growth and put more emphasis on waste prevention and re-use.

### National waste policy

- 13.3.5 The following national waste policy has been identified as applicable to the consideration of impacts upon materials and waste:
- EU Landfill Directive (Directive 1999/31/EC on the landfill of waste);
  - The Waste Framework Directive (Directive 2006/12/EC on waste);
  - Environmental Permitting (England and Wales) Regulations 2010;
  - The Hazardous Waste (England and Wales) Regulations 2005, Statutory Instrument 2005 No. 894, and 2009 amendment SI 507;
  - Waste (England and Wales) Regulations 2011 SI 988 and 2012 amendment SI 1889 (transposes the Revised Waste Framework Directive);
  - The Clean Neighborhoods and Environment Act 2005;

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<sup>179</sup> Planning Policy Statement 10: Planning for Sustainable Waste Management, Communities and Local Government, revised March 2011

- Waste Strategy for England 2007;
- Review of Waste Policy for England, 2011;
- National Planning Policy Framework (DCLG, Mar 2012)
- Waste Management Plan for England (DEFRA, Dec 2013);
- Planning Policy Statement 10: Planning for Sustainable Waste Management (CLG Revised March 2011); and
- Strategy for Sustainable Construction (HM Government 2008).

### **Waste policy and guidance for the East of England and Cambridgeshire**

13.3.6 The following local and regional waste policy and guidance has been identified as applicable to the consideration of impacts upon materials and waste:

- Cambridgeshire and Peterborough Minerals and Waste Development Plan: Core Strategy (adopted 19 July 2011)
- Policy CS24 Design of Sustainable Minerals and Waste Management Facilities
- Policy CS28 Waste Minimisation, Reuse and Resource Recovery
- Cambridgeshire and Peterborough Minerals and Waste Site Specific Proposals Development Plan Document (Adoption Version, 2011)
- Joint Municipal Waste Management Strategy for Cambridgeshire and Peterborough 2008-2022
- Cambridgeshire Design Guide for Streets and Public Realm (2007)
- Development Control Policies Development Plan Document (2007)
- District Design Guide: High Quality and Sustainable Development in South Cambridgeshire Supplementary Planning Document (2010)
- Northstowe Area Action Plan (2007)
- RECAP Partnership: Waste Management Design Guide Supplementary Planning Document (Adopted February 2012)
- Local Plan 2011-2031

13.3.7 The waste strategy includes waste requirements from the previous legislation and guidances and the proposed development response.

### **Study Area**

13.3.8 In addition to the proposed development itself, the study area comprises SCDC for operational waste, and Cambridgeshire, Norfolk and Suffolk for CD&E waste (since data from SCDC is not available). The study area also comprises any waste facilities that would receive

waste arising from CD&E and operational phases of the proposed development. Whilst the study area does not include the operation of these facilities, it is necessary to ensure that the facilities have the capacity and capability to support the proposed development deliver on its waste objectives and targets.

## Methodology

### Establishing baseline conditions

#### Construction, demolition and excavation (CD&E) waste

- 13.3.9 For the purpose of this waste assessment, waste refers to residential, commercial, leisure, education and infrastructure waste arisings from the CD&E phases. The baseline conditions include the current waste management infrastructure in Cambridgeshire, Norfolk and Suffolk and the performance in terms of the proportion of construction waste recycled to produce graded and ungraded aggregates and soil, used for engineering and capping and used on exempt sites.
- 13.3.10 Baseline conditions have been established through desk-top research, including the interrogation of key databases such Building Research Establishment (BRE) benchmarks<sup>180</sup> and Environment Agency data tables<sup>181</sup>.

#### Operational waste

- 13.3.11 For the purpose of this waste assessment, operational waste refers to residential, commercial, leisure and education waste arisings. The baseline conditions are the existing waste management system in SCDC, the quantities of waste and recyclables collected, and the performance in terms of the proportion recycled or composted.
- 13.3.12 Baseline conditions have been established through consultation with SCDC Environmental Services and desk-top research, including the interrogation WasteDataFlow<sup>182</sup> (the web based system for municipal waste data reporting by UK local authorities to government).

### Forecasting waste arisings

#### Construction, demolition and excavation waste

- 13.3.13 For the purpose of this waste assessment, the CD&E waste produced during the construction phase would be affected by the types and methods of construction. At the time of outline planning application

<sup>180</sup> Building Research Establishment Waste Benchmark Data, SmartWaste Plan, Issued 26<sup>th</sup> June 2012

<sup>181</sup> Environments Agency Conversion Table,

[https://www.hesa.ac.uk/dox/datacoll/c09042/Copy\\_of\\_EA\\_RATS\\_Conv\\_into\\_tonnages\\_Table.pdf](https://www.hesa.ac.uk/dox/datacoll/c09042/Copy_of_EA_RATS_Conv_into_tonnages_Table.pdf)

<sup>182</sup> <http://www.wastedataflow.org/>, 7th July 2014



submission, the types and methods of construction had not been decided and so it was not possible to accurately estimate the volume of waste arising from the construction. Benchmarking data from BRE, (representing average data from new build projects) WRAP Netwaste wastage rates and the Northstowe Masterplan Cost Assessment Option A Phase 2 (Produced by Jones Lang LaSalle for Homes and Communities Agency, 11 June 2014) have been used to forecast the amount of construction and excavation waste arising from the buildings and the infrastructure works. For building waste, the building type and specification for each plot, including gross internal floor area, has been taken from the Cost Assessment. Construction waste estimates have been made based on BRE benchmarks for different construction types within the scheme, expressed as:

- m<sup>3</sup> of waste per 100m<sup>2</sup> of floor area<sup>183</sup>
- tonnes of waste per 100m<sup>2</sup> of floor area

13.3.14 These benchmark are applied to gross internal floor areas from the building use schedule to forecast construction waste by building construction type.

13.3.15 For the infrastructure elements of the proposed development, dimensions and specifications of some elements have been estimated to calculate the volumes of the key materials to be used. These volumes have then been used to calculate key waste material volumes using wastage rates taken from the WRAP Netwaste Tool<sup>184</sup>.

13.3.16 A pre-demolition or refurbishment audit of the three existing buildings, water tower and facilities associated with the barracks would be carried out post consent and therefore, at this stage, it has not been possible to accurately estimate the volume of waste arising from the demolition and or refurbishment. However, benchmarking data from BRE, WRAP Netwaste wastage rates and the existing buildings floor areas have been used to forecast the amount of demolition waste arising from these existing buildings and structures.

### **Operational waste**

13.3.17 Forecast waste arisings have been established through consultation with SCDC, and desk-top research, including the interrogation WasteDataFlow<sup>185</sup> and the British Standard 5906:2005 (Produced by Jones Lang LaSalle for Homes and Communities Agency, 10 April 2014).

<sup>183</sup> In cases where waste is calculated as a volume, WRAP's waste conversion factors are applied to convert volume to weight.

<sup>184</sup> Waste and Resources Action Programme, <http://nwtool.wrap.org.uk/ToolHome.aspx>

<sup>185</sup> <http://www.wastedataflow.org/>, 7<sup>th</sup> July 2014

## Significance criteria

- 13.3.18 The assessment of effects from CD&E waste has focused on the potential direct impact of waste arisings on the existing local, regional, and national waste management infrastructure. The waste management infrastructure is therefore the resource or receptor on which impacts are assessed, and its level of sensitivity is dependent on its capacity to absorb additional waste, using the criteria provided in Table 13.1 below.

**Table 13.1: Definitions of Sensitivity**

Level of Sensitivity	Definition of Sensitivity Examples
High	High importance and rarity, national scale, and limited potential for substitution – limited materials reuse, recycling and/or recovery. Recycling of waste is less than 50%. Limited regional waste capacity expected. Waste volumes generated by the Scheme contribute to an excess of 5% of the total generation in the region.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution – moderate materials reuse, recycling and/or recovery. Waste volumes generated by the Scheme contribute to greater than 1% but less than 5% of the total generation in the region. Moderate regional waste capacity expected.
Low	Low or medium importance and rarity, local scale – high materials reuse, recycling and/or recovery. Waste volumes generated by the Scheme are easily managed locally without significant increases in quantity (less than 1% of the total generation in the region). High regional waste capacity expected.

- 13.3.19 The magnitude of the effect on the baseline can then be assessed considering the scale, extent of change, nature and duration of effect.

- 13.3.20 Table 13.2 below provides the definitions of magnitude used for the purposes of this assessment in the absence of topic specific criteria guidance being available or appropriate.

**Table 13.2: Definitions of Magnitude**

Level of Magnitude	Definition of Magnitude
High	Considerable impact (by duration and type and amount of materials used and waste generated that cannot be managed by the regional waste management infrastructure and requires transport outside of the region) of more than local significance in relation to relevant legislation, policy and/or standards.
Medium	Limited impact (by duration and type and amount of materials used and waste generated that cannot be managed by the regional waste management infrastructure and requires transport outside of the region) of more than local significance in relation to relevant legislation, policy and/or standards.
Low	Slight impact (by duration and type and amount of materials used and waste generated that cannot be managed by the regional waste management infrastructure and requires transport outside of the region) of more than local significance in relation to relevant legislation, policy and/or standards.

	and/or standards.
Negligible	Neutral change (by duration and type and amount of materials used and waste generated that cannot be managed by the regional waste management infrastructure and requires transport outside of the region) of more than local significance in relation to relevant legislation, policy and/or standards.

13.3.21 Using these definitions, a combined assessment of sensitivity and magnitude can then be undertaken to determine how significant an effect is, as demonstrated in Table 13.3 below. Where effects are usually considered significant, they have been shaded: effects can be either beneficial or detrimental.

**Table 13.3: Significance Matrix**

		Low	Medium	High
		SENSITIVITY		
MAGNITUDE	High	Moderate	Major / Moderate	Major
	Medium	Minor / Moderate	Moderate	Major / Moderate
	Low	Minor	Minor / Moderate	Moderate
	Negligible	Negligible	Negligible	Negligible

## 13.4 Consultation

13.4.1 Consultation with SCDC has been undertaken as part of the assessment to:

- Define the targets in the SCDC waste policies;
- Discuss waste management aspirations for the proposed development and set targets;
- Determine a formal position with regards to any future waste facilities in the region and implications on waste management at the proposed development; and
- Determine details of SCDC waste and recycling collection systems (materials collected, receptacles provided, frequency of collection etc.).

13.4.2 Further consultation will be required as the proposed development progresses and as part of reserved matters applications.

## 13.5 Baseline conditions

### Construction, demolition and excavation waste

13.5.1 Cambridgeshire, Norfolk and Suffolk has an estimated total CD&E waste arisings of 4,780,477 tonnes (CD&E Waste: Survey of Arisings and Use of Alternatives to Primary Aggregates in England, 2005). Of this total:

- 57% was recycled to produce graded and ungraded aggregates and soil (excluding topsoil) by the regions 56 recycling crushers;
- 34% entered licensed landfill sites (of this 12% was used for engineering and capping and 66% was waste); and
- 9% was used on exempt sites.

13.5.2 The proposed site is largely undeveloped land. There is a very limited amount of demolition occurring on-site. It is anticipated that only a small amount of demolition materials would need to be considered for incorporation into the construction phase of the project.

13.5.3 The regulations require that all construction-related wastes removed from the proposed development is undertaken by a company that is authorised to do so. Table 13.4 below includes details for a selection of companies in the vicinity of the proposed development. It includes their waste carrier registration number and permit under the Environmental Permitting (England and Wales) Regulations 2007, or registered under those Regulations as a waste operation exempt from the need of such a permit.

**Table 13.4: Waste Management Facilities**

Services	Name	Location	Registration number
Waste Carriers	Cottenham Skips	CB24 8UG	CB/XN5475JC
	Cambridgeshire Recycling Ltd	CB4 6DQ	CB/AE5054ES
	Mick George Ltd	PE27 4YQ	CB/BN5911QW
Waste Management Facilities	John Henry's Tip	CB24 3DS	75042
	Malary Ltd – Cottenham Treatment Works	CB24 8PS	70205
	Cambridgeshire Recycling Ltd	CB4 6DQ	70109

## Operational waste

- 13.5.4 Currently an alternating weekly collection system for the properties in SCDC jurisdiction is provided. In 2012-2013 this represented 62,520 households. For households, residual waste is collected on one week and co-mingled dry recyclables and mixed organics are collected the following week.

**Table 13.5: Waste collections for household (kerbside collection)**

Waste stream	Waste type	Collection arrangements
Co-mingled dry recyclables	Newspapers and magazines, telephone directories, catalogues, envelopes, junk mail and shredded paper.	Paper only caddy collected fortnightly.
	Plastic bottles and tops, plastic packaging, plastic bags, plastic film and ceam food wrapping, glass jars and bottles, food and drink cans, aerosols, tin foil and foil trays, cartons, cardboard, greeting cards and wrapping paper	Blue bins with mixed recycables collected fortnightly.
Mixed organics	Garden waste and cooked and uncooked food waste (meat, fish and dairy).	Green bins collected fortnightly.
Residual waste	Non-recyclable and non-compostable material	Black bins collected fortnightly.
Batteries	Batteries including AA and AAA cells, button batteries, size C and D and any laptop and mobile battery.	Kerbside collection weekly, placing the bag outside the blue bins.

- 13.5.5 A chargeable bulky waste collections service is provided to all residents for items such as furniture and white goods. SCDC is also running a trial textile and shoe collection service since January 2013. The trial covers 5,000 households and, if successful, may be rolled out across the district.
- 13.5.6 Dry recyclables from blue bins are currently delivered to a Materials Recycling Facility (MRF) at AmeyCespa near Waterbeach. Separately collected paper is transported from AmeyCespa to a mill in Kent where it is made into newsprint.
- 13.5.7 The waste from the green bins is taken to AmeyCespa and goes through an intensive 'in-vessel' composting process. The resulting soil conditioner is sold for local agriculture, and is also available to householders to collect free of charge from the site.
- 13.5.8 Residual waste from black bins is also taken to AmeyCespa and passed through the Mechanical Biological Treatment plant (MBT). However, at the time of writing this strategy, the MBT was out of action. It is expected to be up and running again at the end of 2014.

13.5.9 There are over 85 bring sites around SCDC, such as supermarket car parks, pub car parks and other community focal points where there are glass, paper, can and textile banks.

13.5.10 SCDC provides ten household waste recycling centres to receive waste exclusively from householders in Cambridgeshire for recycling and disposal. An additional waste recycling centre has been included as part of Phase 1 proposals to be delivered by the joint promoters (as defined within the Northstowe Phase 1 Waste Management Strategy submitted in February 2012).

### Waste statistics

13.5.11 WasteDataFlow is the web based system for municipal waste data reporting by UK local authorities to government. This resource has been interrogated to determine the current SCDC baseline in terms of Municipal Household (MH) waste, residual waste and recycling rates.

**Table 13.6: SCDC waste arisings data and recycling rates**

Metric	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
<b>Total HH waste (t)</b>	59,444	58,649	57,575	58,353	57,501	59,582
<b>Residual waste per household (kg)</b>	468.06	451.77	438.59	412.39	384.78	416.61
<b>Total residual HH waste (t)</b>	27,833	27,190	26,815	25,473	23,999	26,046
<b>Total recycling %</b>	53.18%	53.64%	53.43%	56.35%	58.26%	55.97%

13.5.12 From Table 13.6 above, it can be seen that SCDC achieved a recycling rate of 55.97% in 2012/13. This performance is compared against regional and national performance in

13.5.13 Table 13.7 below. From this it is clear that SCDC recycling rates are well above the average in England.

**Table 13.7: Recycling rates**

Area	2010/11	2011/12	2012/13
<b>SCDC</b>	56.35%	58.26%	55.97%
<b>East England</b>	45.74%	46.75%	45.92%
<b>England</b>	40.50%	42.01%	41.97%

## 13.6 Environmental design/Design mitigation

### Construction, demolition and excavation waste

13.6.1 The potential waste types that could arise during the CD&E phases are summarised in

13.6.2 Table 13.8 below.

**Table 13.8: Potential waste sources during site construction**

Construction phase	Potential wastes produced	Classification of waste
Excavation	Made ground, soil and sub-soils	Inert; and or Non-hazardous; and or Potentially hazardous if it contains sufficiently high levels of heavy metals.
Construction and demolition	Construction materials, such as concrete, bricks, plastics, metals, plasterboard, timber, paint, etc.	Inert; and or, Non-hazardous; and or, Hazardous.
	Made ground, soil and sub-soils	Non-hazardous, and Hazardous if it contains sufficiently high levels of heavy metals.

### Construction waste

13.6.3 Using waste benchmarking data from BRE, WRAP NetWaste wastage rates<sup>186</sup> and the Northstowe Masterplan Cost Assessment Option A Phase 2<sup>187</sup>, the amount of construction waste for the buildings has been forecast. The forecasts are shown in Table 13.9 below.

**Table 13.9: Forecast construction waste arisings**

Construction Type	Average waste (m3/100m2)	Development size (m2)	Forecast waste arising (m3)	Average waste (tonnes/100m2)	Forecast waste arising (tonnes)*
Residential	15.28	466,572	67,751	7.82	36,467
Convenience retail	15.32	10,000	1,532	9.05	905
Service retail	15.32	25,000	3,829	9.05	2,262
Food and drink	15.32	3,500	1,532	25.86	905
Office	20.14	16,200	3,262	11.67	1,891

<sup>186</sup> Waste and Resources Action Programme NetWaste Tool Guide to Reference Data Version 1.0, May 2008

<sup>187</sup> Northstowe Master Cost Assessment Option A Phase 2, 11<sup>th</sup> June 2014

Light industrial	20.06	5,000	1,003	14.41	720
Leisure	13.76	10,000	1,376	4.24	424
Health Community	13.76	6,000	904	7.02	421
Youth facility	13.76	2,000	275	4.24	85
Place of worship	13.76	1,000	138	4.24	42
Primary school 1	13.3	5,000	665	2.48	280
Officers mess to primary school	13.3	2,211	294	5.58	123
Secondary school	13.3	10,000	1,330	5.58	558
Public house	15.32	539	83	9.05	49
Infrastructure			3,574		3,200
Total			87,547		48,332

**Table 13.10: Forecast construction waste arisings by phase from buildings and infrastructure**

Phase	Forecast waste arising (m3)	Forecast waste arising (tonnes)*
A	1,387	609
B	12,859	7,109
C	19,718	11,068
D	19,770	11,839
E	24,898	113,775
F	8,914	4,932
Total	87,547	48,332

13.6.4 The composition of construction waste arisings from buildings is likely to be similar to that shown in Table 13.11 below.

**Table 13.11: Key construction materials waste streams on typical new build (BRE 2008)**

Waste material	Wastage percentage
Packaging (including wood pallets, plastic, cardboard, tins)	25 – 35
Plasterboard	5 – 36
Rubble (including broken bricks, blocks, tiles)	35 – 40
Timber (excluding pallets)	15 – 25
Cement and plaster	10 – 17
Insulation	6 – 15
Metal	3 – 9
Dry concrete products – blocks, slabs, etc.	2 – 12
Plastic products (excluding packaging)	1 -11
Ceramic material	1 - 8



- 13.6.5 The volume of waste arising from construction would depend on how the site is managed and the implementation of the SWMP.

### Demolition waste

- 13.6.6 It is anticipated that any non-hazardous waste generated during demolition may be reused on-site for landscaping or other purposes, therefore only minimal volumes of non-hazardous material may require disposal off-site. Hazardous materials, such as asbestos would be disposed off-site in an appropriate manner.
- 13.6.7 Using waste benchmarking data from BRE, WRAP NetWaste wastage rates and the Northstowe buildings internal floor areas the amount of demolition waste has been forecast. The forecasts are shown in Table 13.12 below. It has been assumed that the majority of the demolition would be carried out during Phase E.

**Table 13.12: Forecast demolition demolition waste arisings**

Description	Average waste (m <sup>3</sup> /100m <sup>2</sup> )	Structure size (m <sup>2</sup> )	Forecast waste arising (m <sup>3</sup> )	Average waste (tonnes/100m <sup>2</sup> )	Forecast waste arising (tonnes)
Building 2 – allowance for soft strip back to cold shell	21	6,633	1,382	15	1,023
Building 7 – allowance for soft strip back to cold shell	21	539	112	15	83
Building 14 – allowance for hard demolition	21	1,086	226	15	167
Water tower			6		3
Break out concrete slabs to existing buildings including crushing – assumed 450mm thick			14,704		18,233
Break out and any surrounding hardstandings/roads to service buildings including crushing – assumed 450mm thick			25,187		31,232
Total			41,618		50,741

- 13.6.8 The average waste benchmark (tonnes/ 100m<sup>2</sup> ) has been calculated using WRAP's individual materials' wastage rates.

### Excavation waste

- 13.6.9 The alignment, location, level and grading of both the Main Phase 2 development area and the Southern Access Road (West) have been designed to minimise excavation volumes. They have also been designed to enable flexibility in the landscaping, so that they can accommodate the changes in spoil volumes that may arise when site conditions differ from those assumed during the design. Both these

approaches should enable all excavation waste (except where contaminated) to be reused on-site where conditions allow. It is expected that only minimal volumes of material may require disposal off-site.

- 13.6.10 The composition of waste arisings from excavation activities is likely to be similar to that shown in Table 13.3 below.

**Table 13.13: Forecast excavated materials**

Material type	Forecast waste arising (m <sup>3</sup> )	Average waste (tonnes/m <sup>3</sup> ) (WRAP benchmarks)	Forecast waste arising (tonnes)*
Soils and stones (groundworks)	1,094,000	1.25	1,367,500
Soils and stones (infrastructure)	33,018	1.25	41,273
<b>Total</b>	<b>1,124,183</b>	<b>1.25</b>	<b>1,408,773</b>

- 13.6.11 The total volume of excavation waste requiring disposal off-site depend on how the site is managed and the good implementation of the SWMP.

## Operational waste

### Municipal household waste

- 13.6.12 The residential component of the proposed development would comprise of approximately 3,500 residential units. Likely volumes of MH wastes arising from the proposed development would be estimated to identify available options for recycling, reuse, treatment or disposal.

- 13.6.13 The types of MH waste that would arise during operation are summarised in Table 13.14 below.

**Table 13.14: Types of waste generated during site operation**

Waste stream	Constituents	Recyclable, reusable or non-recyclable
Mixed organics	Food waste cooked and uncooked, pruning waste, pet straw and sawdust, grass cuttings, plants and leaves).	Recyclable
Dry recyclables	Food tins and drinks cans, plastic bottles and containers, newspapers, directories and magazines, paper and card and aerosol cans	Recyclable
Glass	All colours of glass jars and bottles	Recyclable
Bulky	Furniture, white goods	Recyclable or non-recyclable
Textiles	Clothes and small pieces of material	Recyclable
Residual	Any of the above that has not been separated for recycling: non-recyclable food packaging, plastic	Recyclable or non-recyclable

	film, disposable nappies	
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13.6.14 Based on recent WasteDataFlow returns from SCDC it is estimated that approximately 3,336 tonnes of MH waste (including domestic and non-domestic waste) would be generated per annum during operation of the proposed development. This figure represents the total household operations and does not take into account of any proposed recycling or composting. If current recycling rates (55.97% 2012/13) for SCDC are applied to this figure then an annual residual waste level of 1,458 tonnes of waste is projected. Current waste production levels and subsequent residual waste levels are used to present a worst case scenario of no improvement in both of these areas. Likely composition of MH waste is set out in Table 13.15 below.

**Table 13.15: Key operational materials waste streams based on WasteDataFlow returns**

Waste material	Wastage rate (percentage)	Forecast waste arisings (tonnes)
Commingled materials	33.79%	492.66
Mixed garden and food waste	50.89%	741.99
Paper	14.50%	211.49
Post-consumer, non-automotive batteries	0.03%	0.48
Textiles and footwear	0.12%	1.75
Paper and card	0.03%	0.43
Plastic	0.08%	1.23
Textiles	0.55%	8.05
WEEE	0.003%	0.05
<b>TOTAL</b>		<b>1,458.13</b>

## Commercial and industrial (CI) waste

13.6.15 Likely volumes of CI waste have been calculated based on the most appropriate available data. Where applicable, the British Standard 5906:2005 Waste Management in Buildings – Code of Practice, the Environment Agency's Waste Benchmarking Tool and Environment Agency conversion factors have been used as guidance to identify the potential waste arisings from the CI development.

13.6.16 At this stage, it is estimated that the proposed development could potentially generate around 20,690 tonnes of CI waste per annum (around 397 tonnes per week). The quantities of CI waste arisings from buildings is likely to be similar to that shown in Table 13.16 below.

**Table 13.16: Estimated annual waste arisings from CI uses**

Building	Equation for waste arisings	Proposed development size (m <sup>2</sup> )	Annual waste arisings (tonnes)
Convenience retail	10 litre per m2 per week	10,000	1,408

Building	Equation for waste arisings	Proposed development size (m <sup>2</sup> )	Annual waste arisings (tonnes)
Comparison/service retail	100 litre per m2 per week	25,000	3,520
Food and drink	0.03 tonnes per m2 per year	2,500	75
Offices	50 litres per employee per week	16,200	518
Light industrial	5 litre per m2 per week	5,000	352
Leisure	100 litre per m2 per week	10,000	14,079
Health, community and fitness centre	5 litre per m2 per week	6,000	422
Youth facility	5 litre per m2 per week	2,000	141
Place of worship	5 litre per m2 per week	1,000	70
Primary school 1	45 kg per pupil		27
Primary school 2	45 kg per pupil		27
Secondary school	45 kg per pupil		35
Public house	0.03 tonnes per m2 per year	539	16
<b>TOTAL</b>			<b>20,690</b>

13.6.17 The calculation and composition of CI waste generation is only indicative and should be further refined at a later design stage when the specific elements have been confirmed. This will enable the expected number and type of waste containers, the storage requirements and their collection frequencies to be defined.

13.6.18 The estimated office space is 16,200 m<sup>2</sup>, although the layout and occupancy rates are only indicative at this stage. The office space could have an estimate occupancy of 737 people based on 22 m<sup>2</sup> per person.

13.6.19 Following the socio-economic chapter assumptions, it has been assumed that there would be 600 pupils at the primary schools and 1,600 at the secondary school.

### Construction waste management measures

13.6.20 This section includes a description of environmental mitigation already incorporated into the design to minimise the impacts and successfully manage the waste arisings from the CD&E phases of the proposed development. It provides guidance on issues relating to best practice for the management of waste which, would allow the total waste production to be minimised without impacting the cost of the proposed development. Some of the measures, described in full in the Waste Strategy, that the proposed development should adhere to include:

- Adoption of targets;

- Adoption of best practice;
- Set roles and responsibilities;
- Site preparation and earthworks;
- Best use of materials; and
- Monitoring and reporting.

13.6.21 The following key measures have also been included in the Waste Strategy.

#### **Adoption of the considerate construction scheme**

13.6.22 The Principal Contractor would register with the 'Considerate Constructors Scheme (<http://www.ccscheme.org.uk>). This is a national initiative, set up by the construction industry. Sites that register with the Scheme sign up and are monitored against a Code of Considerate Practice, designed to encourage best practice beyond statutory requirements.

13.6.23 The Scheme is concerned about any area of construction activity that may have a direct or indirect impact on the image of the industry as a whole. The main areas of concern fall into three main categories: the environment, the workforce and the general public. Waste management is a key area of focus and on-site considerations may include:

- How waste is avoided, reduced, reused and or recycled;
- Whether there is a SWMP and how is this monitored; and
- What type of feedback is received (if any) as to how much waste on-site is diverted from landfill.

#### **Produce a Site Waste Management Plan (SWMP)**

13.6.24 As noted above, the now repealed Site Waste Management Plan Regulations 2008 were previously the only legislative requirement governing the assessment of CD&E waste matters. However, the implementation of a SWMP remains industry Best Practice, and is a requirement of PPS10: Planning for Sustainable Waste Management.

13.6.25 A Preliminary SWMP for the proposed development is submitted with the planning application (Appendix A of the Waste Strategy). This forecasts the type and quantity of waste that would be produced on the proposed development and sets out how waste might be managed so that it is reused, recycled, or disposed of appropriately. The SWMP is a live document and should be updated during the duration of the project by the Applicant and the Principal Contractor to record the movements of waste, how it was managed and to encourage better waste management practices.

#### **Waste generated by the excavation works**

- 13.6.26 The alignment, location, level and grading of both the Main Phase 2 development area and the Southern Access Road (West) have been designed to minimise excavation volumes. They have also been designed to enable flexibility in the landscaping, so that they can accommodate the changes in spoil volumes that may arise when site conditions differ from those assumed during the design. Both these approaches should enable all excavation waste (except where contaminated) to be reused on-site where conditions allow.

### Managing wastes on-site

- 13.6.27 As part of the SWMP referred to above the Principal Contractor would have to monitor waste arisings and management practices. Auditing and measurement would enable more effective management of waste through the setting of performance targets for recycling and segregation and monitoring subcontractors on all the sites.
- 13.6.28 The phasing of the proposed development allows the opportunity for the construction and excavation wastes to be reused or recycled on-site in subsequent stages of the development. The SWMP would ensure such opportunities are maximised as the preferred option for dealing with waste arising from the site.

### Operational waste management measures

- 13.6.29 A number of waste management measures would be put in place to minimise the impacts of operational waste. These are outlined in Table 13.17 below.

**Table 13.17: Mitigation Measures**

Impact	Mitigation Measure	Comment
Increased generation of waste	Extend the SCDC recycling and waste collection system to the proposed development.	The recycling and waste collection system provided by SCDC achieves a high recycling performance. This successful system would be extended to the proposed development to utilise existing waste infrastructure and a proven system to increase recycling and reduce waste. The system comprises an alternate weekly collection for co-mingled recyclables, mixed food and garden waste, and residual waste.
	Initial recycling or composting target of 70%	This is the target set out in the waste strategy as a requirement under PPS10, and has been taken into consideration during the planning application.
	Initial residual waste level target of 300kg/household	This is set out in the waste strategy as requirement under PPS10.

### Household recycling centre and bring sites

- 13.6.30 Providing a strategic facility for the whole of Northstowe, the Household Recycling Centre (HRC) is located in the employment area in Phase 1 and is to be designed in accordance with the principles from SCDC's Location Design of Waste Manager Facilities SPD. The HRC is unlikely to be built towards the final build-out period of Phase 1 development. Phase 2 will also be expected to make a financial contribution to this facility.
- 13.6.31 Based on the standards listed in the RECAP Guide<sup>188</sup>, a maximum density of one bring site per 800 homes would be sought. By the completion of the proposed development, five bring sites may be needed. However, the provision requirement for five bring sites should be reviewed if the HRC is operational as it is likely to provide comprehensive recycling facilities for the proposed development. Confirmation of the need for bring sites, their number and location would be detailed as part of the reserved matters application.

### Storage of waste

- 13.6.32 The storage options that would be adopted at the proposed development are described below. Typical dimensions for storage containers are provided in the Waste Strategy.

#### HM waste - internal storage – houses / flats

- 13.6.33 Based on the guidance contained in sections 4.4 and 4.5 of the RECAP Guide, internal waste storage containers that are easily accessible to residents would be provided within the kitchens of all residential units. The containers would have a total capacity of 35 to 40 litres and should be divided to allow the separation of recycling from refuse and, where appropriate, organic waste for composting.

#### HM waste - external storage – houses

- 13.6.34 Based on the guidance contained in section 4.7 of the RECAP Guide, each house would have a suitable hard surface within the curtilage of the property of sufficient size onto which the required external storage containers (with an aggregated capacity of 775 litres) would fit. This is assumed to be three wheeled bins for refuse, recycling and compostable waste.
- A brown 240 litre wheeled bin for mixed organics;
  - A blue 240 litre wheeled bin for co-mingled recyclables; and
  - A green 240 litre wheeled bin for residual waste.
- 13.6.35 The preferred location for these storage areas is at the rear of the property within a designated area. To ensure safe usage, sufficient space would be allocated to allow each wheeled bin to be individually accessed and removed by residents.

<sup>188</sup> RECAP waste Management Design Guide, Supplementary Planning Document Adopted February 2012, [www.recap.co.uk](http://www.recap.co.uk)

- 13.6.36 Storage of wheeled bins within front gardens or driveways would be generally avoided, unless it can be designed as an integral part of the building and architectural design, or another agreed container from within the front garden in accordance with the RECAP Guide.
- 13.6.37 For bulky waste, it has been assumed that residents would make arrangements with the local authority for collection and temporarily store the waste in an agreed location on their property.

#### **HM waste - external storage - flats**

- 13.6.38 Waste storage for flats would comprise high quality communal bin stores with larger capacity wheeled bins for the separate collection of refuse and recycling. Residents would be required to deposit their refuse and recycling in the communal bin stores (unless a private facilities management firm is provided to undertake this service). Residents should not be required to walk more than 30 metres with their waste to a communal store.
- 13.6.39 These stores would be sensitively located and designed to cater for no more than six flats, taking into account the aesthetics of the area.
- 13.6.40 Suitable hard surfaces would be used and sufficient space to allow each wheeled bin to be individually accessed and removed to ensure safe usage for residents and collection crews. In accordance with the RECAP Guide, 150mm clear space would be provided between and around containers.
- 13.6.41 At this outline application stage, the number of floors and units has not been determined so it is not possible to accurately estimate the number of bins needed for the proposed flats. However, it has been assumed that the use of 1,100 litre wheeled bins would be the prevalent choice for flats; however the availability of a range of four-wheeled bins would enable tailored waste storage options where appropriate.
- 13.6.42 For bulky waste, it has been assumed that residents would make arrangements with SCDC for collection and temporarily store the waste in an agreed location at ground level.

#### **CI waste - external storage**

- 13.6.43 At this stage, it is expected that the CI units would be provided with large four-wheel bins for refuse and recycling. These could be for their own or shared use and they would have easy access for end users and for collection vehicles.
- 13.6.44 All waste storage areas would be clearly labelled to ensure cross contamination of refuse and recycling is minimised.



- 13.6.45 Floor surfaces would be of a smooth, continuous finish and free from steps or other obstacles. Any steps would incorporate a drop-kerb. Measures would be taken by the tenants to ensure that access to the agreed collection point would not be restricted on collection day.
- 13.6.46 The following three pieces of key legislation also affect CI enterprises:
- The Hazardous Waste Regulations 2005 make it a legal requirement to separate all hazardous wastes before collection for disposal. This includes fluorescent tubes, computer monitors and batteries;
  - The Waste Electrical and Electronic Equipment (WEEE) Regulations 2006 make the recycling and recovery of such waste types compulsory; and
  - The Landfill Directive makes the initial separation of waste types essential prior to any landfilling.

### Collection of waste

- 13.6.47 The collection options that should be adopted at the proposed development are described below. The assessment criteria of the integrated underground service and the 'default' collection system are provided in the Waste Strategy.

#### Household municipal waste

- 13.6.48 The developers would develop a wheeled bin delivery strategy and pre-order the necessary number of wheeled bins with SCDC. It would be the responsibility of the developers to agree with SCDC as to the specific number and frequency of wheeled bin deliveries.
- 13.6.49 Whilst the above report ranked the integrated underground waste system as the 'preferred' collection option for Northstowe; it should be noted that the traditional default collection system was ranked second. It is the applicant's view that in reality other negative factors, as listed below, would also be significant relative to the underground waste system.
- Leachate running out and over footway / carriageway area during collection and emptying;
  - Access / zoning restriction requirements to ensure collection vehicles are able to pull up alongside (if blocked then cant access) for collection;
  - Potential conflict with other street furniture including signage and lighting;
  - Possible disruptions to cyclist and pedestrians during collection operation;
  - Odour issues, particularly significant during summer months;

- High groundwater levels causing ingress to the underground collection; requiring significant construction and tanking of below ground structures (additional cost);
  - Proliferation of insects or rodents and due to location; and
  - Reduced social drivers leading to reduced recycling.
- 13.6.50 The applicant proposes to develop a traditional wheeled bin delivery strategy, which has proven materials capture rates, and pre-order the necessary number of wheeled bins with SCDC. It would be the responsibility of the developers to agree with SCDC as to the specific number and frequency of wheeled bin deliveries.
- 13.6.51 The applicant would also be responsible for the delivery of wheeled bins to each unit before the first collection and for the wheeled bins until the residential units have received their first waste collection. This would avoid delivery of wheeled bins to unoccupied properties.
- 13.6.52 For bulky waste, it has been assumed that residents would make arrangements with SCDC for collection and temporarily store the waste in an agreed location at ground level.
- 13.6.53 In accordance with the RECAP Guide, the distance from the curtilage of houses (or the agreed collection point for the wheeled bins) to the refuse collection vehicle should not exceed 25 metres.
- 13.6.54 In accordance with the RECAP Guide, the distance from the flat's communal bin stores to the refuse collection vehicle should not exceed 10 metres. It has been assumed that four-wheeled containers would be the primary storage option.

### **Commercial and Industrial waste**

- 13.6.55 At this stage, it has been assumed that collection of CI waste would be undertaken via external waste management contractors. It would be the responsibility of the tenants to arrange for refuse and recycling collection from their premises. The type of collection would be dependent on the nature of the business.
- 13.6.56 Waste collection frequency would be dependent upon the volume of waste generated, the storage method and the schedule of the appointed waste contractor.
- 13.6.57 For bulky waste, it has been assumed that residents would make arrangements with SCDC for collection and temporarily store the waste in an agreed location at ground level.

## **13.7 Potential effects**

- 13.7.1 The potential effects are to be assessed as follows:

## Site establishment and construction effects

- 13.7.2 Cambridgeshire, Norfolk and Suffolk has an estimated total CD&E waste arisings of 4,780,477 tonnes and it is projected that the proposed development would produce 99,073 tonnes of construction and demolition waste (2.07% increase). Therefore the construction and demolition waste would have a medium level of sensitivity and low magnitude of impact. The significance of effect on the SCDC waste management infrastructure is likely to be **Moderate or Minor Adverse**.
- 13.7.3 It is projected that the proposed development would produce 1,408,773 tonnes of excavation waste (29.46% increase). Currently there is capacity in the existing landfill sites. However, consideration must be given to the timescale of the construction phase which is a medium term activity. As such, the impact has a potential to be medium-term and therefore the excavation waste would have a high level of sensitivity and high magnitude of impact. The excavation works would result in **Major Adverse** effects.

## Operational effects

- 13.7.4 The development will add an additional 5.65% of domestic waste burden to the local waste management infrastructure capacity which is currently limited due to stringent landfill targets and availability of recycling facilities. As such, the operational waste would have a medium level of sensitivity and medium magnitude of impact. Therefore the wastes likely to arise from the proposed Development are considered to have a **Moderate Adverse** effect.

## Mitigation and enhancement

- 13.7.5 In addition to the design mitigations discussed above, suitable measures to mitigate the waste and materials impacts during the CD&E and operational phases are outlined below.
- 13.7.6 To reduce waste production during the construction phase the project should employ modern methods of construction such as prefabrication of units and products off-site as described by WRAP<sup>189</sup>.
- 13.7.7 There are number of alternative initiatives that could already be utilised or be undertaken in the future, although no specific provision has been made within the proposed development at present.
- Community composting project - compliant with the third tier of the waste hierarchy (recycling) a community composting project could possibly be established; and
  - Public Incentives Scheme - a scheme could be implemented to incentivise participation in recycling including performance based

<sup>189</sup> <http://www.wrap.org.uk/sites/files/wrap/Modern%20Methods%20of%20Construction%20Full.pdf>

charging schemes.

## Residual Effects

- 13.7.8 Residual effects are those that remain after mitigation has been put in place. The residual effects are to be assessed as follows:

### Site enabling and construction residual effects

- 13.7.9 Recycling all inert and non-hazardous waste on-site, adhering to the requirements of the Waste Strategy submitted with this application would ensure that impacts of construction waste are minimised. Therefore, despite the high volumes of construction and demolition waste likely to arise from the construction of the development, the significance of effect on the SCDC waste management infrastructure is likely to be **Minor Adverse**.
- 13.7.10 The detailed alignment, location, level and grading of the proposed development will be designed to minimise excavation volumes. It will also be designed to enable flexibility in the landscaping, so that it can accommodate the changes in spoil volumes that may arise when site conditions differ from those assumed during the design. Both these approaches should enable all excavation waste (except where contaminated) to be reused on-site where conditions allow. Therefore, despite the high volumes of excavation waste likely to arise from the construction of the development, the significance of effect on the SCDC waste management infrastructure is likely to be **Negligible**.

### Operational residual effects

- 13.7.11 Prior to any of the mitigation measures identified in Section 6, waste arisings from the proposed Northstowe Phase 2 development would contribute an additional 3,336 tonnes per annum of domestic and non-domestic municipal household waste and recyclables. Of this 3,336 tonnes, 1,458 tonnes (43.71% of the total and 2.46% increase) are forecast to relate to annual residual waste. This would be in addition to the estimated 59,593 tonnes per annum of domestic waste already being generated by SCDC. Effects of waste generated in the operational phase of the proposed development would be long-term effects. The assessment anticipates a significant volume of residual waste generated from the proposed development (3,336 tonnes) would be diverted away from landfill thereby resulting in a **Moderate Adverse** residual effect.

### Cumulative Effects

- 13.7.12 Whilst some information and quantitative data are available for the planned and consented schemes in the surrounding area of the proposed development, it has not been possible to undertake a meaningful quantitative assessment of their potential impacts with

regard to waste for the following reasons: Demolition and excavation waste:

- Quantitative data are either not available on likely volumes of waste to be generated, or data needed to calculate likely volumes are not available.
- Construction waste: neither quantitative data and detailed enough schedules available on the construction activities proposed.
- Operational waste: Area/accommodation schedules for all other proposed developments are available with some degree of detail, however data is not available to allow assessment of the current baseline situation for these developments such that the net change is unknown and not possible to estimate.

13.7.13 The above comprise inherent constraints to accurately predicting the waste arisings from these schemes. However it is considered that all of the planned and consented schemes would be developed in line with the same policy requirements as the Development including the requirements for maximising re-use and recycling of demolition, excavation and construction waste through a SWMP and the meeting of targets for recycling and composting waste. Accordingly whilst there may be an overall increase in the quantity of waste arising, it would be managed in such a way that there would be a positive contribution to sustainable waste management.

13.7.14 All the planned and consented schemes in the surrounding area of the proposed development would generate waste. It is reasonable to assume that they would need to comply with local and regional policy in addition to legislation. Therefore through mitigation of other schemes, and the proposals set out in this chapter it is reasonable to conclude that there would be Minor Adverse cumulative effects during the construction and operational phases of the proposed development.

13.7.15 Given the current and predicted waste production levels within the region, it is reasonable to anticipate that the region would have suitable capacity to effectively manage the wastes associated with their construction and operation. It is reasonable to conclude that other schemes would effectively mitigate the impact of their waste arisings and the outcome of any waste assessment would be similar to that of this assessment.

## Limitations

13.7.16 In writing this chapter a number of assumptions were made, which is not unusual in the assessment of waste. The assumptions were associated mainly with lack of specific information relating to wastes and construction materials due to the outline nature of the Main Phase 2 development area.

## Assumptions

- 13.7.17 There are no published or formalised significance criteria relating to the assessment of waste impacts. Professional judgement has therefore, been drawn upon to assess the significance of the proposed development's environmental effects.
- 13.7.18 The assessment of potential effects is carried out against waste baseline conditions. Forecast data for waste generation from the Development has been estimated based upon existing land use since actual waste generation data are not available. Assumptions have been made based upon the floor areas of the proposed units and the nature of existing uses that occupy them and are considered to provide a reliable basis for assessment of the conditions at the proposed development.
- 13.7.19 The assessment has been based on data and information received from a number of external organisations and it has been assumed that the information is accurate.

### **Assessment Summary Matrix**

- 13.7.20 The assessment summary matrix describes the effects that have been identified and the significance of the effects using the criteria you have set out. It then follows through the process of applying mitigation and stating residual effects, before describing offsetting and enhancement.

**Table 13.18: Assessment Summary Matrix**

<b>Assessment Summary Matrix</b>				
<b>Description of Effects</b>	<b>Significance of Effects:</b>	<b>Description of Mitigation Measures and Enhancement</b>	<b>Description of Residual Effects</b>	<b>Significance of Effects</b>
<b>Excavation</b>				
Waste generation related to excavation works	Major -ve, D, MT	Excavation volumes minimised through design; and All excavation materials to be reused on-site or off-site.	No site enabling or construction residual effects are anticipated following mitigation as long as all CD&E works are carried out to best practice and in line with the Waste Strategy.	Negligible (Not significant)
<b>Construction and demolition</b>				
Waste generation related to construction and demolition works	Moderate or Minor -ve, D, MT	No waste sent to landfill except where landfill is the least environmentally damaging option, as detailed in the SWMP and Waste Strategy; Waste to be managed through the development SWMP (Appendix A of the Waste Strategy); and Waste to be monitored and audited.	Minimal quantities of construction and demolition waste are anticipated, if mitigation measures are adopted.	Minor Adverse (Not significant)
<b>Operational assessment</b>				
Waste generation related to the operation of the proposed development	Moderate -vee, D, LT	Implementation of the Waste Strategy, and specifically: Extend the SCDC recycling and waste collection system to the development; An initial recycling or composting target of 70%	1,471 tonnes of the operational waste (43.71% of the total and 2.46% increase) are forecast to relate to annual residual waste. This would be in addition to the estimated 59,593 tonnes per annum of domestic waste already being generated	Moderate Adverse (Significant)

		Initial residual waste level target of 300kg/household	by SCDC.	
<i>Key: +ve (beneficial), -ve (adverse), D (direct), InD (indirect), ST (short term), MT (medium term), LT (long term), P (permanent), R (reversible)</i>				