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Environmental Statement Volume 2

North West Sittingbourne

Land between Quinton Road and Bramblefield Lane and at Pheasant Farm and Great Grovehurst Farm

Prepared by jb planning associates

April 2018

North West Sittingbourne

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ENVIRONMENTAL STATEMENT

Volume 2

April 2018

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Chapter 1

INTRODUCTION

1. INTRODUCTION

Overview

1.1 This document is the Environmental Statement (ES) for a significant part of the north-west Sittingbourne allocation in the Swale Borough Local Plan, 2017. It has been prepared by JB Planning Associates on behalf of Persimmon Homes South East and extends to include land under the control of G H Dean and Co at Great Grovehurst Farm, Sittingbourne.

1.2 Persimmon Homes South East is applying to Swale Borough Council for planning permission to deliver a mixed-use development between Quinton Road, and Bramblefield Lane and at Pheasant Farm, Sittingbourne. G H Dean and Co will be applying separately to develop the land at Great Grovehurst Farm, Sittingbourne. Redrow Homes has applied for planning permission to develop the land adjacent Quinton Farmhouse, Quinton Road, Sittingbourne.

1.3 The Borough Council has confirmed that the proposed development which forms the subject of the planning application in combination with that proposed on the remainder of the north-west Sittingbourne allocation is Environmental Impact Assessment (EIA) development. This Environmental Statement (ES) sets out the findings of that assessment.

1.4 The ES has been prepared in the full knowledge of the proposals being advanced by Redrow Homes on the land adjacent Quinton Farmhouse, Quinton Road, Sittingbourne, and the cumulative impact of all development proposals has been assessed.

Structure of the Environmental Statement

1.5 This ES comprises three volumes and has been prepared in distinct sections to allow the reader to understand the proposals, the purpose of the document, the regulatory framework in which it has been prepared, and the results of the Environmental Impact Assessment (EIA). The volumes are as follows:

- **Volume 1** – Environmental Statement Non-Technical Summary;
- **Volume 2** – Environmental Statement (this document), and
- **Volume 3** – Environmental Statement Appendices.

1.6 The Appendices follow the numbering in this ES, so Appendix 1 relates to Chapter 1, Appendix 2 relates to Chapter 2, Appendix 3 relates to Chapter 3 and

so on. A glossary of terms and abbreviations used throughout the ES has also been provided at the start of this document.

1.7 This ES document is set out as follows:

- **Chapter 1** – comprises a brief description of the development, a brief description of the developer, and an introduction to the EIA process.
- **Chapter 2** – provides a brief description of the planning policy background and regulatory framework in which the ES has been prepared (although a more detailed description is provided in the Planning Statement which accompanies the planning application).
- **Chapter 3** – provides a description of the methodology employed in undertaking the EIA for the proposed development.
- **Chapter 4** – provides a description of the site and the surrounding area and includes a more detailed account of the development proposals which are the subject of the hybrid planning application.
- **Chapter 5** – provides commentary upon the selection of the application site, the consideration of alternatives and the evolution of the design solution.
- **Chapters 6** to **15** – provide a description of the results of the EIA process for each specific environmental topic.
- **Chapter 16** – considers the cumulative impact of the development in association with other development proposals.

North West Sittingbourne

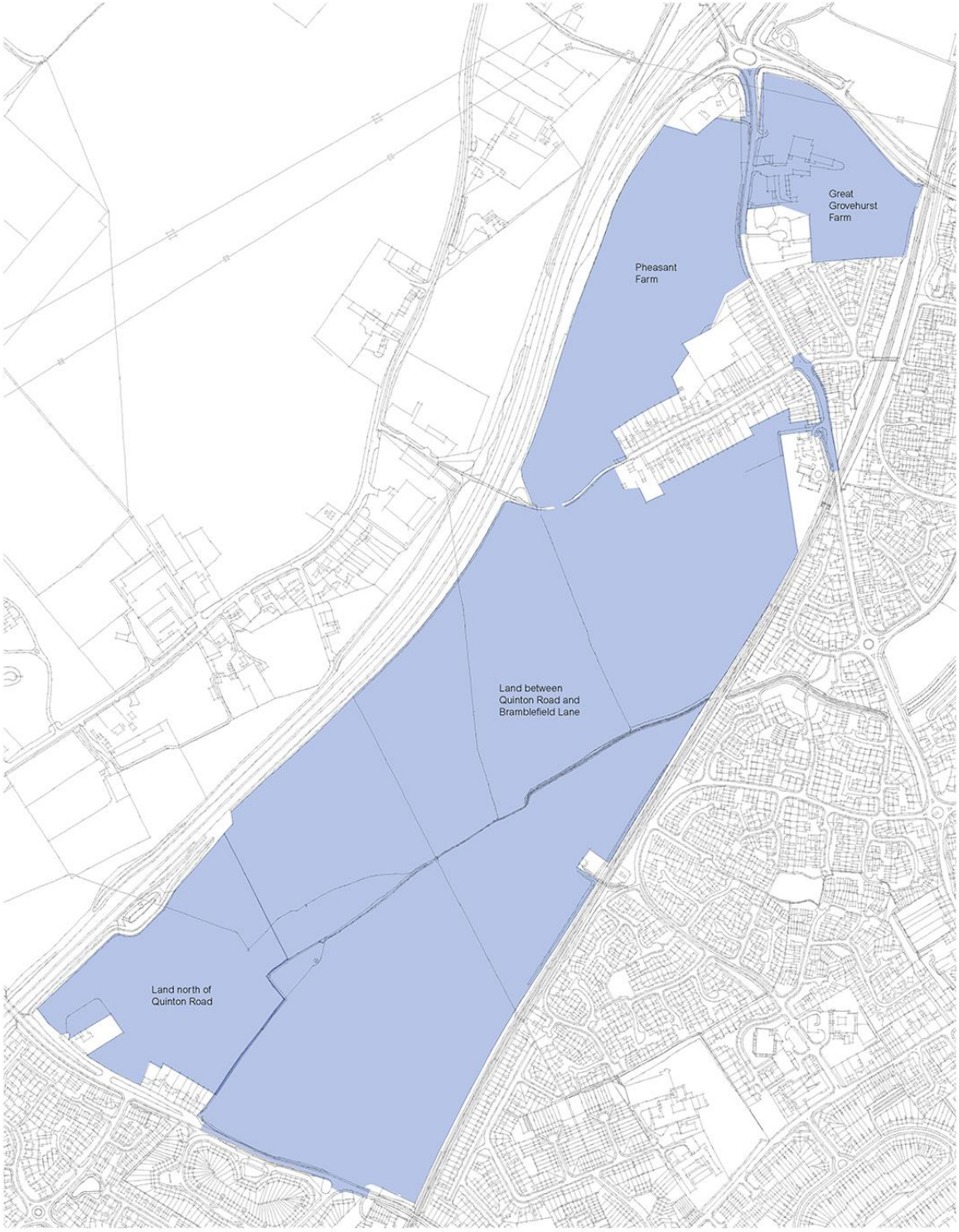
1.8 North West Sittingbourne is the largest of the strategic allocations in the Swale Borough Local Plan, 2017 and is of fundamental importance to the Plan's delivery, since it will meet a significant proportion of the Borough's future development needs in a sustainable location which minimises impacts on the wider countryside due to its relative self-containment.

1.9 This mixed use strategic allocation is expected to provide a minimum of 1,500 new homes, a combined primary and secondary school site, structural landscaping and open space including a countryside gap adjacent to the A249.

1.10 Persimmon Homes South East, Redrow Homes and G H Dean & Co Limited are bringing forward the proposals as the landowners / developers involved in the delivery of the allocation which is divided into four development parcels.

1.11 The extent of the local plan allocation, and the four development parcels, is illustrated by Figure 1.1

Figure 1.1 - North West Sittingbourne Allocation Area and Development Parcels



The Planning Applications

1.12 This ES assesses the proposals that will be the subject of two separate planning applications. One of the planning applications will be a hybrid application for outline planning permission, with full details for the first phase of the development being submitted from the outset, for the land between Quinton Road and Bramfield Lane and at Pheasant Farm, Sittingbourne. The other planning application will be for outline planning permission for the development of land at Grovehurst Farm, Sittingbourne.

Land between Quinton Road and Bramblefield Lane and at Pheasant Farm

1.13 This planning application will seek full permission for the construction of 343 dwellings (including affordable housing) with 91 being accessed from Grovehurst Road and a further 252 being accessed from Quinton Road; public open and amenity space (including an equipped children's play area); together with associated landscaping and ecological enhancement works; acoustic barrier to the A249; internal access roads, footpaths, cycleways, and parking; drainage (including infiltration basins and swales, soakaways, and permeable paving), utilities and service infrastructure works.

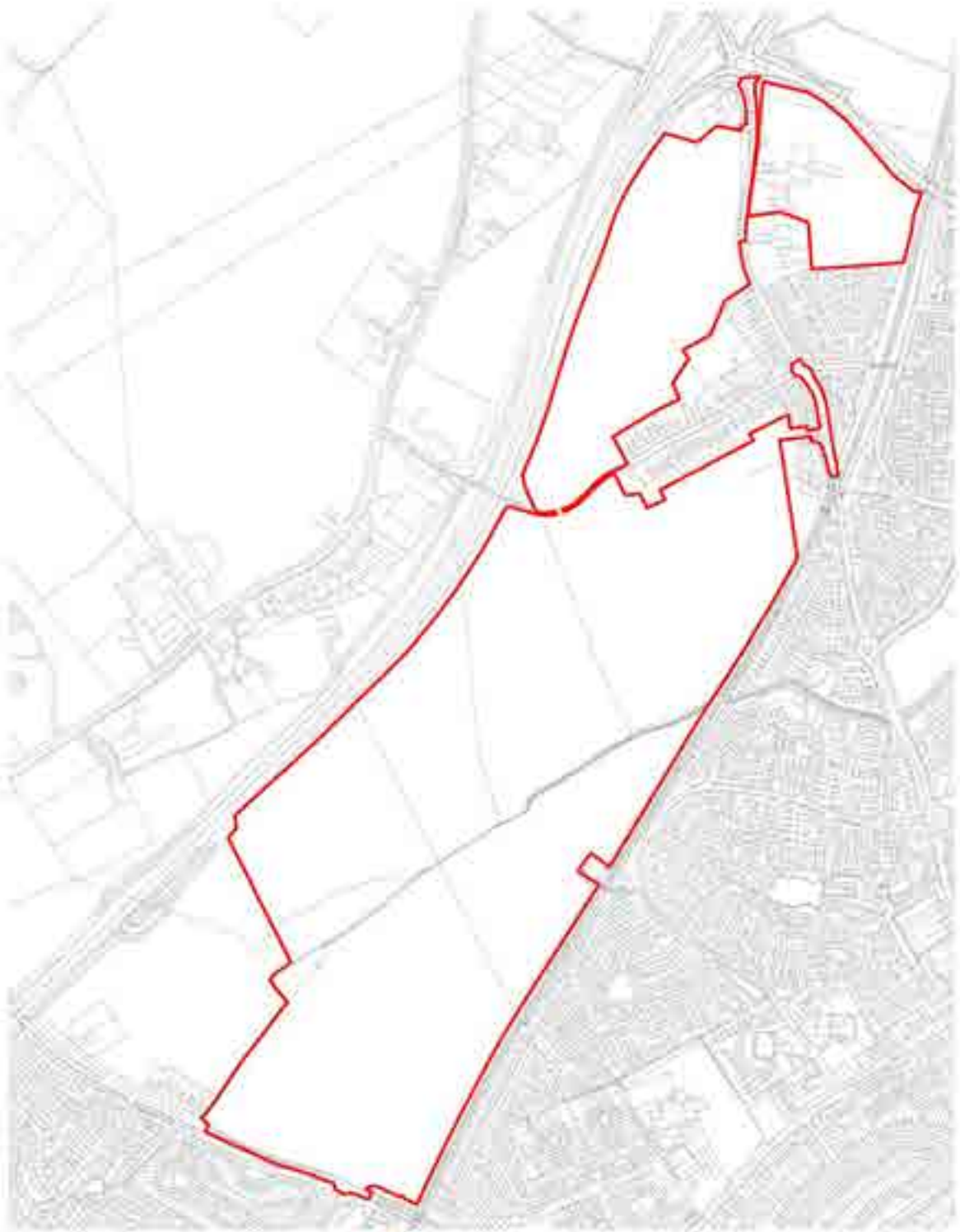
1.14 Outline planning permission will be sought on the remainder of the application site for the construction of up to 863 new dwellings (including affordable housing); a site of approximately 10 ha for a secondary and primary school; a mixed-use local centre including land for a convenience store; public open and amenity space (including equipped children's play areas), together with associated landscaping and ecological enhancement works; acoustic barrier to the A249; internal access roads, footpaths, cycleways and parking; drainage (including a foul water pumping station and sustainable drainage systems), utilities and service infrastructure. All matters are to be reserved for subsequent approval except for access to the school site from Grovehurst Road.

Land at Great Grovehurst Farm

1.15 This planning application will seek outline permission for the development of up to 110 dwellings accessed from Grovehurst Road including internal roads, footpaths and cycle links, open space, play areas, landscaping, parking, drainage, utility services and infrastructure works, and ecological mitigation following the extraction of brickearth.

1.16 Figure 1.2 illustrates the extent of the area that will be subject to the separate planning applications and correspondingly the area being assessed in this ES.

Figure 1.2 - The Environmental Impact Assessment Area



The Developers / Landowners

1.17 Persimmon was founded in 1972 and is today one of the UK's leading housebuilders. Persimmon plc is the holding company for the Persimmon Group of companies. With headquarters in York, the Group operates from 29 regional offices throughout the UK. Persimmon Homes South East is based in Maidstone.

1.18 The Group trades under the brand names of Persimmon Homes, Charles Church, and Westbury Partnerships, building quality homes across England, Wales, and Scotland. In 2016, it delivered 15,171 homes to customers across the UK.

1.19 Key to Group's success is its ability to open new development sites swiftly following receipt of an implementable planning permission and then progressing a build programme to secure rates of new home construction to meet market demand. It therefore has a well-established record in delivering new homes.

1.20 G H Dean and Co is a private family farming business that was established in 1922. Today the company farms approximately 1,200 ha of cereals and keeps some 2,500 breeding-sheep on 570 ha of grass, much of which is unimproved grassland in the Swale Estuary SSSI. In addition, the company owns some 200 ha of orchard land containing apple, pear, cherry, and plum trees. The company is bringing forward the land at Great Grovehurst Farm, Sittingbourne, for residential development.

The Project Team

1.21 Persimmon Homes South East instructed JB Planning Associates to prepare the ES for the proposed development. In addition, JB Planning Associates was instructed to prepare a suite of supporting documents which form part of the planning application.

1.22 In preparing this ES, JB Planning Associates has been assisted by:

- Pegasus Group - Master Planning
- Allen Pyke and Associates - Landscape and Visual Effects
- RPS Planning and Development - Land Use and Agriculture
- Leap Environmental Limited - Ground Conditions
- GTA Civils Limited - Water Environment
- Peter Brett Associates LLP - Traffic and Transport
- Waterman Energy, Environment and Design Limited - Noise and Vibration / Air Quality
- The Ecology Partnership - Natural Environment, and
- CgMs Consulting - Cultural Heritage

1.23 These consultancies have collaborated closely with the other consultancies engaged by G H Dean and Co for the land at Great Grovehurst Farm, Sittingbourne, and those employed by Redrow Homes who have been involved with the advancement of the proposals for the land adjacent to Quinton Farmhouse, Quinton Road, Sittingbourne.

Purpose of the Environmental Statement

1.24 This ES has been prepared JB Planning Associates to record the findings of the EIA that has been undertaken in relation to the proposed development. EIA is required for certain development types in accordance with the provisions of the Town and Country Planning Act, 1990, and the Town and Country Planning (Environmental Impact Assessment) Regulations 2011 (as amended).

1.25 This ES has been prepared for the purposes of meeting these requirements and provides information that will be used by Swale Borough Council to inform its consideration of the planning application for the proposed development.

1.26 The ES reports the findings of an assessment of the potential environmental effects of the proposed development which Swale Borough Council considered might be significant. This reflects the requirement of the EIA Regulations (see

Schedule 4) for the ES to assess the 'main effects' that a development is likely to have on the environment and to focus on those effects that are likely to be significant, which could include,

> *"…direct effects and any indirect, secondary, cumulative, short, medium and long term, permanent and temporary, positive and negative effects of the development..."*.

1.27 The EIA Regulations do not define significance; the overall approach that has been taken to defining significance, as well as further information about the approach to preparing the ES, is outlined in Chapter 3. Subject to what is reasonably required to assess the environmental effects of the development, Schedule 4 of the EIA Regulations also specifies that the ES should describe those,

> *"…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 interrelationship between the above factors."*

1.28 The overall approach to the completion of the EIA as reported in this ES has been informed by:

- Consultation with Swale Borough Council to agree the scope of the EIA,
- The consideration of any potentially relevant technical and environmental alternatives;
- Establishing a comprehensive understanding of the existing baseline environmental conditions for the application site and the relevant study areas for each topic;
- Identifying the potential environmental impacts resulting from the development;
- Determining how the potential environmental impacts can be avoided, reduced, or off-set through informed design and / or further mitigation and how its benefits may be enhanced;
- Assessing the significance of the potential environmental impacts cumulatively with other impacts arising from the development and those from other neighbouring developments and / or sources (cumulative impacts); and
- Proposing options as to how any significant residual impacts will be mitigated, managed, and monitored.

1.29 The ES therefore presents a comprehensive description of the nature, scale, location, and likely significant environmental impacts of the development to inform the determination of the planning application by Swale Borough Council.

Terminology

1.30 The terms ‘impacts’ and ‘effects’ are often used interchangeably within an ES and in some documents the terms are given different meanings. Some use ‘impact’ to mean the cause of an ‘effect’ whilst others use the converse meaning.

1.31 The convention used in this ES is to use the word ‘impact’ only within the context of the term EIA. The word ‘effect’ is used to describe the environmental consequences of the proposed development. Such effects come about because of the following:

- Physical activities that would take place if the proposed development were to proceed (e.g. disturbance to below ground archaeology).
- Environmental changes that are predicted to occur because of these activities (e.g. loss of vegetation prior to the start of construction work or an increase in noise levels). In some cases, one change causes another change, which in turn results in an environmental effect.

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

1.33 This ES is concerned with assessing the effects of the proposed development, drawing upon information about the activities and associated changes that cause them. It is therefore necessary for the activities to be understood and for the likely resultant changes to be defined, often based on predictive assessment work.

Chapter 2

REGULATORY AND POLICY BACKGROUND

2. REGULATORY AND POLICY BACKGROUND

Introduction

2.1 This chapter outlines the main regulatory and policy context that is relevant to the development. The relevant EU directives are considered first, at a high level. An overview is then provided of the current and emerging policies relevant to the proposals at the national, regional, and local level. A fuller description of the planning policy background and its relevance to the ES application is provided in the Planning Statement.

European Union Context

2.2 Pending the enactment of the Government's plans to repeal the European Communities Act 1972 and transpose EU legislation into UK law the following EU directives are of relevance to the proposed development. These EU Directives set out obligations for member states and are implemented through national law in the UK via statutory instruments and regulations.

Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the EIA Directive)

2.3 The EIA Directive ensures that plans, programmes, and projects likely to have significant effects on the environment are made subject to an environmental assessment, prior to their approval or authorisation. The Directive sets the thresholds for projects that require an EIA and outlines the impacts on the environment to be assessed in the EIA process.

Directive 1992/43/EEC of 21 May 1992 on the Conservation of natural habitats and of wild fauna and flora (the Habitats Directive)

2.4 The aim of the Habitats Directive is to contribute towards ensuring biodiversity through the conservation of natural habitats and of wild fauna and flora. Measures taken pursuant to this Directive by the Member States are designed to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of community interest whilst also considering the economic, social, and cultural requirements, and regional and local characteristics. The Conservation of Habitats and Species Regulations 2010 implement the Habitats Directive in England and Wales.

Directive 2009/147/EC of 30 November 2009 on the conservation of wild birds (the Birds Directive)

2.5 The Birds Directive provides a comprehensive scheme for the protection of wild bird species naturally occurring within the EU. The Directive places great emphasis on the protection of habitats suitable for supporting endangered and migratory species, introducing a system of Special Protection Area (SPA) designation to protect important habitats. The Wildlife and Countryside Act 1981 and the Conservation of Habitats and Species Regulations 2010 implement the requirements of the Birds Directive in England and Wales.

Environmental Assessment Regulations

2.6 The process of Environmental Impact Assessment in the context of the town and country planning system in England is governed by the Town and Country Planning (Environmental Impact Assessment) Regulations, 2017. These regulations apply to development which is given planning permission under Part III of the Town and Country Planning Act 1990.

2.7 The regulations apply the amended EU directive to the planning system in England to certain types of development, such as urban development projects. The 2017 Regulations include transitional provisions for procedures which were initiated before the current regulations came into force.

2.8 These transitional arrangements are applicable to the proposals that are the subject of this ES as a screening and scoping opinion was obtained before 16 May 2017 from Swale Borough Council under the provisions of the Town and Country Planning (Environmental Impact Assessment) Regulations, 2011. The Borough Council has confirmed that this is the case.

National Planning Policy Context

2.9 In 2012, the National Planning Policy Framework (NPPF) was published. It sets out the Government's planning policies for England. The NPPF states in Paragraph 6 that the policies contained in Paragraphs 18 to 219 should be applied to achieve sustainable development.

2.10 The NPPF sets out in Paragraph 7 that there are three dimensions to sustainable development: economic, social, and environmental. As the document points out these dimensions give rise to the need for the planning

system to perform several roles however they should not be undertaken in isolation. The roles are described as:

- **an economic role** - contributing to building a strong, responsive, and competitive, economy, by ensuring that sufficient land of the right type is available in the right places and at the right time to support growth and innovation; and by identifying and coordinating development requirements, including the provision of infrastructure;
- **a social role** - supporting strong, vibrant, and healthy communities, by providing the supply of housing required to meet the needs of present and future generations; and by creating a high-quality built environment, with accessible local services that reflect the community's needs and support its health, social and cultural well-being; and
- **an environmental role** - contributing to protecting and enhancing our natural and built and historic environment; and as part of this, helping to improve biodiversity, use of natural resources prudently, minimise waste and pollution, and mitigate and adapt to climate change including moving to a low carbon economy.

2.11 Paragraph 8 indicates that these roles are mutually dependant while Paragraph 9 goes on to state that planning for sustainable development involves seeking positive improvements in the quality of the built, natural, and historic environment as well as people's quality of life, including making it easier for jobs to be created and the choice of high quality homes to be widened.

2.12 Paragraph 12 makes it clear that: "This National Planning Policy Framework does not change the statutory status of the Development Plan as the starting point for decision making. Proposed development that accords with an up-to-date Local Plan should be approved and proposed development that conflicts should be refused unless other material considerations indicate otherwise. It is highly desirable that local planning authorities should have an up-to-date plan in place".

2.13 Paragraph 14 goes on to provide that, "At the heart of the national planning policy framework is a presumption in favour of sustainable development which should be viewed as a golden thread running through both plan-making and decision-taking.

2.14 For **plan-making** this means that:

- Local planning authorities should positively seek opportunities to meet the development needs of their area;
- Local Plans should meet objectively assessed needs, with sufficient flexibility to adapt to rapid change unless:

  - any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole; or
  - specific policies in this framework indicate development should be restricted [1].

2.15 For **decision-taking** this means:

- approving development proposals that accord with the development plan without delay and;
- where the development plan is absent, silent or relevant policies are out-of-date, granting permission unless:

  - any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against policies in this Framework taken as a whole; or
  - specific policies and this Framework indicate development should be restricted [2]".

2.16 The NPPF goes on to advise in paragraph 17 that within the overarching roles described above there are twelve principles that should be applied to both plan-making and decision-taking.

Development Plan Context

2.17 In accordance with Section 38(6) of the Planning and Compulsory Purchase Act 2004 applications for planning permission are to be determined in accordance with the statutory Development Plan unless material considerations indicate otherwise.

[1] For example, those policies relating to sites protected under the Birds and Habitats Directives (see paragraph 119) and/or designated as Sites of Special Interest; land designated as Green Belt, Local Green Space, an Area of Outstanding Natural Beauty, Heritage Coast or within a National Park (or the Broads Authority); designated heritage assets; and locations at risk of flooding or coastal erosion.
[2] Unless material considerations indicate otherwise.

2.18 The Development Plan for the Project site comprises the Kent Minerals and Waste Local Plan, adopted 2016, and the Swale Borough Local Plan, adopted 2017.

The Swale Borough Local Plan, 2017

2.19 In July 2017, Swale Borough Council adopted a new Local Plan to guide future development and investment from 2011 until 2031. Policy MU1 in the Local Plan allocates the land at north-west Sittingbourne for development and provides that:

Planning permission will be granted for mixed uses on land at North West Sittingbourne, as shown on the Proposals Map and will comprise a minimum of 1,500 dwellings, community facilities and structural landscaping and open space adjacent the A249. Development proposals will:

1. *Be in accordance with a Masterplan/Development brief prepared by the landowners/developers involved in the delivery of the allocation, in consultation with the Borough Council, and which reflects the requirements of this policy;*

2. *Be in accordance with Policy CP4 and in particular, achieve an integrated landscape strategy to provide a minimum of 22 ha natural and semi natural greenspace and other open space as a continuous buffer along the A249 that will form part of the important local countryside gap between Sittingbourne and Bobbing Iwade in accordance with Policy DM25 and Policy New A17 for Iwade, as well as contributing toward an appropriate link between the two via Bramblefield Lane/old Sheppey Way. This area will link to a network of green spaces and corridors throughout the allocation to achieve the minimum open space provision;*

3. *Ensure that, through both on and off-site measures, any significant adverse impacts on European sites through recreational pressure will be mitigated in accordance with Policies CP7 and DM28, including a financial contribution towards the Strategic Access Management and Monitoring Strategy;*

4. *Provide on-site flood mitigation measures;*

5. *Integrate heritage assets, having regard to their setting;*

6. *Be accompanied by a Health Impact Assessment in accordance with Policy CP5;*

7. *Be supported by a transport assessment and access strategy in the Masterplan/development brief to determine the need and timing for improvements to the transport network and the phasing of development, and address the following:*

    a. *The scale, nature and timing of interim improvements at Grovehurst Road/A249 junction and if necessary at the Bobbing/A249 junction;*

    b. *Identification of vehicular access points from Quinton Road and Grovehurst Road and mitigation of traffic impacts on the local road network and existing neighbourhoods by defining an appropriate quantum of development relative to these access points;*

    c. *The timing or any necessary off-site highway improvements relative to the phasing of the development;*

    d. *Identification of improvements to the public transport network between the site and Sittingbourne;*

    e. *Encouragement of increased rail use from Kemsley Halt through enhancement of the facilities there and public pedestrian and cycle links;*

    f. *Secure safe and attractive pedestrian and cycle links within the development and to the adjacent network including links to Iwade over the A249;*

    g. *Have regard to the availability of land to the north of Swale Way already safeguarded for the remodelling of the A249/ Grovehurst Road junction and should the mitigation design require it, within any other relevant allocation.*

8. *Achieve a mix of housing in accordance with Policy CP3, including provision for affordable housing in accordance with Policy DM8;*

9. *Achieve suitable means of sustainable energy production and carbon reduction measures compliant with Policy DM20;*

10. *Secure new primary and secondary schools on site, with dual public/school use facilities, to include land for artificial playing pitches; and,*

11. *Provide appropriate community facilities and other infrastructure within the site to meet the needs of future residents, including those within the Local*

Plan Implementation and Delivery Schedule, in particular those arising from primary health care, libraries and community, learning and skills services.

2.20 In addition to Policy MU1, the following emerging Local Plan policies are relevant:

- ST1 Delivering Sustainable Development in Swale
- ST2 Development Targets for Jobs and Homes 2011-2031
- ST3 The Swale Settlement Strategy
- ST4 Meeting the Local Plan Development Targets
- ST5 The Sittingbourne Area Strategy
- CP2 Promoting Sustainable Transport
- CP3 Delivering a Wide Choice of High Quality Homes
- CP5 Health and Wellbeing
- CP6 Community Facilities and Services to Meet Local Needs
- CP7 Conserving and Enhancing the Natural Environment – Providing for Green Infrastructure
- CP8 Conserving and Enhancing the Historic Environment
- DM6 Managing Transport Demand and Impact
- DM7 Vehicle Parking
- DM8 Affordable Housing
- DM10 Gypsy and Traveller Sites
- DM14 General Development Criteria
- DM17 Open Space, Sports and Recreation Provision
- DM19 Sustainable Design and Construction
- DM20 Renewable and Low Carbon Energy
- DM21 Water, Flooding and Drainage
- DM24 Conserving and Enhancing Valued Landscapes
- DM25 The Separation of Settlements – Important Local Countryside Gaps
- DM28 Biodiversity and Geological Conservation
- DM29 Woodlands, Trees and Hedges
- DM31 Agricultural Land

Kent Minerals and Waste Local Plan (2016)

2.21 The Kent Minerals and Waste Local Plan, adopted 2016, sets out a vision and strategy for mineral provision and waste management in Kent up to the year 2030. It also contains development management policies for evaluating

minerals and waste planning applications. It contains the following policies that are of relevance:

- CSM5 Land-Won Mineral Safeguarding
- DM7 Safeguarding mineral resources
- DM9 Prior extraction of minerals in advance of surface development

2.22 To provide guidance on how the policies in the Minerals and Waste Local Plan will be implemented Kent County Council is in the process of producing a Supplementary Planning Document, a draft of which has recently been subject to consultation.

North West Sittingbourne Development Framework

2.23 In accordance with Local Plan Policy MU1 a Development Framework has been prepared for the north-west Sittingbourne allocation. This document provides a set of over-arching design principles to guide the subsequent development of the land.

Other Relevant Policy and Guidance

Kent and Medway Housing Strategy, 2011

2.24 The Kent and Medway Housing Strategy 2011 sets out five key priorities in relation to housing delivery. These are to support:

- the continued delivery of key infrastructure to support managed growth and housing delivery across the County;
- the continued regeneration of disadvantaged neighbourhoods to bring them in line with more affluent parts of the County;
- the provision of choice and affordability in housing for the citizens of Kent and Medway, including rural communities, which meets their needs and aspirations;
- the managed improvement and retrofit of existing homes to make them fit for now and the future; and
- vulnerable people in housing need to fulfil their potential and live a high-quality life through the provision of excellent housing and support services.

Kent and Medway Growth and Infrastructure Framework, 2015

2.25 The Kent and Medway Growth and Infrastructure Framework 2015 brings together at a strategic level a clear framework on the:

- housing and economic growth planned to 2031 across Kent and Medway;
- fundamental infrastructure required to support this growth;
- cost of the infrastructure required;
- identification of potential funding sources across the public and private sectors; and,
- likely public-sector funding gap and how this might be addressed.

2.26 The Growth and Infrastructure Framework informs the work of the Kent and Medway Economic Partnership in setting its priorities and in attracting the infrastructure investment needed to support the growth.

Biodiversity 2020: A strategy for England's wildlife and ecosystem services, 2011

2.27 This document builds on the Natural Environment White Paper for England and provides a comprehensive picture of how England is implementing local, international and EU commitments. It sets out the strategic direction for biodiversity policy for the next decade on land, rivers, lakes, and the sea.

Natural Environment White Paper, 2012

2.28 This document outlines the Government's vision for the natural environment over the next 50 years. The paper makes the case that a healthy, properly functioning natural environment is the foundation of sustained economic growth, prospering communities, and personal wellbeing.

2.29 The paper focuses on protecting and improving the UK's natural environment, encouraging a green economy, the importance of reconnecting with people and nature and refers to international and EU leadership on these matters.

Housing White Paper, 2017

2.30 This document sets out the Government's vision and policies for the delivery of new homes. It expects all areas to have up-to-date Local Plans in place and wants to ensure that homes are built quickly once planning permission is granted.

2.31 The paper also aims to improve the co-ordination and delivery of infrastructure and wants to encourage smaller builders as well as innovation in the design and construction of new homes. The paper offers encouragement to housing associations and local authorities to build more and wants to improve standards in the private rented sector and prevent homelessness.

Chapter 3

ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

3. ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

Introduction

3.1 This chapter outlines the approach that has been taken to the completion of the EIA process. Table 3.1 below sets out information required as specified by Schedule 4, Part 1, of the EIA Regulations and indicates where the relevant requirements have been considered in this ES.

Table 3.1 - Information for Inclusion in Environmental Statement

Requirements of Schedule 4	ES Reference
1. Description of the development, including in particular (a) a description of the physical characteristics of the whole development and the land-use requirements during the construction and operational phases; (b) a description of the main characteristics of the production processes, for instance, nature and quantity of the materials used; (c) an estimate, by type and quantity, of expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat, radiation, etc) resulting from the operation of the proposed development.	Chapter 4
2. 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.	Chapter 5
3. 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 interrelationship between the above factors.	Chapters 6 - 15
4. A description of the likely significant effects of the development on the: (a) the existence of the development; (b) the use of natural resources; (c) the emission of pollutants, the creation of nuisances and the elimination of waste, And the description by the applicant or appellant of the forecasting methods used to assess the effects on the environment.	Chapters 6 - 15
5. A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment.	Chapters 6 - 15
6. A non-technical summary of the information provided under paragraphs 1 to 5 of this Part.	Volume 1
7. An indication of any difficulties (technical deficiencies or lack of know-how) encountered by the applicant or appellant in compiling the required information.	-

3.2 This ES also identifies mitigation measures which are envisaged to avoid, reduce and, if possible, remedy any identified significant adverse environmental impacts. For impacts that cannot be entirely remedied, this ES identifies the likely residual adverse impacts once the mitigation is considered.

Environmental Impact Assessment Methodology

3.3 The EIA process for the development has included the following:

- Establishing, through consultation, the Scope of the EIA including obtaining a Scoping Opinion from Swale Borough Council;
- Consideration of any potential technical and environmental alternatives;
- Establishing a comprehensive understanding of the existing baseline environmental conditions for the development area and the relevant study areas for each topic;
- Identifying the potential environmental impacts resulting from the development;
- Determining how the potential environmental impacts can be avoided, reduced or off-set through informed design and / or further mitigation and how its benefits may be enhanced;
- Assessing the significance of the potential environmental impacts in conjunction with other impacts arising from the development and those from other neighbouring developments and / or sources (in-combination and cumulative impacts); and,
- Proposing options as to how any significant residual impacts will be mitigated, managed, and monitored.

Establishing the Scope of the Environmental Impact Assessment

3.4 On 23 July 2015, a request for a 'Screening Opinion' was formally submitted to Swale Borough Council to determine whether the development constituted EIA development. If the Borough Council found that the development constituted EIA it was also requested to provide a 'Scoping Opinion' and an indication of the topics that should be addressed in the ES.

3.5 On 21 August 2015, the Borough Council confirmed that the development constituted EIA development and subsequently outlined in its letters dated 2 October, 13 November, and 2 December 2015 the extent and scope of the information required within the ES. Before adopting its 'Scoping Opinion', the

Borough Council consulted the relevant consultees as defined in the EIA Regulations.

3.6 Responses were received from several of the organisations consulted and as a result some additional issues were identified. A summary of these issues is provided in Table 3.2. These have been assessed not only for the application site but in combination with the development of the remaining land to determine the potential cumulative impacts.

3.7 On 21 July 2016 a request for a 'Screening Opinion' was submitted on behalf of Redrow Homes to Swale Borough Council to determine whether the development of 200 dwellings on land adjacent Quinton Farmhouse constituted EIA development. On 22 August 2016 the Borough Council confirmed that the proposed development of the land in association with the remainder of the north-west Sittingbourne allocation constituted EIA development and an ES would be required. The Borough Council subsequently indicated on 26 August 2016 that a separate ES would not be required providing the implications of the Redrow Homes development were assessed as part of an overall EIA for the north-west Sittingbourne allocation.

3.8 On 10 May 2017 the Borough Council was informed that an ES was being produced for the entire north-west Sittingbourne allocation, including the land proposed for development by Redrow Homes. The Borough Council was further advised that the ES would be produced in accordance with the previously agreed 'Scoping Opinion'. This position was noted and accepted by the Borough Council on 16 May 2017. Since that time Redrow Homes has decided to submit a planning application in advance of those being prepared for the remainder of the north-west Sittingbourne allocation.

3.9 This ES has been produced in response to the issues identified via the screening process but in line with the provisions of the Town and Country Planning (Environmental Impact Assessment) Regulations 2011 (as amended) as the Screening Opinion and Scoping Opinion pre-date the provisions of the Town and Country Planning (Environmental Impact Assessment) Regulations, 2017. The more recent regulations contain transitional provisions that are relevant in this case and the Borough Council confirmed the position on 16 May 2017.

Table 3.2 - Key Issues Identified During Scoping

Topic	Key issues identified in scoping report	Issues raised during consultation
Landscape and Visual effects	• Effect upon landscape character and views into the site • Change in the appearance of the site post construction • The impact of lighting post construction	No additional issues raised
Land Use and Agriculture	• Loss of best and most versatile agricultural land	No additional issues raised
Water Environment	• Effects upon ground water from contamination during and post construction • Effects of increased surface water run-off on hydrological conditions and flood risk post construction. • Increased demand for drinking water supply and demand for waste water treatment.	No additional issues raised. The design of any SuDS should be carefully considered to enhance its amenity and bio diversity value
Ground Conditions	• Ground contamination • Contaminants effecting ground water during and post construction • Effect of contaminants upon end users post construction	Ground contamination assessment required. No additional issues raised
Traffic and Transport	• Traffic flows during and post construction • Effect on existing highway network • Connectivity (public transport services, footpaths, and cycleways)	No additional issues raised. Additional consultation recommended with Highways England and Kent CC's Highways Team
Noise and Vibration	• Noise and vibration during and post construction	No additional issues raised
Air Quality	• Dust and vehicle emissions during construction • Vehicle emissions post construction • Effect upon existing AQMA's	Impact on AQMA's Additional consultation required with Swale BC's Environmental Protection Team
Natural Environment	• Loss of existing habitats and creation of new habitats • Disturbance to protected species during and post construction • Habitat fragmentation	Impact on protected species. Additional consultation required with Kent CC's Ecology Team
Cultural Heritage	• Impact on buried archaeological remains during construction. • Impact upon the setting of listed buildings near the site during and post-construction.	Additional consultation required with Kent CC's Archaeology Team
Social and Economic effects	• Increase in population • Provision of new market and affordable housing • Effect on local services and facilities • Health impacts • Employment generation during construction • 'Spend' within the economy post construction • Waste during and post construction	No additional issues raised

Description of the Proposed Development and Identification of Potential Impacts

3.10 A full description of the proposed development, the site and it surroundings is provided in Chapter 4. The environmental topics which have been assessed and reported are:

- Landscape and Visual effects – Chapter 6;
- Land Use and Agriculture – Chapter 7,
- Water Environment – Chapter 8,
- Ground Conditions – Chapter 9;
- Traffic and Transport – Chapter 10;
- Noise and Vibration – Chapter 11,
- Air Quality – Chapter 12
- Natural Environment – Chapter 13,
- Cultural Heritage – Chapter 14,
- Socio-Economic effects – Chapter 15
- Cumulative Impacts – Chapter 16

Evaluation and Quantification of Potential Impacts

3.11 To help evaluate and quantify the likely significant environmental effects of the development, environmental significance criteria have been employed to ensure that the identified impacts are fully understood. Effects may be positive (i.e. beneficial) or negative (i.e. adverse).

3.12 Environmental significance criteria are important as they will help inform the determination by the competent authority of the overall acceptability of the development. An understanding of the significance criteria for all assessed impacts is important and relevant consideration in the determination of the planning application for the development.

3.13 The significance of environmental effects resulting from the construction and operation of the development will generally be presented in this ES using a series of matrices. These are developed to describe the sensitivity of receptors which have the potential to be impacted by the development and the magnitude of any impacts which are likely to arise. The magnitude of impact and sensitivity of receptor is cross referenced to give an overall significance of effect for any potential impact. Where it is not possible to quantify impacts, a precautionary qualitative assessment will be carried out, based on available knowledge and professional judgement.

3.14 To provide a consistent approach and enable comparison of impacts upon different environmental components, the assessments generally follow the structure and use the terminology outlined below in Tables 3.3 – 3.5.

3.15 It should however be noted that for some impact sections, significance criteria may need to differ. Each technical chapter of the ES clearly identifies and explains any specific criteria used. Unless otherwise stated, effects of moderate significance or above are considered to be significant for the purposes of the EIA Regulations.

3.16 In addition, two broad types of potential mitigation measures will be described in the ES:

- embedded mitigation, namely design / standard control measures, which will be used to produce an initial assessment of impact; and
- specific mitigation, which may be introduced where appropriate and considered in the assessment of residual impacts.

Table 3.3 - Determining Receptor Sensitivity

Sensitivity	Example
Very High	Internationally designated site (e.g. Ramsar / SPA / World Heritage Site).
High	Nationally designated site (e.g. Site of Special Scientific Interest), / designated Landscape (e.g. National Park) / principal aquifer / main watercourse / human health.
Medium	Regionally designated ecology / heritage site / secondary aquifer / minor watercourse
Low (or lower)	Locally designated ecology / heritage site; area of hardstanding / brownfield land / industrial site / low ecological value.
Negligible.	Negligible ecological value

Table 3.4 - Determining Magnitude of Impact

Magnitude		Example
Major	Adverse	A permanent long term adverse impact on the integrity and value of an environmental attribute or receptor.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality.
Moderate	Adverse	An adverse impact on the integrity and/or value of an environmental attribute or receptor, but recovery is possible in the medium term and no permanent impacts are predicted.
	Beneficial	Benefit to, or addition of, key characteristics, features, or elements or improvement of attribute quality.
Minor	Adverse	An adverse impact on the value of an environmental attribute or receptor, but recovery is expected in the short term and there would be no impact on integrity.
	Beneficial	Minor benefit to, or addition of key characteristics, features or elements; some beneficial impact on attribute or a reduction in the risk of a negative impact occurring.
Negligible	Adverse	Very minor loss
	Beneficial	Very minor benefit
No Change		No change would be perceptible, either positive or negative.

Table 3.5 - Determining Significance of Effect

		Magnitude of Impact				
		No Change	***Negligible***	***Minor***	***Moderate***	***Major***
Receptor Sensitivity	***Very High***	Neutral	Slight	Moderate	Large	Very Large
	High	Neutral	Slight	Moderate	Large	Large
	Medium	Neutral	Slight	Slight	Moderate	Large
	Low	Neutral	Slight	Slight	Slight	Moderate
	Negligible	Neutral	Neutral	Neutral	Neutral	Neutral

Mitigation and Monitoring

3.17 Full consideration has been given to the potential mitigation measures which could be used to ensure that any potentially adverse significant environmental impact of the development is minimised.

3.18 In the hierarchy of mitigation likely significant adverse effects should, in the first instance, be avoided altogether; where this is not possible such effects should then be reduced and, finally, off-set.

3.19 Significant adverse effects are best avoided by incorporating appropriate measures during the detailed design process. As such, the iterative nature of the EIA process can help to inform the final design of the development.

3.20 The development has been, and will continue to be, developed in such a way that the reduction and, wherever possible, elimination of any associated significant adverse environmental impacts are integral to the overall design philosophy.

3.21 Where it has not been possible to avoid adverse significant environmental effects, potential mitigation and monitoring measures will be discussed in each technical chapter. The full monitoring programme can only be established following the completion of the EIA process.

Indirect / Secondary and Cumulative Impacts and Inter-relationships

3.22 Indirect and secondary impacts are those which arise because of a direct / primary impact. For example, deterioration of water quality in a watercourse due to an effluent discharge (which would be a direct impact) could have an indirect / secondary impact on aquatic biodiversity. Cumulative impacts occur when a receptor is subject to impacts from multiple schemes. Each technical chapter in this ES describes the cumulative developments that could have an impact on the environmental topic under discussion.

3.23 Inter-relationships may also exist between several different environmental topics. For example, an increase in traffic movements will not only lead to potential impacts on a road network and require consideration as part of a transport assessment, but will also create vehicle emissions which may have subsequent impacts on local air quality.

3.24 All types of impacts listed above are discussed in each technical chapter of this ES.

Presentation of the Environmental Impact Assessment in this Document

3.25 Chapters 6 to 15 present the assessment of the likely environmental impacts associated with the advancement of the development. Each technical chapter deals with a specific environmental topic area and has been broken down into sub-sections. In summary, these are as follows with a further explanation provided below.

- Introduction
- Legislative and Policy Context
- Development Being Assessed
- Assessment Methodology and Significance Criteria
- Embedded Design Mitigation
- Consultation
- Baseline Conditions and Receptors
- Assessment of Potential Impacts
- Potential Mitigation / Management Techniques
- Assessment of Residual Impacts

Environmental Statement Structure

Introduction

3.26 This sub-section provides details of the key issues regarding the specific environmental topic and impacts being considered.

Regulatory and Policy Context

3.27 This sub-section addresses relevant legislation and policy in respect of the topic under consideration, if it has not already been addressed in the planning policy chapter.

Development being Assessed

3.28 This sub-section describes the realistic 'worst case' development scenario for the topic being assessed within the development parameters.

Assessment Methodology and Significance Criteria

3.29 This sub-section provides details of the assessment methodology adopted for the purposes of the EIA, if it differs from that set out in the over-arching chapter.

The assessment methodology chosen will reflect the relevant guidelines and legislative standards. In addition, significance criteria will be used to quantify the extent of the environmental impact of the development and will be related to the generic criteria set out in the over-arching chapter.

Embedded Design Mitigation

3.30 This sub-section provides details of mitigation measures embedded into the design of the development which are relevant to the topic being assessed.

Consultation

3.31 This sub-section provides a list of the consultation responses to the Scoping Report and sets out how the comments have been addressed.

Baseline Conditions

3.32 This sub-section identifies the study area for each specific impact topic and describes and discusses the environmental baseline conditions, providing, as appropriate, justification for the selection of receptors being considered within the analysis of the impact of the development.

Assessment of Potential Impacts

3.33 This sub-section discusses the findings of the EIA studies. In undertaking this assessment both quantitative and qualitative evaluations are used, in varying degrees, depending on the nature of the environmental impact being assessed. The assessment considers the construction and operational phases of the development as well as the cumulative impacts associated with other relevant developments that have been identified within the planning system in the area. The significance of the environmental impacts identified are addressed, referring to the significance criteria established.

Potential Mitigation / Management Techniques

3.34 This sub-section provides details of the mitigation measures that are proposed to ensure that any potential adverse environmental impacts are either minimised or, wherever possible, avoided altogether. Where relevant, monitoring may be identified to demonstrate that the proposed mitigation measures will be effective.

Assessment of Residual Impacts

3.35 This sub-section assesses the significance of the environmental impacts following the application of any identified mitigation measures.

Chapter 4

THE DEVELOPMENT SITE AND APPLICATIONS

4. THE DEVELOPMENT SITE AND APPLICATIONS

Introduction

4.1 This chapter provides a brief description of the development site and surrounding area. It outlines the proposals which will be the subject of planning applications and provides additional information about the implementation of the development.

North-West Sittingbourne

4.2 The land is located on the north-western side of Sittingbourne, adjacent to the A249 and makes up a significant part of a much larger area of land that has been allocated for development by the Swale Borough Local Plan, 2017. The area is roughly rectangular shape and extends to approximately 76 hectares. The land is currently in agricultural use and generally falls from the north-west to the south-east.

4.3 The land is bordered to the north by Swale Way, to the east by the Sittingbourne to Sheerness railway line, to the south by Quinton Road, and to west by the A249. Kemsley, a village which now forms part of the wider built-up area of Sittingbourne, protrudes into the site in the north-eastern corner and lies on either side of Grovehurst Road (B2005). Kemsley is served by a railway station and has a Medical Centre and Primary School.

4.4 Further to the north, and on the opposite side of Swale Way there is a distribution centre and electricity sub-station. To the east, and on the opposite side of the railway line, there is an existing residential neighbourhood. This neighbouring area has been developed in the recent past and comprises predominantly of two storey dwellings.

4.5 There is limited frontage development on Quinton Road to the south but on the opposite side of the road there is an established residential neighbourhood which also comprises predominantly of two storey dwellings.

4.6 To the west, and on the other side of the A249, lies an area known as Howt Green, whilst approximately 1km further to the north on the B2005 road lies the village of Iwade. Sittingbourne town centre is approximately 2km to the south-east of the development site.

4.7 Two public footpaths cross the development site. One extends westwards from Bramblefield Lane in the north and another in a south-east / north-west direction from the existing residential area to the east of the railway line.

Development Framework

4.8 To guide the development of the north-west Sittingbourne allocation, and in line with the provisions of Local Plan Policy MU1, a Development Framework has been produced. The Framework provides a strategic overview of the mixed-use allocation and establishes overarching design principles that will help guide the development of the allocated site in a comprehensive and structured manner. It has been used to guide the preparation of the planning applications that are the subject of this ES.

4.9 To demonstrate how the north-west Sittingbourne allocation will be developed comprehensively the illustrative masterplan from the Development Framework is shown as Figure 4.1.

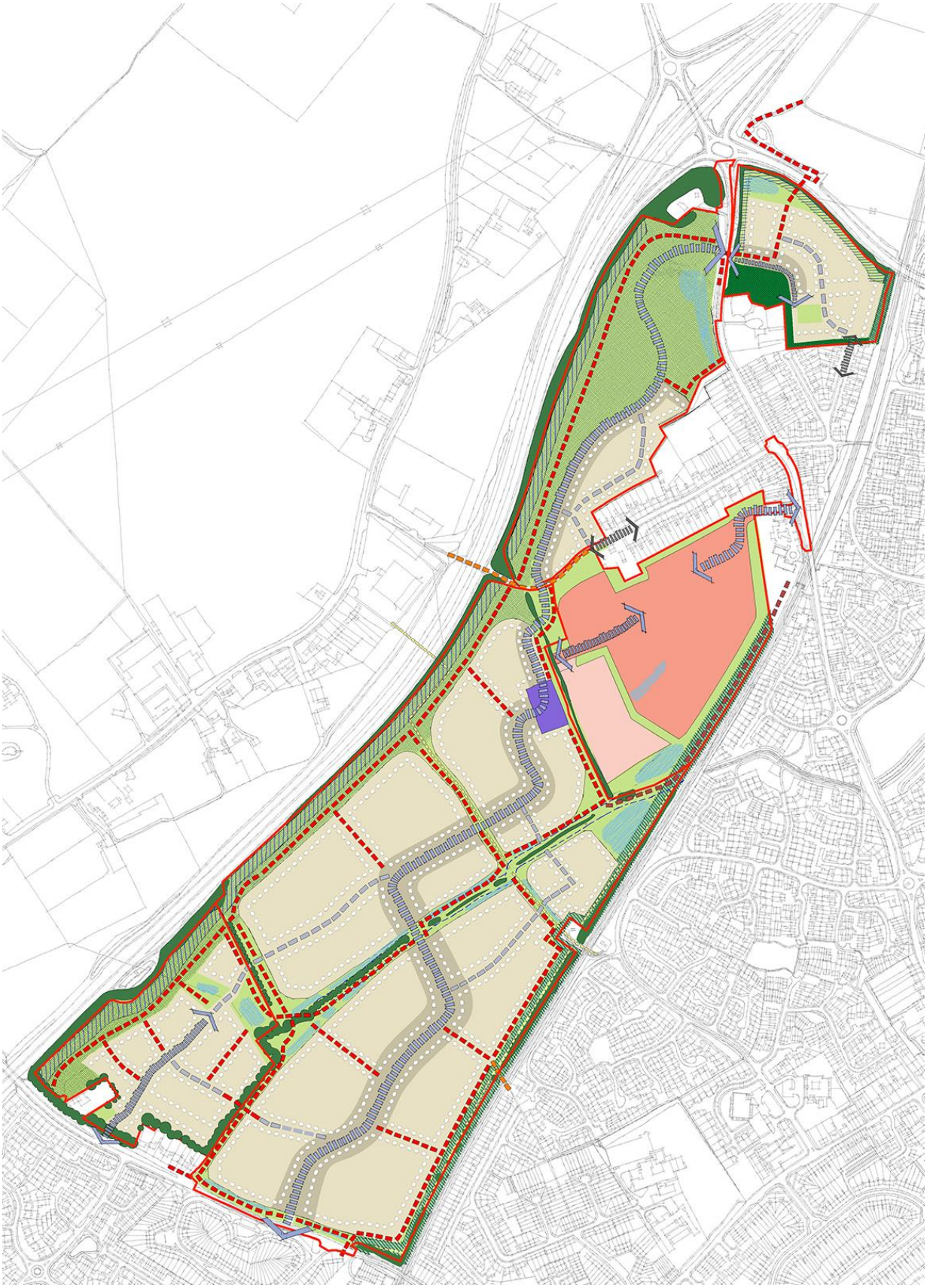
The Development Area

4.10 The ES development area is made up of two parcels which are located roughly to the north and south of an existing public footpath which crosses the land and a further parcel that lies to the east of Grovehurst Road.

4.11 The northern development parcel at Pheasant Farm extends to 10.56 hectares and is currently in agricultural use. This parcel is bounded to the north by a tree belt and planting which screens Featherbed House and its access. Grovehurst Road defines the eastern boundary. Along the southern boundary lies an existing public right of way which leads to properties along Bramblefield Lane. The rear gardens to these properties back onto this portion of the application site. Tree belt planting defines the western boundary. At this point the A249 is in a cutting and the existing woodland screens views into and out of the site including views of the A249 from within the site.

4.12 The land at Pheasant Farm comprises largely of an artificial mound. This was constructed using spoil arising from the construction of the adjacent A249. There are no buildings within the site and all the landscape features are located along the site boundaries.

Figure 4.1 - North-West Sittingbourne: Illustrative Masterplan



4.13 The southern development parcel extends to 42.34 hectares and is also in agricultural use. This parcel consists of two arable fields. The north-western field rises from the south-east to the north-west whilst the south-eastern field is relatively flat but rises slightly to the south. An existing hedge which is punctuated by trees separates the two fields. The hedge follows the route of an existing watercourse.

4.14 To the north, lies Bramblefield Lane, a path which provides pedestrian and cycle access over the A249 to Sheppey Way. This path separates this part of the site from the land at Pheasant Farm.

4.15 The Sittingbourne to Sheerness railway line defines the eastern boundary to the development parcel whilst Quinton Road and the boundary to a further agricultural field define the southern boundary. The development parcel is bounded to the west by the A249.

4.16 The eastern development parcel extends to 4.8 hectares and is located to the east of Grovehurst Road. The northern boundary to the parcel is defined by Swale Way, and the Sittingbourne to Sheerness railway line defines the eastern boundary. To the south there is existing residential development in Godwin Close/Danes Mead. Grovehurst Road defines the western boundary. Great Grovehurst Farmhouse, a Grade 2 Listed Building is located to the south-west.

4.17 In addition to the development parcels described above there is a further parcel within the north-west Sittingbourne allocation which lies on the north-eastern side of Quinton Road, adjacent Quinton Farmhouse, a Grade 2 Listed Building. The parcel extends to 8.74 hectares and here it is proposed to construct 155 dwellings. The implications of this development have been assessed in a separate ES.

Relevant Planning History

4.18 No significant planning applications have been recorded on the site.

The Proposed Development

4.19 This ES assesses the proposals that will be the subject of separate planning applications.

Land between Quinton Road and Bramblefield Lane and at Pheasant Farm

4.20 This planning application will provide for the development of the northern and southern land parcels and will be a hybrid application for outline planning permission, with full details for the first phase of the development being submitted at the outset.

4.21 The first phase of the development will provide for the construction of 343 dwellings (including affordable housing) with 91 being accessed from Grovehurst Road and a further 252 being accessed from Quinton Road; public open and amenity space (including an equipped children's play area); together with associated landscaping and ecological enhancement works; acoustic barrier to the A249; internal access roads, footpaths, cycleways, and parking; drainage (including infiltration basins and swales, soakaways and permeable paving), utilities and service infrastructure works.

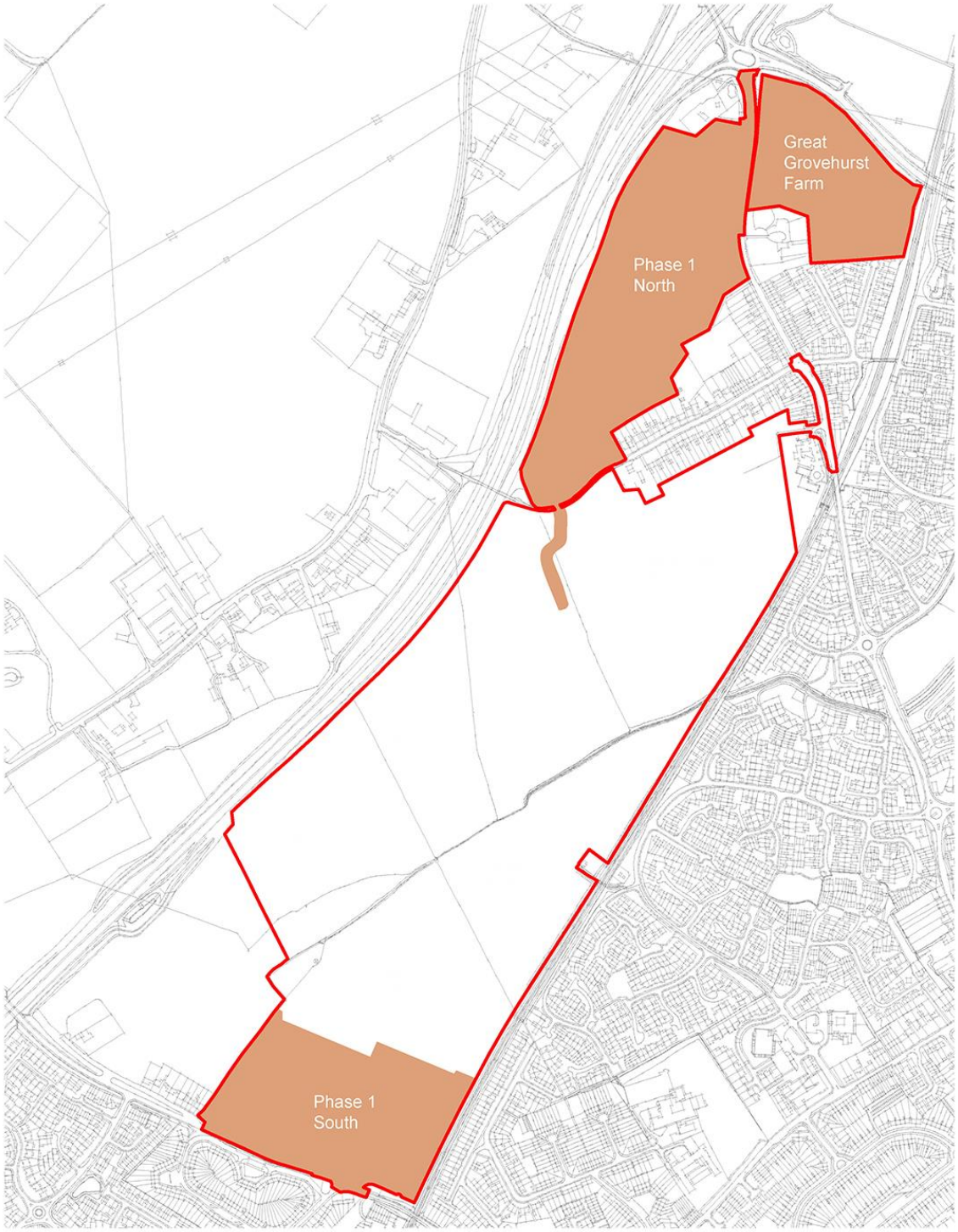
4.22 Outline planning permission will be sought on the remainder of the application site for the construction of up to 863 new dwellings (including affordable housing); a site of approximately 10 ha for a secondary and primary school; a mixed-use local centre including land for a convenience store; public open and amenity space (including equipped children's play areas), together with associated landscaping and ecological enhancement works; acoustic barrier to the A249;internal access roads, footpaths, cycleways and parking; drainage (including a foul water pumping station and sustainable drainage systems), utilities and service infrastructure. All matters are to be reserved for subsequent approval except for access to the school site from Grovehurst Road.

Land at Great Grovehurst Farm

4.23 This planning application will provide for the development of the eastern land parcel. It will be an outline application for the development of up to 110 dwellings accessed from Grovehurst Road including internal roads, footpaths and cycle links, open space, play areas, landscaping, parking, drainage, utility services and infrastructure works, and ecological mitigation following the extraction of brickearth. All detailed matters will be reserved for subsequent approval except for the means of vehicular access from Grovehurst Road.

4.24 Figure 4.2 shows the entire extent of the proposed development and the initial development areas.

Figure 4.2 - Development Area



Land Use and Building Height Parameters

4.26 For the purposes of undertaking the EIA a parameters plan has been produced for the entire north-west Sittingbourne allocation. Figure 4.3 shows the distribution of the land uses and maximum building heights. The site will be developed predominantly with two storey dwellings with some at three storeys in height and include two schools and public and amenity open space and a linear park.

4.27 This ES has been produced based upon the design parameters that are set out in the sections below and form the 'Rochdale Envelope' [1] for the assessment of the proposed development.

Residential

4.28 Across the entire north-west Sittingbourne allocation, a minimum of 1,500 dwellings are proposed in line with Local Plan Policy MU1. The assessment assumes that the two storey dwellings will be up to 11m in height and the three storey dwellings will be up to 13.5m in height (see Figure 4.3).

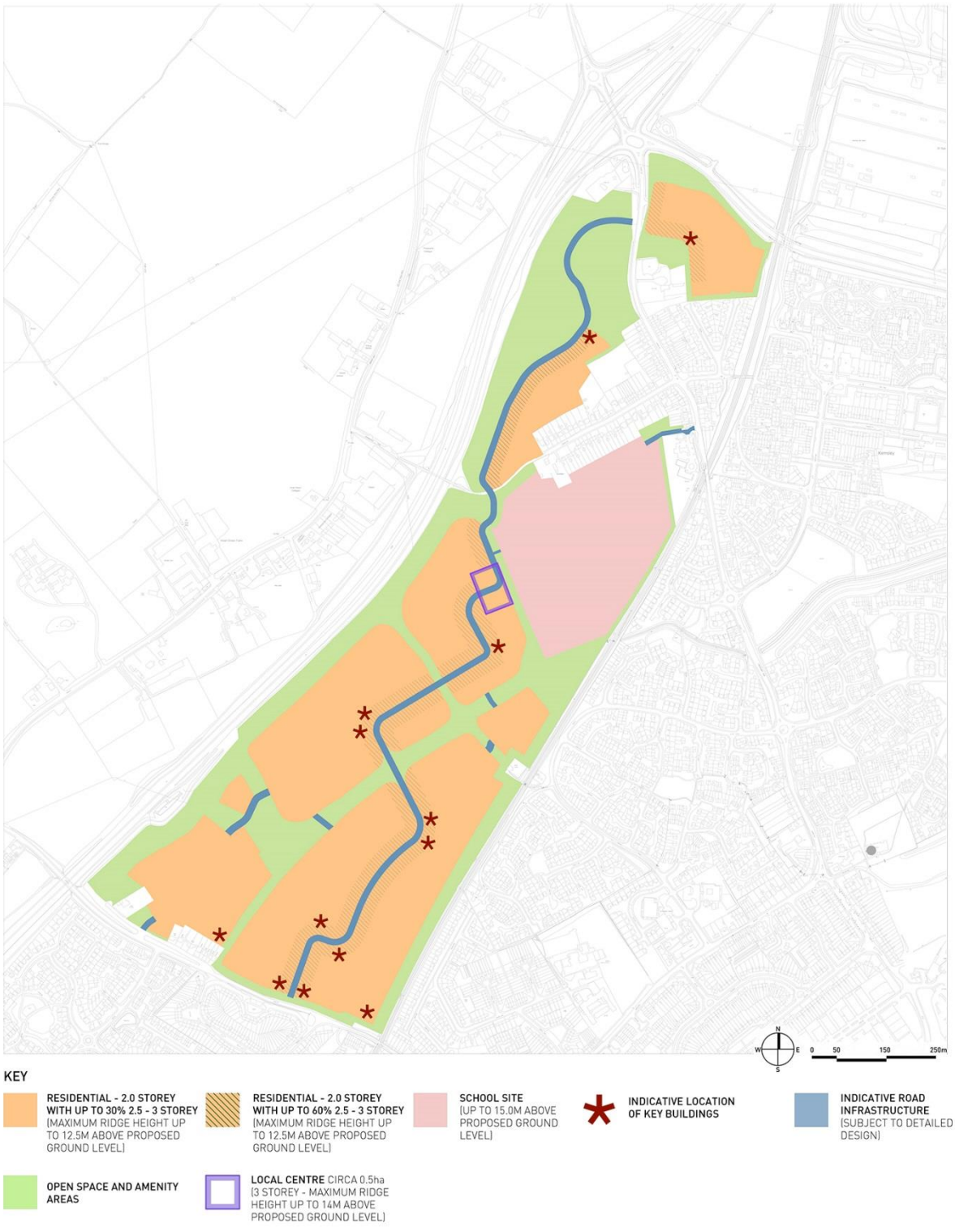
Community Uses

4.29 The assessment assumes that the following community uses would be included within the proposed development:

- a primary school site extending to approximately 2.0 ha. The school would be predominantly single storey in height (up to 4.5m) with a hall up to 10m in height;
- a secondary school site extending to approximately 8.0 ha. The school could potentially be three storeys high and have a height of 15.0 m, and,
- a mixed-use local centre including land for a small convenience store. Some development within the local centre could potentially be three-storeys high and have a height of 14.0 m.

[1] The 'Rochdale Envelope' arises from two cases: R. v Rochdale MBC ex parte Milne (No. 1) and R. v Rochdale MBC ex parte Tew (1999) and R. v Rochdale MBC ex parte Milne (No. 2) (2000).

Figure 4.3 - Land Use and Building Height Parameters Plan



Greenspace, Landscaping, Play Areas

4.30 The north-west Sittingbourne allocation would incorporate an extensive green space network comprising a linear park, children's play areas, amenity space, landscaping, allotments, a SuDS network, and ecological habitats as illustrated by Figure 4.1.

4.31 Extensive new landscape planting is proposed to the boundaries of the north-west Sittingbourne allocation, including the western boundary of the application site. The planting will incorporate new trees which are indigenous to the area and provide for the retention of existing trees and hedgerows where possible.

4.32 A network of public footpaths and cycle paths are proposed within the north-west Sittingbourne allocation to connect the proposed development parcels.

Access

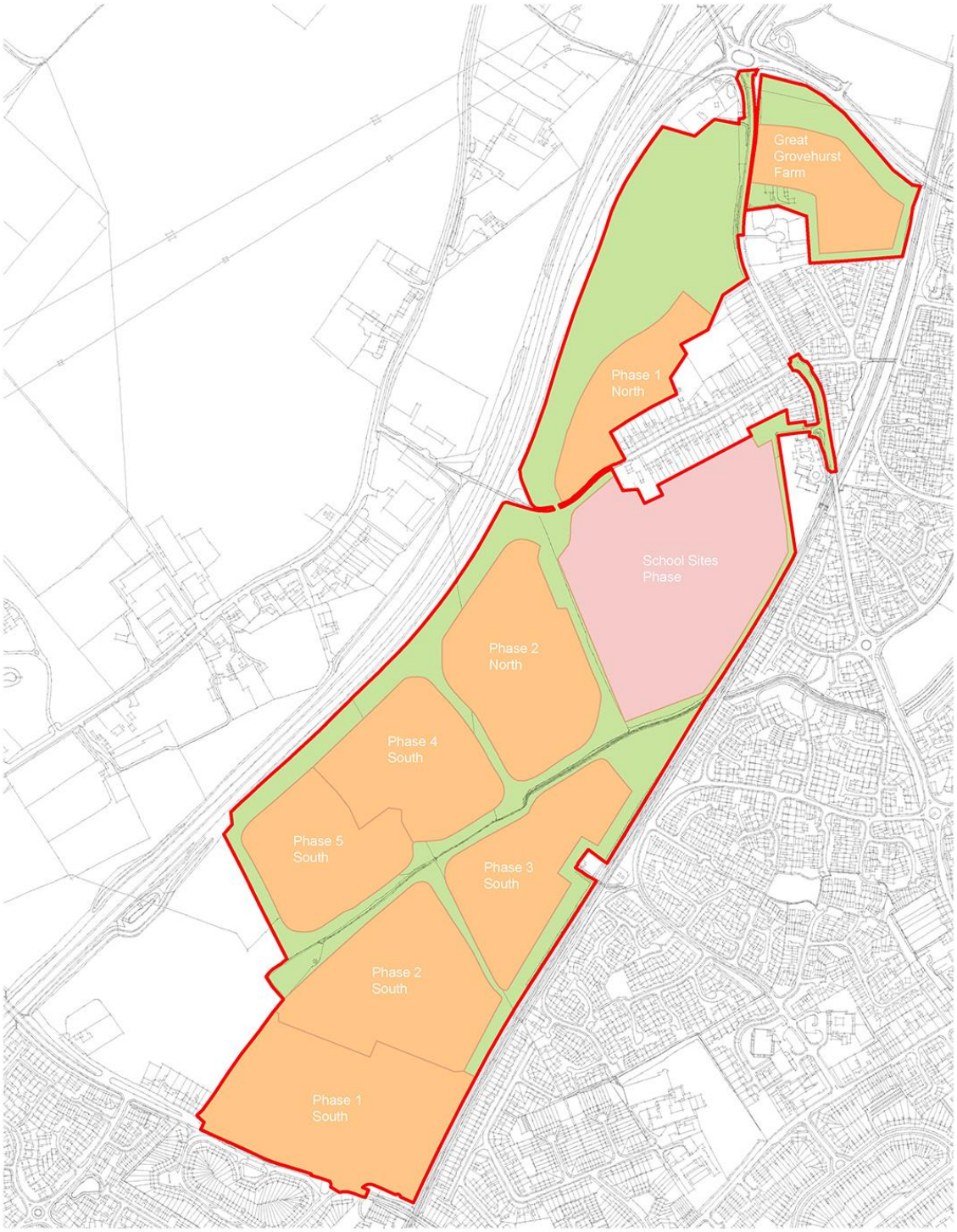
4.33 Five new access points from the existing road network would be created to provide access into north-west Sitingbourne allocation. The approximate locations are shown on Figure 4.1. The assessment assumes that the following junctions would be constructed.

1. A new access from Quinton Road to the west of the existing junction formed by Quinton Road and Knightsfield Road. This would be one of the principal access points serving an internal 'spine road';
2. A new access on the western side of Grovehurst Road. This would also be one of the principal access points serving an internal 'spine road';
3. A secondary access point from Grovehurst Road to serve the land at Great Grovehurst Farm;
4. A secondary access point from Quinton Road to the west of the junction formed by Quinton Road and Sonora Way; and
5. A secondary access point adjacent to the Medical Centre in Grovehurst Road to serve the combined school site.

Drainage

4.34 A SuDS network has been incorporated into the north-west Sittingbourne allocation, the approximate location of which is shown on Figure 4.1. The intended drainage arrangements are discussed in further detail in Chapter 8.

Figure 4.4 – Development Phasing



Construction

4.35 It is envisaged that construction on the land between Quinton Road and Bramblefield Lane and at Pheasant Farm will commence in 2019 and, based upon an average build-out rate of approximately 85 – 95 dwellings per annum, be completed by 2031. The proposed development will be constructed in phases as illustrated by Figure 4.4.

4.36 It is anticipated that development on the land at Great Grovehurst Farm will commence in 2020 following the extraction of brickearth and take approximately 3 years to complete.

Employment

4.37 It is estimated that approximately 270 people will be employed per day during the peak construction period (i.e. when construction is in progress on all three development parcels) although this will fluctuate slightly depending upon the precise nature of the activities being undertaken. Once the development of the land at Great Grovehurst Farm is complete the number employed will decline to 180 per day.

Working Hours

4.38 The normal working hours for all construction activities will be from 07.30 to 18.00 Mondays to Fridays and 07.30 to 13.00 on Saturdays. No continuous 24-hour activities are envisaged and there will be no Sunday or Bank Holiday working without the prior approval of Swale Borough Council.

Plant and Machinery

4.39 The precise nature and quantity of plant and equipment to be employed on site will vary with each stage of the development but is likely to include earth scrapers, excavators, dumpers, fork lift trucks, rollers, and compressors.

Construction Activities

4.40 Any spoil that is generated by the development would be re-used on the application site where possible although it is likely there will be a surplus. Any contaminated material that is discovered would be removed to an appropriately licenced landfill site.

4.41 Fuel and oil will be confined to specified areas and stored in a manner to prevent contamination of soil or groundwater through accidental spillage. Contractors will be required to follow health and safety requirements when using any toxic or hazardous materials.

Construction Materials

4.42 All construction materials would be imported onto site, but opportunities will be taken to use locally sourced materials and supply chains wherever possible. All materials will be sourced responsibly to meet international standards.

Construction Traffic

4.43 To minimise the impact of construction traffic flow on the local road network, and the amenity of residents in Sittingbourne, it is proposed that a Construction Environmental Management Plan (CEMP) traffic will be developed in consultation with Kent County Council as the local highway authority. Wherever possible HGV movements will also be restricted as far as reasonably possible to avoid peak traffic flow periods. It is envisaged that during the peak construction period there will be approximately 24 HGV movements per day (12 in / 12 out) which equates to 8 HGV movements for each development parcel.

Waste Management

4.44 A Waste Management Strategy will be produced to promote the reduction, re-use, and recycling of materials during the construction and subsequent occupation of the proposed development. During the construction phase best practice measures will be promoted to avoid, for example, the over-ordering or inappropriate storage of materials to minimise waste. Once constructed the proposed dwellings will incorporate sufficient storage space to promote the separation of waste into the various streams allowing for re-cycling and the collection of compostable material to take place.

Other Developments Proposals

4.45 In addition to the proposed development which is the subject of this ES there is one further parcel of land within the north-west Sittingbourne allocation. This comprises the land adjacent Quinton Farmhouse, Quinton Road (approximately 8.74 hectares) located to the south-west of the application site.

4.46 The proposals for this part of the allocation will involve the construction of 155 dwellings together with public open and amenity space, associated landscaping, footpaths and cycleways, parking, utilities, and service infrastructure. A new access would be constructed from Quinton Road to the west of the junction formed by Quinton Road and Sonora Way.

Cumulative Impacts

4.47 The cumulative impact of the proposed development described in this ES in combination with the development of the other parcel of land comprised within the north-west Sittingbourne allocation is considered for the purposes of this EIA in Chapter 16.

4.48 Chapter 10 considers the impact of the Local Plan allocation at Iwade as the proposals for the north-west Sittingbourne allocation are linked by a requirement to maintain a countryside gap – via the provision of a linear park.

Decommissioning

4.49 The EIA Regulations require consideration to be given to decommissioning. Developments of the type proposed do not have a finite life and hence decommissioning cannot be sufficiently well defined (in terms of timing and extent) to enable the assessment of likely effects. Hence decommissioning is not included in the scope of this assessment.

Chapter 5

SITE SELECTION, ALTERNATIVES, AND DESIGN EVOLUTION

5. SITE SELECTION, ALTERNATIVES, AND DESIGN EVOLUTION

Introduction

5.1 This Chapter provides commentary upon the selection of the North-West Sittingbourne allocation, the consideration of alternatives and the evolution of the design solution for the proposed development.

North West Sittingbourne: Site Selection

5.2 The Swale Local Plan sets out the vision and overall strategy for delivering sustainable development in the Borough over the plan period 2011 to 2031. It sets requirements for new homes and jobs and establishes the Council's strategy for achieving these requirements through the identification of land for new development throughout the Borough.

5.3 In terms of dwelling numbers, the Local Plan identifies a minimum requirement for 13,192 new homes between 2011-2031 (approximately 776 dwellings per annum). The corresponding requirement for new jobs is 10,900.

5.4 Sittingbourne is the largest town in the Borough and as such has been identified for significant growth. The land to the north-west of Sittingbourne is the largest of the strategic allocations in the Local Plan. It has been selected through the Local Plan process and the Local Plan itself has been the subject of a Sustainability Assessment in line with the requirements of Environmental Assessment of Plans and Programmes Regulations, 2004. The site selection process has therefore been rigorous and relevant environmental considerations have been assessed.

5.5 The north-west Sittingbourne allocation is central to the delivery of housing land in the Borough and the wider objectives of the Local Plan. The mixed use strategic allocation is expected to provide a minimum of 1,500 new homes, a combined primary and secondary school site, structural landscaping and open space including a countryside gap adjacent to the A249 road.

5.6 The development proposals are predicated on the need to deliver additional new homes in the Borough in a timely way with progress being closely monitored to ensure delivery. The development proposals assessed in this ES will therefore help to expedite delivery.

Consideration of Alternatives

5.7 The EIA Regulations require that an ES should include an outline of the main alternatives that have been studied by the applicant and an indication of the main reasons for the ultimate choice of option, whilst considering likely significant environmental impacts. Under the EIA Regulations there is no requirement to assess alternatives, only a requirement to provide information about those alternatives that have been considered.

5.8 In line with the procedures prescribed by the Environmental Assessment of Plans and Programmes Regulations (the 'SEA Regulations') 2004 the north-west Sittingbourne allocation has already been assessed by Swale Borough Council. The Local Plan is accompanied by a Sustainability Appraisal which has considered reasonable alternatives (i.e. mutually exclusive approaches to addressing policy issues) as well as various site options (i.e. the pool of sites that are available and deliverable, and thereby in contention for allocation).

5.9 A further assessment of alternative site locations is not therefore included in this ES. Instead this ES focuses upon alternative design solutions for the development of the planning application site.

Design Evolution

5.10 The design evolution process has been very iterative but the overall objective for the Sittingbourne mixed-use allocation is to create a sustainable new community, that functions successfully as an urban extension to the town, the Borough's largest settlement.

5.11 To achieve this, several overarching design principles have been articulated in the Development Framework. These will be adhered to as part of any detailed design solution. These are to:

- Create a development of character by establishing a place with an individual, distinct identity that links successfully with the existing character of Sittingbourne;
- Provide the necessary vehicular access to the sites via Grovehurst Road and Quinton Road, to respect landscape constraints, maximise the development potential for the uses indicated for the sites and mitigate the impact of development traffic on surrounding neighbourhoods;

- Ensure the proposed development is appropriately scaled, aesthetically pleasing, creating both quality and legibility in the public realm. The relationship with other land uses and open spaces is to be carefully considered to provide the highest quality of settings within the site, aiding the creation of different and individual character areas;
- Provide a minimum of 22 hectares of natural and semi natural greenspace including strategic landscaping, recreational space, parkland, and water features with wildlife corridors extending into the site;
- Provide a coordinated approach to soft landscaping by using carefully selected tree and shrub species to give good structure, seasonal interest and provide high wildlife value. The plant mix will vary across the site allocation to create a strong sense of place utilising native species having regard to the 'Swale Landscape Character and Biodiversity Appraisal' (2011);
- Utilize the framework of open spaces to maintain an important local countryside gap between Sittingbourne and Bobbing / Iwade, to minimise the development's visual impact, restricting views from the A249 and surrounding rural communities;
- Create a legible development, encouraging pedestrian movement through the allocation and to the adjacent network;
- Provide higher density development along the primary access route and other key locations, lessening towards the landscaped edges to create a parkland 'village' setting;
- Provide appropriate noise mitigation to reduce noise from the A249, from Swale Way and from Grovehurst Road itself;
- Consider the orientation of buildings along the western and eastern boundaries, such that private gardens are behind the properties and screened from noise;
- Make available land and contributions towards the provision of a primary and a secondary school within the Project site, to cater for new residents and to provide additional capacity for existing residents within the locality;
- Develop a drainage strategy utilising sustainable drainage systems such as swales and balancing ponds in line with 'Water. People. Places. A guide for master planning sustainable drainage into developments', by providing visually strong but safe water features to development edges and within open spaces. Where practical, these features will be designed to support local biodiversity aims;
- Provide for bus access to the site and improve links to, and the enhancement of, rail facilities at Kemsley;

- Integrate heritage assets having regard to their proximity and setting, and
- Incorporate sustainable design and construction methods.

The Proposals

5.12 The over-arching vision for the north-west Sittingbourne allocation is to create a high-quality, well connected community, set within a landscaped framework that will feature a new linear park, public open space and amenity areas, and tree-lined access roads which embraces sustainability at all levels, providing an exceptional place for people to live and work.

Land between Quinton Road and Bramblefield Lane and at Pheasant Farm

5.13 The Design and Access Statement which accompanies the proposals for this area establishes a set of design principles. Under the following seven sub-headings these are to:

1. Function and Quality

- Establish a new development that is an integrated into Sittingbourne and the wider area delivering a well-connected permeable urban structure that supports social cohesion between existing and new communities;
- Retain existing landscape features on the application site;
- Establish a distinctive identity through well-designed spaces and built form;
- Make efficient use of land through proposing development with an appropriate density;
- Minimise the impact of the development on the open countryside and surrounding area; and
- Protect the existing floodplain which is located near the application site and provide a Sustainable Drainage System to ensure that the development does not increase the risk from flooding in the area.

2. Sense of Place

- Allow key design characteristics of the surrounding settlements to influence the character of the development;
- Provide a clear hierarchy of connected spaces and places, including streets, accessible by a variety of users which consider the design of the space as well as its function as a movement corridor;
- Provide traditional streets with frontage development;
- Utilise green infrastructure as a structuring and defining element of the layout

to promote local distinctiveness, place making and legibility;
- Integrate existing and proposed landscape features to soften the built form, particularly towards the countryside edge of the development and along the existing water course and the railway line;
- Create a clearly defined public realm through the provision of continuous building frontage lines and variations in enclosure of private spaces;
- Control access to private areas, particularly rear gardens, and parking courts;
- Provide a variety of accessible public open spaces and recreation areas to meet the needs of the local community whilst encouraging social activity; and
- Provide outward facing development to much of the application site's edges to respond positively with the surrounding landscape setting.

3. Access to Services and Facilities

- Integrate the proposed development into the existing movement network including new public transport provision with bus stops located within easy walking distance of all the new dwellings;
- Provide convenient, safe, and direct access for all residents to the existing and proposed local services and facilities including schools, retail, community uses and employment opportunities;
- Provide multiple access points into the development forming part of a permeable network of streets which assists in dispersing traffic (vehicular and pedestrian);
- Enhance and extend the existing public rights of way network as an integral part of the development, particularly facilitating access to the Town Centre and existing employment areas;
- Maximise the opportunities for alternative modes of transport to the car particularly walking, cycling and bus travel;
- Create a clear movement hierarchy providing easily recognisable routes which balance the street as a space alongside its function as a movement corridor; and
- Maximise the connections to Sittingbourne Town Centre via sustainable routes for pedestrians, cyclists, and public transport users.

4. Respond to Context

- Reflect the local pattern of the streets and blocks into the scheme's layout;
- Integrate the development into the existing fabric of Sittingbourne particularly in relation to scale, height, and massing;
- Reflect the diversity of built form and public realm in Sittingbourne and the surrounding villages including Iwade and Bobbing;

- Respond to the existing topography of the application site including the consideration of views in and out of the application site;
- Provide outward facing development particularly where it adjoins open countryside to respond positively with the rural setting;
- Retain the existing landscape features and habitats on the site where possible and where it supports and enhances the character and placemaking qualities of the development;
- Protect the setting of the Listed Buildings adjacent to the site; and
- Protect existing and proposed residential amenity using frontage development and seeking to enclose rear gardens.

5. Safe and Accessible Environments

- Create a clearly defined public realm through the provision of appropriate principle building frontage lines and variations in enclosure of private spaces;
- Provide a hierarchy of connected spaces and places, including streets and green spaces, which are accessible by a variety of users and through design realizes the place-making potential of spaces as well as their function as movement corridors and open spaces;
- Control access to private areas, particularly rear gardens, and parking courts, while ensuring high levels of passive surveillance to these spaces;
- Provide a development which allows ease of movement for all types of users and provides educational, social, community and recreation activity opportunity for all;
- Consider the location of buildings on the site, gradients, and the relationship between various uses and transport infrastructure, particularly for those with disabilities; and
- Consider the availability of road connections linking the application site to the surrounding allocated site particularly on the western boundary.

6. Sustainability

- Provide for a mix of uses which cater for the everyday needs of the new residents including work, education, leisure, recreation, and retail activities whilst respecting and assisting in the development of the north west Sittingbourne allocation;
- Provide for a range of house types, sizes, and tenures to cater for choice and a variety of households;
- Provide Sustainable Drainage Systems as part of the flood mitigation proposals;
- Build in flexibility to enable the development, including individual buildings, to

adapt to changes such as use, lifestyle and demography over time; and
- Make efficient use of land through proposing a development with an appropriate density.

7. Promote Good Design

- Provide a development that responds to local character and identity to create architectural and landscape designs that are visually attractive;
- Provide a coherent design across the application site which demonstrates an appropriate balance between the design qualities of variety and uniformity;
- Design buildings, public spaces, highways, and landscaped areas that work together to present a contextually distinctive character and identity; and
- Deliver designs that demonstrate good composition, form and proportion that brings a natural sense of order and balance to the overall architectural expression.

Land at Great Grovehurst Farm

5.14 The Design and Access Statement which accompanies the proposals for this area sets out the principles of development in terms of frontages, edges, and the creation of a clear and legible street network. In summary the urban design framework contained within the Design and Access Statement promotes:

- a development that will address this important entrance into Sittingbourne by fronting onto Swale Way and Grovehurst Road to allow for glimpses into this high-quality place;
- a land use, scale and density that is appropriate for the site and its local context, with a residential development of 2 / 3 storey houses that will not detract but complement the existing residential areas by creating a dynamic roofline;
- a permeable and well-connected network of routes within the site that link also into its wider context;
- a network of open spaces that fulfil not only their role as amenity spaces but also as mitigation areas and important ecological habitats by protecting and enhancing existing landscape features;
- a development form that is characteristic of Kent towns and Sittingbourne, with predominantly semi-detached and terraced buildings of simple form that will present a simple material palette including traditional materials such as brick, weatherboarding, and white or light coloured paint and render; and,
- the establishment of character areas that will add interest and variety by creating a formal gateway approach to the site frontage, an informal approach

to the centre of the development and softer approach to the northern development edge.

Chapter 6

LANDSCAPE AND VISUAL EFFECTS

6. LANDSCAPE AND VISUAL EFFECTS

Introduction

6.1 This Landscape and Visual Impact Assessment chapter assesses the impact of the proposed development described in Chapter 4 of this ES upon both the landscape character and visual amenity of the area. The chapter has been prepared by Allen Pyke Associates Ltd, a registered practice of the Landscape Institute and corporate member of the Institute for Environmental Management and Assessment.

6.2 The site and its setting have been the subject of several landscape and visual assessments in the past. These assessments have formed part of the evidence base for local plan policy. The site is in agricultural use and is located on the edge of settlement, it would therefore be expected to display characteristics of both rural and urban landscapes and is less susceptible to changes to the landscape character than locations further away from the settlement edge.

6.3 The settlement edge location also means that there are several visual receptors close to the site boundary but longer views, if possible, by visual receptors at greater distances, would be limited to users of public rights of way and the small number of properties in the scattered villages to the west of the A249.

Regulatory and Policy Context

6.4 Planning policies relating to the Proposed Development are discussed in Chapter 2 of this ES. Policies relating specifically to landscape or visual amenity are outlined below.

National Planning Policy Framework, 2012

6.5 The National Planning Policy Framework (NPPF) sets 12 Core Principles to underpin planning and decision making, of these: Principle 4 highlights the importance of high quality design and Principle 5 sets out the importance of landscape character and the intrinsic character and beauty of the countryside in supporting thriving rural communities.

6.6 The NPPF has 13 policy sections, four of which are relevant to this assessment:

- **Section 6** highlights that housing applications should be considered in the context of the presumption in favour of sustainable development;
- **Section 7** highlights the importance of high quality, inclusive design and the connections between people and places and the integration of new development into the natural, built and historic environment which responds to local character and is "visually attractive as a result of good architecture and appropriate landscaping";
- **Section 11** (paras 109-125) identifies the importance of protecting and enhancing valued landscapes, geological conservation interests and soils and minimising impacts on biodiversity.
- **Section 12** (paras 126-141) sets out requirements for local authorities relating to the "conservations and enjoyment of the historic environment" and that heritage assets should be conserved in a "manner appropriate to the significance".

Swale Borough Local Plan, 2017

6.7 The application site is allocated for development by the adopted Swale Borough Local Plan, 2017 as highlighted in chapter 2. Policy MU1 outlines the type of acceptable development and provides several stipulations that any development of the north-west Sittingbourne allocation should meet. One of these relates directly to the provision of landscape and open space:

2. *Be in accordance with Policy CP4 and in particular, achieve an integrated landscape strategy to provide a minimum of 22 ha natural and semi natural greenspace and other open space as a continuous buffer along the A249 that will form part of the important local countryside gap between Sittingbourne and Bobbing Iwade in accordance with Policy DM25 and Policy New AX6 for Iwade, as well as contributing toward an appropriate link between the two via Bramblefield Lane/old Sheppey Way. This area will link to a network of green spaces and corridors throughout the allocation to achieve the minimum open space provision;*

6.8 The provision of greenspace and other open space across the site will be integral to the mitigation measures employed by the proposed development and will meet or exceed the minimum greenspace and open space requirements of the policy.

6.9 The application site is not subject to any statutory national, regional, or local landscape designation for scenic quality or beauty.

6.10 The site does not fall within a Conservation Area. There are four Grade II listed buildings on or adjacent to the wider site boundary - Bramblefield Farmhouse, Quinton Farmhouse, Quinton Cottage and Great Grovehurst Farmhouse.

Development being Assessed

6.11 The area being assessed for the purposes of this ES comprises three land parcels:

- Land at Pheasant Farm;
- Land between Quinton Road and Bramblefield Lane; and
- Land at Great Grovehurst Farm

6.12 The land at Pheasant Farm and between Quinton Road and Bramblefield Lane is located to the west of Grovehurst Road and is divided by a PROW (ZR110/National Cycle Route 1). The development of these areas will be phased. It is proposed to construct 91 dwellings on the land at Pheasant Farm. These properties will be located adjacent to the existing dwellings on the north side of Bramblefield Lane. The remainder of this parcel will become public open space.

6.13 The land between Quinton Road and Bramblefield Lane comprises three large fields. Around 1,100 dwellings and a small local centre set within a strong green infrastructure framework including areas of informal public open space, amenity space and play are proposed in this area. A site for a primary and secondary school will be located in the northernmost field adjacent to Kelmsley Halt station. This will be accessed via the existing turning to Grovehurst Surgery off Grovehurst Road. The primary school will be predominantly single storey building up to 4.5m in height, with a school hall up to 10m high. The secondary school would be larger, up to 3 storeys high, and have an overall height of 12.5m.

6.14 The land at Great Grovehurst Farm, on the east side of Grovehurst Road, will be developed separately. Around 110 dwellings are proposed for this land parcel. Demolition of the former buildings within this parcel took place in November 2017. Brickearth extraction will be carried out in this part of the site during the construction period.

6.15 The primary vehicular access will be provided by new junctions on Grovehurst Road and Quinton Road. Additional pedestrian and cycle route will be created.

The existing PROW which crosses the land between Quinton Road and Bramblefield Lane will be diverted through the development.

6.16 The proposed dwellings will vary in size, with the majority of properties being 2 to 2.5 storey detached and semi-detached properties, with associated gardens. Landmark buildings, up to 3 storeys, will be located in the local centre, along on the primary street which links Grovehurst Road to Quinton Road and overlooking key areas of open space. The arrangement of residential parcels will respond to existing field patterns and site constraints, such as service easements.

6.17 The proposed layout has been informed by the topography, existing vegetation and drainage. The steepest and most prominent part of the application site, north of Bramblefield Lane, will not be developed and will be managed as public open space.

6.18 An acoustic bund will be created adjacent to the A429 to mitigate noise. The bund will be approximately 3m high with a 1.8m fence on top. The development of the land at Great Grovehurst Farm will also require noise mitigation measures to be implemented. This will be achieved by creating a landscape buffer between Swale Way to the north of the parcel and the residential area.

6.19 Lighting of the development would be limited to street lighting, which will be designed to adoptable standards with directional 'cut-off' lanterns to minimise spillage and glare.

Assessment Methodology and Significance Criteria

6.20 Allen Pyke Associates has developed the methodology used in this chapter. It is based on best practice as set out in the Guidelines for Landscape and Visual Impact Assessment; Third Edition, 2013 (GLVIA3) published by the Landscape Institute and IEMA.

6.21 GLVIA3 states that the role of a Landscape and Visual Impact Assessment (LVIA) is to *"consider the effects of development on the landscape as a resource in its own right and the effects on views and visual amenity"*. It refers to 'landscape', as adopted by the Council of Europe in the European Landscape Convention 2002, as being "*an area, as perceived by people, whose character is the result of the action and interaction of natural and /or human factors."* The application of the Convention is inclusive referring to

natural, rural, urban and peri-urban areas, including land, inland water and marine areas and it goes on to state that it *"concerns landscapes that might be considered outstanding as well as every day or degraded landscapes".*

6.22 GLVIA3 requires that professional judgements are *"reasonable and based on clear and transparent methods"* and that *"in carrying out an LVIA the landscape professional must always take an independent stance, and fully and transparently address both the negative and positive effects of a scheme in a way that is accessible and reliable for all parties concerned"*. A definition of each of the terms used throughout this Chapter is given below.

6.23 The assessment is undertaken in two parts; baseline study and assessment of effects. Landscape Character and Visual Amenity are considered independently.

6.24 The baseline study combines desk-based research and site visits (March 2016, April 2017, November 2017) to assess the existing conditions and consider the landscape elements (landform, vegetation, historic features, adjacent development, relevant planning policies and key views) that make up the site and its surrounding context. This information contributes to an assessment of the susceptibility and sensitivity of landscape character. Visual amenity considers existing views into and out of the site from a variety of public viewpoints and, where relevant, from residential properties. It should be noted, however, that access to private properties is not usually possible so an assessment based on the nearest accessible viewpoint is used. This process assists in identifying the visual envelope around the proposed development and locations from which the site is visible to a person (the Visual Receptor).

6.25 The second part describes the scheme and provides an assessment of the potential effects of the proposals (including the built form, associated infrastructure, planting and mitigation treatments), on the landscape and visual receptors identified in the baseline survey. The results have been used to assess the potential magnitude of change that might be brought about by the proposed development and the significance of any temporary effects i.e. effects during construction and the first year of operation/occupation, or residual effects i.e. 'Year 15' when the proposed mitigation measures will have established.

Assessment of existing baseline sensitivity

6.26 The '**Sensitivity'** of the existing **landscape character** or **view** is determined through the combined assessment of the '**susceptibility to change'** and '**value'** of the landscape or view. The '**susceptibility to change'** is defined as '*the ability of the landscape or view to accommodate the proposed development without undue negative consequences'*.

6.27 Landscape '**Susceptibility'** is derived from the assessment of the '**Character'** of the landscape, i.e. the distinct and recognisable pattern of elements which create a sense of place, along with the '**Condition'** of the landscape, i.e. the degree to which the character is intact.

6.28 Visual **'Susceptibility'** is derived from the categorisation of the type of visual receptor experiencing the view along with the **'nature of the view'**.

Determining Sensitivity

6.29 The **definition** of **'Landscape Sensitivity'** or '**Visual Sensitivity'** is as follows:

Table 6.1 - Sensitivity

Sensitivity	Criteria
High	Where the elements that make up a character area or view are of considerable merit and/or would be difficult to restore or could not be replaced/removed without substantial detriment to the overall character area or view.
Moderate	Where the elements that make up a character area or view are of merit and/or could in part be restored or replaced/removed without a notable detriment to the overall character area or view.
Low	Where the elements that make up a character area or view are of little merit and/or could be restored or replaced/removed without detriment to the overall character area or view.

Assessment of the significance of the effects of development

6.30 The assessment of the **'Magnitude of Change'** and resultant **'Significance'** of the effects on '**Landscape Character'** or **'Visual Receptors'** is undertaken during three periods to identify the temporary operational and residual effect of the proposed development:

- **Construction** (temporary effects)
- **Year 1** - Operational Period (temporary effects with landscape/mitigation treatments established in part)
- **Year 15** – Operational Period (residual effects after landscape/mitigation treatments established in full)

Determining the significance of the effects of development

6.31 The **'Significance'** of the effects of development on landscape character and visual receptors is determined by combining the assessment of:

- the **'Sensitivity'** of the landscape or view, as established in the (Stage 1) baseline assessment; and
- the potential **'Magnitude of Change'** resulting from the proposed development.

Assessment of magnitude of change

6.32 The following criteria are considered when assessing the **'Magnitude of Change'** on landscape character or views:

- Scale, duration and/or reversibility of development;
- Effect of any components of the landscape that are likely to be affected by the scheme;
- The change in and/or partial or complete loss of elements, features or aspects that contribute to the character and distinctiveness of the landscape;
- The addition of new features or elements that will influence the landscape character; and
- The landscape proposals and/or mitigation treatments.

6.33 The '**Magnitude of the Change'** on landscape character is **defined** using the following criteria:

Table 6.2 - Magnitude of Change

Magnitude of Change	Criteria
High	Where the scale of the proposed scheme (or works to facilitate it) would be the dominant element in or adjacent to a character area.
Medium	Where the scale of the proposed scheme (or works to facilitate it) would be one of a number of important elements in or adjacent to a character area.
Low	Where the scale of the proposed scheme (or works to facilitate it) would be a minor element in or adjacent to a character area.
Negligible/None	Where the scale of the proposed scheme (or works to facilitate it) would be remote and/or be an inconsequential element in or adjacent to a character area.

Determining the significance of effects

6.34 The **'Significance of the Effects'** on landscape character or views by visual receptors is defined as follows:

Table 6.3 - Significance of Effects

Temporary Effect on Character	Criteria
Substantial	Where the scheme would cause a substantial change in the quality, condition and/or nature of the existing character area and the new development (or works to facilitate it) would be the dominant element.
Moderate	Where the scheme would cause a notable change in the quality, condition and/or nature of the existing character area and the new development (or works to facilitate it) would be one of a small number of elements in the overall setting/or view.
Minor	Where the scheme would cause a slight change in the quality, condition and/or nature of the existing character area and the new development (or works to facilitate it) would be one of many elements in the overall setting/or view.
Neutral	Where the scheme would cause a negligible or no change in the quality, condition and/or nature of the existing character area and the new development (or works to facilitate it) would be obscured or hidden by many other elements in the overall setting/or view.

Significance of Impact

Table 6.4 draws together the issues of landscape or visual sensitivity, the magnitude of change and the significance of effects to determine the significance of impact.

Table 6.4 - Determining Impact

		Magnitude of Impact			
		None/ Negligible	***Minor***	***Moderate***	***Major***
Receptor Sensitivity	***High***	Slight	Moderate	High	High
	Medium	Slight	Slight	Moderate	High
	Low	Slight	Slight	Slight	Moderate

Direction

6.35 The '**effects'** on landscape character or visual receptors can be positive or negative **(the 'Direction')** and are described as being either **'Beneficial'** or **'Adverse'**. Where the development is unlikely to have any discernible influence the '**Direction'** is described as being **'Neutral'**.

Table 6.5 - Direction

Beneficial Criteria (+)
Where the development and any associated landscape proposals and / or mitigation • Fits well with scale of landform &/or pattern of landscape • Increases attributes or enhances in contribution to setting • Enhances balance of landscape elements or sense of tranquillity • Provides ability to include adequate or appropriate mitigation • Complements local/national planning policies or guidance to protect landscape character • Increases the positive attributes within the view or enhances the view • Enhances the balance of landscape/townscape elements within the view
Adverse Criteria (-)
Where the development and any associated landscape proposals and / or mitigation is • Out of scale with landform &/or pattern of landscape • Loss of attributes or deterioration in contribution to setting • Disrupts balance of landscape elements or sense of tranquillity. • Lacks ability to include adequate or appropriate mitigation. • Conflicts with local/national planning policies or guidance to protect landscape character • Results in the loss of positive attributes within the or a deterioration of the view • Disrupts balance of landscape elements within the view
Neutral
• Where there is no discernible change to landscape character or visual amenity • Where there is no positive or negative affect on landscape character or visual amenity

Embedded Design Mitigation

6.36 The layout of the proposed development responds to the existing topography and green infrastructure to minimise the loss of habitats and important landscape features which may contribute to the character of the site and its setting as illustrated by the Landscape Framework plan which appears in the accompanying Design and Access Statement.

6.37 In accordance with the recently adopted Local Plan Policy MU1, a continuous landscape buffer will be created along the A249 boundary. This buffer will include a noise attenuation bund and acoustic fence in order to reduce noise from the road. The treatment of the bund, and wider landscape buffer will have an important role in ensuring the edge of the development is suitably screened and assimilated within wider views towards the north-west Sittingbourne allocation from the west and north. The bund will be planted with native tree species in line with the treatment of existing roadside embankments.

6.38 The policy also requires a network of other green spaces and corridors to be created across the land allocation. The location of the new green spaces will be informed by existing landscape features, such as the watercourse, mature hedgerows and trees. The retention and enhancement of such elements will inform the arrangement of land parcels and break up the expanse of the development thereby resulting in a less conspicuous change to the landscape.

6.39 The creation of wide landscaped buffer zones adjacent to the A249 and railway line and open spaces to the north will aid in the proposed development becoming increasingly screened and softened and appropriately integrated into the existing settlement edge.

6.40 A small number of dwellings will be proposed immediately adjacent to the existing properties boundaries on the north side of Bramblefield Lane. Minimum back-to-back distances will be observed in order to maintain privacy between new and existing dwellings.

6.41 The land at Great Grovehurst Farm contains several ecological constraints which require parts of the site to remain undeveloped. The proposed development includes wide, landscaped buffers around the edges adjacent to Swale Way and Grovehurst Road, which will limit the extent of changes in views of road users to some degree.

Consultation

6.42 The representative viewpoints have been based on locations agreed with Swale Borough Council during the previous LVIA of the site.

Baseline Conditions

6.43 The land is located on the north western edge of Sittingbourne between the North Downs (to the south) and the Thames Estuary. Sittingbourne and the local plan allocation, are situated on the edge of the low-lying marshy land (Coldharbour Marshes) to the south of the River Swale. The application site is located at the foot of a ridge which rises to the west of the A249 trunk road, which links Sheerness to the M2 motorway, some 5km to the south. The village of Iwade is approximately 2 km to the north. The linear settlements of Howt Green and Bobbing are positioned along the old Sheppey Way, 0.3 km to the west and 0.5 km to the southwest respectively. Further west and south are numerous scattered farmsteads linked by narrow country lanes lined by mature

hedgerows. The potential views of the site by people in these settlements and moving between them are considered by this assessment.

6.44 The eastern and southern edges of the site are enclosed by the suburbs of Kemsley to the east and Milton Regis to the southeast. Figure 6.1 in Appendix 6.1 illustrates the site features.

6.45 The land at Pheasant Farm consists of a single triangular field positioned between the A249 to the west and Grovehurst Road on the east. Featherbed House is located at the northern tip of the field and does not form part of the parcel. Mature trees surround the property.

6.46 The Grovehurst Road boundary is formed by a dense, 3m high, deciduous native hedge. The hedge appears lower (1.5-2m high) as it is within a ditch. The boundary with the A249 is formed by a timber post and rail fence. The ground slopes steeply down from the fence to the A249 some 4m lower. The embankment is vegetated with dense semi-mature native woodland trees.

6.47 The internal topography of the field has been artificially raised to form a mound which contrasts with the surrounding landform. The north face of the mound rises steeply from around 15m AOD to almost 25m AOD. The south face ground falls more gently to meet Bramblefield Lane at approximately 23m AOD. There are no trees and few features within the field. A small, former orchard separates the field from the rear gardens of properties on Grovehurst Road and the east end of Bramblefield Lane. There are few remaining orchard trees in this piece of land and it is unmanaged.

6.48 The land at Pheasant Farm and at Quinton Road is separated by Bramblefield Lane and PROW ZR110/National Cycle Route 1 which lead off it. After passing between the landholdings (distance of approx. 200m) the cycle route crosses over the A249 via a footbridge then connects to the old Sheppey Way at the north end of Howt Green.

6.49 The land at Quinton Road comprises three arable fields. The parcel is enclosed by Bramblefield Lane, the A249, the Sittingbourne to Sheppey railway line to the east, and Quinton Road to the south. The ground falls from the northwest corner at approximately 23m AOD, eastwards from the A249 trunk road, towards a small watercourse at approximately 10m AOD. The ground then rises at a gentle gradient towards the railway line at around 12m AOD.

6.50 At the time of the site visits the watercourse was holding some water but there was limited flow. In the north, the west bank is vegetated by mature hedgerow of mainly deciduous species such as Oak, Hawthorn and Field Maple, up to 12m in height. There is limited vegetation on the east bank. The hedge becomes increasingly sparse where the watercourse is crossed by a PROW (ZU6), via a 4m wide land bridge with culvert pipe. The PROW runs southwest along the site's western boundary from the A249 footbridge for 380m then turns 90 degrees and runs southeast to an unmanned level crossing before entering the end of Middletune Avenue at the edge of Sittingbourne. Refer to Figure 6.2 for location of PROW in and around the site.

6.51 The vegetation along the watercourse becomes increasingly dense to the south where there is a short line of Poplar trees (around 15m high) which provide a windbreak to the field which southwest corner (Land at adjacent Quinton Farmhouse), which is not part of the site.

6.52 Dense boundary vegetation continues along the A249, outside of the site boundary. There are a number of mature trees close to the railway line with an understorey of native scrub. The trees and scrub thin out towards Quinton Road, where the boundary is completely open in places.

6.53 The land at Great Grovehurst Farm comprises an area of improved grassland, hardstanding, a single house and large barn structures. The buildings have recently been demolished. Vegetation within the landholding is limited to its boundaries with adjacent residential properties (including Great Grovehurst Farmhouse) and the railway line and includes a large proportion of evergreen conifers. There is an existing pond within the garden of Great Grovehurst Farmhouse which provides a potential habitat for wildlife in the vicinity. Immediately to the north of Land at Great Grovehurst Farm is Swale Way and the Nicholls Transport Depot.

Existing Landscape Character

6.54 The following section reviews published landscape character assessments of the site and its surroundings.

6.55 At a national level Natural England has produced a National Character Areas Plan which divides England into 159 distinct natural areas. The site is in National Character Area 113 'North Kent Plain'. Key characteristics of this national character area are:

- *Open, low and gently undulating landscape characterised by high-quality, fertile, loamy soils dominated by agricultural land use*
- *Urbanisation and large settlements … often visually dominant in the landscape due to the lack of any screening woodlands or shelterbelts*

6.56 This is largely reflective of the wider landscape context of the site. The site sits between the edge of the residential settlement of Sittingbourne and the A249 meaning the character is heavily influence by urban elements.

Regional Level

6.57 At the regional level the Kent Landscape Assessment, published in 2004, identified the site as part of the 'Fruit Belt' character area within the wider 'Thames Gateway' character area, which wraps around Sittingbourne.

6.58 The character area is described as a *'predominantly a rural, agricultural landscape characterised by a complex landscape pattern of orchards, shelterbelts, fields of arable and pasture and horticultural crops, and divided by small blocks of woodland. Apart from the large urban area of Sittingbourne, the area contains only small, scattered villages and farm complexes which contribute to its rural character and landscape diversity. The A2 and A249 route corridors, and associated ribbon development, run through the area and have a localised urbanising effect.'*

6.59 This description provides an accurate summary of the setting of the site, despite being over ten years old.

Local Level

6.60 More recently the local landscape was assessed by the 'Swale Landscape Character and Biodiversity Appraisal SPG' (SLCBA) (adopted September 2011). Landscape Character Areas are illustrated in Figure 6.3.

6.61 The site falls within a character area known as 'Iwade Arable Farmlands'. Key characteristics of the character area are:

- *Mixed geology, clay and fertile drift soils*
- *Cereal production has replaced traditional orchards*
- *Medium to large-scale fields*
- *Fragmentation and extensive loss of hedgerows*

- *Hawes and Wardwell Woods are larger woodlands on a prominent hillside near the coast*
- *Valley and hill setting to village of Newington with landmark Church*
- *Isolated farmsteads and cottages*
- *Isolated historic properties. Elsewhere mixed 20th century development*
- *Intrusive overhead power lines*
- *Major trunk road, rail link and enclosed, winding country lanes*

6.62 This character area is described by the SLCBA as being of Poor condition and Moderate sensitivity. This description of condition and sensitivity corresponds to the findings of this assessment, which noted that elements which make up a character of the area are of some merit but could be replaced or removed without notable detriment to the overall character.

Assessment of Landscape Character

6.63 The following methodology has been used to review and assess the Character, Condition and Value of the site and its setting. The *'Character'* and *'Condition'* ratings then determine the *'Susceptibility to Change'*. The *'Value'* and *'Susceptibility to Change'* determine the *'Sensitivity'* of each character area. A description of each area that has the potential to be influenced by the proposals for the site is provided below with a summary provided in Table 6.1.

6.64 The site, to the west of Grovehurst Road, exhibits some of the key characteristics of the 'Iwade Arable Farmlands' Local Character Area but is heavily influenced by the proximity to the Sittingbourne settlement edge and railway line, and the A249 which separates it from the rest of the character area. Land on the east side of Grovehurst Road is further detached from the countryside both physically and in terms of character. The area is of Moderate condition and has a Medium susceptibility to change. The area undesignated but of local importance. The value is Moderate and the sensitivity of the character area is Moderate.

6.65 The following site level landscape character areas have been identified and are illustrated by Figure 6.3:

6.66 **CA1 Land north of Bramblefield Lane** – This area is artificially raised making the field a distinguishable feature on the approach to Sittingbourne from the north. It has no internal vegetation or features of note and is not publically accessible. It is of Low value and in Moderate condition. This Character Area is assessed as being of Low sensitivity.

6.67 **CA2 Land south of Bramblefield Lane –** This area is also of Moderate condition. The area contains some internal vegetation and a watercourse and is a more naturally undulating topography than CA1. The presence of overlooking properties, railway line and A249 heavily influence the character which is enclosed and peri-urban. The landscape is undistinguished but contains elements which could be improved. The value of this Character Area is Low and the sensitivity is Low.

6.68 **CA3 Great Grovehurst Farm –** The character of the land parcel is heavily influenced by its proximity to the busy Swale Way and the Nicholls Transport Depot immediately to the north. Grovehurst Road and the railway line also detract from the character and the proximity to other residential areas to the south and east create an urban–fringe character, rather than a one of countryside. Prior to commencement of demolition works (November 2017) the buildings and land were in poor repair. The character is Low and condition is Poor. The Character Area contains few redeeming features and, in accordance with the assessment methodology, considered to be of Poor value and Low sensitivity.

6.69 The sensitivity of landscape character areas is summarised below.

Table 6.6 - Summary table of Landscape Character Area Sensitivity

Name	Character	Condition	Susceptibility to change	Value	Sensitivity
LCA Iwade Arable Farmlands	Moderate	Moderate	Medium	Moderate	Moderate
CA1 Land north of Bramblefield Lane	Moderate	Moderate	Medium	Low	Low
CA2 Land south of Bramblefield Lane	Moderate	Moderate	Medium	Low	Low
CA3 Great Grovehurst Farm	Low	Poor	Low	Poor	Low

Visual Assessment

6.70 A Zone of Theoretical View (ZTV) was generated using GIS computer software to illustrate the extent to which the development as a whole may be potentially visible from the surrounding area (1.6m high receptor). The ZTV provides a ‘bare-earth’ model and does not take into account built form or vegetation. Site visits were carried out in March 2016, before deciduous vegetation was in leaf, April 2017 when vegetation was coming into leaf, and during autumn in

November 2017 to refine the extent of the visual envelope. The existing visibility of the site from a number of public vantage points and from local properties was assessed. The study was used to establish the Zone of Visual Influence (ZVI) (refer to Figure 6.4). The ZVI is the area from which the site and future proposals might be seen and is determined by the landform, topographical features such as surrounding buildings and vegetation (whose screening capacity may change through the seasons) and the scale and height of the proposed development.

6.71 The methodology has been applied to assess the '*Type of Receptor*', '*Nature of View*' and '*Value of View*' for each Visual Receptor (VR). The '*Type of Receptor*' and '*Nature of View*' determines the '*Susceptibility to Change*' while the '*Value of View*' and '*Susceptibility of Change*' determines the '*Sensitivity'* of each Visual Receptor. This is summarised in Table 2 below.

6.72 The visual receptors range from users of public footpaths or residents of nearby housing ('Type A - High') to users of busy roads ('Type C – Low)'. The value of view varies between Low and Medium. No receptor is assessed as having High value views.

6.73 Views from key receptors are summarised below. Representative views (Photoviews 1 to 17) are provided in Appendix 6.2 to assist in understanding the visibility of the site.

6.74 **VR1. Users of PROW ZU6** - PROW ZU6 runs adjacent to the A249 boundary before crossing an arable field and entering the edge of Sittingbourne. The PROW is not of great scenic value and users are mainly dog walkers. There are open views across the Land between Quinton Road and Bramblefield Lane from the footpath interrupted in part by existing site vegetation. Views are enclosed by existing properties to the east and vegetation and topography to the west. The Land at Pheasant Farm is largely screened by vegetation and properties along Bramblefield Lane and the Land at Great Grovehurst Farm is not visible. Views of the site terminate when the PROW enters the built-up area.

6.75 **VR2. Users of PROW ZR110/NCR1** (Refer to Photoviews 1 & 2) - Users of this route experience views into the Land between Quinton Road and Bramblefield Lane and at Pheasant Farm. Views north are obscured by the raised ground, Featherbed House is not visible but the upper parts of the A249 bridge to the Isle of Sheppey can be glimpsed on the horizon. To the south, views extend towards Quinton Road and across Sittingbourne, where Holy

Trinity Church is a prominent feature in the view. The hills of the Kent AONB can just be made out in the far distance, but are too far away to be considered in this assessment. Land at Great Grovehurst Farm is not visible from the PROW.

6.76 **VR3. Residents of Bramblefield Lane** (Photoviews 1 & 2) - The majority of properties on Bramblefield Lane are two storey houses, with some bungalows located on the north side at the western end. Most properties have large, well-established rear gardens with mature vegetation, which restrict views beyond the garden boundary. From ground floor windows and within the garden most views will be enclosed, but it is anticipated that there may be views from some upper storey windows towards parts of the Land at Pheasant Farm and Land between Quinton Road and Bramblefield Lane. These views would be largely open or partially screened. Some very oblique views of the edge of the Land at Great Grovehurst Farm may be possible from a small number of houses at the end of the north side road. The position of Bramblefield Lane means that the properties on it are orientated north-south and any views of the site would be restricted to only one direction. Views of the site are of limited scenic value and would always be seen within the context of the edge of Sittingbourne.

6.77 Bramblefield Farmhouse, a Grade II listed building, is located at the end of Bramblefield Lane. The property is enclosed by a 10m high conifer hedge and a small outbuilding which is not listed. These features prevent all but occasional glimpsed views of the site so it is not considered as a VR.

6.78 **VR4. Patients and staff of Grovehurst Surgery** (Photoview 3) - The rear windows of the Grovehurst Surgery directly overlook a small portion of the Land between Quinton Road and Bramblefield Lane, which will become the future school site. More open views are possible from the surgery car park but are of limited value.

6.79 **VR5. Commuters at Kemsley Halt Station** (Photoview 4)- Open views into the future school site are experienced from the platforms at Kemsley station where the boundary between the site and platform is formed by a low wire-mesh fence. As the ground falls, views of the site become more obscured. From the elevated position of the footbridge open views across the whole of the Land between Quinton Road and Bramblefield Lane are possible, but Land at Pheasant Farm and Great Grovehurst Farm are completely blocked by intervening development.

6.80 **VR6. Residents of properties backing onto railway line** (Photoviews 5 & 6) - The southeastern boundary of the site is formed by the railway line which is bordered by the rear garden fences of properties on Sandstone Drive, Flint Close, Eclipse Drive, Atlee Way, Volante Drive, Middletune Avenue and Roberts Close. All the properties immediately adjacent to the track face away from the Land at Quinton Road and views are partially screened by intervening vegetation both on the site boundary, the railway line and within rear gardens. Some views will be experienced from upper storey windows, views are also dependant on the season and will be more obscured during the summer months. Where views are possible they would be expected to extend towards the A249 but would be limited by topography and would be of medium value to the residents of the individual dwellings.

6.81 **VR7. Users of Quinton Road** (Photoview 7) – From the western end of Quinton Road where it crosses the A249, views into the site are extremely limited by intervening vegetation on the A249 embankment and on the north side of Quinton Road. A short row of houses, including the listed Quinton Cottage and Quinton Farmhouse and a corner shop are located on a private road which runs parallel to Quinton Road and further prevent views from Quinton Road towards the site. Further east, beyond the houses, the roadside vegetation is more sporadic and there are open views across the site to the rear of properties on Bramblefield Way.

6.82 **VR8. Residents of properties on Quinton Road** (Photoview 8) – It would be anticipated that some views into the site would be possible from upper storey windows of properties on the north side of Quinton Road. Views from this small number of houses would be partially screened by boundary vegetation and it would not be possible to see the whole breadth of the site. Views from gardens or ground floor windows would be almost completely blocked.

6.83 Views from properties on the opposite side of Quinton Road, i.e. Sonara Way are screened by intervening vegetation and houses and views into the site are not possible.

6.84 To the east, properties on Quinton Road, accessed off Knightsfield Road, are position at a lower level than to the road but views of the southern end of the site would be expected from upper storey windows.

6.85 **VR9. Residents of Featherbed House** (Photoview 9) – Residents and visitors to this property would have views of the rising ground in Land at Pheasant Farm, which also screens views of land further south. Views from the house

would be partially screened by trees with the property boundary. There is little or no intervisibility between Featherbed House and properties along Bramblefield Lane. Limited views in to Great Grovehurst Farm may be possible across the road.

6.86 **VR10. Users of Grovehurst Road** –The rising landform of Land at Pheasant Farm is prominent in the view from Grovehurst Road and appears incongruous to the surrounding topography. Partial views into Great Grovehurst Farm are possible from the road. Land at Quinton Roadpart of the site is not visible from Grovehurst Road.

6.87 **VR 11a. Users of the A249 (passing Land at Pheasant Farm/Quinton Road)** (Photoview 10-12) - The site can be glimpsed seen through the existing vegetation along the embankment verges of the A249. Where the road is not in a cutting the vegetation is thinner and views into the site are less filtered but remain very limited due to the speed of travel.

6.88 **VR 11b. Users of the A249 (north of the site)** (Photoview 13) – Views of the site continue to decrease with distance. Travelling south from the Isle of Sheppey the site is seen as part of the wider panorama. The mound is identifiable but views are partially screened by intervening roads (Swale Way) and electricity pylons. The speed of travel means views are fleeting. Views are not possible from the A249 south of the site.

6.89 **VR 12. Users of Swale Way** (Photoview 14) – People walking or driving along Swale Way and the roundabouts obtain views of rising ground at Land at Pheasant Farm, but there are no views to Land at Quinton Road. Swale Way is elevated from Great Grovehurst Farm and glimpsed, open views into the site are possible when travelling past.

6.90 **VR13. Residents of Godwin Close and Danes Mead** (Photoview 15 & 16) – Properties on these are typically single storey dwellings with 1.5m or 1.8m high closeboard fences to the rear gardens. Properties are orientated facing east-west (perpendicular to the site boundary) and only partial views of the southern edge of the land at Great Grovehurst Farm may be possible from within the properties closest to the site boundary. The majority of the site is unlikely be visible from Godwins Close or Danes Mead due to boundary vegetation and fencing. Where possible, the views across the site are not of scenic value, but being largely undeveloped do have some positive attributes. The value of the view is Low.

6.91 **VR 14. Users of Coldharbour Wall PROW** (Photoview 17) - Footpath users, approximately 2km north of the site, experience wide, open views across the marshes. Looking southeast the view is of an industrial landscape with factories, distribution sheds and the Kemsley paper mill and the settlement of Sittingbourne. To the southwest views of the Iwade Arable Farmland landscape are possible. The northern part of the site is identifiable in the view but is not a notable element in the wider landscape of the area. Views are partially screened by electricity pylons.

6.92 **Surrounding Settlements** - Views from the surrounding hamlets of Bobbing and Howt Green beyond the A249 are filtered by the intervening vegetation along the road. Views from Iwade are not possible because of the intervening topography, vegetation and roads.

6.93 The sensitivity of visual receptors is summarised below in line with the description of terms detailed in that assessment methodology and significance criteria section above.

Table 6.7 - Summary table of sensitivity of visual receptors

Ref	Name	Type of receptor	Nature of view	Susceptibility to change	Value of view	Sensitivity
VR1	Users of PROW ZU6	Medium	High	High	Medium	High
VR2	Users of PROW ZR110/NCR1	Medium	High	High	Medium	High
VR3	Residents of Bramblefield Lane	High	Low	Medium	Medium	Moderate
VR4	Patients and staff of Grovehurst Surgery	Medium	Moderate	Medium	Low	Low
VR5	Commuters at Kemsley Halt Station	Low	Moderate	Low	Low	Low
VR6	Residents of properties backing onto railway line	High	Low	Medium	Medium	Moderate
VR7	Users of Quinton Road	Low	Moderate	Low	Medium	Low
VR8	Residents of properties on Quinton Road	High	Moderate	High	Medium	High
VR9	Residents of Featherbed House	High	Low	Medium	Low	Low
VR10a	Users of Grovehurst Road	Low	Low	Low	Low	Low
VR10b	Users of the A249 (passing the Site)	Low	Low	Low	Low	Low
VR11	Users of the A249 (north of the Site)	Low	Low	Low	Medium	Low
VR12	Users of Swale Way	Low	Moderate	Low	Low	Low
VR13	Residents of Godwin Close & Danes Mead	High	Moderate	High	Low	Moderate
VR14	Users of Coldharbour Wall PROW	High	Low	Medium	Medium	Moderate

Night Time Lighting Assessment

6.94 A night-time light sources appraisal was carried out in April 2017 in order to identify the night time character of the site and its setting and the visibility of existing light sources. This involved desktop analysis and a site visit.

6.95 Desktop review of the Campaign to Protect Rural England's (CPRE) Light Pollution and Dark Skies Map indicates that the site does not fall within an area of Dark Skies.

6.96 The site and surrounding area were visited during daylight and after sunset which was at 20:00 hours on the day. The evening was dry with some light cloud cover.

6.97 The Institute of Lighting Professionals provides a range of Light Control Zones, as outlined in Table 6.8, and which is recognised in Section 7 of the Local Plan.

Table 6.8 - ILP Light Control Zones

Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark	Designated Dark Skies
E1	Natural	Intrinsically Dark	Areas of darkest skies. Rural areas.
E2	Rural	Low district brightness	Village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Small town centres / suburban locations
E4	Urban	High district brightness	Town centres with high levels of night-time activity

6.98 The Sittingbourne urban area is generally well lit with overhead street lighting within residential streets. It is assessed as having a medium district brightness (ILP Light Control Zone E3). There are two notable light sources within the wider Sittingbourne urban area which are significantly brighter than the surrounding built-up area. These are the area around Sittingbourne train station, which includes large retail units, open air car parking and busy road junctions, and the industrial estate around Kemsley Paper Mill. The red aircraft warning lights on the top of the tall industrial chimneys are prominent features. These areas are assessed as having high district brightness (ILP Light Control Zone E4). Representative photographs of the light sources are provided in Figure 6.5.

6.99 The site is subject to light pollution due to the close proximity to the Sittingbourne settlement edge, and proximity to the Kemsley Paper Mill. The northern and eastern parts of the site being most affected by neighbouring dwellings and street lightson Grovehurst Road and Swale Way.

6.100 Light levels decrease slightly on the west side of the site but there remains some brightness associated with the settlement edge. The A249 is not lit and is mostly in cutting which reduces the effect of passing vehicle lights. The site is assessed as having a medium district brightness (ILP Light Control Zone E3). Figure 6.6 provides a summary of the light sources in the vicinity of the site as identified on the site visit.

6.101 Land to the west of the A249 is less developed and is assessed as having low district brightness (ILP Light Control Zone E2).

6.102 The proximity of the site to the settlement edge of Sittingbourne and medium level of brightness means that it could accommodate a change in its night time character without affecting any designated dark skies. The night time character of the site is assessed as having a low sensitivity.

6.103 The night time character of the landscape west of the site is more sensitive to change being darker and therefore more likely to be affected by the introduction of new or brighter light sources.

Assessment of Potential Impacts

6.104 This section of the report considers the significance of the effects of the proposed development on both the landscape character and visual amenity.

6.105 The *Effects* of development are considered in terms of *Magnitude of Change* and the *Sensitivity* of both the landscape character areas and visual receptors. Temporary Effects are predicted at during construction and at Year 1 i.e. operation.

Temporary Effects on the Site and Surrounding Landscape Character

6.106 The application site makes a minor contribution to the Iwade Arable Farmlands LCA being on the periphery and separated from the rest of the area by the A249. During Construction the magnitude of change will be 'Low' as the changes within the site would be a minor element in the wider character area. The temporary effect of the Proposed Development would be of Minor significance and the direction of effect Adverse as it would result in the loss of existing pattern of the landscape and a reduction in the physical separation between the urban edge and wider countryside east of the A249.

6.107 **CA1 Land north of Bramblefield Lane** – The proposed development would result in an irreversible change to the land use and character of this area and the increased activity during construction would be particularly notable. There will be a High magnitude of change. In Year 1 the large open space would have been implemented but would not have established sufficiently to fully mitigate the adverse effects. The Low sensitivity of the area means that the significance of the effects will be Moderate significance. The direction of effect would be Adverse.

6.108 **CA2 Land south of Bramblefield Lane –** The south part of the site will be affected to a similar extent and the existing landscape character would be

significantly changed as large areas of arable land are gradual replaced by development. The protection and retention of important landscape features and PROW mitigate the adverse effects to some extent.

6.109 **CA3 Great Grovehurst Farm –** The character of the part of the site will be change from a largely inactive parcel of land to a busy construction site then a functioning residential development. The site would become more prominent and active resulting in a change of High magnitude during brickearth extraction and construction works. By Year 1 the level of activity would have decreased and wide landscape buffers surrounding the development area would begin to soften the residential area. The significance of the effect would be Moderate and the direction of effect would be Adverse.

6.110 Table 6.9 below sets out the temporary effects of the proposed development on the landscape character.

Table 6.9 - Summary of Significance of Temporary Effects on Landscape Character

Name	Sensitivity	Magnitude of Change		Significance of Temporary Effects, Direction of Effect	
		Constr'n	Year 1	Constr'n	Year 1
LCA Iwade Arable Farmlands	Moderate	Low	Low	Minor, Adverse	Minor, Adverse
CA1 Land north of Bramblefield Lane	Low	High	High	Moderate, Adverse	Moderate, Adverse
CA2 Land south of Bramblefield Lane	Low	High	High	Moderate, Adverse	Moderate, Adverse
CA3 Great Grovehurst Farm	Low	High	High	Moderate, Adverse	Moderate, Adverse

Temporary Effects on Visual Amenity

6.111 In general, visual receptors which pass through the site, or are located close to it, will be more greatly affected by the proposed development than those further away where views of the site are partial or where it make up a small part of a wider view.

6.112 **VR1 Users of PROW entering Sittingbourne & VR2 Users of PROW ZR110/NCR1** will experience a high magnitude of change during construction. The phased nature of the development may result in views to either side of the PROW being screened by hoarding and there will be an adverse effect on the

overall view. Part of the PROW may also be temporarily stopped up for a time and ultimately will be permanently rerouted. Once construction works are finished the PROW will be set within new landscape corridors overlooked by new homes. Views from the PROW will be irreversibly changed. There would be an effect of Substantial significance. The direction of effect would be Adverse.

6.113 **VR3 & VR6 Residents of adjacent properties** – The magnitude of change on views by visual receptors during the construction period will vary depending on the proximity to the construction phase and extent to which the development has been completed. While construction works are close by and as the development reaches completion the magnitude of change will be high as the new buildings and infrastructure would become the dominant element in views. In-built mitigation measures, such as the wide buffers and a coherent green infrastructure incorporating mature vegetation will ensure that, by Year 1, the new development will have begun to assimilate within adjacent built-up area. The change in views will remain of Substantial significance. The direction of effect would be Adverse.

6.114 **VR4. Patients and staff of Grovehurst Surgery** – The position of the school site and retention of existing vegetation around the school site boundary means that views of the residential area by people at the surgery will be heavily filtered and separated by distance. The construction of the schools will have a greater effect as it is likely there will be direct views into the construction site and new access. The magnitude of change would be High and the temporary effect of Moderate significance. The direction of effect would be Adverse.

6.115 **VR5. Commuters at Kemsley Halt Station** –There would be no effects on views while construction is limited to land north of Bramblefield Lane. Once construction begins on the school site or residential area to the south, there will be direct views of the works and a High magnitude of change, resulting in an effect of Moderate significance in an Adverse direction. The new school boundary treatment and planting will be continue along the boundary with the station platform but will not have fully established and views into the development will be possible in Year 1.

6.116 **VR7. Users of Quinton Road** – Works to create the new site access point off Quinton Road will inevitably change views of road users. The proposed development will fill the gap between houses on the north side of Quinton Road and the built-up area to the east of the railway line and the loss of field views will detract from the view. Due the period of construction close to the road the

magnitude of change will be High and the significance Moderate. The direction of effects would be Adverse. In Year 1 a new gateway into the proposed development would be the main feature in the view of people using the road, and would initially appear out of character with the more established surroundings. The significance of effects would be High, in an Adverse direction.

6.117 **VR8. Residents of properties on Quinton Road** – The proposed development will be physically and separated from properties on the north site of Quinton Road and views will be continue to be largely screened. Residents of properties on the south side of the road to the east will experience a High magnitude of change in the view as the new site access is constructed and out to use. The proposed development will shorten the length of view and the magnitude of change will be High and the significance Substantial. The direction of effects would be Adverse. In Year 1 the landscape treatment of the development frontage would not have established fully and the effect would be of Substantial significance and Adverse.

6.118 **VR9. Residents of Featherbed House** – The new site access near this property will significantly change views of residents and visitors. The Low sensitivity of VR means the effect will be of Moderate significance. The direction of effect would be Adverse. Once complete the introduction of cars regularly using the new road will be prominent in the view. The landscape treatment of the intervening open space will have been implemented but will not have established fully. The magnitude of change would reduce to Moderate. The significance of effects would be Minor and the direction of effect would remain Adverse.

6.119 **VR10. Users of Grovehurst Road** – Users of Grovehurst Road would experience similar change to residents of Featherbed House. During construction there would be a High magnitude of change resulting in an effect of Moderate significance. The direction of effect would be Adverse. This would continue into Year 1 of the development.

6.120 **VR 11a. Users of the A249 (passing the site)** - The proposed development will introduce a wide landscaped buffer adjacent to the road, meaning there will limited construction activity close to the road. The creation of a noise bund will further block the limited views into the site from the road. During construction of the bund there would be a Low magnitude of change to views of road users and once complete it will be difficult to perceive the change.

6.121 **VR 11b. Users of the A249 (north of the site)** & **VR 14. Users of Coldharbour Wall PROW** – The effects on views from distance will be very limited. During the construction period the increased activity on the site may make it more prominent in the wider view. There would be an effect of Minor significance. The direction of effect would be Adverse. Once complete there will be little identifiable change.

6.122 **VR 12. Users of Swale Way** – People passing the Great Grovehurst Farm site on Swale Way would have clear views into the construction site and there would be High magnitude of change resulting in an effect of Moderate significance. The direction of effects would be adverse. By Year 1 the green buffer adjacent to the road would have been implemented and, although not established, would already begin to help the new development appear integrated with its surroundings and the significance of effects would reduce to Minor. Construction works to create the access road to land west of Grovehurst Road would be partially visible to people traveling west along Swale Way but would have limited additional influence on the magnitude of change in views by the VR.

6.123 **VR13. Residents of Godwin Close and Danes Mead** – As part of the proposals for brickearth extraction an acoustic bund will be created. This will separated from adjacent residential area by a 10m wide green corridor which is required as part of the mitigation strategy for Great Crested Newts. The creation of the bund and buffer will change the nature of available views from the end of Godwin Close and Danes Mead in to the site. Once extractions are complete, the bund will be removed to make way for construction works. Site levels will be approximately 0.6m lower following the brickearth excavation. During the construction period views of people in properties closest to the site will experience a small change in views, but the majority of the site would remain screened by boundary vegetation. The effects on views would be further reduced with distance from the site boundary. The magnitude of change would be Low. Works to the west of Grovehurst Road will have no effect on views of these VRs. The significance of effects for a small number of people would be Minor. The direct of effects would be Adverse.

6.124 New buildings would be set back from the boundary and at a lower level to adjacent single storey properties, helping them integrate with the surrounding residential development. In Year 1 the treatment around the edges of the development will be complete and will begin to create an attractive green interface between the new development and existing settlement edge. A new pedestrian/cycle link into Godwin Close will build a positive connection

between the new and existing residential areas. The magnitude of change would be Low and significance of effects Minor. The landscaped edge would have some positive influence the direction of effect would become Beneficial.

6.125 Table 6.10 sets out the temporary effects of the proposed development on the visual receptors.

Table 6.10 - Summary of Significance of Temporary Effects on Visual Receptors

Ref	Name	Sensitivity	Magnitude of Change		Significance of Temporary Effects, Direction of Effect	
			Construction	Year 1	Construction	Year 1
VR1	Users of PROW ZU6	High	High	High	Substantial, Adverse	Substantial, Adverse
VR2	Users of PROW ZR110/NCR1	High	High	High	Substantial, Adverse	Substantial, Adverse
VR3	Residents of Bramblefield Lane	Moderate	High	High	Substantial, Adverse	Substantial, Adverse
VR4	Patients and staff of Grovehurst Surgery	Low	High	High	Moderate, Adverse	Moderate, Adverse
VR5	Commuters at Kemsley Halt Station	Low	High	High	Moderate, Adverse	Moderate, Adverse
VR6	Residents of properties backing onto railway line	Moderate	High	High	Substantial, Adverse	Substantial, Adverse
VR7	Users of Quinton Road	Low	High	High	Moderate, Adverse	Moderate, Adverse
VR8	Residents of properties on Quinton Road	High	High	High	Substantial, Adverse	Substantial, Adverse
VR9	Residents of Featherbed House	Low	High	Medium	Moderate, Adverse	Minor, Adverse
VR10	Users of Grovehurst Road	Low	High	High	Substantial, Adverse	Moderate, Adverse
VR11a	Users of the A249 (passing the Site)	Low	Low	Low	Minor, Adverse	Minor, Adverse
VR11b	Users of the A249 (north of the Site)	Low	Low	Negligible	Minor, Adverse	Neutral
VR12	Users of Swale Way	Low	High	Medium	Moderate, Adverse	Minor, Adverse
VR13	Residents of Godwin Close & Danes Mead	Moderate	Low	Low	Minor, Adverse	Minor, Beneficial
VR14	Users of Coldharbour Wall PROW	Moderate	Low	Negligible	Minor, Adverse	Neutral

Night Time Effects

6.126 A Construction Environment Management Plan would control working hours to ensure there would be no additional night time lighting during construction. The Proposed Development will introduce new street lighting but this will be directional and with limited light spillage. Dark corridors should be retained along green corridors to preserve potential bat habitats.

Potential Mitigation / Management Techniques

6.127 Mitigation measures are intrinsic to the landscape strategy and masterplan. Refer to Section 5 of this chapter. The most prominent parts of the site will not be developed and will be managed as public open space. The loss of undeveloped arable landscape or views cannot be prevented but the creation of attractive and sustainable amenity open space and informal greenspace will introduce positive elements to the new landscape, which will compensate for the loss to some extent.

Assessment of Residual Impacts

6.128 'Year 15' is used to determine the Residual Effects when the established planting proposals would have matured and achieved their full screening potential.

Potential Effect on Landscape Character

6.129 **CA1 Land north of Bramblefield Lane** – After a period of establishment the previously inaccessible field will become an attractive open greenspace. New homes adjacent to the existing built-up edge would create a more outward facing edge of settlement and have a positive influence on the landscape which will become publicly accessible and managed to promote a diverse range of uses and habitats. The proposed development, including open space, will be the dominant element in the character area and the magnitude of change at Year 15 would be High and there would be an effect of Moderate significance. The direction of residual effect will change from Adverse to Beneficial.

6.130 **CA2 Land south of Bramblefield Lane –** The proposed development seeks to retain and improve existing vegetation and the structure of landscape will be maintained, albeit in a different form. By Year 15 the landscape proposals will have established and a strong green infrastructure developed. The proposed

development would sit well within this structure and would remain the driving element of the landscape character. The magnitude of change would be High and there would be an effect of Moderate significance. There would be a lasting Adverse effect on the landscape character of the area.

6.131 **CA3 Great Grovehurst Farm –** By Year 15 the proposed development within this landholding will have established as part of the northern edge of Sittingbourne, tying in with adjacent development around the Swale Way to the east. The creation of green buffers to the edges of the development area, which will improve habitats and create a more valued landscape. The magnitude of change would be Medium, i.e. where there the proposed scheme is largely successful in assimilating into surrounding landscape/townscape. The direction of residual effects would be Beneficial.

6.132 Table 6.11 below sets out the residual effects of the proposed development on landscape character.

Table 6.11 - Summary of Significance and Direction of Residual Effects on Landscape Character

Name	**Sensitivity**	**Magnitude of Change**	**Significance of Residual Effects, Direction of Effect**
		Year 15	**Year 15**
LCA Iwade Arable Farmlands	Moderate	Low	Minor, Adverse
CA1 Land north of Bramblefield Lane	Moderate	Low	Minor, Beneficial
CA2 Land south of Bramblefield Lane	Low	High	Moderate, Adverse
CA3 Great Grovehurst Farm	Low	Medium	Minor, Beneficial

Potential Effect on Visual Amenity

6.133 **VR1. Users of PROW entering Sittingbourne** & **VR2. Users of PROW ZR110/NCR1** – The proposed development will irreversibly change views of footpath users as they pass through the site. Beyond the site boundaries, as views quickly recede the effects of development on views will be negligible. The PROW will be set within landscape corridors, however the loss of open views and presence of overlooking houses cannot be wholly mitigated against. The magnitude of change would be High and there would be an effect of Substantial significance. The direction of effect on views would be Adverse.

6.134 **VR3, VR6 and VR8 Residents of adjacent properties** – In-built mitigation measures, well-designed and appropriate treatment of the site boundaries and entrances, and a coherent green infrastructure incorporating mature vegetation and new planting will ensure the new development, once complete and established, will positively contribute to the appearance of the area.

6.135 **VR4. Patients and staff of Grovehurst Surgery** – On completion the site boundary will be replaced, and new boundary planting will be implemented. Immediate views into the site will be blocked by vegetation or be directly into the school site through the school gate resulting in a High magnitude of change. The loss of field views, although unremarkable, would result in an effect of Moderate significance. The direction of effect would be Adverse.

6.136 **VR5. Commuters at Kemsley Halt Station** – By Year 15 the planting on the school boundary will have developed to create a dense planted area, the magnitude of change would be High and the significance of effect Moderate. The direction of effect would be Adverse.

6.137 **VR7. Users of Quinton Road** – The creation of an active frontage on the north side of Quinton Road will provide an attractive continuation of the built-up area. By Year 15 when tree planting adjacent to the road has matured the development will be seen as one of many elements in a sequential view travelling along Quinton Road. The residual magnitude of change is Low and the significance of effect Minor. The direction of effect would be Adverse, as although the new landscape treatment would be attractive it would not compensate for the loss of view across undeveloped land.

6.138 **VR9. Residents of Featherbed House** – By Year 15 the public open space will have established and will provide an attractive outlook and positive setting. New housing adjacent to Bramblefield Lane will be largely screened from view. The magnitude of change from views of arable field to views of open space would be Medium and the significance of effect Minor. The residual effects would be in a Beneficial direction.

6.139 **VR10. Users of Grovehurst Road** – By Year 15 the public open space and associated landscape features will have introduce positive elements in the view which was previously unremarkable, and will have a Beneficial effect on views of people approaching or leaving Sittingbourne. The effect would be of Minor significance.

6.140 **VR 11a. Users of the A249 (passing the site)** – The magnitude of change in views by road users would be very low by Year 15. The limited views would be further screened by the bund which would now be fully vegetated. The direction of effect would be Neutral, being neither a detracting element nor positive feature.

6.141 **VR 11b. Users of the A249 (north of the site)** & **VR 14. Users of Coldharbour Wall PROW** – Once complete there will be little identifiable change. Views of the site would continue to be limited. The green treatment of the northern end of the site maintains the undistinguished in the view.

6.142 **VR 12. Users of Swale Way** – At Year 15 the proposed scheme will remain visible to people using the Swale Way, but would well integrated with the wider view. The landscape treatment of site edges will provide an attractive, green buffer between road users and the residential dwellings. The residual magnitude of change would be Medium and significance of effects Minor. The lasting change from poorly maintained grassland and buildings to an actively managed residential area would be Beneficial.

6.143 **VR13. Residents of Godwin Close and Danes Mead** – The proposed scheme will make links with adjacent residential areas and there would be a small but lasting change to views of residents close to the site boundary. The landscape proposals will soften the edges of development and for residents of Godwin Close make views more open, extending into the new residential area and green open space surrounding it. Residents further from the site boundary will experience an insignificant change in view. The magnitude of change would be Low and significance of effects Minor and Beneficial.

6.144 Table 6.12 below sets out the residual effects of the proposed development on the visual receptors.

Table 6.12 - Summary of Significance and Direction of Residual Effects on Visual Amenity

Ref	Name	Sensitivity	Magnitude of Change	Significance of Residual Effects, Direction of Effect
			Year 15	**Year 15**
VR1	Users of PROW ZU6	High	High	Substantial, Adverse
VR2	Users of PROW ZR110/NCR1	High	High	Substantial, Adverse
VR3	Residents of Bramblefield Lane	Moderate	High	Substantial, Adverse
VR4	Patients and staff of Grovehurst Surgery	Low	High	Moderate, Adverse
VR5	Commuters at Kemsley Halt Station	Low	High	Moderate, Adverse
VR6	Residents of properties backing onto railway line	Moderate	High	Substantial, Adverse
VR7	Users of Quinton Road	Low	Low	Minor, Adverse
VR8	Residents of properties on Quinton Road	Moderate	High	Substantial, Adverse
VR9	Residents of Featherbed House	Low	Medium	Minor, Beneficial
VR10	Users of Grovehurst Road	Low	Medium	Minor, Beneficial
VR11a	Users of the A249 (passing the Site)	Low	Low	Minor, Neutral
VR11b	Users of the A249 (north of the Site)	Low	Negligible	Neutral
VR12	Users of Swale Way	Low	Medium	Minor, Adverse
VR13	Residents of Godwin Close & Danes Mead	Moderate	Low	Minor, Beneficial
VR14	Users of Coldharbour Wall PROW	Moderate	Negligible	Neutral

Cumulative Effects

6.145 Redrow Homes is proposing a development of 155 dwellings for the land parcel adjacent to Quinton Farmhouse to the southwest corner of the north-west Sittingbourne allocation. The proposed scheme will share two boundaries with the site and will be accessed by a separate new access point off the private road off Quinton Road, to the west of Quinton Farmhouse. The development will be subject to a separate planning application and construction programme but it is intended that road and pedestrian links will be created between the two developments. Proposals for the open space will be coordinated to ensure a seamless transition.

Cumulative Effects on Landscape Character

6.146 The A249 is an important element in the character of the site and the land parcel adjacent Quinton Farmhouse separates them from the wider Iwade Arable Farmlands character area and limits their contribution to it. Development of the land adjacent Quinton Farmhouse would not result in an increased cumulative significance of effects on the Iwade Arable Farmlands area.

6.147 The land adjacent Quinton Farmhouse forms part of the character area CA2 Land South of Bramblefield Lane identified by this assessment. Development of this land parcel in addition to the proposed development of the land between Quinton Road and Bramblefield Lane will result in the loss of arable fields, however other key features, such as the watercourse and Poplar tree belt, will be retained. The combined development sites would result in a cumulative effect of Moderate and Adverse significance.

6.148 The separation of the land adjacent Quinton Farmhouse from character areas CA1 and CA3 by intervening development of the Land between Quinton Road and Bramblefield Lane means there would be no cumulative effects on the landscape character of these areas.

Cumulative Effects on Visual Amenity

6.149 The location of the land adjacent Quinton Farmhouse in the southwest corner of the Local Plan allocation between the A249 and Quinton Road, means that it would not be visible from most of the VRs identified in this assessment.

6.150 The land parcel being developed by Redrow Homes is visible by users of PROWs (VR1 and VR2) and limited, partial views would also be possible by

residents of properties on the south side of Bramblefield Road (VR3) and to the east of the railway line (VR6), visitors to Grovehurst Surgery (VR4) and Kemsley Halt station (VR5) but views would be blocked by the future Proposed Development.

6.151 The development on the land adjacent Quinton Farmhouse will be visible by users of Quinton Road (VR7) and residents of properties on the north side of the road, where the new access point and new houses behind will be glimpsed when passing by or through gaps in boundary vegetation. The land adjacent Quinton Farmhouse will be seen in the context of the wider development area and would not increase the magnitude of change or significance of effects on views by these VRs.

6.152 Users of the A249 passing the site will experience the most obvious change, as views through vegetation into the land parcel being developed by Redrow Homes will be blocked by a new acoustic bund and fence, like that proposed along the edge of the site. These existing views are experienced as glimpses along a route and their loss would not be significant.

Summary

6.153 The land that has been assessed for the purposes of this ES comprises three land parcels, each of which has distinct landscape character, informed by topography, internal landscape features (or lack of) and surrounding development.

6.154 Each land parcel is directly overlooked by residential properties close to the site boundary, but there are no locations where it is possible to see into all three parcels. In most cases visual receptors are only able to see part of one parcel. Users of roads or PROW which past between the parcels, e.g. users of Grovehurst Road have views into the land at Pheasant Farm to the west and Land at Great Grovehurst Farm experience sequential glimpsed or partial views. Views of the elevated part of the land at Pheasant Farm from to the north are restricted by intervening landform, vegetation and other paraphernalia, such as pylons and road junction signage.

6.155 In the short-term, the proposed development would have a temporary effect of Minor significance in an Adverse direction on the wider local landscape character area (Iwade Arable Farmland). At site level the temporary effects would be Moderate and Adverse as the arable landscape is replaced by new residential development. In the longer term, once the embedded mitigation

measures and new landscape structure have established the development will become well integrated with the settlement edge, aided by the comprehensive network of green spaces. The largest character area – CA2 Land south of Bramblefield Lane would be permanently affected in an Adverse direction. However, improved access to new open spaces will increase the value of areas where access was previously restricted (CA1 and CA3) and in these cases, the residual effects would be Beneficial.

6.156 During Construction and Year 1 the proposed development would result in temporary effects of Substantial or Moderate significance on a number of visual receptors, due to their close proximity to the site and open views. The direction of effects would be Adverse. By Year 15 the significance of effects would have reduced for some visual receptors as the landscape proposals begin to screen and soften the development, but those visual receptors closest to the site will continue to experience an effect of Substantial significance. Mitigation measures will have some positive impact on views but the direction of effects will be Adverse. In a small number of cases, i.e. where receptors have limited views of fields or where existing view is of low value, the direction of effects will become Beneficial as the development and the associated greenspaces become an established part of the view and introduce positive elements to it.

Chapter 7

LAND AND AGRICULTURE

7. LAND AND AGRICULTURE

Introduction

7.1 This chapter provides an assessment of the potential effects of the proposed development on agricultural land use and soils. The agricultural land use receptors that have been considered in the assessment include:

7.2

- The nature and characteristics of the agricultural soil types present within the Site;
- The agricultural land quality of the Site and surrounding area assessed according to the Ministry of Agriculture Fisheries and Food (MAFF) Agricultural Land Classification (ALC) system 1998; and
- The farming characteristics and agricultural productivity of the Site and on the wider local and regional area.

Regulatory and Policy Context

7.3 Pending the enactment of the Government's plans to repeal the European Communities Act, 1972 and transpose EU legislation into UK law the following EU directive is relevant.

7.4 The EU Thematic Strategy for Soil Protection (September 2006 (COM (2006) 231)) outlines the condition of soils in Europe and aims to ensure their protection and sustainable use. The overarching aims are to prevent further soil degradation; preserve soil functions; and restore degraded soils to a standard appropriate to their intended use. An EU Soil Framework Directive, which promoted the sustainable use of soil and its protection as a natural and non-renewable resource, was withdrawn in April 2014, albeit the EU Commission stated that it remained committed to the protection of soil.

7.5 The Town and Country Planning (Development Management Procedure) Order 2013 sets out the statutory consultation procedures whereby Natural England must be consulted on development proposals which individually or cumulatively involve the loss of more than 20 hectares of best and most versatile agricultural land.

National Planning Policy Framework, 2012

7.6 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these should be applied. Section 11 deals with agriculture and soils and includes:

1 *paragraph 109: identifies the protection and enhancement of soils as a priority in the conservation and enhancement of the natural and local environment;*
2 *paragraph 112: advises that local planning authorities should take into account the economic and other benefits of the best and most versatile agricultural land (i.e. that classified as Grades 1, 2 and 3a in the ALC system of England and Wales);*
3 *paragraph 112: advises that, where significant development of agricultural land is demonstrated to be necessary, local planning authorities should seek to use areas of poorer quality land (i.e. Grades 3b, 4 and 5) in preference to that of a higher quality.*

7.7 There is no reference in the NPPF that deals with potential effects of development on farm holdings.

Swale Borough Local Plan, 2017

7.8 Policy DM 31 in the recently adopted Swale Borough Local Plan, 2017 states that:

Development on agricultural land will only be permitted when there is an overriding need that cannot be met on land within the built-up area boundaries. Development on best and most versatile land (specifically Grades 1, 2 and 3a) will not be permitted unless:

1. *The site is allocated for development by the Local Plan: or*
2. *There is no alternative site on land of a lower grade than 3a or that use of land of a lower grade would significantly and demonstrably work against the achievement of sustainable development; and*
3. *The development will not result in the remainder for the agricultural holding becoming not viable or lead to likely accumulated and significant losses of high quality land."*

Development being Assessed

7.9 The study area for the assessment of the effects on agricultural land use has included all the land identified by Figure 1.2 in Chapter 1 and is as described in Chapter 4.

Assessment Methodology and Significance Criteria

Relevant Guidance

7.10 There are no standard criteria for assessing environmental effects on agricultural land use. Therefore, account has been taken of the guidance that is provided on this topic in the Design Manual for Roads and Bridges (DMRB) Volume 11 (Highways Agency 2008). Although developed for highways projects, the DMRB has developed methodologies that are also useful to the assessment of other forms of development.

7.11 In addition, the assessment has considered the following:

- The requirements of EIA as set out by the Town and Country Planning (Environmental Impact Assessment) Regulations 2011 as amended, which give effect to EC Directive 85/337/EEC; and
- Department for Communities and Local Government: Environmental Impact Assessment Guidance (DCLG 2014).

7.12 Based on this guidance the assessment therefore considers the following agricultural resources:

- Agricultural Land Quality assessed in accordance with the Ministry of Agriculture Fisheries and Food (MAFF) Agricultural Land Classification (ALC) Guidelines 1988 and areas of the 'best and most versatile' grades 1, 2 and 3a land;
- Agricultural soil resources; and
- The farm holding framework

Baseline Methodology

7.13 The assessment of the effects on agricultural land use and soils has been undertaken in two stages, comprising a desk top review of published information and a site survey. Both stages have focused on agricultural land quality, agricultural productivity, and the farming framework.

7.14 The information reviewed during the desk study has included the following information in relation to soil types and the quality of the agricultural land:

- Published soil survey and British Geological Survey information;
- MAFF (1969) published 1 inch to 1-mile Provisional ALC Sheet;
- Site specific climatic information taken from the Agroclimatic Datasets produced by the Meteorological Office for the MAFF ALC Guidelines (October 1988);
- Ordnance Survey maps at 1:25,000 scale to identify topographic characteristics of the survey area; and,
- Department for the Environment, Food and Rural Affairs (DEFRA) Detailed ALC and Soil Survey work carried out on and surrounding the sites.

7.15 The methodology employed for determining the quality of agricultural land is known as ALC, which is a system originally devised by MAFF (which is now part of Natural England). The ALC system was introduced in 1966 but was comprehensively revised with the current guidelines 'Agricultural Land Classification of England and Wales: Revised Guidelines and Criteria for Grading the Quality of Agricultural Land' introduced in October 1988.

7.16 The ALC system provides a framework for classifying land according to the extent to which physical characteristics impose long term limitations on agricultural use. The system is based on the assessment of the following limiting factors:

- Climate: accumulated temperature and annual average rainfall;
- Site: gradient, micro-relief and flood risk;
- Soil: texture, structure, depth, and stone content; and
- Interaction of the above: soil wetness, the susceptibility of the land to drought and liability to erosion.

7.17 These factors impose limitations on the performance of land in terms of the typical cropping range and expected level and consistency of yield. The ALC grade, which ranges from grade 1 (highest quality land) to grade 5 (lowest quality land), is determined according to the severity of the limitations. Grade 3 is further subdivided into subgrades 3a and 3b.

7.18 A site walkover survey of soils and agricultural land quality was carried out on the site in November 2016 to provide an understanding of the soil survey work carried out by DEFRA and to confirm the results of the ALC survey.

7.19 The structure of land ownership and farming has been further considered through discussions with the landowners regarding farming practices on the respective holdings.

Significance Criteria

7.20 The section describes the approach taken to identifying the sensitivity/value of receptors and the magnitude of impacts in relation to the agricultural land use on the sites.

7.21 With respect to value or sensitivity, a level has been assigned to the key receptors in the agricultural assessment, i.e. agricultural land quality and the farming framework. The guidelines that have been used to assess this are described in Table 7.1 below. Where a receptor could be placed within more than one category of value, professional judgement has been applied to determine which category is appropriate.

Table 7.1 - Guidelines for Assessment of Receptor Sensitivity – Agricultural Land Use

Value and Sensitivity	Guidelines
High	Grade 1 agricultural activity Specialised horticultural/intensive agricultural unit.
Medium	Grades 2 and 3a agricultural land Annual horticultural and intensive arable cropping High Level Stewardship Schemes
Low	Grades 3b and lower quality land Arable and grassland areas Environmental Stewardship Schemes
Negligible	Grade 4 or 5 agricultural land Grassland/ limited arable areas

Magnitude of Impact

7.22 The magnitude of the impact on agricultural land use has also been considered having regard to the key factors in the agricultural assessment, i.e. agricultural land quality and the farming framework. There is no statutory guidance on the thresholds that should be applied for this topic area. However, land loss area thresholds historically adopted by MAFF in their consideration of proposals involving the loss of 20 ha or more of the 'best and most versatile' land, a criterion that is still applied by the Welsh Government in their consideration of

development proposals, has been considered in the development of the criteria used in this assessment.

7.23 The magnitude of an impact has been categorised as high, medium, low, or negligible as described in Table 7.2 below. Where an impact could be placed within more than one category of magnitude, conservative professional judgement has been applied to determine which category is appropriate.

Table 7.2 - Guidelines for Assessment of Magnitude – Agricultural Land Use

Magnitude	Guidelines
Major Adverse	Loss of more than 50 ha of the best and most versatile land. Agricultural production affected at a regional level with full time farming enterprises rendered unworkable.
Moderate Adverse	Loss of more than 20 ha of best and most versatile land. Agricultural production affected at a local level. Full-time farming enterprise/s rendered unworkable.
Minor Adverse	Loss of 5 – 20 ha best and most versatile land. Affects the workability of individual farming enterprises, but farming can continue as before.
Negligible	Loss of less than 5 ha best and most versatile land. No adverse effects on farming enterprises or production.
No Change	No loss of agricultural land.

Significance of Effects

7.24 For the purposes of the assessment of overall significance, a scale of significance has been adopted. The evaluation of significance has been based on professional judgement and considers the matrix presented at Table 7.3 below. This approach uses the terms beneficial (for an advantageous or positive effect on an environmental resource or receptor) or adverse (for a detrimental or negative effect on an environmental resource or receptor).

Table 7.3 - Significance of Effects – Agricultural Land Use

Sensitivity	Magnitude of Impact				
	No Change	Negligible	Minor	Moderate	Major
High	Neutral	Slight	Moderate	Large	Large
Medium	Neutral	Slight	Slight	Moderate	Large
Low	Neutral	Slight	Slight	Slight	Moderate
Negligible	Neutral	Neutral	Neutral	Neutral	Neutral

7.25 Within this assessment of significance of Moderate Adverse or above is significant in EIA terms.

Embedded Design Mitigation

7.26 Throughout the proposed development, the consideration of the appropriate use of the soil resources within the area can draw upon the soils information collected during the soil survey work undertaken and consider the principles of good practice in soil handling set out in the following documents to wherever possible, reduce the damage to soil resources during the construction process:

- MAFF (2000) Soil Handling Guide;
- DEFRA (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (including the Toolbox Talks).

Consultation

7.27 Agricultural Land Classification data was requested for the site via the Natural England Consultation email service. Consultation also took place with the owners of the agricultural land within the allocated area to collate information on the nature of the farming enterprise that would be affected by the loss of the agricultural land associated with the proposed development.

Baseline Conditions

Agricultural Land Classification (ALC) - Topography

7.28 The development area occupies land between the A249 and the Sittingbourne to Sheppey railway on the north-western edge of Sittingbourne, Kent. The land

along the A249 is at about 20m a.o.d. and there are gentle slopes which impose no agricultural limitation towards the east where the land is at about 10m a.o.d along the railway line

7.29 There are no limitations on the agricultural land classification of the site due to gradients.

Agricultural Land Classification – Climate Data

7.30 The assessment of several limitations within the ALC system required the use of site specific Climatic data. This data is obtained from the Met Office's standard 5km grid point data set for a representative point on the site and is as follows.

Reference Point	**TQ 899 657**
Altitude (m)	15
Accumulated Temperature ATO (day degrees)	483
Average Annual Rainfall AAR (mm)	597
Climatic Grade	1
Field Capacity Duration (days)	118
Moisture Deficit for wheat (mm)	122
Moisture Deficit for potatoes (mm)	119

7.31 The data are typical of the mild, low rainfall area of North Kent. The climate does not impose any agricultural limitation but the moderately high moisture deficits which build up during the summer may result in droughtiness unless the soils have good moisture holding capacities.

ALC – Published Geological Information

7.32 According to the BGS Internet Portal, the local bedrock geology consists of various sedimentary deposits known collectively as the Tertiary Beds. They include the Thanet Formation (mainly sands), the Lambeth Group (formerly the Woolwich and Reading Beds, mainly clays) and the London Clay. These, however, are widely covered by a variable thickness of superficial drifts, collectively referred to on the geological map as Head. The commonest of these is a silty material called Brickearth. This has been worked at several locations in the area and has resulted in the underlying bedrock sediments coming close to, or exposed at, the surface.

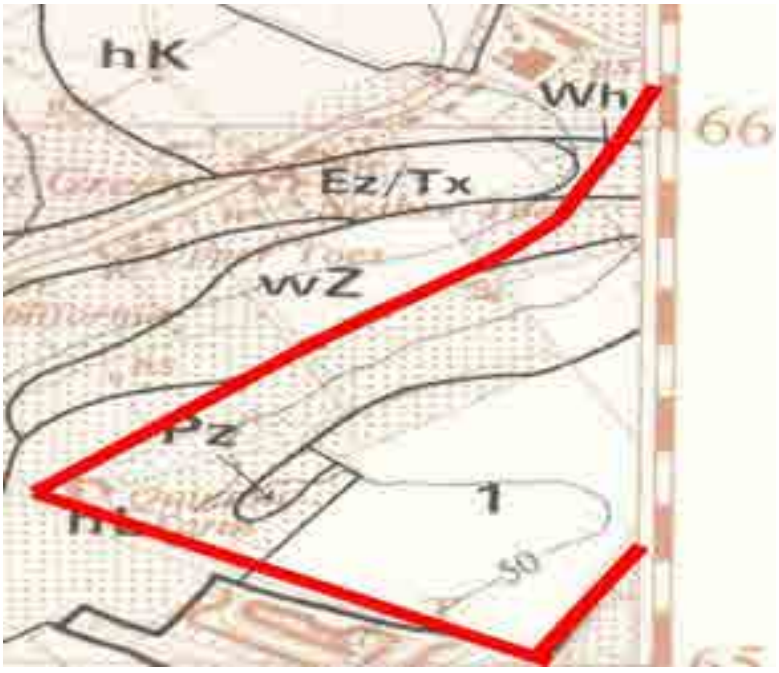
ALC – Published Soils Information

7.33 The geological pattern described above has resulted in a range of soils developed either completely in Brickearth, including the Hamble, Hook and Park Gate series. There are also soils developed in a thin covering of brickearth or similar superficial drift over local bedrock, including the Titchfield and Wickham series and some developed entirely in bedrock sediments including the Bursledon, Woodnesborouh, Curdridge and Windsor series. Restored former brickearth workings can have soils like any of these, depending on the thickness of the brickearth, if any, left on the floor of the pit.

7.34 The profile drainage of both undisturbed and restored soils depends largely on the nature of the underlying bedrock and the thickness of the superficial drift. Thus, soils developed in thick drift e.g. the Hamble series or over permeable bedrock e.g. the Woodnesborough series are well drained, while those with slowly permeable bedrock such as some of the Lambeth Formation sediments or the London Clay have a variable degree of drainage impedance e.g. Woodnesborough, Curdridge, Wickham and Windsor series.

7.35 Examples of all these soil types are shown on the detailed 1:25,000 scale soil map for the Rainham area published in 1976 (sheet TQ86). Only a small part of the site, west of OS Easting 90, is covered, as shown below:

Figure 7.1 - Portion of 1:2500 scale detailed soil map TQ86 with approximate site boundary. Not to scale



7.36 Most of this is marked 1, denoting Restored Brickearth Excavations, i.e. the area shown on the geological maps as Thanet Formation where excavation of the brickearth now means that this bedrock is now at or near the surface. The rest is mainly the well drained silty soil developed in thick brickearth, the Hamble series (hL), with an insignificant area of a less well drained analogue, the Park Gate series (Pz). In the north of the portion of the site shown on this map there are soils developed wholly partly in Tertiary sediments, including the well drained Woodnesborough series (wZ) developed in loamy Lambeth Formation sediments and the poorly drained Wickham series (Wh) in thin drift over London Clay, the strip marked Ez/Tx denotes a mixture of poorly drained stony Essendon (Ez) and Titchfield (Tx) series over London Clay.

7.37 It is likely that similar soils occur in the rest of the site not covered by the detailed soil map, soils with some degree of poor drainage associated with London Clay at depth.

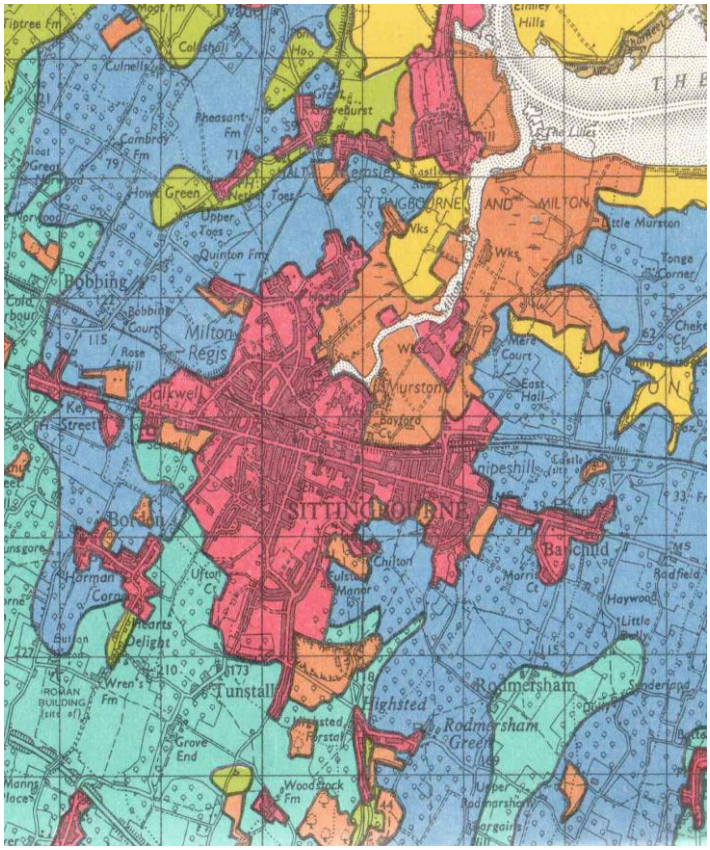
7.38 Detailed soil maps such as the one described above were used, with additional reconnaissance surveying, to compile the 1: 250,000 scale National Soil Map published in several Sheets in 1984.

7.39 These maps show geographic groupings of soils called Soil Associations, usually related to specific parent materials. Within each association there are likely to be several more tightly defined soil types known as Soil Series. For the record, the whole North-West Sittingbourne allocation is shown as the HAMBLE 1 Association (571y) developed mainly in Brickearth. This does not consider, however, the likely range of soils where the brickearth is thin or absent as is likely to be the case on at least the northern parts of the site.

Agricultural Land Classification – Published ALC mapping

7.40 The Provisional 1:63,360 scale ALC map, Sheet 172 (Chatham & Maidstone), published in 1968, shows much of the land round Sittingbourne as Grade 1 (dark blue) in the perhaps somewhat optimistic expectation that most of the soils were developed in Brickearth or loamy Tertiary Beds and were well drained. A few small areas, including one running across the site, where the soils were believed to be developed in more clayey Tertiary Beds, were allocated to undifferentiated Grade 3 (green).

Figure 7.2 - Published Provisional ALC as taken from Sheet 172 (Chatham & Maidstone). Not to Scale



7.41 This map is now of historic interest only because, since it was published, there has been a comprehensive revision to the ALC system and many sites round Sittingbourne have been the subject of detailed surveys by DEFRA during the 1990s using the revised system.

7.42 All the land within the proposal has been surveyed as part of this exercise and Appendix 7.1 shows the distribution of ALC grades across the site, based on this survey work

7.43 Such surveys have tended to find less Grade 1 than on the published Provisional map. Thus, the land on the site lying south of Bramblefield Lane is now considered to have only about 50% Grade 1, found on undisturbed Brickearth (Hamble series) and on similar soils on the floor of the restored Brickearth workings. Land quality deteriorates to the north and includes some Grade 2 where the soils demonstrate a slight drainage impedance and/or are subject to a slight droughtiness limitation because of particularly sandy subsoils. Subgrade 3a is found mainly in the north where soils exhibit these two

limitations. It seems that the Subgrade 3b on the site is associated mainly with poorly drained clayey soils.

7.44 On the Pheasants Farm part of the allocation, north of Bramblefield Lane, the whole area has been classed as Subgrade 3a because of a moderate droughtiness limitation. It was shown as Grade 1 on the Provisional ALC map in 1968 but was used for the deposit of spoil during the construction of the A249.

ALC and Soils – Site Survey

7.45 In May 2016, a site survey was undertaken to verify the results of the previous survey work undertaken by the Ministry of Agriculture in the 1990's.

7.46 This survey work included a total of 27 auger borings located in areas of the different Grades previously identified within the north west Sittingbourne allocation as shown on Figure 1. The soil profile descriptions are provided in Appendix 7.1.

7.47 The survey work confirmed that the grading of the land across the site is broadly correct. However, the following observations are made:

1. Within the Grade 1 areas on the southern part of the site, which comprise restored brickearth excavation, there is variability in the quality of the restoration within this area. Although the detailed DEFRA survey work has picked up this variation in a couple of small areas on the southern part of areas A, the soil profiles within this area of Grade 1 are certainly not uniform in their physical characteristics, as would be the case in an area of undisturbed brickearth.
2. The surveys of the site that were carried out within the northern part of Area A (Figure 1) alongside the A 249 did identify a limited amount of disturbance within a 10 – 20m strip alongside the road, presumably associated with road construction activities; and
3. The presence of the area of lower quality Grade 3b shown within Area A has been confirmed by the verification work.

Farm Holdings

7.48 The development area forms part of two substantial agricultural holdings. The first comprises a total of 1,095 ha of land and farms the land areas A and B shown on Figure 1. The holding is predominantly arable based, with 84ha of grazing land on the North Kent Marshes. The main farm buildings and

farmhouse are in Hooks Hole, Borden. No farm buildings are located on this site.

7.49 Six people are employed full time on the holdings with additional part-time assistance as required.

7.50 The land between Quinton Road and Brambefield Lane and at Pheasant Farm has been subject to numerous incidents of trespass and vandalism, including fires in standing crops, vehicle damage to standing crops and dumping of cars and other materials within the fields. This has limited the nature of the agricultural operation that can be undertaken on the area, with

7.51 The loss of the land from the holding would affect approximately 6 % of the holding but forms an outlying piece of land to the main holding and its loss would not lead to any notable change in the nature or the operation of such a large farming enterprise.

7.52 The remaining small area of land at Great Grovehurst Farm (Area C as shown on Figure 1) forms part of a substantial farming business comprising 1,200 ha of cereals, 570 ha of grass and 200 ha of apples, pears cherries and plums which are distributed to supermarkets locally and nationally as well as local farm shops.

7.53 The loss of this area of approximately 3.6 ha of agricultural land would affect less than 0.0.1% of the overall business and its loss would not lead to any notable change in the nature or operation of such a large farming company.

Assessment of Potential Impacts

Agricultural Land

7.54 The development of the allocated land would lead to the permanent loss of agricultural land at the beginning of the construction period. This includes the following areas of land within the areas A and B as identified by Table 7.4.

Table 7.4 - Agricultural Land Classification

Land between Quinton Road and Bramblefield Lane and at Pheasant Farm (Area A)		
ALC Grade	**Area (ha)**	**Percentage %**
Grade 1	27.9	45
Grade 2	15.8	25
Grade 3a	15.6	25
Grade 3b	2.9	5
Total	62.2	100

Great Grovehurst Farm (Area B)		
ALC Grade	**Area (ha)**	**Percentage %**
Grade 1	3.6	100
Grade 2	0.0	0
Grade 3a	0.0	0
Total	3.6	100

Totals within Site - Areas A and B		
ALC Grade	**Area (ha)**	**Percentage %**
Grade 1	31.5	54
Grade 2	15.8	21
Grade 3a	15.6	21
Grade 3b	2.9	4
Total	65.8	100

7.55 The total area of land within the proposal therefore includes 31.5 ha of Grade 1 land, 15.8 ha of Grade 2 land and 15.6 ha of Grade 3a “best and most versatile” Grades 1, 2 and 3a land. The sensitivity of the agricultural land quality on the Site is Medium to High and the Magnitude of Impact on agricultural land quality would be Major Adverse, based on the loss of 62.9 ha of “best and most versatile” land. The significance of the loss of agricultural land quality on the Site is therefore Large Adverse, which is considered significant in EIA terms.

Farm Holdings

7.56 The proposed development would lead to the permanent loss of small areas of land from two substantial farm holdings. Both holdings comprise more than 1,000 ha of productive agricultural land. The loss of land associated with the development would lead to an approximate loss of 6% of the total of one holding and < 0.01% of the other.

7.57 The sensitivity of both farming enterprises is assessed to be low to medium, with a minor adverse magnitude of impact on the individual holdings due to a limited loss of agricultural production. Overall this would lead to a Slight Adverse significance of effect on farm holdings, which is not significant in EIA terms.

Effects post-construction

7.58 The permanent loss of agricultural land would take place at the beginning of the construction period and therefore no further effects would occur beyond this phase.

Potential Mitigation / Management Techniques

7.59 There are no universally applicable methods to mitigate the direct permanent loss of agricultural land to development. The permanent loss of agricultural land would take place at the beginning of the construction period and therefore no further effects would occur beyond this phase. There are however opportunities to re-use the surplus soil on site to form green spaces and gardens in accordance with Defra's Construction Code of Practice for the Sustainable Use of Soils on Construction Sites.

Assessment of Residual Impacts

7.60 The total area of land affected by the proposal includes 31.5 ha of Grade 1 land, 15.8 ha of Grade 2 land and 15.6 ha of Grade 3a "best and most versatile" Grades 1, 2 and 3a land. The sensitivity of the agricultural land quality in the development area is Medium to High and the Magnitude of Impact on agricultural land quality would be Major Adverse. The significance of the loss of agricultural land quality in the development area is therefore Large Adverse, which is considered significant in EIA terms.

7.61 Whilst there would be a loss of areas of the best and most versatile land associated with the proposal, and this is fully recognised in this ES, the quality of land generally near Sittingbourne and more widely within Kent is exceptionally high. As the Swale Borough Local Plan identifies, the area contains some of the highest quality land in the UK. The loss of the land on this development area would therefore not be considered of exceptionally high quality within the context of the overall high quality of the land in the vicinity and has been considered in the Sustainability Appraisal produced in association with the Local Plan as detailed in Chapter 5.

7.62 In addition, the use of the high-quality land within the development area, and the full versatility of the Grade 1 and 2 land is not able to be fully exploited due to the context of the development area close to urban areas and the problems that this has historically caused in the area. There have been numerous incidents of vandalism and damage and the extent of public accessibility to the area precludes the growth of the most intensive horticultural crops that could theoretically be physically sustained on the highest quality parts of the development area.

7.63 The proposed development would lead to the permanent loss of small areas of land from two substantial farm holdings. Both holdings comprise more than 1,000 ha of productive agricultural land. The loss of land associated with the development proposals would lead to an approximate loss of 6% of the total of one holding and < 0.01% of the other.

7.64 The sensitivity of both enterprises is assessed to be low to medium, with a minor adverse magnitude of impact on the individual holdings due to a limited loss of agricultural production. Overall this would lead to a Slight Adverse significance of effect on farm holdings, which is not significant in EIA terms.

Cumulative Effects

7.65 Two areas of land are considered as part of the cumulative assessment. These include:

- Land adjacent Quinton Farmhouse, Quinton Road (Redrow Homes); and
- Proposals for the expansion of Iwade (Policy A17 in the Swale Borough Local Plan).

7.66 The land adjacent to Quinton Farmhouse comprises approximately 7.9ha of the “best and most versatile” Grades 1 and 3a land.

7.67 The land at Iwade has also been previously surveyed by MAFF in 1994, with the results of the survey attached in Appendix 7.2. This survey work shows that the land affected by this proposal comprises a mixture of Grades 3a and Grade 3b lower quality agricultural land. The development of this land would therefore lead to an additional loss of an area of Grade 3a “best and most versatile” land.

7.68 Whilst the loss of these areas would increase the total amount of “best and most versatile” land likely to be affected by development, this does not change the level of significance already assessed in relation to this effect.

Chapter 8

WATER ENVIRONMENT

8. WATER ENVIRONMENT

Introduction

8.1 This chapter assesses the likely significant effects of the proposed development in terms of flood risk and drainage.

8.2 It provides an overview of relevant legislation and planning policies and the methodology used to establish baseline conditions and to facilitate an impact assessment. Consideration is given to the potential effects of the proposed development on flood risk, surface water discharge, groundwater flood risk and waste water disposal capacities. Mitigation measures required to prevent, reduce or offset the impact, and the residual impacts are then considered.

Regulatory and Policy Context

National Planning Policy Framework, 2012

8.3 Section 10 of The NPPF requires local authorities to adopt proactive strategies to mitigate and adapt to climate change, taking account of flood risk and coastal change. The NPPF steers development away from areas which experience flood risk and requires the application of the sequential test when considering new development. The NPPF promotes the use of Sustainable Drainage Systems (SuDS) and states that local authorities should prevent both new and existing developments from contributing to, or being put at unacceptable risk of, water pollution.

8.4 The Technical Guidance to the NPPF provides additional guidance to local planning authorities to ensure the effective implementation of the planning policy set out in the NPPF on development in areas at risk of flooding, The Technical Guidance emphasises the avoidance of inappropriate development in areas at highest risk of flooding. Where development is necessary within areas at risk of flooding, the Technical Guidance provides for making development safe without increasing flood risk elsewhere.

Planning Practice Guidance

8.5 The National Planning Practice Guidance on Flood Risk and Coastal Change advises how to take account of and address the risks associated with flooding and coastal change in the planning process.

Swale Borough Local Plan, 2017

8.6 Policy ST 1 states at point 10 that to deliver sustainable development in Swale, all development proposals will meet the challenge of climate change, flooding, and coastal change through:

- promotion of sustainable design and construction, the expansion of renewable energy, the efficient use of natural resources and the management of emissions;
- the management and expansion of green infrastructure; and,
- applying planning policies to manage flood risk and coastal change

8.7 Policy ST 5 states at point 14 that development proposals in the Sittingbourne area must be appropriate to the level of risk from climate change, flooding, and coastal change.

8.8 Policy MU 1 relates specifically to the land at north-west Sittingbourne and explains how a narrow drain runs centrally through the site which could flood in certain conditions. Policy MU 1 requires a site flood risk assessment to be submitted with any future planning application to examine this issue further.

Other Policy Guidance and Legislation

Water Resources Act, 1991

8.9 The Water Resources Act 1991 (WRA) is an Act of the Parliament of the United Kingdom that regulates water resources, water quality and pollution, and flood defence. Part II of the Act provides the general structure for the management of water resources. Part III then explains the standards expected for controlled waters; and what is considered as water pollution. Part IV then provides information on mitigation through flood defence.

Water Industry Act, 1991

8.10 The Water Industry Act 1991 (c. 56) is an Act of the United Kingdom Parliament consolidating previous enactments relating to the water supply and the provision of wastewater services in England and Wales. It further implemented recommendations of the Law Commission.

Flood and Water Management Act

8.11 The Flood and Water Management Act is the government's newest legislation to help improve flood risk management and ensure the security of water supplies in England and Wales. The Act updates legislation to ensure better protection from flooding, manage water more sustainably, improve public services and secure water resources during periods of drought. The Flood and Water Management Act helps reduce flood risk by:

- clarifying who is responsible for managing all sources of flood risk;
- encouraging more sustainable forms of drainage in new developments; and
- making it easier to resolve misconnections to sewers.

Pollution Prevention Advice and Guidance (PPG)

8.12 The Environment Agency provides pollution prevention guidance notes (PPGs) to advise industry and the public on legal responsibilities and good environmental practice. Each PPG gives advice on law and good environmental practice, to help reduce environmental risks from business activities.

Local Flood Risk Management Strategy

8.13 The Local Flood Risk Management Strategy is authored by Kent County Council (KCC), who is the Lead Local Flood Authority (LLFA). It identifies objectives to manage local flood risk to local communities. It considers all sources of local flood risk such as surface water, groundwater, and ordinary watercourses.

Strategic Flood Risk Assessment

8.14 In line with national planning policy, Swale Borough Council (SBC) have undertaken Level 1 and 2 Strategic Flood Risk Assessments (SFRAs) to inform future land use in the Borough.

Development being Assessed

8.15 The development being assessed is as described in Chapter 4 and encompasses sensitive receptors within the area of influence of the site including the proposed development of the land adjacent Quinton Farmhouse, Quinton Road, Sittingbourne.

Assessment Methodology and Significance Criteria

8.16 In this chapter of the ES, flood risk and drainage will be analysed against the significance criteria, in particular regarding fluvial flood risk, surface water flood risk, surface water drainage, foul water drainage, and water pollution. The criteria will be analysed against the existing baseline conditions regarding the impact during construction, operation, and following mitigation measures.

Study Area

8.17 The study area is defined by the development area boundaries, as set out in Chapter 1 of this ES.

Surveys

8.18 A topographical survey dated August 2015 by SLR Consulting has been used to inform the baseline conditions.

Flood Risk Assessment

8.19 A Flood Risk Assessment (FRA) will be prepared for the Project by GTA Civils Ltd. The methodology for the FRA complies with the National Planning Policy Framework (NPPF), alongside Pollution Prevention Guidelines (PPG). It includes an assessment of the Environment Agency's flood mapping, the Swale Borough Council SFRA, existing and proposed surface water runoff, and overview of flood risks.

Consultation

8.20 At this stage, including consultation in respect to the ES Scoping Opinion, there has been further consultation with KCC's SuDS department. Their response reference is NON/2017/063574 (dated 10/11/17). This response followed a design meeting which took place on 27/10/2017 at KCC's offices.

Significance Criteria

8.21 The process of this assessment will identify the magnitude of impact on flood risk and drainage (beneficial, adverse, negligible), the scale of the effect (major, moderate, minor) and its significance (short to medium term, long term). The descriptions are tabulated below:

Table 8.1 - Significance criteria

Significance criteria	Description of criteria
Beneficial	Advantageous or positive effect in terms of reduced flood risk, or lower pollution risk
Adverse	Detrimental or negative effects in terms of increasing flood risk, or higher pollution.
Negligible	Very little change or no effect on flood risk, pollution, or natural drainage characteristics.
Major	These effects are likely to be important considerations at a regional or borough scale but, if adverse, are potential concern to the project, depending upon the relative importance attached to the issue during the decision-making process
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	The effect 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 if the project.
Short to Medium Term	These effects are considered to be those associated with the construction phase

Embedded Design Mitigation

Land at Pheasant Farm

8.22 This section for Pheasant Farm (Phase 1 North) should be read in conjunction with drawings appended to the associated FRA.

8.23 The proposed site drainage plan for this parcel of the land shows two separate surface water networks, one to the north and the other to the south roughly within the centre of the overall allocation. Both watercourses discharge to the network away from the site.

Flood Risk

8.24 The existing QBAR greenfield runoff rate for this portion is 10.0 l/s. The proposed restricted runoff rate is also 10.0 l/s, partitioned between two outfalls, to the north and south, of 4.0 and 6.0 l/s respectively. There is therefore no increase in off-site flows as a result of the development of this parcel of land, and consequently no increase in surface water flood risk to surrounding land.

8.25 Attenuation storage is provided in various forms: the sub-bases under the permeable roadway, balancing pond and storage swale. All these elements are sized for the peak 1 in 100 year storm plus 20% climate change allowance.

Water Pollution

8.26 The site drainage design proposes water treatment in the forms of a porous storage area under the roadways. In addition, the northern network discharges to a storage swale before continuing to the receiving watercourse.

Land between Quinton Road and Bramblefield Way

8.27 The section for Land between Quinton Road and Bramblefield Way should be read in conjunction with drawings appended to the associated FRA.

8.28 The proposed site drainage plan for this parcel of the land shows surface water runoff from roofs and hard surfaces in the southern most section of the parcel discharging to ground, via porous paving and soakaways (trench, ring and cellular). The ground conditions in the portion of the site allows for this form of discharge.

8.29 The middle and northern section of the parcel can be seen discharging into the existing ditch to the centre of the site via permeable paving, attenuation tanks, swales and a pond. The less favourable geology of this section of the site means that discharging into the ground was not an option.

Flood Risk

8.30 Currently the southern section of land sheds greenfield runoff to the east. The proposed scheme manages runoff at source by discharging runoff from roofs and hardstanding's to ground; hence, there will be a reduction in flow rates from this part of the site, with a concomitant decrease in flood risk to surrounding land.

8.31 The infiltration devices proposed – porous paving with storage sub-bases, trench, ring and cellular soakaways – are all sized for the peak 1 in 100 year storm plus 20% climate change allowance.

8.32 North of this section the bulk of the parcel sheds its greenfield run off to the centre of the parcel following the natural topography of the site. The proposed scheme manages runoff at source by discharging runoff from roofs and hardstanding's to multiple outlets along the existing ditch via swales, attenuation tanks and ponds.

8.33 The existing QBAR greenfield runoff rate for this portion of the site is is 80.9 l/s. The proposed restricted runoff rate is also 80.9 l/s, divided out via multiple parcels and multiple outlets into the ditch. The drainage strategy within the FRA indicates the allocation of discharges across this parcel of land.

8.34 There is therefore no increase in off-site flows as a result of the development of this parcel of land as a whole, and consequently no increase in surface water flood risk to surrounding land.

Water Pollution

8.35 Surface water runoff is filtered at source by granular fill, contained within the porous paving sub-bases and trench soakaways.

8.36 The exception to this is are the cellular soakaways which, where present, drain runoff from roofs, which are considered to be a low risk source of runoff pollutants. These cellular soakaways will be connected to catch pits upstream allowing settlement of silt.

Land between Quinton Road and Bramblefield Way and at Pheasant Farm

Foul Drainage

8.37 The foul drainage proposal across the various parts of the development is to install an adoptable on-site foul network with a connection to the existing foul sewer network where possible.

8.38 The Northern parcel of the development (Pheasant Farm) will connect into the Southern Water foul drainage system that currently runs through Pheasants Farm.

8.39 The remaining parcels of land to the south will connect into the above proposed drainage system via an adoptable pumping station. However there is an option for connection along the foul drainage run that lies within Bramblefield Lane.

8.40 There is a possibility that there will be insufficient capacity within the surrounding system for the 1500 or so dwellings that are proposed. A capacity check application should be submitted to Southern Water.

8.41 The foul drainage will be pumped at a low approved rate with Southern Water to their sewerage network. This will mitigate against the receiving sewer becoming overloaded.

Land at Great Grovehurst Farm

8.42 The outline surface water drainage strategy drawing contained within the draft Flood Risk Assessment by PFA Consulting dated August 2017 shows the Great Grovehurst Farm site discharging to an existing watercourse to the north of Swale Way.

8.43 The discharge rate is shown restricted to the existing greenfield QBAR runoff rate of 17.4 l/s. Attenuation storage is provided within a detention basin sized for the 1 in 100 year + 20% event.

8.44 Due to the restricting flows to existing rates, there will be no increase in off-site flows as a result of the development of this parcel of land, and consequently no increase in surface water flood risk to surrounding land.

8.45 Foul drainage: the sewer record plans show a rising main being pumped from north to south adjacent to the site in Grovehurst Road. This rising main breaks into a 225mm gravity foul water sewer within Grovehurst Road. There are also 150mm diameter foul water sewers identified within Godwin Close and Danes Mead to the south of the site.

8.46 It is likely that a foul water pumping station would be required within the site to pump flows to an existing sewer but this will need to be considered in the context of the drainage arrangements for the larger NW Sittingbourne allocation.

Consultation

8.47 The following consultation responses to the Scoping Report that are relevant to this chapter are given below.

Environment Agency

8.48 The EA's consultation response reference KT/2015/120281/01-L01 (dated 03/09/2015) states that the applicant should consider and assess the risk to groundwater and surface waters from contamination which may be present.

8.49 The response also recognises that the site is located within Flood Zone 1 and recommends that a detailed Flood Risk Assessment (FRA) be submitted to accompany the application for planning approval. This should include a detailed

surface water management strategy (plans and calculations), which Kent County Council as Lead Local Flood Authority may wish to review.

Kent County Council SuDS

8.50 KCC SuDS' consultation response reference 15/506821/EIASCO (dated 7 September 2015) states they are satisfied with the scope of the forthcoming ES from a flooding/drainage perspective.

8.51 Within their response, the applicant/their consultants are encouraged to contact KCC SuDS at their earliest convenience to discuss the surface water management at this site and any associated implications for Kent County Council (as Lead Local Flood Authority), adding that it must be ensured the drainage of the site is considered from the outset (at the master planning stage), and that sufficient room is allocated for appropriate drainage features.

8.52 As mentioned in section 8.4.5, a meeting took place between the design team and KCC SuDS. The meeting covered the proposed surface water drainage for the site and the consideration that needed to be made through out. Surface water drainage strategy now incorporates the comments raised in the response received dated 10 November 2017.

Southern Water

8.53 Southern Water's consultation response reference PLAN-010974 (dated 14 September 2015) provides notice that additional off-site sewers or improvements to existing sewers will be required to provide sufficient capacity to service the development.

8.54 Points are also included regarding the requirement to submit a formal application where making new connections to their sewerage network, distances to respect when building near sewers, and a reminder that post October 2011, shared drains now deemed to be public sewers may be present.

Baseline Conditions

Flood Risk

8.55 The topographical survey of the site indicates that the levels fall generally towards the water course that bisects the site. The levels on the northern side of the stream fall steeply towards the stream, whereas the levels on the southern side are relatively flat. The northernmost section of the site forms a prominent mound.

8.56 Fluvial flooding: the Environment Agency Flood Map shows that the site lies within Flood Zone 1 (FZ1.) Inland sites within Flood Zone 1 are susceptible to less than a 1 in 1000 chance (0.1%) of river or coastal flooding each year.

8.57 Tidal flooding: does not pose a risk due to a combination of the site's distance from the shoreline and the site's elevation which is approximately 10m or higher than Ordnance Datum.

8.58 Surface water flooding: occurs when excess rainwater does not infiltrate into the ground, or is not intercepted by urban drainage systems, and instead flows across the surface. The EA's online surface water flooding maps (reproduced as Appendix C in the accompanying Flood Risk Assessment) show that there are areas with the site that are liable to flood in both the '1 in 100 years' and '1 in 1000 years' storm events.

8.59 There are areas of ponding and the depth of the watercourse that flows eventually to the Milton Creek would be between 300mm and 900mm. The ramifications of this will be outlined in the next section.

8.60 Sewer flooding: occurs due to limited capacity or blockage in the sewer system causing backing up of storm water and effluent. The Strategic Flood Risk Assessment (SFRA) commissioned by SBC does not show any registered historical sewer flooding incidents at the site.

8.61 Groundwater flooding: occurs when water levels in the ground rise above the surface. The SFRA does not show any registered historical groundwater flooding incidents at the site. Much of the south of the site is, however, in a groundwater vulnerability zone and a smaller area falls in a Groundwater Source Protection Zone. There is no indication that this site is particularly at risk from this source. It is unlikely that any of the proposed dwellings will include basements and so it is considered that the risk of flooding from this source is low.

8.62 Artificial sources: flooding from reservoirs, canals and docks. The EA's reservoir flooding map shows the site as being outside the nearest area being at risk of flooding if a reservoir were to fail.

8.63 The LA's Strategic Flood Risk Assessment includes a flood map. This shows that the site is removed from the fluvial flood zones (floodplain) and also from all recorded flooding incidents.

8.64 Kent CC's Surface Water Management Plan confirms that this site lies outside the nearest area covered in its list of Local Action Plans, meaning that no special mitigation measures are needed here.

8.65 The southern end of the site lies within a Source Protection Zone and a larger area falls within a Groundwater Vulnerability Zone (Minor Aquifer Intermediate). The need for pollution control measures will be greater in these zones. That said, as the proposed use is private residential dwellings, only a limited number of measures will be needed.

8.66 The finalised FRA will have all the relevant maps and data mentioned above appended to it.

Ground Conditions and Hydrogeology

8.67 The BGS online map shows that the solid geology is dominated by London Clay to the north and the Lambeth and Thanet Groups (sand, silt and clay) to the south. There are bands of Head drift deposits over both halves of the site but there are also swathes where the bedrock geology is at the surface.

8.68 BRE 365 soakage tests were carried out across the site by Leap Environmental, the results of which are detailed in their report reference LP001432, dated 29 September 2017.

8.69 The Pheasant Farm (Phase 1 North) parcel, where clay is present, was found to have very poor infiltration rates such as to render the use of infiltration infeasible.

8.70 The land between Quinton Road and Bramblefield Way, where sand, silt and clay are present, was found to have infiltration rates which, although relatively low, are considered to be workable for the design of infiltration devices in this part of the site.

8.71 Groundwater: the same report by Leap Environmental notes the presence of groundwater 2 - 2.8m below ground level. The presence of this relatively shallow groundwater will limit the storage potential of infiltration devices.

8.72 The Kemsley Drain originates within the site, towards the south end. This flows north-eastwards, eventually discharging into the Milton Creek via Kemsley Marshes. This is the major eastern element that links with the contiguous series of Reaches associated with The Swale, which separates Sheppey from the mainland.

Assessment of Potential Impacts

Land between Quinton Road and Bramblefield Lane and at Pheasant Farm

Construction Potential Effects

Flood Risk - Surface Water

8.73 It is likely that without mitigation measures in place, the surface water flood risk will increase during construction phase as there will be an increase in impermeable surfaces which may cause an increase in surface water runoff to the existing ditch network.

Surface Water Drainage

8.74 Greenfield runoff leaves the site predominantly via the existing watercourse that runs through the site. It is proposed to maintain this during the construction phase of the Project. Without the correct construction procedures in place, there is a potential for the brook to become overloaded from runoff received from an increase in impermeable surfaces.

Water Pollution

8.75 During construction, the installation of impermeable surfaces will cause increased surface water runoff, potentially with silt, suspended solids and possible construction related, or other contaminants. Without mitigation, this could cause pollution to the underlying groundwater or to the existing brook.

Operational Potential Effects

Surface Water Drainage

8.76 Without pollution control measures in place, there is a potential for silt and contaminated runoff from vehicular areas to enter into the existing brook.

8.77 Without a restricted outflow and attenuation storage, there is a potential for the receiving brook to become overloaded with surface water flows from the Project.

Foul Water Drainage

8.78 There is a potential for the receiving public foul sewer to become overloaded. There will need to be further investigation as to the capacity of the existing foul sewer system surrounding the site, by consulting with Southern Water.

Assessment of Effects - Construction Effects

Flood Risk – Fluvial

8.79 The Project is within fluvial Flood Zone 1 i.e. is at low risk of flooding from fluvial sources. The effect during construction to the fluvial flood risk profile is **negligible**. There will be no change to the existing fluvial flood risk characteristics.

Flood Risk – Surface Water

8.80 Without mitigation, the effect is **short term**, **minor**, and **adverse**

Flood Risk – Groundwater

8.81 The groundwater flood risk is low. The construction phase will not increase the flood risk beyond this level. The effect is **negligible**.

Surface Water Drainage

8.82 Without mitigation, the effect is **short term**, **minor**, and **adverse.**

Foul Drainage

8.83 There is limited portion of existing foul drainage on the Project's land to access.

8.84 The contractor may wish to discharge foul effluent from temporary site facilities to the nearest public foul sewer. It is contended that outflows will be low and the effect on capacity within Southern Water's foul network will be **negligible**.

Water Pollution

8.85 Without mitigation, the effect is **short term**, **minor**, **adverse effect** on water pollution locally.

Assessment of Effects - Operational Effects

Flood Risk – Fluvial

8.86 The Project is within fluvial Flood Zone 1 and is thus at a low risk of flooding from fluvial sources. The effect of the Proposed Development on the fluvial flood risk profile is **negligible**. There will be no change to the existing fluvial flood risk characteristics.

Flood Risk – Surface Water

8.87 Without mitigation, the effect is **long term**, **substantial**, and **adverse.**

Flood Risk – Groundwater

8.88 The effect of the Proposed Development on the groundwater flood risk profile is **negligible**. There will be no change to the existing groundwater flood risk characteristics.

Surface Water Drainage

8.89 Without mitigation, the effect is **long term**, **minor**, and **adverse.**

Foul Drainage

8.90 Without mitigation, the effect is **long term**, **moderate**, and **adverse.**

Water Pollution

8.91 Without mitigation, the effect is **long term**, **moderate**, and **adverse.**

Cumulative Effects on the land adjacent Quinton Farmhouse

8.92 Due to the various flood risk and water pollution mitigation measures embedded in the design, as described in the embedded design mitigation section of this chapter, it is likely that the cumulative effect of the Quinton Road and Pheasant Farm development component on the Quinton Road adjacent to the A249 development component will be will be **negligible.**

Land at Great Grovehurst Farm

Construction Potential Effects

Flood Risk - Surface Water

8.93 It is likely that without mitigation measures in place, the surface water flood risk will increase during construction phase as there will be an increase in impermeable surfaces which may cause an increase in surface water runoff to the existing ditch network north of the site.

Surface Water Drainage

8.94 Greenfield runoff leaves the site predominantly via the existing watercourse that runs through the site. It is proposed to maintain this during the construction phase of the Project. Without the correct construction procedures in place, there is a

potential for the brook to become overloaded from runoff received from an increase in impermeable surfaces.

Water Pollution

8.95 During construction, the installation of impermeable surfaces will cause increased surface water runoff, potentially with silt, suspended solids and possible construction related, or other contaminants. Without mitigation, this could cause pollution to the underlying groundwater or to the existing ditch.

Operational Potential Effects

Surface Water Drainage

8.96 Without pollution control measures in place, there is a potential for silt and contaminated runoff from vehicular areas to enter into the existing brook.

8.97 Without a restricted outflow and attenuation storage, there is a potential for the receiving brook to become overloaded with surface water flows from the Project.

Foul Water Drainage

8.98 There is a potential for the receiving public foul sewer to become overloaded. There will need to be further investigation as to the capacity of the existing foul sewer system surrounding the site, by consulting with Southern Water.

Assessment of Effects - Construction Effects

Flood Risk – Fluvial

8.99 The Project is within fluvial Flood Zone 1 i.e. is at low risk of flooding from fluvial sources. The effect during construction to the fluvial flood risk profile is **negligible**. There will be no change to the existing fluvial flood risk characteristics.

Flood Risk – Surface Water

8.100 Without mitigation, the effect is **short term**, **minor**, and **adverse**

Flood Risk – Groundwater

8.101 The groundwater flood risk is low. The construction phase will not increase the flood risk beyond this level. The effect is **negligible**.

Surface Water Drainage

8.102 Without mitigation, the effect is **short term**, **minor**, and **adverse.**

Foul Drainage

8.103 There is limited portion of existing foul drainage on the Project's land to access.

8.104 The contractor may wish to discharge foul effluent from temporary site facilities to the nearest public foul sewer. It is contended that outflows will be low and the effect on capacity within Southern Water's foul network will be **negligible**.

Water Pollution

8.105 Without mitigation, the effect is **short term**, **minor**, **adverse effect** on water pollution locally.

Assessment of Effects - Operational Effects

Flood Risk – Fluvial

8.106 The Project is within fluvial Flood Zone 1 and is thus at a low risk of flooding from fluvial sources. The effect of the Proposed Development on the fluvial flood risk profile is **negligible**. There will be no change to the existing fluvial flood risk characteristics.

Flood Risk – Surface Water

8.107 Without mitigation, the effect is **long term**, **substantial**, and **adverse.**

Flood Risk – Groundwater

8.108 The effect of the Proposed Development on the groundwater flood risk profile is **negligible**. There will be no change to the existing groundwater flood risk characteristics.

Surface Water Drainage

8.109 Without mitigation, the effect is **long term**, **minor**, and **adverse.**

Foul Drainage

8.110 Without mitigation, the effect is **long term**, **moderate**, and **adverse.**

Water Pollution

8.111 Without mitigation, the effect is **long term**, **moderate**, and **adverse.**

Cumulative Effects on the land adjacent Quinton Farmhouse

8.112 Due to the various flood risk and water pollution mitigation measures embedded in the design, as described in embedded design mitigation section of this chapter, it is likely that the cumulative effect of the Great Grovehurst Farm component on the Quinton Road adjacent to the A249 development, Pheasants Farm and the land between Quinton Road and Bramble field way component will be will be **negligible.**

Potential Mitigation/Management Techniques

Land between Quinton Road and Bramblefield Lane and at Pheasant Farm

Project Design

8.113 All the mitigation/management techniques are for the Project Design stage are embedded in the design and are covered in embedded design mitigation section of this chapter.

Construction Stage

Flood Risk - Surface Water

8.114 The use of siltation ponds, silt barriers, flood bunds and ditches is recommended at construction stage. These will be secured by a CEMP (Construction Environmental Management Plan) which can be conditioned.

Surface Water Drainage

8.115 The following mitigation measures are recommended at construction stage to prevent possible damages to the existing ditch and new drainage system:

- Standard ‘good practice’ during construction with regard to the proposed drainage system, such as those outlined in a typical NBS R12 Specification.
- Compliance with CIRIA C698 for the construction of sustainable drainage.

Water Pollution

8.116 The following mitigation measures are recommended during the construction phase to prevent water pollution incidents:

- An emergency spill response kit to be maintained on Project and on-Project fuel and chemical storage to be bunded;
- Compliance with the Environment Agency's Pollution Prevention Guidance PPG1 and PPG6. PPG1 gives information to businesses about basic environmental responsibilities and practices. It includes basic advice on risk assessment, Project drainage, storing oils and chemicals, waste management and dealing with incidents. PPG6 provides information about complying with environmental laws and preventing pollution at construction and demolition Projects. It is for Project managers, foremen and supervisors. It includes advice on planning activities, Project drainage, excavation, storing and using oils and chemicals, cement and concrete, land contamination, waste management and dealing with environmental incidents.

8.117 These measures will be secured by way of a CEMP (Construction Environmental Management Plan) which can be conditioned.

Land at Great Grovehurst Farm

Project Design

8.118 All the mitigation/management techniques are for the Project Design stage are embedded in the design and are covered in embedded design mitigation section of this chapter.

Construction Stage

Flood Risk - Surface Water

8.119 The use of siltation ponds, silt barriers, flood bunds and ditches is recommended at construction stage. These will be secured by a CEMP (Construction Environmental Management Plan) which can be conditioned.

Surface Water Drainage

8.120 The following mitigation measures are recommended at construction stage to prevent possible damages to the existing ditch and new drainage system:

- Standard 'good practice' during construction with regard to the proposed drainage system, such as those outlined in a typical NBS R12 Specification.
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Water Pollution

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8.122 These measures will be secured by way of a CEMP (Construction Environmental Management Plan) which can be conditioned.

Assessment of Residual Impacts

Land between Quinton Road and Bramblefield Lane and at Pheasant Farm

Construction Effects

Flood Risk – Surface Water

8.123 With the described mitigation measures in place, the surface water flood risk will reduce to existing levels i.e. low risk. The effect will be **negligible**.

Surface Water Drainage

8.124 With the described mitigation measures in place, the effect will be **negligible**.

Water Pollution

8.125 With the described mitigation measures in place, the effect will be **negligible**.

Operational Effects

Flood Risk – Surface Water

8.126 With the described mitigation measures in place, the effect will be **negligible**.

Surface Water Drainage

8.127 With the described mitigation measures in place, the effect will be **negligible**.

Foul Drainage

8.128 With the described mitigation measures in place, the effect will be **negligible**.

Water Pollution

8.129 With the described mitigation measures in place, the effect will be **negligible**.

Land at Great Grovehurst Farm

Construction Effects

Flood Risk – Surface Water

8.130 With the described mitigation measures in place, the surface water flood risk will reduce to existing levels i.e. low risk. The effect will be **negligible**.

Surface Water Drainage

8.131 With the described mitigation measures in place, the effect will be **negligible**.

Water Pollution

8.132 With the described mitigation measures in place, the effect will be **negligible**.

Operational Effects

Flood Risk – Surface Water

8.133 With the described mitigation measures in place, the effect will be **negligible**.

Surface Water Drainage

8.134 With the described mitigation measures in place, the effect will be **negligible**.

Foul Drainage

8.135 With the described mitigation measures in place, the effect will be **negligible**.

8.136 With the described mitigation measures in place, the effect will be **negligible**.

Chapter 9

GROUND CONDITIONS

9. GROUND CONDITIONS

Introduction

9.1 This chapter presents a description and assessment of the potential impacts of the project on the geology and hydrogeology beneath the site and the surrounding area. Constraints posed by the ground conditions on the proposed development are also considered.

Regulatory and Policy Context.

National Planning Policy Framework, 2012

9.2 The NPPF indicates at paragraph 120 that 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 considered. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.

9.3 In line with the requirements of paragraph 121 of the NPPF, remediation of contaminated land is required as a minimum, to be such that, “Land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990.”

9.4 The NPPF advices that both local planning policies and decisions, should ensure that the ground conditions of a proposed development site are suitable for the proposed new use of that site. The NPPF states (paragraph 122) “local planning authorities should focus on whether the development itself is an acceptable use of the land, and the impact of the use, rather than the control of processes or emissions themselves where these are subject to approval under pollution control regimes. The NPPF advises that local planning authorities should assume that these regimes will operate effectively.”

Planning Practice Guidance

9.5 The Planning Practice Guidance (PPG) Land Affected by Contamination, released in March 2014, provides guidance in support of the NPPF and states that the responsibility for securing a safe development, in relation to land contamination, rests with the developer and/or landowner. However, local

planning authorities should however be satisfied that a proposed development will be appropriate for its location and not pose an unacceptable risk.

9.6 The PPG requires that where there is a reason to believe contamination could be an issue, development should provide proportionate but sufficient site investigation information (a risk assessment) to determine the existence or otherwise of contamination, its nature and extent, the risks it may pose and to whom/what (the 'receptors') so that these risks can be assessed and satisfactorily reduced to an acceptable level. A risk assessment of land affected by contamination should inform an Environmental Impact Assessment if one is required.

The Swale Borough Local Plan, 2017

9.7 The Swale Borough Local Plan, 2017 does not contain any specific policies relating to ground affected by contamination or hydrology and advises that any development on previously developed land to a more sensitive use should follow the guidelines contained in the Borough Council's Land Contamination: Planning Guidance Document, 2013. In addition, the Borough Council's Contaminated Land Strategy (2016) should be referred to by developers.

9.8 The Local Plan advises that where development is approved on previously developed land and made subject to a land contamination condition, the risk assessment undertaken should follow guidance contained in the Model Procedures for the Management of Land Contamination - Contaminated Land Report 11 (CLR 11). This reaffirms the provisions of the NPPF which requires that land should be remediated to an acceptable standard and suitable for the new proposed use and as a minimum and should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990.

Environmental Protection Act, 1990

9.9 Part 2A of this Act contains specific UK legislation on contaminated land. The legislation endorses the principle of a 'suitable for use' approach to contaminated land, where remedial action is only required if there are significant risks to human health or controlled waters.

Contaminated Land (England) (Amendment) Regulations, 2012

9.10 The legacy of contaminated land in England is regulated by The Contaminated Land (England) (Amendment) Regulations, 2012. The accompanying statutory

guidance introduces a four-category test which is intended to clarify when land does, and does not, need to be remediated. The Guidance describes a risk assessment methodology in terms of 'significant contaminants' and 'significant contaminant linkages' within a contaminant-pathway-receptor conceptual model.

9.11 For land to be determined as 'contaminated' all three elements (contaminant-pathway-receptor) of a significant contaminant linkage must be present. The legislation places a responsibility on the Local Authority to determine whether the land in its area is contaminated by consideration of whether:

- Significant harm is being caused;
- There is a possibility of significant harm being caused; or
- Pollution of controlled waters is being, or is likely to be, caused.

Water Framework Directive (2000/60/EC)

9.12 The Water Framework Directive (WFD), 2003, is an over-arching framework which is designed to:

- Enhance the status and prevent further deterioration of aquatic ecosystems and associated wetlands, which depend on the aquatic ecosystems;
- Promote the sustainable use of water;
- Reduce pollution of water, especially the 'priority' and 'priority hazardous' substances; and
- Ensure progressive reduction of groundwater pollution.

9.13 It commits European Union members to achieve good qualitative and quantitative status of all water bodies (inland and coastal) by 2021 or 2027 at the latest, or, as soon as natural conditions permit after 2027.

9.14 The Groundwater (Water Framework Directive) (England) Direction (2016) contains specific instructions and specifications for groundwater classification.

Development being Assessed

9.15 In respect of geology and hydrogeology the development being considered is as described in Chapter 4.

Assessment Methodology and Significance Criteria

9.16 The assessment methodology has been set out in Chapter 3 and has been used in preparation of this Chapter. The land contamination assessment for the EIA stage of the works has been undertaken in accordance with the Environment Agency 'Model Procedures for the Management of Land Contamination Guidance (CLR11) (2004)', which provides an assessment of the potential risk to relevant receptors via the identification and subsequent iterative assessment of contaminant linkages. This has been carried out to establish baseline conditions.

9.17 To assess the possible impact of each of the potential contaminant linkages they have been 'ranked' according to both the probability and severity of any likely impact. This approach is based on guidance presented in CIRIA Document C552 'Contaminated Land Risk Assessment – A Guide to Good Practice 2001. For each of the contaminant linkages, an estimate has been made of the potential severity of the risk, and the likelihood of the risk occurring. Table 9.1 below presents the classifies the severity of the risk.

Table 9.1 - Severity of Risk Classification

Severe	Acute risks to human health; Major pollution of controlled waters (watercourses or groundwater)
Medium	Chronic (long-term) risk to human health; Pollution of sensitive controlled waters (surface waters or aquifers)
Minor	Requirement for protective equipment during site works to mitigate health effects; Damage to non-sensitive ecosystems or species

9.18 The probability of the risk occurring is classified according to the criteria given in the following Table 9.2.

Table 9.2 - Probability of Risk

High Likelihood	Contaminant linkage may be present, and a risk is almost certain to occur in the long term, or there is evidence of harm to the receptor.
Likely	Contaminant linkages may be present, and it is probable that the risk will occur over the long term.
Low Likelihood	Contaminant linkage may be present and there is a possibility of the risk occurring, although there is no certainty that it will do so.
Unlikely	Contaminant linkage may be present but the circumstances under which harm would occur is improbable.

9.19 An overall evaluation of the levels of risk is gained from a comparison of the severity and probability as presented in Table 9.3 below.

Table 9.3 - Risk Evaluation Process

		Severe	**Medium**	**Minor**
Probability	**High Likelihood**	Very High Risk	High Risk	Moderate / Low Risk
	Likely	High Risk	Moderate Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate / Low Risk	Very Low Risk
	Unlikely	Moderate / Low Risk	Low Risk	Very Low Risk

9.20 The assessment of risks associated with each of the potential contaminant linkages identified at the site is used as a basis for assessment of the significance of effects within this Chapter.

9.21 The assessment of potential impacts for this Chapter of the EIA involves four stages:

1) Establishing the extent of sources of contamination;
2) Establishing receptor/resource sensitivity or value;
3) Establishing magnitude/ severity of impact; and
4) Defining significance of effect.

9.22 This assessment process is consistent with that which is outlined within Chapter 3 of this ES, with an additional stage (Stage 1) at the beginning of the process. The approach for each stage in the context of geology and ground conditions is outlined below.

Stage 1 - Establishing Sources of Contamination

9.23 The extent of identified sources of existing land contamination can be described qualitatively in the categories shown within Table 9.4 below.

Table 9.4 - Descriptive Scale for Extent of Sources of Land Contamination

Qualitative Description of Source (Hazard)	**Extent / Previous Land Use**
Major	Previous or ongoing activity on or near to a site with high potential to cause land contamination (e.g. gas works, chemical works, landfills) or site investigation data indicating widespread or severe contamination.
Moderate	Previous or ongoing activities with some potential to cause moderate contamination (e.g. railways, collieries, and scrap yards) or site investigation data indicating limited contamination.
Minor	Greenfield site or site with previous/ present activities with low potential to cause land contamination (e.g. Residential, retail or offices) or site investigation data indicating no significant contamination.
No Change	Greenfield site with no ongoing or previously recorded activities with potential for land contamination.

9.24 The possible contamination sources have been assessed in the desk study using the Department of the Environment (DoE) Industry Profile series of reports and CLR8 (Potential Contaminants for the Assessment of Land, DEFRA/ Environment Agency, March 2002).

Stage 2- Establishing Receptor / Resource Sensitivity, or Value

9.25 The presence and sensitivities of receptors at risk from potential land contamination have been assessed by considering the following:

- Surrounding land uses, based on mapping;
- Likely end-use, based on the nature of the proposed development;
- Type of construction operations that will be necessary as part of the proposed development; Project;
- Surrounding sites of nature conservation importance; and
- Geology, hydrogeology and hydrology of the Project Site and its surrounding area.

9.26 The qualitative description of receptor sensitivity, in the context of geology and hydrology has been modified from Table 3.3 and is defined in Table 9.5 below.

Table 9.5 - Defining Receptor Sensitivity in the context of geology, ground conditions and agriculture

	Receptor Sensitivity		
Receptor	**High**	**Medium**	**Low / Negligible**
End Users	Residential properties, allotments, play	Landscaping or public open space	'Hard' end use (e.g. industrial, car parking)
Construction Workers	Extensive earthworks and demolition of buildings	Limited earthworks	Minimal disturbance of ground
Surrounding Land Uses	Greenfield site, residential	Open space, commercial area	Industrial area
Controlled Waters	Principle Aquifer of surface water near site	Secondary Aquifer	Aquitard or aquiclude beneath site, or no surface water body near site
Ecological Systems	Nationally or internationally designated ecological sites	Locally designated ecological sites	No sites of significant ecological value close by
Built Environment	Buildings of high historic value or other sensitivity	Buildings, including services and foundations	Not applicable

Stage 3: Establishing magnitude/ severity of impact

9.27 The magnitude of impact, and typical descriptions, is detailed within Table 9.6 below (and remains unmodified from Table 3.4 in Chapter 3)

Table 9.6 - Defining the Magnitude of Impact in the context of geology and hydrology

Magnitude		Example
Major	Adverse	A permanent long term adverse impact on the integrity and value of an environmental attribute or receptor.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality.
Moderate	Adverse	An adverse impact on the integrity and/or value of an environmental attribute or receptor, but recovery is possible in the medium term and no permanent impacts are predicted.
	Beneficial	Benefit to, or addition of, key characteristics, features, or elements or improvement of attribute quality.
Minor	Adverse	An adverse impact on the value of an environmental attribute or receptor, but recovery is expected in the short term and there would be no impact on integrity.
	Beneficial	Minor benefit to, or addition of key characteristics, features or elements; some beneficial impact on attribute or a reduction in the risk of a negative impact occurring.
Negligible	Adverse	Very minor loss
	Beneficial	Very minor benefit
No Change		No change would be perceptible, either positive or negative.

Stage 4: Defining significance of effect

9.28 The approach to assigning significance of effect relies on reasoned argument, professional judgement and taking on board the advice and views of appropriate organisations. To aid the decision-making process, each potential impact has been assigned a significance category. The significance of effect maybe adverse, beneficial, or neutral and depends upon the importance of the receptor and the magnitude of impacts.

9.29 The methodology for determining the significance of effect categories is detailed within Table 3.5 in Chapter 3 and Table 9.7 below:

Table 9.7 - Determining Significance of Effect

		Magnitude of Impact				
		No Change	***Negligible***	***Minor***	***Moderate***	***Major***
Receptor Sensitivity	***Very High***	Neutral	Slight	Moderate	Large	Very Large
	High	Neutral	Slight	Moderate	Large	Large
	Medium	Neutral	Slight	Slight	Moderate	Large
	Low	Neutral	Slight	Slight	Slight	Moderate
	Negligible	Neutral	Neutral	Neutral	Neutral	Neutral

Embedded Design Mitigation

9.30 The proposed development has been designed from the outset to ensure its impacts are minimised. In respect of geology and hydrology such design mitigation includes following best practice during the construction of the development. The first step of embedded mitigation at the pre-construction stage would be the design and completion of a geo-environmental site investigation across the application site to confirm the baseline conditions.

9.31 The geo-environmental investigation will facilitate both human health and controlled waters risk assessments for the site, to enable the development of a conceptual site model. This would be conducted in line with CRL11 and with the appropriate guidance and consultation from the relevant regulators.

9.32 Where contamination is identified, remediation may be required. In this case a Remediation Options Appraisal will be prepared, in line with CLR11, which will take into consideration aspects such as cost, sustainability and long-term liabilities in the selection of appropriate techniques. It has been assumed that any remediation identified would be carried out and would therefore avoid potential effects on end-users and controlled waters.

9.33 The outcome of the geo-environmental investigation would also inform:

- Concrete specification;
- Specification of materials for water pipes / services;
- Strategy for re-use / disposal of excess arisings;
- Methodology and materials selection for foundation design;
- Gas protection measures for buildings if required;

- Contingency planning for any future work which may be required; and
- Need for any additional investigation to target areas of uncertainty.

9.34 The design and implementation of the construction works will be undertaken in accordance with ISO 14001. A Construction Environmental Management Plan (CEMP) will be developed which will apply to each of the key construction elements and secured by a planning condition.

9.35 Risks to construction workers during the construction phase of the development will be mitigated by the correct implementation of Health and Safety measures, such as suitable working methods and the correct use of personal protective equipment (PPE). PPE will be site-specific and based on the outcome of the residual risks identified from the human health risk assessment based upon guidance from the Health and Safety Executive.

9.36 The CEMP will include mitigation such as waste management, dust suppression techniques, bunding to prevent surface run off and correct storage of construction materials. Standard risk assessment, including a piling risk assessment, would also be undertaken prior to the final design and construction of the development.

Consultation

9.37 No additional consultation has been undertaken other than that which occurred at the ES Scoping Stage.

Baseline Conditions

Establishing sources of contamination

9.38 A Phase I Desk Study and Site Reconnaissance[1] was undertaken during May 2015 which has been updated to reflect the current proposals (see Appendix 9.1). The objectives of the report were to:

- Provide information on the geotechnical and environmental quality of the ground present on the site;
- Assess the potential health and other environmental risks posed by the site to the proposed development and to other specifically identified receptors; and
- Assess the potential for offsite contamination to adversely affect the proposed development.

[1] Phase I Desk Study and Site Reconnaissance, Leap Environmental Ltd (2015, reference LP941)

9.39 The following sources of information were also reviewed:

- Groundsure Enviroinsight and Geoinsight database report;
- Insight Historical Map Search;
- British Geological Survey (BGS) mapping;
- British Geological Survey website (www.bgs.ac.uk) including historic BGS borehole data;
- Unexploded WWII aerial delivered bomb (UXB) regional risk maps produced by Zetica;
- Interrogation of the Environment Agency Web site on 29 April 2015;
- Interrogation of Swale Borough Council planning records for the site on 29 April 2015; and
- Interrogation of on-line data sources for general information pertaining to the site history.

9.40 A site reconnaissance was carried out on 1 May 2015.

9.41 The desk study and site reconnaissance were used to develop an initial conceptual site model, which in turn was used to identify geotechnical and geo-environmental hazards and the qualitative degree of risk associated with them. In terms of the geo-environmental assessment the conceptual site model was used to identify potential sources of contamination, potential receptors, and pathways by which the two may be connected. These are known as possible pollutant linkages and it is these pollutant linkages that are key to contaminated land risk assessment. The desk study includes proposal for intrusive investigation that will be required to confirm ground conditions and provide a quantitative risk assessment.

Investigation Rationale

9.42 As part of future ground investigations trial holes will need to be located to give general coverage, taking into consideration the proposed development and the potential geo-environmental and geotechnical risks/hazards highlighted by the Conceptual Site Model (CSM) in accordance with BS10175[2]. Trial holes will also be targeted around historic landfill and ground working within the boundaries of the site and adjacent to boundaries where historic landfills were identified from the desk study to be present off site.

[2] BS 10175 2013 – Investigation of potentially contaminated sites. Code of Practice

9.43 The spacing of investigation locations will need to be consistent with the requirements for an exploratory investigation under BS10175.

Establishing Receptor Sensitivity

9.44 It is proposed to develop the site with residential properties with gardens as well as two schools.

9.45 Pollutant linkages containing human health will be risk assessed by comparing the soil laboratory test results to Tier 1 Site Assessment Criteria. These are based on published Soil Guideline Values or LQM/CIEH Generic Assessment Criteria[3] (GAC) and or Category 4 screening levels (C4SL)[4] assuming a residential land use.

9.46 Pollutant linkages for Controlled Water will be assessed using a mix of qualitative and quantitative assessment. Whereby an assessment of the concentration of contamination encountered within the soils will be used to establish whether controlled waters are likely to be affected. Where leachate testing has been completed on soils or where groundwater samples are collected then the results will be compared against Environmental Quality Standards (EQS) for freshwater environments or Drinking Water Standards where appropriate and where standards are available.

9.47 The land gas assessment will be carried out following the CIRIA C665 approach for low rise housing. In this assessment the model low rise house is assumed, i.e. one with a floor plan area of approx. 8m x 8m, a well-ventilated sub-floor void of 150mm and a minimum ventilation rate of one complete volume change per 24 hours.

9.48 A risk-based method will be used to allow for identification of gas protection measures for such housing by comparing measured emission rates to generic "Traffic Lights". Typical maximum concentrations of methane and carbon dioxide are considered and where these exceed typical maximums for the generation potential of the source then risk based Gas Screening Values are considered.

9.49 The source is then rated as Green, Amber 1, Amber 2, or Red and appropriate design protection measures recommended.

[3] The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment. 2nd edition. Chartered Institute of Environmental Health and Land Quality Management Ltd. 2009.
[4] CLAiRE Final Project Report. SP1010 – Development of Category 4 Screening Levels for assessment of land affected by contamination. CLAiRE, December 2013.

Geological, hydrogeological, and hydrological conditions

9.50 The following sections present the baseline geological, hydrogeological, and hydrological conditions together with any areas of potential land contamination identified beneath the application area and the immediate surrounding area.

Geology

9.51 The geology of the site has been ascertained by reference to the 1:50,000 British Geological Survey Sheet No. 272, solid and drift edition and ground investigations completed. The south-eastern portion of the Project area is mapped as being underlain by Thanet Formation (sand, silt and clay), the central part of the Project area by Lambeth Group (sand, silt and clay) and the northern portion by the London Clay Formation (clay and silt). The northern and central areas are overlain by drift deposits comprising Head Deposits (silt and clay). It is likely the Head deposits in the southern area of the site have been removed for brick production.

Head – Brickearth

9.52 Head deposits accumulated largely by solifluction (the slow downslope movement of soil in response to the seasonal freezing and thawing of ground) and hillwash, mainly under periglacial conditions during the Quaternary glaciations. In general, it occurs beneath concave slopes on the flanks and floors of valleys. It is locally derived, and its content reflects the base geology, in this instance it comprises of variable deposits of impure clays, silts and sands, locally gravelly.

London Clay Formation

9.53 The London Clay Formation is found extensively throughout the London Basin. The Formation mostly comprises thoroughly bioturbated, slightly calcareous silty clay to very silty clay. Beds of clayey silt and silty fine-grained sand are found increasingly towards the west of its subcrop towards Reading.

9.54 At outcrop the London Clay Formation is weathered to brown and may contain secondary carbonate nodules. This weathered or oxidized zone varies from about 3-6m in depth and may be less than 1m thick where superficial deposits overlie the clay. Below this it is generally blue grey in colour and fissured. The top few metres of unweathered clay and bottom of the weathered zone often contain gypsum crystals a source of sulphates.

Lambeth Group

9.55 The Lambeth Group (formerly known as Woolwich and Reading Beds) tend to consist of grey and grey-brown interbedded fine sands silts and clays. There are sometimes shelly beds at the top and bottom of the formation. Some very strong bands of weakly cemented shells and limestone can be encountered, particularly in the area between Lewisham and Bermondsey.

Thanet Formation

9.56 The Thanet Formation consists of fine grained pale yellow and grey mottled silty sands. On the Isle of Thanet, in east Kent they are generally more clayey. The boundary with the underlying chalk is very irregular and often marked by a bed of green coated flints and glauconitic sand and clay (the Bullhead Beds).

9.57 Solution features are commonly encountered in or near Thanet Formation outcrops (particularly where there was a layer of overlying clay). This formation and the underlying chalk were also often worked.

Hydrogeology

9.58 The Hydrogeology of the site has been ascertained from the Groundsure data report. The source of the data is reported to be the Environment Agency Groundwater Vulnerability mapping.

9.59 The Thanet Formation which underlies the southern area of the site is classed as a Secondary A Aquifer. The London Clay Formation which underlies the northern area of the site is Unproductive Strata. The Head deposits located across the northern and central portions of the site are classified as Unproductive Strata. The soil leaching potential ranges from intermediate to high across the site.

9.60 The south-eastern corner of the site is situated within the Inner and Outer Zone of a Groundwater Source Protection Zone (SPZ).

9.61 There are several groundwater abstraction licences within 1km of the site. The closest is located some 172m south of the site and relates to abstraction of process water from Southern Region Groundwater.

9.62 There are several surface water abstraction licences located within 1km of the study site. The closest is located 230m west of the site and is used for spray irrigation.

9.63 The closest potable water abstraction licence is located some 1.9km south west of the site.

Hydrology

9.64 One surface water feature has been identified on the Project area. This relates to an unidentified secondary river. The closest surface water features identified off-site include two culverts (Coldharbour Fleet and an unidentified culvert) and three tertiary rivers (Coldharbour Fleet and two unidentified rivers) located to the north of the Project area. Coldharbour Fleet, is classed as a secondary river, and is located 15m east of the site and Coldharbour Fleet culvert is located 23m east of the site.

9.65 The desk data reports that the Environment Agency does not hold any information on surface water quality within 1500m of the study site.

Flooding

9.66 According to the Environment Agency website, the site is not situated within an Environment Agency Flood Zone. Areas within 50m of the study site are reported by the BGS to be susceptible to groundwater flooding.

Designated Environmentally Sensitive Sites

9.67 A review of designated environmentally sensitive sites presented within the Groundsure report has been carried out. The dataset refers to several sensitive sites including the following:

- Sites of Special Scientific Interest (SSSI);
- Records of National Nature Reserves (NNR);
- Areas of Special Conservation (SAC);
- Records of Special Protection Areas (SPA);
- Records of Ramsar Sites;
- Records of Local Nature Reserves;
- Ancient Woodland Records.

9.68 Five Sites of Special Scientific Interest (SSSI) have been identified within 2km of the study site. The closest relates to 'The Swale' located 400m north of the northern boundary, which is also classed as a Special Protection Area (SPA) and a Ramsar site.

9.69 One National Nature Reserve (NNR) is located within 2km of the site. This relates to Elmley located some 1.6km east of the site.

9.70 An unidentified Ancient Woodland is located some 1.3km west of the site.

9.71 Two environmentally sensitive areas have been identified within 2km of the study site. The closest relates to the North Kent Marshes located approximately 400m to the north of the site. The second relates to an area some 1.8km north west of the site.

Ground Stability Hazards

9.72 The Groundsure report includes data from the National Geoscience Information Service (NGI) regarding the potential for certain ground stability hazards in the soil in certain locations. The ground stability information for the application area is summarised as follows:

Table 9.8 - Ground Stability Hazard Risk Levels

Ground Stability Hazard	**NGI Reported Risk Level (Hazard potential)**
Soil Volume Change Potential	Moderate to High – relating to the Lambeth Group and London Clay Formation Negligible – relating to the Thanet Formation
Landslides	Low
Dissolution	Low to Moderate
Compressible Deposits	Negligible
Collapsible Deposits	Very low – relating to bedrock on site Moderate to High – relating to the Head deposits
Running Sand	Negligible – relating to the London Clay Formation Very Low – relating to the Lambeth Formation Moderate to High – in the south eastern corner of the site relating to the Thanet Formation.

9.73 It should be noted that the actual risks from these hazards will be dependent on the actual ground conditions encountered.

Ground Workings

9.74 There are 21 historical ground workings listed onsite by the Groundsure report. Fifteen relate to cuttings, whilst the remaining six are composed of three unspecified pits, a single pond, an unspecified heap, and an unspecified ground working.

9.75 There are a further 61 historical ground workings recorded within 250m of the site; comprising two brickworks, a brickfield, ponds, unspecified pits, cuttings and heaps, ponds, and sand pits.

Mining, Extraction, and Natural Cavities

9.76 The Groundsure report indicates the site is not situated within an area affected by coal mining. However, the Sittingbourne area has been extensively quarried for clay and mined for chalk to produce bricks. With six small scale chalk extraction pits noted in the Project area and a further ten located within 200m of the site. The Groundsure report does not record any onsite clay extraction although the historic maps suggest such activities may have occurred.

Site Development History

9.77 The earliest recorded map reviewed as part of the Phase 1 desk study (see Appendix 9.1) indicates that the development area has mainly been used for agriculture, including both fields and orchards. The main area of development on site is associated with Great Grovehurst, a farm located at the northern end of the site. Signs of onsite mineral extraction were also noted as a gravel pit located in the south-eastern corner of the site adjacent to Quinton Road.

9.78 Beyond the development area boundary, the land uses of the surrounding land are reasonably well defined, with mainly agricultural land to the west and north west. To the south and east the land was historically used for clay and gravel extraction with several brickworks interspersed with residential land uses. In more recent times these former industrial uses have ended, and the sites redeveloped with residential.

9.79 At the time of the writing the Phase I Desk Study and Site Reconnaissance [1] the Great Grovehurst Farm buildings were still present and had been converted for light industrial use, with the gravel extraction works terminated (see Appendix 9.1). The structures at Great Grovehurst Farm have been subsequently demolished (December 2017) with no post demolition inspection of the ground or updates to the risk assessment completed. The remaining areas of the development site have been retained in agricultural use.

9.80 The intrusive investigations completed to date have found the site to be generally underlain with topsoil over firm to stiff grey and orange clay from 0.25 to 9.2m (undifferentiated Head and London Clay Formation) and medium dense to dense sandy gravel from 1.5 to more than 20m (Thanet Formation – Lambeth Group). Areas of made ground were identified in both investigations which extended to depths of between 0.4 and 3.5m. These areas are thought to be associated with historic landfill and ground workings.

Potential On-site Sources of Contamination

9.81 Based on a review of the available site information the following sources of contamination are noted:

Table 9.9 – On-site Sources of Contamination

Source	Contaminants of Concern
Made Ground associated with former buildings, ponds and works on site and fly-tipped material	Potential for metals, PAHs (polycyclic aromatic hydrocarbons) and asbestos.
Electricity sub-station	Potential for polychlorinated bi-phenols (PCBs).
Current and former fuel tanks and oil drums and unspecified tanks	Potential for petroleum hydrocarbons.
Former vehicle maintenance garage (Grovehurst Cars company)	Metals, asbestos, VOCs (Volatile Organic Compounds), SVOCs (Semi-Volatile Organic Compounds), PAHs and petroleum hydrocarbons.
Former unspecified works on site	Metals, asbestos, VOCs, SVOCs, PAHs and petroleum hydrocarbons.
Warehouse buildings and broken asbestos sheeting observed on site	Asbestos.
Agricultural fields	Herbicides and pesticides.
Historical inert landfill	Landfill leachate – hydrocarbons, VOCs, SVOCs and PAHs Landfill gas –carbon dioxide and methane
Made Ground associated with former buildings, ponds and works on site and fly-tipped material	Potential for metals, PAHs (polycyclic aromatic hydrocarbons) and asbestos.

Potential Off-site Sources of Contamination

9.82 The desk study has highlighted the following potential offsite sources of contamination:

Table 9.10 – Off-site Sources of Contamination

Source	Distance from Site (m)	Contaminants of Concern
Railway line	Adjacent to eastern boundary	Potential on-site migration of PCBs, PAHs, petroleum hydrocarbons, metals, and asbestos.
Unspecified tanks	25m north east of the site.	Potential on-site migration of petroleum hydrocarbons, metals, and PAHs.
Former tile works	Adjacent to northern boundary	Metals and asbestos.

9.83 On-site migration of PCBs associated with off-site electricity sub-stations is not considered to present a significant risk to the site given the recorded distances and low mobility of the contamination type.

Assessment of Potential Impacts

Conceptual Site Model

9.84 A risk-based approach is used to assess contaminated or potentially contaminated land within the UK. For a potential risk to exist, there must be a pollutant linkage in place, i.e. there must be a source of contamination, a potential receptor, and a pathway linking the two.

9.85 To quantify the magnitude of the risk, it is necessary to first calculate the potential exposure of the receptor because of all the individual active pollutant linkages affecting that receptor. Secondly it is necessary to ascertain “what is an acceptable exposure level for each of the identified receptors and contaminants?”.

9.86 The purpose of the CSM, in this instance, is to identify all the potential pollutant linkages by considering, in turn, the potential sources, receptors and pathways. The findings form the basis of the Assessments of Effects section below.

Receptors

9.87 Potential receptors identified which may be impacted by any of the contaminants of concern identified above, and include the following:

- Future Residents (High Sensitivity)
- Construction workers (High Sensitivity)

- Groundwater – Secondary A Aquifer in the south east of the development area (Medium sensitivity)
- Surface Water – secondary river in southern portion of the development area (Medium Sensitivity)
- Material construction of buildings and infrastructure (Low Sensitivity)

9.88 At this stage, potential risks to identified environmentally sensitive receptors ('The Swale' designated as a SSSI, RAMSAR and SPA located approximately 400m to the north of Zone C), are not considered to be significant given the distance from the site.

Pathways

9.89 The development will include private gardens and areas of soft covered public open space (communal areas, playing fields etc). All potential pollutant linkages involving resident humans and soil contaminants will be active i.e. direct ingestion of soil, ingestion of soil attached to plants as well as via plant uptake, inhalation of indoor and outdoor vapour and of dust tracked back into the house and finally ingestion of water carried by plastic water pipes through contaminated ground.

9.90 Ground workers are at risk as a result from all the above, except for those involving edible plants.

9.91 The south-eastern corner of the site is situated within the Inner and Outer Zone of a Groundwater Source Protection Zone (SPZ). The site is underlain by a Secondary A Aquifer to the south, and unproductive strata to the north overlain by Head classified as unproductive strata. There is a range of intermediate to high leaching potential across the site. Hence there is a potential pathway for leachate from soil pollutants and for mobile liquid contaminants to enter the groundwater. There is an historic inert landfill listed in the northern part of the site and former ground workings in the southern portion. There is therefore the potential for landfill gas and landfill leachate on the subject site.

9.92 Tables 9.11 and 9.12 below provide a summary of the risk assessments for potential pollution and geotechnical issues highlighted by the works completed to date.

Table 9.11 - Pollutant Linkages Qualitative Risk Assessment Summary

Potential Risk	Overall Risk	Comment
Heavy Metals	Moderate	Future site users, construction workers and controlled waters. Potential for metals to be present locally in made ground and fly tipped materials. Further testing required to quantify risk.
Asbestos	Moderate to High	Future site users. Construction workers. Potential for asbestos to be present within made ground soils and fly tipped materials. Further testing required to quantify risk.
Methane and Carbon Dioxide	Low to Moderate	Future residents and proposed structures. Potential for methane and carbon dioxide associated with the backfilled ponds, ground workings and the historic inert landfill. Further monitoring required to assess risk
PAH and Petroleum Hydrocarbons	Moderate	Future site users, construction workers and controlled waters. Potential for Petroleum hydrocarbons and PAH to be present locally in made ground associated with former above ground tanks and fuel storage. Further testing required to quantify risk.
polychlorinated bi-phenols (PCBs).	Low	Future site users, construction workers and controlled waters. Potential of PCBs associated with the electricity substation at end of Bramblefield Lane. PCBs have a low mobility and are likely to remain close to source. Further testing required to quantify risk
VOCs (Volatile Organic Compounds), SVOCs (Semi-Volatile Organic Compounds)	Low to Moderate	Future site users, construction workers and controlled waters. Potential source from light industrial units at Great Grovehurst. Testing required to quantify risk
Herbicides and pesticides	Moderate	Future site users, construction workers and controlled waters. Risk of compounds from agricultural land uses. Testing required to quantify risk

9.93 Potential risks to human health and controlled waters have been identified from gas migrating from backfilled ponds and historic landfills; on going and historic agriculture; and on site industrial activities such as the mineral extraction and light industry around Grovehurst.

Construction Phase

9.94 Consideration is given to the potential impacts from the identified risks. These are presented in Table 9.12

Table 9.12 - Summary of potential impacts during the construction phase

Activity	**Nature of Impact / Comments**
Site clearance, removal of current structures (including foundations), clearance of hardstanding's, spoil heaps, removal, and stockpiling of soils (including topsoil) during construction works.	Potential for asbestos containing materials to be present, buried wastes and potentially contaminated soils. Potential for generation of sediment run-off during storage, particularly during, but not limited to, wetter winter conditions.
Clearance of ditches and ponds (infilled or open)	Unknown characteristics of any infill material, with a potential for this to be contaminated. Need to manage inflows of (ground and surface) water. Unknown water quality or flow rates across the site. Dredging of ponds if undertaken may disturb potential contamination within sediments.
Cut and Fill activities	Soils moved during regrading works may redistribute contamination across the site if present. Erosion of excavated or exposed soils with the potential for high suspended solid content run-off to be generated which may lead to pollution.
Excavations and foundation construction	Potential for migrating ground gases to collect within voids if present. Identified risks associated with a potentially elevated groundwater. Possible stability concerns related to 'running sands'. Potential risk of deep made ground in areas of former chalk and clay/gravel exploitation.

Activity	Nature of Impact / Comments
Construction Workers	Potential for contamination to be present across the site with possible areas of contaminated soils, waters (ground and surface) and contaminative materials (i.e. asbestos) considered to be encountered during the construction works.

9.95 A review of the baseline information has identified activities during the demolition and construction phases which have the potential to cause harm to receptors. The potential impact has been considered and is summarised below.

Site Clearance

9.96 This activity has the potential to encounter contaminated soils or other hazardous construction materials (i.e. asbestos). Subsequent relocation and stockpiling of these materials may result in a **moderate to major adverse** impact for the short to medium term where contaminated soils/hazardous materials are not suitability identified, segregated, or stored separately from other non-contaminated or non-hazardous materials. Erosion of these soils/materials and suspension within surface water run-off that then enters controlled waters may represent a **minor adverse** impact for the short term.

9.97 Identification of potential areas where such materials may be encountered, together with development and implementation of an effective site soils management plan is considered necessary to control the potential impacts.

Clearance of ditches

9.98 There is the potential for contaminated sediments or water to be found, with their removal presenting a risk to uncontaminated soils and controlled waters. Where there is a need for the removal of these to enable development to proceed, consideration must be given to the methodology and handling of the sediments and waters. The dewatering of any excavated saturated sediments adjacent to the excavation would prevent the spillage of potentially contaminated waters entering soils or controlled waters. Where the ditches are to be retained there is likely to be a **minor adverse** impact to water quality in the short term with increased suspended solids. Removal of any potentially contaminated material is likely to result in an overall improvement.

9.99 Controls to include the provision or construction of a temporary handling area suitable of containing sediments with a very high-water content, together with a method of collecting the generated run-off for treatment or removal.

Cut and Fill Activities

9.100 Excavation and movement of soils around the development area may result in an increased risk of impact to controlled waters through the exposure of soils that are more susceptible to erosion resulting in surface water run-off that has a high content of suspended solids, which then enters surface waters. This may result in a **minor adverse** impact for the short term. Careful management of cut and fill materials is important in the control of wastes, with a need to consider the balance of soils generated and used within the development area.

Excavations

9.101 The baseline information has identified several backfilled features and an inert landfill within the development area and in the near vicinity. Desk based information shows that there is a risk from ground gases. The underlying geology may allow for the presence of pathways for ground gases to migrate. Consideration must be given to the potential for excavations, trenches or foundations intercepting migrating ground gases. This may result in a **major adverse** impact in the short term to ground workers entering excavations where ground gas ingress occurs.

9.102 Gas monitoring will need to be undertaken to assess the onsite ground gas regime. This assessment would also be included within the design for protection of site users.

9.103 Also identified in the baseline information is the potential for instability of excavations due to 'running sands' relating to the effects of groundwater on sand deposits encountered in the underlying geology. These conditions are likely to result in short term instability of excavations, resulting in a **major adverse** impact in the short term to ground workers either entering excavations and surface instability (e.g. overbreak of excavations) where such conditions are encountered.

9.104 Further understanding of the likelihood of this condition being present and the location, would be gained through site investigation. Details of potential excavation stability problems can then be used to inform safe method of excavation, including the need for temporary supports or dewatering works.

Construction Workers

9.105 The potential for contaminated materials and soils being present has been noted. Construction workers, particularly ground workers, are potentially at risk of encountering such soils and materials, with potential **moderate to major** Adverse impacts to the health of construction workers in the short and long terms. This

potential impact would be further understood through additional site investigation which would inform on the types of contamination present and the depths that it may be encountered.

9.106 The information from site investigation will determine whether remediation is required prior to excavation, or the types of personal protective equipment required, to reduce the exposure workers may have to contaminated soils.

Operational (Occupation) Phase

9.107 Consideration is given to the potential impacts from the identified risks during the Operational Phase. These are presented in Table 9.13.

Table 9.13 - Operational effects

Activity	Nature of Impact / Comments
Occupation of dwellings and operation of school	Contact with contaminants (if present) within garden and soft covered areas, consumption of produce grown in contaminated soils. Inhalation 'dusts' generated from contaminated soils. Impact from ground gases entering properties.
Soft Landscaped Areas (Public Open Space)	Potential for contaminated soils (if present) associated with infilled features to be present in areas defined as being for public open space.

9.108 A review of the baseline information has identified activities during the Operational phase which have the potential to cause harm to receptors. The potential impact has been considered and is summarised below.

Occupation of Dwellings and Schools

9.109 The baseline information has identified that there are several potential areas of contamination within the development area. Movement (or importation) of contaminated soils within the development area without suitable controls to identify or segregate contamination, may lead to **moderate to major** Adverse impact for the long term to occupants where contact with contaminated soils from garden areas where ingestion, inhalation of dusts or consumption of produce grown in contaminated soils occurs.

9.110 Further understanding of the presence, concentration, and distribution of contamination across the development area with be gained through further site investigation works. The baseline information has identified potential areas where contamination is likely to be present. Subject to findings of intrusive ground

investigation and monitoring, a remediation strategy would be provided, identifying appropriate measures required to protect end users and other identified receptors. Validation sampling and reporting will be undertaken to confirm remediation method statement has been successfully implemented on site.

Soft Landscaped Areas

9.111 The baseline information has identified that there are several potential areas of contamination within the development area. Movement (or importation) of contaminated soils within the development area without suitable controls to identify or segregate contamination, may lead to **minor to moderate** Adverse impact for the short term to end users encountering contaminated soils.

9.112 Further understanding of the presence, concentration, and distribution of contamination across the development area with be gained through site investigation works. The baseline information has identified potential areas where it is considered likely to be present. Subject to ground investigation and monitoring findings, a remediation strategy would be provided, identifying appropriate measures required to protect end users and other identified receptors. Validation sampling and reporting will be undertaken to confirm remediation method statement has been successfully implemented on site.

Potential Mitigation / Management Techniques

9.113 The following section provides a qualitative assessment of potential effects. It is stressed that further, site wide and detailed intrusive site investigation will be required to allow a quantitative assessment.

Site Clearance

9.114 Implementation of soils management plan to segregate and control the movement and storage of soils will prevent the likelihood of mixing of contaminated, hazardous materials and ‘clean’ soils. Additionally, identification of suitable stockpile locations to prevent the generation of run-off that could impact controlled waters. Pre-treatment of soils prior to excavation or within excavations would also control the potential impact by reducing the level of contamination.

9.115 This approach would reduce the potential impact from moderate adverse to **moderate beneficial** impact in the short term.

Clearance of ditches

9.116 Use of a temporary handling area for excavated saturated sediments from ditches to collect any generated waters will reduce the risk of spillage to soils and controlled waters.

9.117 This approach would reduce the potential impact from minor adverse to **minor beneficial** impact in the short term.

Cut and Fill Activities

9.118 Further understanding of the site-specific ground conditions through additional site investigation will inform the development of soils management plan. Through appropriate controls, the movement, storage, and reuse of excavated materials would reduce the geotechnical risk and risk to controlled waters from run-off.

9.119 Reuse of material on site would need to be implemented under the Development Industry Waste Code of Practice (DoWCoP). The DoWCoP applies to reuse of natural soils and made ground on site of origin and reuse of natural soils arising from other sites. Reuse of made ground between sites cannot currently be undertaken using the DoWCoP.

9.120 The Guidance presents key principals for demonstrating compliance with DowCoP to reuse of soils as non-waste, this needs to be lines of evidence based to demonstrate that soils are not waste. Lines of evidence must be set out in the Material Management Plan. Key principals to be met when reusing soils as non-waste are as follows:

- Reuse of material will not create unacceptable risk to human health or other identified receptors – i.e. risk assessment confirming suitability for reuse
- Suitability for reuse without further treatment – suitable chemically and geotechnically – must meet relevant specification – e.g. use as backfill beneath cover systems buildings or hardstanding or for site regrading
- Certainty of Use – must demonstrate that material will actually be used and is not just a probability – i.e. there is planning for the scheme and that backfill is required to make up levels or clean soils required for cover systems
- Quantities – materials used should only be in the quantities required – i.e. use of excessive material will = landfill on site as disposing waste soils that aren't required

9.121 A Material Management Plan should be submitted to a 'Qualified Person' (QP) for review and if appropriate the QP will sign a declaration that proposals within the MMP are in accordance with DoWCoP. The QP must be independent from and have had no prior involvement with the development area.

9.122 On completion, a verification plan must be produced documenting whether proposals set out in MMP were implemented on site – confirming volumes of material reused, reuse locations, and compliance with specifications.

9.123 This approach would reduce the potential impact from **minor adverse** to **moderate beneficial** impact in the short term.

Excavations

9.124 Further understanding of the site-specific ground conditions through additional site investigation will provide a better understanding of the extent of the contaminated infill and ground gas migration. Avoiding entry to deep pits is advised. However, should ground worker entry to deep excavations where ground gases have been encountered be required it may be necessary to use personal gas monitoring devices or confined spaces working protocols.

9.125 This approach would reduce the potential impact from major adverse to **minor beneficial** impact in the short term to ground workers entering excavations where ground gas ingress has occurred.

9.126 Further understanding of the site-specific ground conditions through site investigation will determine the ground conditions and the likelihood of instability due to factors such as 'running' sands. Construction methods can be identified to prevent collapse occurring through temporary supports, de-watering or preventing the entry of ground workers into excavations.

9.127 This approach would reduce the potential impact from major adverse to **minor beneficial** impact in the short term.

Construction Workers

9.128 Through site investigation, the presence and location of contaminated materials and soils/waters can be determined and assessed to determine the level of risk posed. Controls minimising the contact and exposure that construction workers have to contaminated soils/waters and hazardous materials may include the pre-treatment of contaminated soils/waters, limiting dust generation and the use of appropriate personal protective equipment.

9.129 This approach would reduce the potential impact from moderate/major adverse to **minor beneficial** impact in the short term to ground works from exposure to contaminated soils/waters or hazardous materials.

Occupation of Dwellings and Schools

9.130 Through site investigation works and risk assessment, the location, type and concentration of contamination identified can be mitigated to prevent the risk to future occupants. This may include the removal or relocation of contaminated soils and/or use of gas protection measures.

9.131 This approach would remove the moderate/ major adverse potential impact to end users and improve it to a **minor beneficial** impact allowing the development to proceed in accordance with suitable for use approach (i.e. removing pollutant linkages if present).

Soft Landscaped Areas

9.132 Through site investigation works and risk assessment, the location, type and concentration identified can be mitigated to prevent the risk to future users of the proposed soft landscaped open spaces. This may include the removal or relocation of contaminated soils and replacement with clean soils.

9.133 This approach would remove the potential impact to end users allowing the development to proceed in accordance with suitable for use approach (i.e. removing pollutant linkages if present) and have a **minor beneficial** impact.

Cumulative Effects

9.134 The baseline information has identified the potential presence of contamination associated with a former farm, inert landfill, former ground works, fuel storage tanks and agricultural farmland on site. With off-site agricultural land, brick works and gravel/clay extraction pits. Specific areas of potential infill have been noted and will require investigation to determine whether It is considered that there will not be any cumulative environmental effects arising from the development (with relation to ground condition issues).

Assessment of Residual Impacts

9.135 The site has a history of use as agricultural land and mineral extraction works. The desk study has identified several potential on and off-site sources of contamination associated with the site's current and former uses.

9.136 Detailed site investigation is required to confirm the ground conditions and levels of any contamination present, together with installation and monitoring of gas and groundwater level monitoring standpipes. This information can then be used to quantify the risks and refine the understanding of potential impacts.

9.137 Based on the information available, the overall impacts of the development is considered to provide a **minor beneficial** impact.

Chapter 10

TRAFFIC AND TRANSPORT

10. TRAFFIC AND TRANSPORT

Introduction

10.1 The north-west Sittingbourne allocation comprises four land ownership areas which collectively make-up the land allocated by Local Plan Policy MU1 (the Allocation Site). This ES relates to the proposed development as described in Chapter 4 (the Development) on land between Quinton Road and Bramblefield Lane, and at Pheasant Farm and Great Grovehurst Farm (the Site). The remainder of the allocated land adjacent Quinton Farmhouse, Quinton Road, is being promoted by Redrow Homes and is the subject of a separate ES.

10.2 This chapter documents the assessment of the likely significant effects of the Development with respect to transport. This chapter further assesses the likely significant cumulative effects of the Development in combination with development on the land adjacent Quinton Farmhouse.

10.3 This chapter summarises the technical work that has been undertaken to assess the likely significant environmental effects of the Development related traffic. In doing so, this chapter assesses base year traffic conditions within the vicinity of the Site and study area. It continues with an assessment of the forecast years (2023 and 2031) baseline conditions and finally an assessment of the "with Development" conditions at 2023 and 2031.

10.4 The Development and the associated significant environmental effects are considered, together with the mitigation measures required to prevent, reduce or offset significant effects, and the likely residual effects after these measures have been employed. The same assessment is completed for the cumulative developments comprising the Allocation Site.

10.5 It is intended that this chapter provides the reader with sufficient information to understand the likely significant transport effects of the Development.

Regulatory and Policy Context

Guidelines for the Environmental Assessment of Road Traffic

10.6 The analysis within this transport chapter has been prepared in accordance with 'Guidelines for the Environmental Assessment of Road Traffic' (Institute of Environmental Assessment, 1993). Accordingly, the topics of severance, driver

delay, pedestrian delay, pedestrian amenity and accident and safety are considered within this transport chapter.

National Planning Policy Framework, 2012

10.7 The National Planning Policy Framework (NPPF) was published in March 2012 and is the current over-arching planning guidance for local authorities. The NPPF highlights that sustainable development is made up of three elements that are mutually dependent on each other – economic, social and environmental. It further mentions that "plans and decisions need to take local circumstances into account, so that they respond to the different opportunities for achieving sustainable development in different areas."

10.8 The document is divided into a series of sections, and these are intended to provide guidance in specific circumstances. Section 4 of the document relates to the promotion of sustainable transport. In paragraph 30, planning authorities are encouraged to support a pattern of development which facilitates the use of sustainable modes of transport.

10.9 The NPPF recognises that different policies should be applied in different communities to achieve this balance, and that opportunities to maximise sustainable modes of transport will vary between urban and rural areas. The North-West Sittingbourne allocation is well located with existing connections to the town centre by all modes of transport and would be able to further enhance sustainable transport connections through its delivery.

10.10 Section 32 lists several considerations for planning authorities to apply in their decision making when reviewing Transport reports. These include the need to consider that opportunities for sustainable transport have been taken up, if the access arrangements are safe and suitable and if there are cost effective improvements to the transport network that could be made. Paragraph 32 of the Framework states that:

> *"'Development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe"*
>
> and that
>
> *"Plans and decisions should take account of whether safe and suitable access to the site can be achieved for all people".*

10.11 Importantly, NPPF advises that development should only be refused on transport grounds if the residual cumulative impacts are likely to be "severe". The term "severe" is not defined and interpretation and judgement therefore must be applied based upon the technical evidence available. Within the context of an Environmental Impact Assessment "severe" impacts are often described as those that would have a national or regional significance.

10.12 It is reasonable to suggest that within most urban settings, the existing traffic conditions will be busy, with congestion at peak periods, perhaps at weekends and even at other times as well. However, NPPF is suggesting that planning authorities should not allow this to stifle valuable economic development, in locations that are the best connected to encourage the use of alternative modes of transport.

10.13 The Site falls firmly into this category. Although mitigation of potential traffic impacts can be undertaken, the test is whether any residual impacts could be considered "severe" in the context of NPPF, and it is clear from the assessment that follows that this is not the case.

10.14 Section 34 of the NPPF requires developments that generate significant movement are located where the need to travel will be minimised and the use of sustainable transport modes maximised.

10.15 The allocation of the land at north west Sittingbourne is consistent with this policy objective as it ensures that residents, visitors, and employees associated with the development will have access to a range of transport modes, including access to bus and rail services. Footways are provided alongside the local carriageways along with formal crossing points to ensure access for pedestrians. On-site cycle facilities will also be provided. The Allocation Site and application Site will therefore connect with existing sustainable transport networks and enhance these, thereby providing a choice of travel modes for existing and future residents.

10.16 Paragraph 35 of the NPPF requires opportunities for sustainable travel to be exploited and should therefore give priority to pedestrians and cyclists and be accessible by public transport facilities. Developments should also:

> *"create safe and secure layouts which minimise conflicts between traffic, cyclists or pedestrians."*

10.17 The masterplan responds to this through provision of dedicated walking and cycling infrastructure on-site that connects to the external network and on-site facilities.

National Planning Practice Guidance, 2014

10.18 The National Planning Practice Guidance (NPPG) sets out current guidance for different aspects to development. For the purposes of this document, the guidance within the NPPG 'Travel Plans, Transport Assessments and Statements' document is considered.

10.19 The NPPG sets out the following with regards to Transport Assessments:

> *"Transport Assessments and Transport Statements primarily focus on evaluating the potential transport impacts of a development proposal… The Transport Assessment or Transport Statement may propose mitigation measures where these are necessary to avoid unacceptable or "severe" impacts… Transport Assessments and Statements can be used to establish whether the residual transport impacts of a proposed development are likely to be "severe" …"*

10.20 It is noted within the NPPG that Transport Assessments can positively contribute towards:

- encouraging sustainable travel;
- lessening traffic generation and its detrimental impacts;
- reducing carbon emissions and climate impacts;
- creating accessible, connected, inclusive communities;
- improving health outcomes and quality of life;
- improving road safety; and
- reducing the need for new development to increase existing road capacity or provide new roads.

10.21 The Development will encourage the use of sustainable travel modes by future residents and provide mitigation measures to avoid "severe" impacts as necessary.

Local Transport Plan for Kent 4 (LTP4)

10.22 Kent's fourth Local Transport Plan was adopted during August 2017 and sets out KCCs plans to meet its role of enabling:

"planned, sustainable growth and ensure the necessary infrastructure is in place, which will stimulate regeneration and encourage people and businesses to come to Kent. To be able to travel easily, safely and quickly to our destinations we need a transport network that can cater for current demand, enables economic growth, and supports a growing population."

10.23 The LTP4 document replicates the infrastructure requirements up to 2031 identified within the Growth and Infrastructure Framework (GIF) document. The GIF sets out the transport schemes necessary to address current and future capacity issues.

10.24 As the Local Transport Authority, KCC have a statutory duty to produce a LTP for the county of Kent. This strategy must identify the transport priorities for the county, as well as emphasising the investment required to support growth. The Kent and Medway GIF provides the evidence base for LTP4.

10.25 The LTP4 states the following ambition for Kent:

"To deliver safe and effective transport, ensuring that all Kent's communities and businesses benefit, the environment is enhanced and economic growth is supported."

10.26 To achieve this ambition the LTP4 document sets out five overarching policies that are targeted at delivering specific outcomes as summarised below.

- Policy: Deliver resilient transport infrastructure and schemes that reduce congestion and improve journey time reliability to enable economic growth and appropriate development, meeting demand from a growing population.

  Outcome 1: Economic growth and minimised congestion.

- Policy: Promote affordable, accessible and connected transport to enable access for all to jobs, education, health and other services.

  Outcome 2: Affordable and accessible door-to-door journeys.

- Policy: Provide a safer road, footway and cycleway network to reduce the likelihood of casualties and encourage other transport providers to improve safety on their networks.

  Outcome 3: Safer travel

- Policy: Deliver schemes to reduce the environmental footprint of transport and enhance the historic and natural environment.

Outcome 4: Enhanced environment

- Policy: Provide and promote active travel choices for all members of the community to encourage good health and well-being and implement measures to improve local air quality.
- Outcome 5: Better health and wellbeing

10.27 Kent's transport priorities in LTP4 are described as being strategic, countywide or local. The strategic priorities are infrastructure projects that KCC may not directly deliver or operate and are likely to affect a number of districts. Some of these are national priorities. Countywide priorities include promotion of road safety, sustainable travel and maintenance and upgrade of transport assets.

10.28 The LTP4 document brings together local priorities from individual Local Plans and supporting Transport Strategies that set out the transport infrastructure requirements to support growth in each District / Borough. Many of these priorities are also highlighted in the GIF.

10.29 With respect to Swale the LTP4 document identifies the following:

- Capacity issues at M2 Junction 5 is acting as a major barrier to growth in the Borough.
- Junction 7 of the M2 is key for development across East Kent, with growth loading traffic on to a junction already operating over capacity.
- A corridor study of the A249 is needed to define what improvements to the principal junctions (Grovehurst, Key Street and Bobbing) will be required to support the new allocations in the Local Plan, with the A249/Grovehurst Road Junction already identified in the GIF.
- On the Isle of Sheppey, serious congestion on the A2500 is a barrier to growth.
- On the Isle of Sheppey east-west travel is challenging and links to the mainland are largely dependent upon the Sheerness-Sittingbourne branch line.

10.30 The Development will support the outcomes defined within LTP4 by promoting sustainable travel opportunities, enhancing walking and cycling infrastructure, extending public transport connectivity, including access to Kemsley Rail Halt, and off-site highway infrastructure upgrades.

Growth without Gridlock – A transport delivery plan for Kent

10.31 Growth without Gridlock, published in December 2010, identifies a package of transport measures that KCC proposed to unlock growth potential within Kent. The plan sets out KCC's priorities for the county and their offer to government to deliver them.

10.32 With regard to Swale, the document advises that the key transport challenges are:

- Securing the necessary infrastructure to open up key development areas for housing and employment.
- Delivering capacity improvements on the strategic road network.
- Regeneration of Sittingbourne town centre
- The proposals within the document for Swale include major road infrastructure including:
- Sittingbourne Northern Relief Road extension to the A2;
- The A249 at Grovehurst, Key Street and Bobbing junctions, and
- M2 Junction 5 capacity improvement.

Swale Borough Local Plan, 2017

10.33 The Swale Borough Local Plan was adopted on 26 July 2017 and sets out the vision and overall strategy for the area and how it will be achieved for the period to 2031. Applications for planning permission will be determined in accordance with the Local Plan.

10.34 The Council has an overarching vision for the Borough to transform its economic, social and environmental prospects, making it one of the best places in Britain in which to live, work, learn and invest. The Local Plan has been prepared to support these priorities.

10.35 Paragraph 4.1.1 of the Local Plan states:

> *"…When considering development proposals, we will take a positive approach which reflects the national presumption in favour of sustainable development. We will always work pro-actively with developers to find solutions which mean that proposals can be approved as sustainable development and thereby secure improvements to the economic, social and environmental conditions in our area.*

Planning applications that accord with the policies in the Local Plan (and, where relevant, policies in neighbourhood plans) will be approved without delay, unless material considerations indicate otherwise."

10.36 Paragraph 4.1.24 of the Local Plan relates to the Local Plan transport strategy and states:

"Our Local Plan transport strategy:
encourages sustainable travel by the use of alternatives to the private car;
improves transport infrastructure by the removal of pinch points which are barriers to development and growth;
promotes alternative access to services by reducing the need to travel and supporting independence; and
helps improve road safety by reducing the number of people killed or seriously injured."

10.37 The Local Plan seeks to ensure that the proposed development on the Allocation Site will encourage and enhance the use of sustainable transport modes and will provide residential units in close proximity to amenities. Residents will have a choice of travel mode by which to make their journey.

10.38 Policy ST1 within the Local Plan sets out the means by which all development proposals must deliver sustainable development. This includes development being able to

"Offer the potential to reduce levels of out-commuting and support the aims of the Swale Local Transport Strategy;".

10.39 With respect to assessing the capacity for growth the Local Plan states at paragraph 4.2.14:

"The local highway authority advise that the local road network is adequate (subject to site specific improvements) to accommodate growth levels indicated by objectively assessed need in the first part of the plan period. There are implications both for the strategic and local road networks beyond 2021/22, which will need to be kept under review. For the strategic road network, improvements to Junction 5 of the M2 are programmed to commence by 2020. For the other A249 junctions within the local network, mitigation schemes have been identified and implementation will be carried out in tandem with the build out of development schemes. For the local road network, whilst the likely traffic impact of growth can be

accommodated in the short to medium term, there would be stresses toward the end of the plan period."

10.40 The Local Plan sets out a strategy for Sittingbourne. Paragraph 4.3.49 states:

"To promote sustainable transport, we are focusing on improving the quality of bus journeys, in particular the accessibility and facilities for passengers in central Sittingbourne. Within the town centre, major proposals will provide a central focus for bus and rail services in the vicinity of the station, which has been boosted by the award of £2.5m from the South East Local Economic Partnership local growth fund. Central Sittingbourne regeneration will also contribute to improvements to the highway network and traffic management within the town centre. A bus quality partnership will aim to improve public transport conditions and services at the town and in its centre, alongside additional routes to new developments and better walking and cycling routes."

10.41 Paragraph 4.3.52 states:

"At the north-west of the town, good connections to rail, bus and roads will enable a new community of 1,500 dwellings to be focused there. This location offers excellent connections to the existing urban area and beyond and is located close to Kemsley rail station and to the A249. It has significant potential to provide new schools, major open space and biodiversity enhancements."

10.42 Paragraph 4.3.56 and 4.3.57 state:

"These allocations will give rise to a series of improvements needed to the highway network, notably at junctions with the A249 to the west of the town and particularly at its junctions with Key Street and Grovehurst Road. Crucially, beyond limited planned improvements to Junction 5 of the M2, major improvements are now programmed for completion by 2024.

10.43 It is evident from the above paragraphs that the North-West Sittingbourne allocation is of considerable importance. It will support and enhance local public transport services and hence contribute to the objectives of the bus quality partnership as well as provide other infrastructure including schools and open space and links to Kemsley Rail Halt affording access to onward destinations.

10.44 Section 5 of the Local Plan sets out the core planning policies whilst section 5.2 considers the promotion of sustainable transport. The Local Plan recognises the key role that transport will play in the delivery of the Local Plan strategy. Paragraph 5.2.1 states:

> *"…..The transport network needs to strike a balance between providing adequate capacity for current and future residents and business needs, whilst minimising any negative environmental, social and health impacts. This can be achieved through improvements to the capacity of the highway network and through provision of an integrated sustainable transport network."*

10.45 With respect to impact of development, the Local Plan states at paragraph 5.2.3:

> *"The National Planning Policy Framework (NPPF) continues the core principle of sustainable development, through means such as using technology to reduce the need to travel, using planning policies and decisions to actively manage patterns of growth to make the fullest use of public transport, walking and cycling and focusing significant developments in areas which are or can be made sustainable. Only if the residual cumulative impacts of development are 'severe' when all of these policy measures have been explored and exhausted, is there a reason to prevent development on transport grounds. 'Severe' in terms of the NPPF is not defined."*

10.46 And paragraph 5.2.8 relates to the Strategic Road Network (A249 and M2 within Swale) and states:

> *"For the SRN, development proposals are likely to be acceptable if they can be accommodated within the existing capacity of a section (or link or key junction) of the relevant part of the network; or they do not increase the demand for use of that section which is already operating over capacity, taking account of any mitigation and/ or capacity enhancement measures which may be proposed. Generally, development should only be prevented or refused where the residual cumulative impacts of development are severe. Safety of the SRN is the key consideration for judging impact of proposed development."*

10.47 Paragraph 5.2.36 notes the need for strategic sites (including North West Sittingbourne) to provide improvements to the A249 junctions and states:

"This Local Plan continues to focus on Sittingbourne as the main urban area, with strategic allocations for housing and employment proposed to the north west and north east of the town. This utilises existing capacity on the A249 and the built and anticipated sections of the SNRR. The Grovehurst and Key Street interchanges with the A249 are nearing capacity and will require improvement to accommodate traffic arising from development proposed in the Local Plan. The impact on the Bobbing junction of further land allocations will also need to be evaluated. Suitable interim mitigation will be provided through strategic development allocations in the plan impacting on these junctions. S.278 or S.106 contributions will be pooled towards both interim mitigation and more major long-term improvement schemes, the latter of which will also require support from public funding."

10.48 An interim improvement scheme for the Grovehurst Road / A249 junction along with a mitigation scheme at Bobbing junction are proposed to support development of the north-west Sittingbourne allocation.

10.49 Policy CP2 sets out the policy with respect to sustainable transport and network improvements. The Development will enhance capacity on the highway network as necessary to mitigate its impact and promote the use of sustainable transport through appropriate Travel Plan measures. This will include enhancements to local walking, cycling and public transport provision.

10.50 Section 6 of the Local Plan details the site allocations. Section 6.6 deals with mixed use allocations including the largest of these at north west Sittingbourne. With respect to this site the Local Plan notes at 6.6.2 that it has:

"been identified as having significant potential to meet the Borough's future growth needs in a sustainable location that minimises impacts on the wider countryside due to its relative self-containment."

10.51 Paragraphs 6.6.7 to 6.6.9 state:

"A key issue affecting the allocation is the need for a new junction, between Grovehurst Road and the A249 which has been identified as necessary by the Highway Authorities. The main vehicular access into the allocation will need to have regard to the layout of this junction. There will also need to be pedestrian and cycle way links across the A249 utilising the existing right of way along Bramblefield Lane, both to facilitate use of the open space uses on either side and to enable a continuous pedestrian

and cycle route to Kemsley rail halt and the new schools at the Quinton Road site. Existing pedestrian/cycle links across the Grovehurst/A249 Junction will be retained and may need to be improved as part of the major remodelling of the junction rather than in any interim improvement scheme. Improvements to bus routes serving the site and the rail halt will be required, whilst improvements to station facilities at Kemsley should be explored.

Transport assessment work will also need to assess wider impacts in the A249 corridor between the Key Street and Grovehurst junctions and measures may be required to address any impacts arising. The assessment will also need to consider the phasing of development relative to any interim or longer term improvements to junction 5 of the M2.
The Masterplan/Development Brief should be informed by a Transport Assessment for the allocation which seeks to mitigate the impact of development traffic on surrounding roads including junctions with the strategic road network and within existing neighbourhoods. Access points are available from Grovehurst Road and Quinton Road, although the Transport Assessment will establish the need for, scale and nature of any off-site highway improvements necessary to mitigate unacceptable traffic impacts at the Grovehurst/A249 Junction and Bobbing/A249 Junction and elsewhere on the local highway network. Highways England and Kent County Council have, in principle, agreed the appropriateness of an interim improvement scheme to the Grovehurst Road/A249 junction to accommodate increases in traffic arising from Local Plan allocations. Development at the North West Sittingbourne allocation will be expected to contribute to the funding of the interim scheme although some development is likely to be acceptable in advance of it. The Transport Assessment will therefore need to inform the timing of transport mitigations to complement the phasing proposals in the Masterplan/development brief. Pedestrian/cycle links across the A249 will need to be improved via Bramblefield Lane and Old Sheppey Way commensurate with the interim improvement of the Grovehurst Road/A249 junction and at the junction itself as part of the ultimate junction remodelling."

10.52 Local Plan Policy MU1 sets out the Borough Council's requirements for the north-west Sittingbourne allocation and in relation to transport matters point 7 requires that;

7. Be supported by a transport assessment and access strategy in the Masterplan development brief to determine the need and timing for

improvements to the transport network and phasing of development and address the following:

a. The scale, nature and timing of interim improvements at Grovehurst Road/A249 junction and if necessary at the Bobbing/A249 junction;
b. Identification of vehicular access points from Quinton Road and Grovehurst Road and mitigation of traffic impacts on the local road network and existing neighbourhoods by defining an appropriate quantum of development relative to these access points;
c. The timing of any necessary off-site highway improvements relative to the phasing of development;
d. Identification of improvements to the public transport network between the site and Sittingbourne;
e. Encouragement of increased rail use from Kemsley Halt through enhancement of the facilities there and public pedestrian and cycle links;
f. Secure safe and attractive pedestrian and cycle links within the development and to the adjacent network including links to Iwade over the A249;
g. Have regard to the availability of land to the north of Swale Way already safeguarded for the remodelling of the A249/Grovehurst Road junction and should the mitigation design require it, within any other relevant allocation.

10.53 The Development will contribute towards an interim upgrade to the A249 Grovehurst junction that will accommodate Local Plan growth and will promote a mitigation scheme at the Bobbing junction. Pedestrian and cycle routes will be provided across the North-West Sittingbourne allocation, including use of the Bramblefield Lane PROW, which will be incorporated to the development and will integrate with (and enhance) the existing network. Links will also be made to Kemsley Rail Halt.

10.54 In accordance with Local Plan Policy MU1 a Development Framework has been produced by the site promoters and this has been shared with the local authority.

10.55 Section 7 of the Local Plan sets out development management policies and in particular section 7.2 sets out those related to managing transport demand. The Development is located such that it provides connections to sustainable modes of transport for future residents which can be enhanced as a result of the Development. On-site design will provide walking and cycling routes. A route suitable for a bus to pass through the development will also be provided along with footpath and cycle links to Kemsley Rail Halt.

10.56 Policy DM6 sets out the policy relating to the management of transport demand and impact. The Development responds to the requirements of DM6. The transport assessment document sets out the effects of the development on the local highway network and the mitigation measures proposed to address this. In addition, the masterplan shows a walking and cycling network on site to facilitate priority being given to these modes in navigating the site and linking with the external network. Existing PROWs will be retained and enhanced on site. Buses will serve the Site directly with the provision of a service along the spine road.

Swale Transport Strategy – Draft

10.57 The draft Transport Strategy for Swale considers the issues regarding transport in Swale and potential solutions to these in the context of national and local policies. The transportation action plan is structured into four main sections, those being:

- Encouraging sustainable travel
- Improvements to transport infrastructure
- Alternative access to services
- Road Safety

10.58 It is intended that the strategy will provide a detailed policy framework for the district which will support and complement the Local Plan. It will identify the transportation solutions that are considered to be necessary to support or unlock future development.

10.59 The key transport issues in Swale are set out by the document as being:

- Congestion at M2 Junction 5 acts as a barrier to further development in Swale.
- Capacity improvements required at A249 Key Street and Grovehurst interchanges.
- Rural areas of the borough are remote from main centres and less well served by public transport.
- Public transport tends to be inaccessible to the mobility impaired.
- Traffic congestion with school / employment commuting into Sittingbourne, causing rural rat-runs in the south of town and air quality issues.
- Transport interchange between cycle routes, bus services, and train services is poor, therefore encouraging the use of cars to rail stations, which add to problems with parking and congestion.

- Not enough uptake of sustainable transport.
- No current parking strategy.
- Constrained viability of new developments to provide significant infrastructure contributions.

10.60 The draft Transport Strategy summarises the transportation modelling of the planned development in Swale looking at a 'Do Minimum' scenario which assumes only background growth, and two 'Do Something' scenarios, one assuming the construction of 540 dwellings per annum, and one assuming the construction of 740 dwellings per annum.

10.61 The document explains that across the Borough there is scope to improve the levels of walking and cycling, and in particular travel by bus. All new developments will be required to provide for sustainable transport by:

- ensuring that all housing and employment developments are served by bus routes, with fully accessible stops within 400m of any part of the site;
- ensuring there is space for secure cycle provision;
- ensuring that local amenities are within walking distance;
- prioritising walking and cycling routes, making them direct and secure through design.

10.62 With respect to sustainable transport the document sets out a number of actions, including those listed below:

- Implement the Swale Cycling Strategy.
- Secure and sheltered cycle parking covered by CCTV to be provided at all train stations.
- Use the Quality Bus Partnerships to ensure that the needs of the whole Borough are being met and that the expertise of the bus operators is fully utilised.
- Ensure that new developments provide kickstart funding to make a bus service viable from the outset.

10.63 With respect to transport infrastructure the document recognises that

"it is not realistic to aim to remove all congestion at all times"

10.64 and that:

"major road building solutions are not likely to be affordable solely using developer contributions or community infrastructure levy, but notwithstanding this, developers will be required to contribute proportionately to improvements to the highway directly and indirectly affected by their proposals."

10.65 The strategy advises that capacity improvements and safety improvements at key junctions will be required, particularly where queuing traffic would impact on the strategic road network (M2 or A249). The document sets out a number of actions including:

- Improve capacity at M2 junction 5.
- Improve capacity at the A249 Grovehurst junction.

10.66 The draft Transport Strategy sets out several targets to maintain traffic volumes, increase proportion of mode share by sustainable modes, improve public transport reliability and safety.

10.67 The Development will support and provide opportunities for sustainable travel and will offset the effect of development traffic as appropriate at junctions off site through mitigation schemes.

Development being Assessed

Land between Quinton Road and Bramblefield Lane and at Pheasant Farm

10.68 This part of the allocation is bordered to the west by the A249, to the east by the railway line, Quinton Road to the south and Grovehurst Road to the north. Access to this part of the allocation will be directly via Quinton Road to the south and Grovehurst Road to the north. The Quinton Road access junction will comprise a priority give way junction with a right turn bay. The Grovehurst Road access will comprise a staggered priority junction with right turn bays providing access to each part of the Site on the east and west sides of the road. A spine road will connect the Quinton Road and Grovehurst Road access points.

10.69 A further access will be available to serve the secondary school on site via the medical centre access on Grovehurst Road. Additional emergency access could be achieved from Bramblefield Lane. On this part of the allocation it is proposed to deliver the following:

- Some 1,200 residential units.
- A new local centre with retail provision to meet local requirements.
- A 2 form entry primary school.
- A 6 form entry secondary school.
- A Linear Park along the western boundary that would act as a multifunctional area (open space, play area, noise buffer, ecological mitigation and enhancement area).
- Greenways of multi-functional public open space to serve the development and also the wider community.
- Improved links to Kemsley Rail halt.
- Provision for bus access to serve the site.

Land at Great Grovehurst Farm

10.70 This part of the is enclosed by Swale Way to the north, Grovehurst Road to the west, the Sittingbourne to Sheerness railway line to the east and the Godwin Close/ Danes Mead estate to the south.

10.71 Access to the site will be via a priority junction with a right turn bay on Grovehurst Road. The site will deliver the following:

- 110 residential units
- Open space.

Land adjacent Quinton Farmhouse, Quinton Road

10.72 This part of the north-west Sittingbourne allocation is bound by Quinton Road and several residential properties to the south and the A249 to the west. Access to this parcel of land will be gained directly from Quinton Road as a simple priority junction and internally from within the wider Allocation Site to the north and east. The Development is proposed to deliver the following:

- 155 residential dwellings.
- A Linear Park along the western boundary of the site.

10.73 It is anticipated that the first planning permissions will be granted during 2018, allowing the Development (and wider Allocation Site development) to be commenced later that year or early in 2019. The table below provides an indication of the anticipated build rate for delivery of the residential units. It should be noted that the figures given are greater than those stated above to provide a robust assessment.

Table 10.1 - Anticipated build rate

Year	Quinton Rd Bramblefield Ln / Pheasant Farm	Land adj Quinton Farmhouse	Grovehurst Farm	Total	Cumulative
2018/19	60	60		120	120
2019/20	75	60		135	255
2020/21	100	60	23	183	438
2021/22	135	20	55	210	648
2022/23	90		42	132	780
2023/24	90			90	870
2024/25	100			100	970
2025/26	100			100	1070
2026/27	100			100	1170
2027/28	100			100	1270
2028/29	100			100	1370
2029/30	90			90	1460
2030/31	60			60	1520
Total	**1200**	**200**	**120**	**1520**	**1520**

10.74 It is noted that during the first 5 years of development there will be around 100 to 200 units completed per annum. This reflects the simultaneous build out on each of the sites. Thereafter, it is anticipated that around 60 to 100 units would be completed each year on the land at Quinton Road/Bramblefield Lane/Pheasant Farm.

10.75 The 2-form entry primary school proposed within the Allocation Site is intended to meet the education needs generated by the residential on site. Therefore, the primary school will be delivered at an early stage in the development.

10.76 Kent County Council (KCC) has indicated that they expect the primary school to initially be fitted out as a 1 form entry school and then, when the development of the Allocation Site is sufficiently progressed, a further form entry will be made available. The Development Framework for the site indicates that a 1 form entry school will be available by 450 completions (2020 / 2021) and 2 forms at around 1100 units (2026 / 2027). This has been assumed for cumulative assessment purposes.

10.77 The 6-form entry secondary school proposed within the Allocation Site will have a larger catchment area and, in view of its scale, is likely to take longer to deliver. Again, KCC has indicated that they expect the development to be phased, with 3 forms of entry initially provided, prior to a future expansion to 6 forms of entry. The Development Framework for the Allocation Site indicates

that a 3-form entry school will be available by 650 completions (2021 / 2022) and 6 forms at around 1250 units (2027 / 2028). This has been assumed for cumulative assessment purposes.

10.78 The convenience store and any community facilities within the Allocation Site will be provided to meet the needs of the residents on site. The timing of these will be dependent upon the demand generated by the development and can hence be flexible.

10.79 The initial infrastructure requirements will comprise access to the Allocation Site. To the south it is intended that accesses will be provided from Quinton Road for both the main part of the north-west Sittingbourne allocation and the land adjacent Quinton Farmhouse. To the north it is intended to provide an access to the land at Pheasant Farm and Great Grovehurst Farm. The proposed secondary school access from Grovehurst Road would be constructed as the secondary school is progressed and will be fully built and open for use prior to opening of the secondary school.

10.80 For the purposes of assessment, the completion of the proposed spine road has been assumed at 2022 / 23. At this stage the land at Great Grovehurst Farm (120 units have been assumed for the purposes of assessment) and northern first phase of the land at Pheasant Farm (100 units) will be built out and accessed independently from Grovehurst Road. In addition, development on the land adjacent Quinton Farmhouse will be complete (155 units) and accessed independently from Quinton Road. For the purposes of assessment, a maximum quantum of 200 units has been assumed for this part of the allocation and hence this reflects a robust assessment. By this time 360 completions will have occurred on the land at Quinton Road/Bramblefield Lane and accessed independently from Quinton Road.

10.81 The assessment completed for the Development and the cumulative Allocation Site development considers a 2023 scenario, just prior to the spine road through connection being made. This is considered to be a worst-case scenario whereby drivers are forced to use the independent access and egress junctions associated with their site, rather than being able to choose the wider access and egress points to the Allocation Site most appropriate for their journey. Hence, this scenario assesses the maximum number of units on site without the ability to pass through the Site.

10.82 It is intended that the spine road through the Allocation Site will not be a through route attractive to general traffic but will instead serve the needs of the

Allocation Site development, both for private vehicles, walking and cycling and public transport. Hence the spine road will be designed accordingly with raised tables at junctions and crossing points, walking and cycling infrastructure alongside it, but with sufficient width to accommodate bus movements.

10.83 On completing the spine road through the Site at 2023 it is anticipated that traffic patterns from the Allocation Site would adjust to the availability of new routes. Hence, a proportion of the Development traffic would divert to Grovehurst Road and a proportion of the Pheasant Farm/Great Grovehurst Farm traffic would head south through the Site to Quinton Road. Beyond 2023 the build out would continue with both access locations available.

10.84 On the basis of the above it has been assumed appropriate to assess a completion year of 2031 and an interim year of 2023. This has been completed as an assessment for both the Development and the cumulative Allocation Site development. This also coincides with the Local Plan horizon.

10.85 There will be a need for physical highway mitigation schemes off site resulting from the effect of the Development traffic and / or cumulative Allocation Site development traffic imposed upon them. The off-site junction assessments define the mitigation schemes required at 2023 and / or 2031.

10.86 Alongside the physical highway works there will be infrastructure requirements for walking and cycling journeys. On-site the masterplan shows walking and cycling provision through the Development and connectivity with the off-site facilities.

10.87 Connecting the Site by bus to the town centre, rail station and other local amenities will be important. The Development will support existing bus services through additional patronage and enhancement to existing services.

Assessment Methodology and Significance Criteria

Scope of assessment

10.88 The analysis within this transport chapter has been prepared in accordance with 'Guidelines for the Environmental Assessment of Road Traffic' (Institute of Environmental Assessment, 1993). Accordingly, the topics of severance, driver delay, pedestrian delay, pedestrian amenity and accident and safety are considered within this transport chapter.

Baseline

10.89 Background traffic flow information for the morning and evening peak hours within Sittingbourne for 2015 was derived from traffic surveys. The traffic flow data comprises traffic flows on the highway network surrounding the site and for the A249 and A2 corridors serving Sittingbourne.

10.90 Site visits and a desktop study have been completed to define the existing transport network serving the Site and local area. This includes a review of local bus and rail services and walking and cycling facilities.

10.91 Forecast years of 2023 and 2031 have been assessed to coincide with the Development Framework timetable of providing a link through the site and the Local Plan period. The assessment therefore comprises a comparison of a '2023 Baseline' scenario (i.e. predicted traffic flows in 2023 without the implementation of the Development) and a '2023 with development' scenario (i.e. the traffic flows at 2023 with implementation of the Development). The same is assessed for 2031. A further assessment is completed at the two forecast years to determine the cumulative effect of the Allocation Site.

10.92 In this manner the effect of the Development has been identified and assessed, separate to any increase in background traffic that is not associated with the Development.

With development

10.93 The assessment completed within the Transport Assessment (TA) considers the ability of the highway network to serve the additional traffic associated with the Development. Where the highway network is demonstrated to not operate satisfactorily, mitigation measures have been considered and assessed.

10.94 Development traffic flows were derived and added to the 2023 and 2031 baseline scenarios. This provides an understanding of the likely effects of the Development traffic on the highway network. The same is completed for the cumulative traffic flows as a result of the Allocation Site development.

Significance Criteria – Receptors

10.95 To evaluate and quantify the likely significant transport effects of the development, significance criteria have been adopted. Effects may be positive (ie beneficial) or negative (ie adverse).

10.96 The overall significance of effect for each potential transport impact has been derived through cross referencing the sensitivity of receptors, and the likely magnitude of the transport impact upon each of them

10.97 Categories of receptor sensitivity have been defined from the principles set out in the 'Guidelines for the Environmental Assessment of Road Traffic' and are summarised in Table 10.2 below.

Significance Criteria – Magnitude of impact

10.98 The paragraphs below consider the definition of Magnitude for various transport impacts.

Table 10.2 - Receptor sensitivity

Sensitivity	Criteria
High	Schools, colleges and other educational institutions
	Retirement/care homes for the elderly or infirm
	Roads with no footway that may be used by pedestrians
	Accident blackspots
Medium	Hospitals, surgeries and clinics
	Parks and recreation areas
	Shopping areas
	Roads with narrow footway that may be used by pedestrians
Low	Open spaces
	Tourist/visitor attractions
	Historical buildings
	Churches and other places of worship

Significance Criteria – Magnitude of impact

10.99 The paragraphs below consider the definition of Magnitude for various transport impacts.

Severance

10.100 The measurement for assessing severance is difficult to predict as according to the Guidelines for the Environmental Assessment of Road Traffic, 1993:

> *"the correlation between the extent of severance and the physical barrier of a road is not clear and there are no predictive formulae which give simple relationships between traffic factors and levels of severance"*

10.101 Nevertheless, a range of indicators set out by the Manual for Environmental Appraisal (Department for Transport, 1983) can be used to determine the significance of relief from severance. These indicators will be used to assess the severance in this instance and are summarised Table 10.3 below.

Table 10.3 - Severance indicator thresholds

Indicator	Change in traffic flow
No change	No change
Negligible	< 30%
Minor	30% - 60%
Moderate	60% - 90%
Major	> 90%

Fear and intimidation

10.102 With respect to the assessment of 'Fear and Intimidation', the thresholds summarised in Table 10.4 below will be adopted. The thresholds adopted are based upon (and add to) the thresholds identified within the 1981 study by Crompton and Gilbert entitled 'Pedestrian Delays, Annoyance and Risk'.

Table 10.4 - Fear and intimidation thresholds

Degree of hazard	Average traffic flow over 18 hr day vehicles/hour	Total 18 hr HGV flow	Average speed over 18 hr day miles/hour
Major	1800 +	3000+	20+
Moderate	1200-1800	2000-3000	15-20
Minor	600-1200	1000-2000	10-15
Negligible	<600	<1000	5-10
No change	No change	No change	No change

Driver delay

10.103 Routes affected by the Development traffic have been considered and whether these routes can be mitigated. The assessment of driver delay has been based on a judgement using the comparison of the Development traffic flows and the baseline flows.

Pedestrian Delay

10.104 With respect to 'Pedestrian Delay' the guidance advises that assessors use judgement to determine whether pedestrian delay is a significant impact. The guidance highlights changes in the volume, composition or speed of traffic may affect the ability of people to cross roads.

Pedestrian Amenity

10.105 With respect to 'Pedestrian Amenity' this is described in the guidance as 'relative pleasantness of a journey'. The guidelines suggest that the significance of changes in pedestrian amenity would be where the traffic flow (or its lorry component) is halved or doubled.

Accidents and Safety

10.106 With respect to 'Accidents and Safety' the likelihood of accidents occurring on a link or at a junction, relating to the addition of traffic associated with development, is considered in this assessment based upon several factors. These include the:

- current number of accidents
- whether they have a common causation factor

- and the number of new trips from the Development travelling through the link / junction

10.107 These factors are considered, and assessor judgement used to make an assessment.

Significance Criteria – Significance of effect

10.108 The significance criteria adopted for likely traffic and transport effects is based on the magnitude (or scale) of the change as well as the sensitivity (or importance) of the receptor affected. The magnitude of effects and receptor sensitivity will be compared to estimate the significance of the effect.

10.109 As there are no published standard criteria, Table 10.5 below includes a range of criteria to allow the specific characteristics of each effect to be considered.

Table 10.5 - Significance of effect criteria

		Magnitude of impact				
		No change	Negligible	Minor	Moderate	Major
Receptor sensitivity	Very High	Neutral	Slight	Moderate	Large	Very Large
	High	Neutral	Slight	Moderate	Large	Large
	Medium	Neutral	Slight	Slight	Moderate	Large
	Low	Neutral	Slight	Slight	Slight	Moderate
	Negligible	Neutral	Neutral	Neutral	Neutral	Neutral

Embedded Design Mitigation

10.110 With respect to pedestrian and cycle access the Development design promotes a permeable layout for these modes with convenient connections to the existing network and all parts of the wider Allocation Site.

10.111 The Development will provide the following pedestrian and cycle access points to and from the existing highway network:

- Quinton Road vehicle access – Pedestrian and cycle access will be gained via the proposed vehicular access arrangements. A 2m wide footway will be provided along the west side of the access spine road and a 3m footway / cycleway on the east side, linking with the external pedestrian network on the southern side of Quinton Road. This footway will run to the east and

west of the access, on the northern side of Quinton Road, and provide access to the wider network via new crossing points.

- Grovehurst Road vehicle access – Footway / cycleway connections to the wider external network to the north will be provided. A 2m wide footway will be provided along the west side of the access spine road and a 3m footway / cycleway on the east side, linking with the external network on Grovehurst Road.
- Medical centre vehicle access – A footway connection to the wider external network will be provided to the secondary school. A 2m wide footway will be provided along the north side of the medical centre access linking with the external network on Grovehurst Road.
- The spine road passing through the Site will be designed to accommodate two-way bus movement. This will facilitate bus services through the Site allowing encouragement of residents to use this travel mode.
- Bus stopping locations will be provided on-site such that all residents will sit within a 400m radius of a bus stop on-site.
- A link to Kemsley rail halt could be provided through the KCC school site and this would be subject to masterplanning of the school site and agreement with Network Rail. In the absence of this connection, alternative routes to Kemsley rail halt are available using the medical centre access (for secondary school students) and Bramblefield Lane.

Consultation

10.112 With respect to Transport no additional issues were raised over and above those identified at the formal ES Stage. Those issues being:

- Traffic flows during and post construction
- Effect on existing highway network
- Connectivity (public transport services, footpaths, and cycleways)
- Consultation recommended with Highways England and KCC's Highways Team

10.113 This ES chapter has been produced in response to these issues but in line with the relevant policy and regulation documents and in discussion with officials at the relevant highway authorities.

Baseline Conditions

Receptors

10.114 The receptors that have been identified along each link are based upon Table 10.2 above and are listed in Appendix 10.1: Table 1 attached.

Strategic highway network

10.115 Access to the Site from the strategic highway network is via the A249 trunk road dual carriageway. The A249 is a strategic route that links Maidstone with Sheerness on the Isle of Sheppey and also serves as a link between the M2 and M20 motorway corridors.

10.116 The A249 can be accessed from the Site via the Grovehurst Road junction to the north and routes to Bobbing junction to the south. The Grovehurst Road junction is a grade separated dumbbell junction, comprising two roundabouts connected by a single bridge over the A249. The Grovehurst Road junction layout allows all movements to be made between Grovehurst Road and the A249.

10.117 The Bobbing junction is a four-arm grade separated junction that comprises a gyratory below the A249 main line. Slip roads serve merging and diverging traffic to and from the A249 main line.

10.118 Heading further south the A249 passes through the A2 Key Street junction and thereafter intersect the M2 at Junction 5 (some 8km south of the Grovehurst Road junction). This interchange comprises a five arm roundabout, with the M2 on and off slips forming the east and west arms and the A249 forming the north and south arms. Maidstone Road forms the fifth, north-eastern arm of the junction. The M2 passes over the top of the A249 at this location.

Local highway network

10.119 The majority of the Allocation Site will be directly accessed from Quinton Road to the south and Grovehurst Road to the north. The land at Great Grovehurst Farm will be accessed directly from Grovehurst Road.

10.120 Quinton Road performs the role of a local distributor road, with no direct access for private dwellings. It is subject to a 30mph speed limit and features street lighting along its length.

10.121 A footway is provided alongside the south side of Quinton Road from The Meads Avenue heading west across the A249 and Sheppey Way. A 7.5T weight restriction (except for access) applies to Quinton Road and the national speed limit (60mph) applies to the west and over the A249.

10.122 To the east of the Allocation Site access, Quinton Road crosses over the railway line via a single lane bridge. Traffic movements are controlled by shuttle working signal control.

10.123 To the north, the B2005 Grovehurst Road is predominantly residential in nature along much of its length. At its north extent the B2005 Grovehurst Road connects with the A249 Grovehurst Road junction. Heading south from this location the B2005 Grovehurst Road is a wide single carriageway and is subject to the national speed limit (60mph) and benefits from a street lighting regime.

10.124 Approximately 150m south of the Site access, the speed limit reduces to 30mph as the road enters the built-up area and is flanked by residential properties on both sides. Footways are also provided on both sides of the road.

10.125 Heading further south the B2005 Grovehurst Road passes through the staggered crossroads of Bramblefield Land and Hurst Lane. At this location is a convenience store and post office. Sections of cycleway are provided on the south west and south east corners of the junction whilst pedestrian crossing refuges are located north and south of this junction.

10.126 Continuing south a parking layby is provided on the east side of the road on the approach to the medical centre access.

10.127 The B2005 Grovehurst Road continues south as a wide route passing Kemsley Station. The direct residential frontage disappears south of the station although a footway continues on the west side of the road to the roundabout with Grovehurst Avenue.

10.128 South of this roundabout the B2005 Grovehurst Road widens and comprises a mix of parking laybys, bus stops, intermittent direct frontage, further roundabouts, pedestrian crossings, a footway on the west side and a footway / cycleway on the east side.

10.129 Bramblefield Lane penetrates into the Allocation Site from the eastern side. This road is an existing residential cul-de-sac and also forms part of National Cycle

Route 1. The route of NCR1 has been stopped up to motor vehicle traffic where it crosses the A249 between Bramblefield Lane and Sheppey Way.

10.130 To the north, Swale Way is a 40mph single carriageway route connecting with the B2005 Grovehurst Road junction. A footway / cycleway is provided along its southern side and it features street lighting along its length.

10.131 Swale Way forms part of the Sittingbourne Northern Relief Road (SNRR), which aims to link the A249 (at the Grovehurst Road junction) with the A2 corridor to the east of Sittingbourne, via the industrial areas to the north and north-east of the town.

10.132 To the west of the A249 the Grovehurst Road provides access to Iwade. This settlement has been the subject of significant development over recent years and continues to be identified for growth within the Local Plan. The Iwade development is accessed from the Grovehurst Road junction to its east and Sheppey Way to its north and south.

10.133 Sheppey Way is a single carriageway route that connects the Isle of Sheppey to the north with the A2 to the south. It passes through Iwade and connects with Bobbing junction and the Key Street junction.

10.134 Sheppey Way provides a connection between Quinton Road and Bobbing junction. It forms a priority junction with Quinton Road incorporating a right turn bay facility. Continuing south it is unlit until the vicinity of the school. A footway is provided on the east side of the carriageway for the full length whilst a footway heads south on the west side in the vicinity of the school. Cycleways are marked on street in both directions.

10.135 The route continues south towards Bobbing junction where it forms a priority junction with the west arm of Bobbing junction.

Walking and cycling

10.136 There is a footway on the south side of Quinton Road opposite the Development access. This will be supplemented through the provision of a pedestrian footway on the north side of Quinton Road to be delivered by the Development. The existing footway provides a link west to Sheppey Way and thereafter south to Bobbing as a footway and on street cycleway.

10.137 A crossing point will be created on Quinton Road at the spine road access using a pedestrian refuge and dropped kerbs and tactile paving. This will provide access to the existing footway on the south side of Quinton Road and hence a route between the site and Knightsfield Road and The Meads.

10.138 A signal-controlled crossing point can be provided to the east where the existing signal-controlled shuttle working across the rail line exists. This could be provided as a toucan crossing and would provide a route to the existing footway / cycleway on the south side of Quinton Road / Vicarage Road. The crossing facilities described above are illustrated below.

10.139 Heading west the existing footway provides a link to Sonora Way and The Meads. A shared pedestrian/cycle route is provided along Sonora Way, to the south of the site, providing off-carriageway access through the residential area to the B2006.

10.140 Within the Site a permeable walking and cycling network will be provided. The Site masterplan provides a spine road connecting Quinton Road and Grovehurst Road. This spine road will include a walking and cycling route alongside its length.

10.141 A footway runs along the western side of the entire length of Grovehurst Road, from the A249 Grovehurst Road junction in the north to the Saffron Way / North Street junction in the south. This route crosses the railway line adjacent to Kemsley station on a footbridge, connecting with footways running along either side of Saffron Way and North Street and hence providing a pedestrian link into Sittingbourne town centre.

10.142 In addition, there is also a footway running along the eastern side of one section of Grovehurst Road. This extends from the northern most property on this road to just south of the junction with Hurst Lane.

10.143 There is a Public Right of Way passing through the Site. Route ZU6 starts at the junction of Middletune Avenue and Newbridge Avenue, to the south east of the site, and continues north west, crossing the railway line between Sittingbourne and Kemsley via an at-grade crossing before continuing into the site.

10.144 As it crosses the middle section of the Site, route ZU6 turns into route ZR110, continuing in a north easterly direction alongside the A249 dual-carriageway before terminating at Bramblefield Lane. On Bramblefield Lane the route is on street for cyclists although this is a lightly trafficked cul de sac amenable to cycle

journeys. Within the Site the route continues as a hard-surfaced walk / cycle route heading west towards the A249. The route crosses the A249 via a cycle / footbridge and continues on street to Iwade to the north and Howt Green to the south.

10.145 National Cycle Route 1 (NR1) includes a mix of on and off-road sections through Sittingbourne. It follows Bramblefield Lane to the east through to the existing residential area on the eastern side of the railway line via a footbridge and then heads south to Sittingbourne town centre and the train station. The route to the west crosses the A249 and continues north to Sheerness and west to Gillingham and beyond. To the east it continues along Ypres Drive and Grovehurst Avenue before running along Grovehurst Road, Saffron Way, Mill Way and Eurolink Way.

10.146 To the west, the route splits and continues south west towards Rainham (via Sheppey Way and Stickfast Lane), and north through Iwade towards the Isle of Sheppey.

10.147 The route is on-carriageway for the majority of this section, although there is a short off-road section along Saffron Way between the North Street and Langley Road junctions, facilitated by a shared footway / cycleway along both sides of the road at this location.

10.148 Further afield footways are typically provided adjacent to the local highway network surrounding the site and these enable access to Sittingbourne town centre where amenities and potential employment opportunities exist.

Bus

10.149 Existing bus stops are located on Quinton Road close to the development access. They consist of a flagpole with a ‘Bus Stop’ sign attached and are served by the 341. This is operated by Arriva Kent & Surrey and runs once per day on weekdays to Sittingbourne town centre and returns, continuing to Iwade.

10.150 Bus stops are also located on Sonora Way, approximately 400m (around a five-minute walk) from the proposed Site entrance. These bus stops are served by the 334, operated by Arriva Kent & Surrey and run once per hour Monday to Saturday between Maidstone, Detling, Sittingbourne, Iwade, Queenborough and Sheerness.

10.151 To the north there are additional bus services on Grovehurst Road. The nearest bus stops on Grovehurst Road are adjacent to the entrance to Grovehurst Surgery and around 500m (around a 5-6 minute walk) from the main vehicular access to the site. The northbound bus stop sits in a dedicated layby and consists of a flagpole with timetable information. The southbound bus stop meanwhile does not feature any physical infrastructure.

10.152 Additional bus stops on the B2005 Grovehurst Road are located approximately 90m north of the junction with Hurst Lane, approximately 160m (around a 2-minute walk) from the main vehicular Site access.

Rail

10.153 The nearest rail station to the Site is Kemsley, located alongside the B2005 Grovehurst Road. Access to this station will be gained either directly from within the Site or via the existing footways on Grovehurst Road.

10.154 There are two public entrances to the station (one on either side of the railway line), accessed via footways that lead from the western side of Grovehurst Road. These provide step-free access to both platforms. There is no vehicular access to the station or vehicle or cycle parking and the station is unmanned. A gated pedestrian access is also accessible from the adjoining medical centre.

10.155 Services at Kemsley railway station typically operate twice per hour between Sittingbourne and Sheerness, with interchange provided at Sittingbourne for onward connections to Canterbury, Ramsgate, the Medway Towns and London. There are two services operating direct from Kemsley to London Victoria (not stopping at Sittingbourne) on weekday mornings and two weekday evening services arriving from Victoria.

10.156 Sittingbourne station is located approximately 2km (around a 25-minute walk) south-east of the Site. The station can be reached by train from Kemsley via the half-hourly shuttle between Sittingbourne and Sheerness. Trains from Sittingbourne station serve London Victoria and St Pancras International, via Gillingham, Chatham and Rochester, and also Canterbury, Dover and Ramsgate. In addition, there is also the half-hourly shuttle service to Kemsley and Sheerness together with a few early morning weekday commuter services to London Cannon Street and Blackfriars in the City (and vice versa in the evenings).

Traffic flows 2015

10.157 The 2015 base year traffic flows for the links considered have been extracted from the observed traffic movements and converted to 18-hour data using factors derived from Department for Transport's statistics. These are summarised in Appendix 10.1: Table 2 attached.

Accident data

10.158 Crash data for the previous 5 years was purchased from KCC for the local highway network surrounding the site.

10.159 The information assessed comprised 133 crashes within the extent considered, of which 14 was classified as 'serious' in severity and the remaining 119 as 'slight' in severity. The accident data was reviewed, and no common causation factors were generally identified.

Background traffic flows

10.160 The 2023 forecast background traffic flows for the links considered were derived by factoring the 2015 observed traffic flows using the growth factors below:

- 6.88% for trips on the local highway network (AM peak hour)
- 6.86% for trips on the local highway network (PM peak hour)
- 9.38% for trips on the trunk road network (AM peak hour)
- 9.36% for trips on the trunk road network (PM peak hour)

10.161 The 2031 forecast background traffic flows for the links considered were derived by factoring the 2015 observed traffic flows using the growth factors below:

- 13.76% for trips on the local highway network (AM peak hour)
- 13.72% for trips on the local highway network (PM peak hour)
- 18.76% for trips on the trunk road network (AM peak hour)
- 18.72% for trips on the trunk road network (PM peak hour)

10.162 These growth factors have been based upon growth factors from the Tempro database which have been adjusted to remove double counting of growth added explicitly from committed development sites in Sittingbourne.

Committed development traffic flows

10.163 When considering the baseline traffic flows on the local highway network, it is appropriate to consider other local development schemes which will be coming forward, by virtue of having planning permission, in the local area during the assessment period.

10.164 During the scoping exercise it was agreed with highway officers that account should be taken of the following committed development sites within the baseline traffic flows.

- SW11/0159 Morrison's Mill Way - 150 residential units left to build out.
- SW14/501588 Stones Farm, Bapchild - 600 houses.
- SW14/505440 Spirit of Sittingbourne - 215 residential units.
- SW/02/1180 - Land at East Hall Farm – 314 residential units left to build out.
- SW/08/1127 – Land at Coleshall Farm, Iwade – 145 residential units left to build out.
- SW/13/0215 - Eurolink V / Land North of Swale Way - construction of up to 43,000m2 of business park.
- SW/16/507689/OUT - Frognal Lane mixed use development - no significant effect arises from the Frognal Lane development on the junctions considered within this ES and hence no explicit account is required of this development.
- SW/17/503888/OUT transport depot at Lydbrook Close - no net discernible impact at any of the junctions considered within this ES and hence no explicit account is required of this development.
- SW/14/506167 FloPlast site on Sheppey Way - a reduction in traffic flow as a result of the development, hence no explicit account is required of this development.
- SW/16/507877 Crown Quay Lane –an impact at 4 of the junctions included within this ES and herefore, explicit account has been taken of the traffic flows for this site in the baseline scenario.
- SW/10/0444 Kemsley Paper Mill –only a modest level of traffic generation from the proposed Kemsley Mill development during the morning and evening peak hours and reasonable to assume that the background traffic growth factors make an allowance for this.
- Allocated Iwade site - An allocation for 572 residential units considered close enough to the site to include explicitly.

10.165 The traffic flows from the above development sites has been explicitly included within the baseline. In addition, the allocation identified at Iwade has been included explicitly as committed development.

Baseline traffic flows 2023

10.166 The 2023 baseline traffic flows used for assessment purposes are summarised within Appendix 10.1: Table 3 attached.

Baseline traffic flows 2031

10.167 The 2031 baseline traffic flows used for assessment purposes are summarised within Appendix 10.1: Table 4 attached.

Assessment of Potential Impacts

Construction phase

10.168 Construction of the development is to commence in 2018 / 19 for a period of approximately 13 years.

10.169 Consideration of construction traffic effects is not possible in detail at this stage, in terms of quantity or types of movement, because construction methods and the exact timing of development build out have not been defined and would be subject to market conditions.

10.170 However, it is anticipated that that the number of vehicular movements to and from the site as a result of the construction phase will not be more than the number of trips generated by the completed development as assessed below.

10.171 Details on the routing strategy, hours of operation, along with logistics and mitigation measures would be included in the 'Construction Environmental Management Plan' (CEMP) which should be secured through a suitable planning condition. As a result, the likelihood is that construction vehicle movements will predominantly occur outside of peak hours such that operatives can avoid busy periods on the external network and avoid late nights / early hours to reduce the disturbance of nearby residents.

10.172 There will also be some disruption to the local highway network during the implementation of the highway improvements proposed as part of the development and the implementation of utility works within the highway.

10.173 The following topics have been considered in relation to the construction period with respect to the change in magnitudes between the baseline and 'with construction' flows.

Severance

10.174 The daily traffic flow associated with the construction traffic is considered to be relatively low when compared to the indicators set out in the guidance. The change in traffic flow due to the construction traffic would be significantly less than the 30% regarded as a negligible change. In addition, the flows are likely to be spread over the day rather than concentrated at particular times of the day. Therefore, the change in magnitude for severance is considered to be negligible adverse for all links assessed.

Fear and Intimidation

10.175 The guidelines highlight that the impact is dependent on the volume of traffic, its HGV composition, its proximity to people or the lack of protection caused by such factors as narrow pavement widths.

10.176 In general, the construction vehicles would use the Site access point either on Quinton Road and / or Grovehurst Road. This corridor and the proposed spine road will have standard footways available either on one or both sides of the carriageway.

10.177 On this basis, the change in magnitude is considered to be negligible adverse for all links assessed.

Driver Delay

10.178 It is anticipated that there would be minimal flows associated with construction during the peak hours. In addition, delivery / collection vehicles associated with the construction would be spread throughout the day.

10.179 There is potential for delays associated with the off-site works relating to junction improvements and the potential utility works that may be required adjacent to the site.

10.180 Therefore, on this basis the change in magnitude of the driver delay (as a result of construction traffic) is considered negligible adverse.

Pedestrian Delay

10.181 The daily traffic flow associated with the construction traffic is considered to be minimal and spread throughout the day. Therefore, on this basis the change in magnitude of pedestrian delay (as a result of construction traffic) is considered negligible adverse.

Pedestrian Amenity

10.182 The daily traffic flow associated with the construction traffic is likely to be minimal. It is assumed the change in magnitude in pedestrian amenity (as a result of construction traffic) is considered negligible adverse.

Accidents and Safety

10.183 The daily traffic flow associated with the construction traffic is likely to be minimal when compared to the operational phase, although the construction phase will generate a higher proportion of large vehicles such as delivery vehicles and construction vehicles.

10.184 It is noted that the existing accident data for the links and junctions assessed did not show a particular type of crash occurring or a common causation factor.

10.185 As with all major construction sites it is anticipated that a Construction Environmental Management Plan (CEMP) will be secured through a suitable planning condition so that the contractor will consider how vehicles will enter/exit the site onto the highway network in a safe manner.

10.186 On this basis the change in magnitude in accidents and safety (as a result of construction traffic) is considered negligible adverse.

Operational (occupation) phase

Development trip generation

10.187 Vehicular trip generation rates for the Development have been obtained from the TRICS database and were the subject of a scoping exercise with highway officers. Table 10.6 summarises the peak hour trip rates from the Development.

Table 10.6 - Peak hour trip rates (per unit and per pupil) associated with the Development

	AM peak hour			PM peak hour		
	In	Out	2 way	In	Out	2 way
Residential	0.124	0.403	0.527	0.367	0.205	0.572
Secondary school	0.162	0.098	0.260	0.017	0.028	0.045
Primary school	0.334	0.226	0.560	0.000	0.009	0.009

10.188 At 2023 the Development Framework suggests that the completed Development will comprise:

- 580 residential units (on land at Quinton Road/ Bramblefield Lane/Pheasant Farm and at Great Grovehurst Farm)
- 630 secondary school pupils
- 210 primary school pupils

10.189 This development quantum has been assessed. It has been assumed that the primary school provision will meet the needs within the Site and hence not generate external traffic for the purposes of assessment. The secondary school trip rate above has been adjusted to reflect the proportion of secondary school pupils that will be generated from within the site. Table 10.7 below summarises the peak hour trip generation associated with the Development at 2023.

Table 10.7 - Peak hour trip generation associated with the Development at 2023

	AM peak hour			PM peak hour		
	In	Out	2 way	In	Out	2 way
Residential	72	234	306	213	119	332
Secondary school	83	50	133	9	14	23
Total	**155**	**284**	**439**	**222**	**133**	**355**

10.190 At 2031 the Development will be fully developed, and this will comprise:

- 1320 residential units
- 1260 secondary school pupils
- 420 primary school pupils

10.191 This development quantum has been assessed. It has been assumed that the primary school provision will meet the needs within the Site and hence not generate external traffic for the purposes of assessment. The secondary school trip rate above has been adjusted to reflect the proportion of secondary school pupils that will be generated from within the site. Table 10.8 below summarises the peak hour trip generation associated with the Development at 2031.

Table 10.8 - Peak hour trip generation associated with the Development at 2031

	AM peak hour			PM peak hour		
	In	Out	2 way	In	Out	2 way
Residential	164	532	696	484	271	755
Secondary school	161	98	259	17	28	45
Total	**325**	**630**	**955**	**501**	**299**	**800**

Allocation Site trip generation

10.192 Vehicular trip generation rates for the Allocation Site have been obtained from the TRICS database and were the subject of a scoping exercise with highway officers. Table 10.9 summarises the peak hour trip rates from the Allocation Site development.

Table 10.9 - Peak hour trip rates (per unit and per pupil) associated with the Allocation Site

	AM peak hour			PM peak hour		
	In	Out	2 way	In	Out	2 way
Residential	0.124	0.403	0.527	0.367	0.205	0.572
Secondary school	0.162	0.098	0.260	0.017	0.028	0.045
Primary school	0.334	0.226	0.560	0.000	0.009	0.009

10.193 At 2023 the development brief suggests that the completed Allocation Site development will comprise:

- 780 residential units
- 630 secondary school pupils
- 210 primary school pupils

10.194 This development quantum has been assessed. It has been assumed that the primary school provision will meet the needs within the Allocation Site and hence not generate external traffic for the purposes of assessment. The secondary school trip rate above has been adjusted to reflect the proportion of secondary school pupils that will be generated from within the site. Table 10.10 below summarises the peak hour trip generation associated with the Allocation Site development at 2023.

Table 10.10 - Peak hour trip generation associated with the Allocation Site development at 2023

	AM peak hour			PM peak hour		
	In	Out	2 way	In	Out	2 way
Residential	97	314	411	286	160	446
Secondary school	77	46	123	8	13	21
Total	**174**	**360**	**534**	**294**	**173**	**467**

10.195 At 2031 the Allocation Site will be fully developed, and this will comprise:

- 1520 residential units
- 1260 secondary school pupils
- 420 primary school pupils

10.196 This development quantum has been assessed. It has been assumed that the primary school provision will meet the needs within the Allocation Site and hence not generate external traffic for the purposes of assessment. The secondary school trip rate above has been adjusted to reflect the proportion of secondary school pupils that will be generated from within the site. Table 10.11 below summarises the peak hour trip generation associated with the Allocation Site development at 2031.

Table 10.11 - Peak hour trip generation associated with the Allocation Site development at 2031

	AM peak hour			PM peak hour		
	In	Out	2 way	In	Out	2 way
Residential	188	613	801	558	312	869
Secondary school	155	94	249	16	27	43
Total	**343**	**707**	**1050**	**574**	**339**	**912**

Development trip distribution

10.197 The Development traffic has been distributed onto the wider network in accordance with Census 2011 data (Journey to Work data) for the surrounding local area residents.

Development traffic link flows

10.198 Appendix 10.1: Tables 5 and 6 summarise the Development traffic flows on the links considered at 2023 and 2031.

10.199 Appendix 10.1: Tables 7 and 8 summarise the Allocation Site development traffic flows on the links considered at 2023 and 2031.

With development link flows

10.200 Appendix 10.1: Tables 9 and 10 summarise the 2023 and 2031 with Development traffic flows on the links considered.

10.201 Appendix 10.1: Tables 11 and 12 summarise the 2023 and 2031 with Allocation Site development traffic flows on the links considered.

Comparison of baseline and “with development” traffic

10.202 Appendix 10.1: Tables 13 and 14 summarise the comparison between the 2023 and 2031 baseline traffic flows and the 2023 and 2031 with Development traffic flows on the links considered:

10.203 Appendix 10.1: Tables 15 and 16 summarise the comparison between the 2023 and 2031 baseline traffic flows and the 2023 and 2031 with Allocation Site development traffic flows on the links considered:

Potential Development effects – severance

10.204 A comparison of the percentage increase in link flows (from Appendix 10.1: Tables 13 and 14) with the magnitude criteria defined earlier (in Table 10.3) is summarised by Appendix 10.1: Tables 17 and 18 for the Development. These tables provide the magnitude of the effect on severance.

10.205 On this basis it is noted that the magnitude of effect on severance is predominantly "No Change" or "Negligible" at 2023 with the exception of the following:

- A "Moderate" magnitude of effect is predicted on the medical centre access.
- A "Minor" magnitude of effect is predicted on Quinton Road west of the Site access.
- A "Minor" magnitude of effect is predicted on Sonora Way south of Quinton Road.

10.206 At 2031 it is noted that the magnitude of effect on severance is predominantly "No Change" or "Negligible" with the exception of the following:

- A "Major" magnitude of effect is predicted on the medical centre access.
- A "Major" magnitude of effect is predicted on Quinton Road west of the Site access.
- A "Minor" magnitude of effect is predicted on Sonora Way north of the B2006.
- A "Major" magnitude of effect is predicted on Sonora Way south of Quinton Road.

10.207 Appendix 10.1: Tables 19 and 20 summarise the significance of the effect on severance as a result of the Development traffic. This is based upon the magnitude of effect from Appendix 10.1: Tables 17 and 18, the receptor sensitivity (Table 10.2) and the significance of effect criteria in Table 10.5.

10.208 On this basis it is noted that the significance of effect on severance is either "Neutral" or "Slight", at 2023 with the exception of the following:

- A "Moderate" significance of effect is predicted on the medical centre access.

10.209 At 2031 it is noted that the significance of effect on severance is either "Neutral" or "Slight", with the exception of the following:

- A "Large" significance of effect is predicted on the medical centre access.
- A "Large" significance of effect is predicted Quinton Road between the Site Access and Sonora Way.
- A "Large" significance of effect is predicted on Sonora Way south of Quinton Road.

Potential Allocation Site effects – severance

10.210 A comparison of the percentage increase in link flows (from Appendix 10.1: Tables 15 and 16) with the magnitude criteria defined earlier (in Table 10.3) is summarised by Appendix 10.1: Tables 21 and 22 for the Allocation Site development. These tables provide the magnitude of the effect on severance.

10.211 On this basis it is noted that the magnitude of effect on severance for every link assessed is either “No Change” or “Negligible” at 2023 with the exception of the following:

- A “Minor” magnitude of effect is predicted on Quinton Road between the accesses to the land at Quinton Road/Bramblefield Land and the land adjacent Quinton Farmhouse.
- A “Moderate” magnitude of effect is predicted on Sonora Way south of Quinton Road.

10.212 It is noted that the magnitude of effect on severance for every link assessed is either “No Change” or “Negligible” at 2031 with the exception of the following:

- A “Major” magnitude of effect is predicted on the medical centre access.
- A “Minor” magnitude of effect is predicted on Quinton Road west of the access to the land adjacent Quinton Farmhouse.
- A “Minor” magnitude of effect is predicted on Quinton Road between the land adjacent Quinton Farmhouse access and Sonora Way.
- A “Major” magnitude of effect is predicted on Quinton Road between the Site access and Sonora Way.
- A “Minor” magnitude of effect is predicted on Sonora Way north of the B2005.
- A “Major” magnitude of effect is predicted on Sonora Way south of Quinton Road.

10.213 Appendix 10.1: Tables 23 and 24 summarise the significance of the effect on severance as a result of the Allocation Site development traffic. This is based upon the magnitude of effect from Appendix 10.1: Tables 21 and 22, the receptor sensitivity (Table 10.2) and the significance of effect criteria in Table 10.5.

10.214 On this basis it is noted that the significance of effect on severance for every link assessed is either “Neutral” or “Slight” at 2023 with the exception of the following:

- A “Moderate” significance of effect is predicted on the medical centre access.
- A “Moderate” significance of effect is predicted on Sonora Way south of Quinton Road.

10.215 It is noted that the significance of effect on severance for every link assessed is either “Neutral” or “Slight” at 2031 with the exception of the following:

- A “Large” significance of effect is predicted on the medical centre access.
- A “Large” significance of effect is predicted Quinton Road between the Site and Sonora Way.
- A “Large” significance of effect is predicted on Sonora Way south of Quinton Road.

Potential Development effects - Fear and intimidation

10.216 Appendix 10.1: Tables 25 and 26 illustrate the average hourly traffic flow over an 18 hour day, and the total 18 hour HGV flow for each link. This is shown for both the baseline and “with development” scenarios at 2023 and 2031.

10.217 Appendix 10.1: Tables 27 and 28 summarise the fear and intimidation magnitude classifications for each link considered for both the baseline and “with development” scenarios at 2023 and 2031. The classifications are based upon reference to Appendix 10.1: Tables 25 and 26 above and Table 10.4. Links below 600 vehicles / hour have been classed as a magnitude of “negligible”.

10.218 When considering the average hourly flow it is evident that there is no change in magnitude between the baseline and “with development” scenarios at 2023, with the exception of the following:

- The Sonora Way link north of the B2006 moves from “Negligible” to “Minor”.
- The B2006 St Paul’s Street link (east of Chalkwell Road) moves from “Minor” to “Moderate”. Closer inspection shows this to be as a result of 15 additional vehicles per hour with development. This increase is around 1 vehicle every 4 minutes and is unlikely to be perceptible in practise.
- The B2006 St Paul’s Street link (west of High Street) moves from “Minor” to “Moderate”. Closer inspection shows this to be as a result of 14 additional vehicles per hour with development. This increase is around 1 vehicle every 4 minutes and is unlikely to be perceptible in practise.

10.219 When considering the average hourly flow it is evident that there is no change in magnitude between the baseline and "with development" scenarios at 2031, with the exception of the following:

- The Quinton Road link west of the Site Access moves from "Negligible" to "Minor".
- The B2006 east of Bobbing junction moves from "Moderate" to "Major".
- The Sonora Way link north of the B2006 moves from "Negligible" to "Minor".

10.220 When considering the 18 hour HGV flow it is evident that there is no change in magnitude between the baseline and "with development" scenarios at 2023 and 2031.

Potential Allocation Site development effects - Fear and intimidation

10.221 Appendix 10.1: Tables 29 and 30 illustrate the average hourly traffic flow over an 18 hour day, and the total 18 hour HGV flow for each link. This is shown for both the baseline and "with development" scenarios at 2023 and 2031.

10.222 Appendix 10.1: Tables 31 and 32 summarise the fear and intimidation magnitude classifications for each link considered for both the baseline and "with development" scenarios at 2023 and 2031. The classifications are based upon reference to Appendix 10.1: Tables 29 and 30 above and Table 10.4. Links below 600 vehicles / hour have been classed as a magnitude of "negligible".

10.223 When considering the average hourly flow it is evident that there is no change in magnitude between the baseline and "with development" scenarios at 2023, with the exception of the following:

- The Sonora Way link north of the B2006 moves from "Negligible" to "Minor".
- The B2006 St Paul's Street link (east of Chalkwell Road) moves from "Minor" to "Moderate". Closer inspection shows this to be as a result of 22 additional vehicles per hour with development. This increase is around 1 vehicle every 3 minutes and is unlikely to be perceptible in practise.
- The B2006 St Paul's Street link (west of High Street) moves from "Minor" to "Moderate". Closer inspection shows this to be as a result of 21 additional vehicles per hour with development. This increase is around 1 vehicle every 3 minutes and is unlikely to be perceptible in practise.

10.224 When considering the average hourly flow it is evident that there is no change in magnitude between the baseline and "with development" scenarios at 2031, with the exception of the following:

- The Quinton Road link (between the Site Access and Sonora Way) moves from "Negligible" to "Minor".
- The B2006 link (east arm of Bobbing junction) moves from "Moderate" to "Major.
- The B2006 link (west of Sonora Way) moves from "Moderate" to "Major.
- The Sonora Way link (north of the B2006) moves from "Negligible" to "Minor".
- The Sheppey Way link (north of Key Street) moves from "Minor" to "Moderate".

10.225 When considering the 18 hour HGV flow it is evident that there is no change in magnitude between the baseline and "with development" scenarios at 2023 and 2031.

Potential Development effects – Driver delay

10.226 Within Sittingbourne there is existing delay on the highway network, particularly during peak periods. Additional traffic is likely to lead to further delay on the network. However, the development traffic will be dispersed from the Site via five routes up until 2023, those being west on Quinton Road, east on Quinton Road, south on Sonora Way, north on Grovehurst Road and south on Grovehurst Road. At 2023 a further route becomes available when the access through the Site becomes available. As the Development traffic gets further from the site there is less of an impact as more route choice is available.

10.227 During the peak hours the number of vehicles associated with the development at 2023 are:

- 155 inbound and 284 outbound in the morning peak hour, a total of 439 vehicles (two way) during the hour.
- Of the morning peak hour trips, 35 use the route to / from the west (towards Sheppey Way), 199 use the routes to / from the north (Grovehurst roundabout), 124 use Sonora Way to the south and the remaining trips head towards the east.
- 222 inbound and 133 outbound in the evening peak hour, a total of 355 vehicles (two way) during the hour.

- Of the morning peak hour trips, 33 use the route to / from the west (towards Sheppey Way), 137 use the routes to / from the north (Grovehurst roundabout), 125 use Sonora Way to the south and the remaining trips head towards the east.

10.228 During the peak hours the number of vehicles associated with the development at 2031 are:

- 325 inbound and 630 outbound in the morning peak hour, a total of 955 vehicles (two way) during the hour.
- Of the morning peak hour trips, 101 use the route to / from the west (towards Sheppey Way), 328 use the routes to / from the north (Grovehurst roundabout), 369 use Sonora Way to the south and the remaining trips head towards the east.
- 501 inbound and 299 outbound in the evening peak hour, a total of 800 vehicles (two way) during the hour.
- Of the morning peak hour trips, 99 use the route to / from the west (towards Sheppey Way), 198 use the routes to / from the north (Grovehurst roundabout), 382 use Sonora Way to the south and the remaining trips head towards the east.

10.229 The delay to drivers resulting from the development have been modelled at junctions using modelling software. Where delays and queues are considered unacceptable because of the development then mitigation measures will be considered.

10.230 Based on the above it is considered that the change in magnitude (between the base and "with development"' scenario) of the driver delay during the peak hours will not be significant for all junctions considered.

Potential Allocation Site development effects – Driver delay

10.231 The Allocation Site development traffic will be dispersed from the site via five routes up until 2023, those being east or west on Quinton Road, south on Sonora Way and north or south on Grovehurst Road. At 2023 a further route becomes available when the access through the Allocation Site is opened. As the Allocation Site development traffic gets further from the site there is less of an impact as more route choice is available.

10.232 During the peak hours the number of vehicles associated with the development are:

- At 2023 the development generates 174 inbound and 360 outbound vehicles during the morning peak hour, a total of 534 vehicles (two way) during the hour.
- At 2031 the development generates 343 inbound and 707 outbound vehicles during the morning peak hour, a total of 1050 vehicles (two way) during the hour.
- At 2023 the development generates 294 inbound and 173 outbound vehicles during the evening peak hour, a total of 467 vehicles (two way) during the hour.
- At 2031 the development generates 574 inbound and 339 outbound vehicles during the evening peak hour, a total of 913 vehicles (two way) during the hour.

10.233 The delay to drivers resulting from the development has been modelled at junctions using modelling software. Where delays and queues are considered unacceptable because of the development mitigation measures will be considered.

10.234 Based on the above it is considered that the change in magnitude (between the base and "with Allocation Site development"' scenario) of the driver delay during the peak hours will not be significant for all junctions considered.

Potential Development effects – Pedestrian delay

10.235 The volume of traffic will increase between the baseline and with development scenarios as a result of the Development. As a result of increased traffic volume there is the potential for a negative impact on the ability for pedestrians to cross roads and hence an increase in pedestrian delay.

10.236 The Guidelines for the Environmental Assessment of Road Traffic, 1993 document states that:

> *"Given the range of local factors and conditions which can influence pedestrian delay, it is not considered wise to set down any thresholds but instead it is recommended that assessors use their judgement to determine whether pedestrian delay is a significant impact."*

10.237 There is a relationship between pedestrian delay and increased traffic volume. On this basis the significance of the change in traffic magnitude on severance

has been considered as a suitable measure of the significance of the change in traffic magnitude on pedestrian delay.

10.238 Therefore, reference has been made to Appendix 10.1: Tables 17 to 20. On this basis it is noted that the significance of effect on pedestrian delay is either "Neutral" or "Slight", at 2023 with the exception of the following:

- A "Moderate" significance of effect is predicted on the medical centre access.

10.239 On the same basis, and at 2031, it is noted that the significance of effect on pedestrian delay is either "Neutral" or "Slight", with the exception of the following:

- A "Large" significance of effect is predicted on the medical centre access.
- A "Large" significance of effect is predicted Quinton Road between the Site Access and Sonora Way.
- A "Large" significance of effect is predicted on Sonora Way south of Quinton Road.

Potential Allocation Site development effects – Pedestrian delay

10.240 Similarly, there will be a relationship between pedestrian delay and increased traffic volume as a result of the Allocation Site development.

10.241 On this basis the significance of the change in traffic magnitude on severance has been considered as a suitable measure of the significance of the change in traffic magnitude on pedestrian delay.

10.242 Therefore, reference has been made to Appendix 10.1: Tables 21 to 24. On this basis it is noted that:

- The significance of effect on pedestrian delay for every link assessed is either "Neutral" or "Slight" at 2023 with the exception of the following:
- A "Moderate" significance of effect is predicted on the medical centre access.
- A "Moderate" significance of effect is predicted on Sonora Way south of Quinton Road.
- The significance of effect on pedestrian delay for every link assessed is either "Neutral" or "Slight" at 2031 with the exception of the following:
- A "Large" significance of effect is predicted on the medical centre access.

- A “Large” significance of effect is predicted Quinton Road between the Site Access and Sonora Way.
- A “Large” significance of effect is predicted on Sonora Way south of Quinton Road.

Potential Development effects – Pedestrian amenity

10.243 The Development is predominantly residential and so will not have a significant proportion of HGVs associated with it. The proposed spine road through the site is not intended for use as a through route, and it is not intended for use by HGVs. The proposed spine road will be designed to encourage walking and cycling and whilst providing permeability for local residents.

10.244 Pedestrian amenity is described in the ‘Manual of Environmental Appraisal’ guidelines as ‘relative pleasantness of a journey’. The guidelines suggest that the significance of changes in pedestrian amenity would be where the traffic flow (or its lorry component) is halved or doubled.

10.245 Appendix 10.1: Tables 33 and 34 consider all the links assessed and summarise the baseline and with Development traffic flows for 2023 and 2031 respectively. Any links where traffic flows or HGV flows double or halve are identified.

10.246 It is noted that there are no links where traffic flows double or halve or where HGV flows double or halve at 2023. On this basis it is concluded that the significance of the effect on pedestrian amenity is not significant.

10.247 At 2031 there are three links where traffic flows double and none where HGV flows double or halve. The three links where traffic flows double are as follows:

- Medical centre access increase from 939 to 2,500 vehicles.
- Quinton Road (west of the Site Access) increases from 5,488 to 11,607 vehicles.
- Sonora Way (south of Quinton Road) increases from 3,771 to 8,603.

Potential Allocation Site development effects – Pedestrian amenity

10.248 Similarly, to above, an assessment of the significance of the effect on pedestrian amenity has been completed in the context of the Allocation Site development.

10.249 Appendix 10.1: Tables 35 and 36 consider all the links assessed and summarise the baseline and with Development traffic flows for 2023 and 2031 respectively. Any links where traffic flows or HGV flows double or halve are identified.

10.250 It is noted that:

- At 2023 there are no links where traffic flows double or halve or where HGV flows double or halve.
- At 2031 there are three links where traffic flows double and none where HGV flows double or halve. The three links where traffic flows double are as follows:
  - Medical centre access increase from 939 to 2,500 vehicles
  - Quinton Road (west of the Site Access) increases from 5,488 to 11,794 vehicles.
  - Sonora Way (south of Quinton Road) increases from 3,771 to 9,454.

Potential Development effects – Accidents and safety

10.251 From the accident data provided there are no common causation factors highlighted on the existing links assessed. Any new links (within the Development) and the proposed access junctions will be the subject of a safety audit at detailed design stage.

10.252 Accidents will generally occur where traffic movements conflict, typically at junctions. The assessment completed for the Development demonstrates the modest increase in traffic flows at most off-site junctions and includes the undertaking of mitigation upgrades to provide appropriate capacity at the site access junctions and off-site junctions where appropriate.

10.253 On this basis it is considered that the significance of the effect of the Development traffic on accidents and safety will be neutral.

Potential Allocation Site development effects – Accidents and safety

10.254 Similarly, to the above the assessment completed for the Allocation Site development demonstrates the modest increase in traffic flows at most off-site junctions and includes the undertaking of mitigation upgrades to provide appropriate capacity at the site access junctions and off site junctions where appropriate.

10.255 On this basis it is considered that the significance of the effect of the Development traffic on accidents and safety will be neutral.

Potential Mitigation / Management Techniques

The Development

10.256 The Development will implement (or contribute towards as part of the Allocation Site development) a suite of mitigation and management techniques. With respect to walking and cycling these will comprise:

- A footway / cycleway will be provided on the east / south side of the spine road through the site. This will connect The Meads to the south with Kemsley to the north.
- Upgrade of the existing footway to a shared cycleway / footway is proposed on the west side of Grovehurst Road heading north (from the Site access) to the roundabout. At this location cyclists will be able to cross Grovehurst Road and connect with the existing cycleway on the south side of Swale Way.
- A walking and cycling route will be available through the land at Great Grovehurst Farm to connect with the existing footway / cycleway on the south side of Swale Way. This would provide onward access to the employment areas along this corridor.
- The walking and cycling connections to Swale way would connect with the existing route on the west side of the Nicholls Transport depot which runs from the Nicholls access, northbound and under the rail line. This creates a connection to the Ridham / Kemsley Strategic Employment Area. The underpass beneath the railway has been resurfaced, lined and lit under the terms of a recent s106 Agreement.
- A walking / cycling route on Sheppey Way (from Bramblefield Lane towards Iwade) will be contributed towards by the Development. This is in accordance with policy and will connect with the provision being made on Sheppey Way by existing development at Iwade.
- A walking and cycling route will be available through the land at Great Grovehurst Farm to connect with Godwin Close on the south boundary. This provides a route to Kemsley village.
- The existing Public Right of Way (PROW) connecting the west end of Bramblefield Lane with Sheppey Way to the west will be retained. This incorporates National Cycle Route 1 and would hence provide a walking and cycling access to the Site.

- The entrance to the medical centre will be retained and amended to allow vehicular access to the secondary school. This will also provide a pedestrian footway leading to the secondary school site.
- The existing PROW crossing the site from east to west provides access to the Site from Middletune Avenue and Newbridge Avenue via an at grade crossing of the rail line. This PROW currently passes alongside the A249 before connecting with the PROW from Bramblefield Lane and crossing the A249 corridor. A route broadly in line with the existing alignment will be retained and hence existing journeys will remain possible.
- The spine road access will incorporate shared walking and cycling facilities on its east side and a footway on the west side as it approaches Quinton Road to the south. On reaching Quinton Road an appropriate length of footway would be provided within the allocation site frontage to allow pedestrians to cross and use the existing footway on the south side of Quinton Road.
- A pedestrian link will be provided to the south to connect with the existing convenience store on Quinton Road.
- Internal pedestrian links will be provided between the Site and the land adjacent Quinton Farmhouse.
- A pedestrian access will be provided to Quinton Road. This would connect with the existing footway on the south side of Quinton Road.
- The Public Right of Way crossing the Sheerness Line (which serves Kemsley rail halt) will also be retained within the development layout.
- Footpath ZU11 and the eastern part of ZR108 provide pedestrian / cycle access to The Meads Local Centre where there is a range of shops including a convenience store, public house, community centre and medical centre.
- Provision will be made within the development for walking and cycling. For example, the spine road passing through the allocation site will incorporate a walking and cycling corridor along its length. A network of paths and footways will allow for ease of movement around the Site, including the convenience store, community facilities school and routes to Kemsley rail halt.
- At the south boundary a footway will be provided on the north side of Quinton Road within the allocation site frontage. This facility will connect the two access points on Quinton Road and extend east as far as the existing shuttle working signals on Vicarage Lane.
- A crossing point will be created on Quinton Road at the spine road access using a pedestrian refuge and dropped kerbs and tactile paving. This will provide access to the existing footway on the south side of Quinton Road and hence a route between the site and Knightsfield Road and The Meads.

- A signal-controlled crossing point can be provided to the east where the existing signal-controlled shuttle working across the rail line exists. This could be provided as a toucan crossing and would provide a route to the existing footway / cycleway on the south side of Quinton Road / Vicarage Road.
- To the north, the vehicular access from Grovehurst Road will incorporate a pedestrian crossing facility in the form of a dropped kerb, tactile paving and refuge within the hatched central reserve. This will provide connectivity between the main allocation site and the land at Great Grovehurst Farm.
- The Site development will contribute towards an upgrade of the Bobbing junction to mitigate highway capacity effects. This will include signal control of the off slips. It would be possible to include pedestrian crossing facilities within the signal control upgrade to assist pedestrian movements between the Site and The Meads and Bobbing village.

10.257 With respect to public transport the Site development will offer and / or facilitate the following.

- Positive discussions have been held with Network Rail with respect to linking the Site directly with Kemsley rail halt for pedestrians and cyclists. In principle this would seem acceptable and hence the masterplan submitted with the application indicates how this may be achieved.
- It is proposed that the Site development would provide a contribution to improve facilities at Kemsley rail halt and hence increase the attractiveness of this for residents and school children.
- Connecting the Site by bus to the town centre, rail station and other local amenities will be important. Bus services already pass along Quinton Road to the south and Grovehurst Road to the east. Further bus services are available along Sheppey Way to the west. It is proposed that the Development will support and enhance this existing network through additional patronage and infrastructure (as described below).
- To increase the attractiveness and convenience of the bus mode, and hence the propensity of residents to use the bus, it would be appropriate for the Development to enhance the local bus services. The masterplan shows how bus services can penetrate the site. This is through an appropriately sized spine road (6.75m) to allow two-way bus working and three on site bus stop locations at suitable spacings and at key activity locations. Footways will be provided on site to allow ease of access to bus shelters.
- Aside from the infrastructure it is proposed to enhance bus services serving the Site. This is anticipated to be in the form of a stand-alone and dedicated

service to and from the Site linking with key destinations such as the town centre and rail station.

10.258 As a result of the above enhancements, it is anticipated that residents will consider modes other than the private car. This will potentially reduce the number of vehicles on the network. It is difficult to quantify the change in magnitude, but it is anticipated that there would be an improvement to all topics considered above.

10.259 With respect to highway mitigation and management the following is proposed:

- Direct highway access to the Site will be gained from three locations. Direct highway access from the south will be via a priority junction from Quinton Road. The spine road passing through the Site will form an access on Quinton Road in the form of a priority junction. At the north end of the spine road a vehicular access will be provided on Grovehurst Road in the form of a staggered priority junction. This will provide access to the west and east parcels of the Site development. Access to the secondary school would be gained from Grovehurst Road at the existing medical centre access.

10.260 Several off-site mitigation schemes will be required as part of the wider highway access strategy. Schemes have been identified for the following junctions.

- A249 Grovehurst Junction
- A249 Bobbing Junction
- B2006 / Sonora Way / Vellum Drive

10.261 The package of off-site mitigation measures will address the highway effects of the Allocation Site development traffic at these locations.

The Allocation Site development

10.262 The Allocation Site development will implement a suite of mitigation and management techniques. These are consistent with those listed above. In addition, a further highway access will be provided to Quinton Road through the land being developed adjacent Quinton Farmhouse.

Assessment of Residual Impacts

The Development

10.263 The effect on severance is either “Neutral” or “Slight”, at 2023 with the exception of the following:

- A “Moderate” significance of effect is predicted on the medical centre access.

10.264 At 2031 it is noted that the effect on severance is either “Neutral” or “Slight”, with the exception of the following:

- A “Large” significance of effect is predicted on the medical centre access.
- A “Large” significance of effect is predicted Quinton Road between the Site Access and Sonora Way.
- A “Large” significance of effect is predicted on Sonora Way south of Quinton Road.

10.265 The addition of the on and off-site enhancements described above will provide a beneficial effect and reduce the effect on severance.

10.266 There is no change in fear and intimidation between the baseline and with development scenarios on the links considered at 2023 with the exception of the following:

- The Sonora Way link north of the B2006 moves from “Negligible” to “Minor”.
- The B2006 St Paul’s Street link (east of Chalkwell Road) moves from “Minor” to “Moderate”. Closer inspection shows this to be as a result of 15 additional vehicles per hour with development. This increase is around 1 vehicle every 4 minutes and is unlikely to be perceptible in practise.
- The B2006 St Paul’s Street link (west of High Street) moves from “Minor” to “Moderate”. Closer inspection shows this to be as a result of 14 additional vehicles per hour with development. This increase is around 1 vehicle every 4 minutes and is unlikely to be perceptible in practise.

10.267 There is no change in fear and intimidation between the baseline and “with development” scenarios at 2031, with the exception of the following:

- The Quinton Road link west of the site access moves from “Negligible” to “Minor”.

- The B2006 east of Bobbing junction moves from “Moderate” to “Major”.
- The Sonora Way link north of the B2006 moves from “Negligible” to “Minor”.

10.268 When considering the 18 hour HGV flow it is evident that there is no change in magnitude between the baseline and “with development” scenarios at 2023 and 2031.

10.269 The above increases are likely to be reduced with the implementation of the Travel Plan.

10.270 The delay to drivers as a result of the Development has been modelled at junctions using modelling software. Where delays and queues are considered unacceptable as a result of the Development then mitigation measures have been proposed.

10.271 On the basis of the above it is considered that the change in magnitude (between the base and “with development”’ scenario) of the driver delay during the peak hours will not be significant for all junctions considered. The implementation of the Travel Plan will reduce vehicular traffic and hence reduce driver delay.

10.272 The significance of the change in traffic magnitude on severance has been considered as a suitable measure of the significance of the change in traffic magnitude on pedestrian delay. On this basis it is noted that the significance of effect on pedestrian delay is either “Neutral” or “Slight”, at 2023 with the exception of the following:

- A “Moderate” significance of effect is predicted on the medical centre access.

10.273 At 2031, it is noted that the significance of effect on pedestrian delay is either “Neutral” or “Slight”, with the exception of the following:

- A “Large” significance of effect is predicted on the medical centre access.
- A “Large” significance of effect is predicted Quinton Road between the Site Access and Sonora Way.
- A “Large” significance of effect is predicted on Sonora Way south of Quinton Road.

10.274 The implementation of the Travel Plan will reduce vehicular traffic and hence reduce pedestrian delay.

10.275 There are no links where traffic flows double or halve or where HGV flows double or halve at 2023. On this basis it is concluded that the significance of the effect on pedestrian amenity is not significant.

10.276 At 2031 there are three links where traffic flows double and none where HGV flows double or halve. The three links where traffic flows double are as follows:

- Medical centre access increase from 939 to 2,500 vehicles.
- Quinton Road (west of the site access) increases from 5,488 to 11,607 vehicles.
- Sonora Way (south of Quinton Road) increases from 3,771 to 8,603.

10.277 The implementation of the pedestrian measures described within this chapter and the implementation of the Travel Plan to reduce vehicular movements will reduce the effect on pedestrian amenity.

10.278 Accidents will generally occur where traffic movements conflict, typically at junctions. The assessment completed for the Development includes the undertaking of mitigation upgrades to provide appropriate capacity at the site access junctions and off-site junctions to offset the effect of the Development traffic. On this basis it is considered that the significance of the effect of the Development traffic on accidents and safety will be neutral. The implementation of the Travel Plan will reduce vehicular traffic and hence reduce the potential for accidents.

The Allocation Site development

10.279 The effect on severance is either neutral or slight at 2023 with the exception of the following:

- A “Moderate” significance of effect is predicted on the medical centre access.
- A “Moderate” significance of effect is predicted on Sonora Way south of Quinton Road.

10.280 The effect on severance for every link assessed is either “Neutral” or “Slight” at 2031 with the exception of the following:

- A “Large” significance of effect is predicted on the medical centre access.

- A “Large” significance of effect is predicted Quinton Road between the Site Access and Sonora Way.
- A “Large” significance of effect is predicted on Sonora Way south of Quinton Road.

10.281 The addition of the on and off-site enhancements described above will provide a beneficial effect and reduce the effect on severance. The implementation of the Travel Plan will reduce vehicular traffic and hence reduce the effect on severance.

10.282 There is no change in fear and intimidation between the baseline and with development scenarios at 2023 on the links considered with the exception of the following:

- The Sonora Way link north of the B2006 moves from “Negligible” to “Minor”.
- The B2006 St Paul’s Street link (east of Chalkwell Road) moves from “Minor” to “Moderate”. Closer inspection shows this to be as a result of 22 additional vehicles per hour with development. This increase is around 1 vehicle every 3 minutes and is unlikely to be perceptible in practise.
- The B2006 St Paul’s Street link (west of High Street) moves from “Minor” to “Moderate”. Closer inspection shows this to be as a result of 21 additional vehicles per hour with development. This increase is around 1 vehicle every 3 minutes and is unlikely to be perceptible in practise.

10.283 There is no change in fear and intimidation between the baseline and “with development” scenarios at 2031, with the exception of the following:

- The Quinton Road link (between the Site Access and Sonora Way) moves from “Negligible” to “Minor”.
- The B2006 link (east arm of Bobbing junction) moves from “Moderate” to “Major.
- The B2006 link (west of Sonora Way) moves from “Moderate” to “Major.
- The Sonora Way link (north of the B2006) moves from “Negligible” to “Minor”.
- The Sheppey Way link (north of Key Street) moves from “Minor” to “Moderate”.

10.284 When considering the 18 hour HGV flow it is evident that there is no change in magnitude between the baseline and “with development” scenarios at 2023 and 2031. The addition of the on and off-site enhancements described above will provide a beneficial effect and reduce the effect on fear and intimidation. The

implementation of the Travel Plan will reduce vehicular traffic and hence reduce the effect on fear and intimidation.

10.285 The delay to drivers as a result of the Allocation Site development has been modelled. Where delays and queues are considered unacceptable as a result of the Allocation Site development then mitigation measures have been proposed. On the basis of the above it is considered that the change in magnitude (between the base and "with development"' scenario) of the driver delay during the peak hours will not be significant for all junctions considered.

10.286 The significance of the change in traffic magnitude on severance has been considered as a suitable measure of the significance of the change in traffic magnitude on pedestrian delay. The effect on severance is either neutral or slight at 2023 with the exception of the following:

- A "Moderate" significance of effect is predicted on the medical centre access.
- A "Moderate" significance of effect is predicted on Sonora Way south of Quinton Road.

10.287 The effect on severance for every link assessed is either "Neutral" or "Slight" at 2031 with the exception of the following:

- A "Large" significance of effect is predicted on the medical centre access.
- A "Large" significance of effect is predicted Quinton Road between the Site Access and Sonora Way.
- A "Large" significance of effect is predicted on Sonora Way south of Quinton Road.

10.288 The addition of the on and off-site enhancements described above will provide a beneficial effect and reduce the effect on severance and hence pedestrian delay. The implementation of the Travel Plan will reduce vehicular traffic and hence reduce the effect on pedestrian delay

10.289 At 2023 there are no links where traffic flows double or halve or where HGV flows double or halve. At 2031 there are three links where traffic flows double and none where HGV flows double or halve. The three links where traffic flows double are as follows:

- Medical centre access increase from 939 to 2,500 vehicles.

- Quinton Road (west of the site access) increases from 5,488 to 11,794 vehicles.
- Sonora Way (south of Quinton Road) increases from 3,771 to 9,454.

10.290 The addition of the on and off-site enhancements described above will provide a beneficial effect to pedestrian connectivity and hence pedestrian amenity. The implementation of the Travel Plan will reduce vehicular traffic and hence reduce the effect on pedestrian amenity.

10.291 Accidents will generally occur where traffic movements conflict, typically at junctions. The assessment completed for the Allocation Site development includes the undertaking of mitigation upgrades to provide appropriate capacity at the site access junctions and off-site junctions to offset the effect of the Allocation Site development traffic. On this basis it is considered that the significance of the effect of the Allocation Site development traffic on accidents and safety will be neutral. The implementation of the Travel Plan will reduce vehicular traffic and hence reduce the potential for accidents.

Chapter 11

NOISE AND VIBRATION

11. NOISE AND VIBRATION

Introduction

11.1 This chapter presents an assessment of the suitability of the land for development, together with the likely significant noise and vibration impacts on sensitive receptors associated with the proposed preparation and construction works and the development once it is completed and operational.

11.2 This chapter provides a summary of relevant planning policy and a description of the methods used in the assessmernt. This is followed by a description of the relevant baseline conditions for the site and surrounding area, and an assessment of the likely significant impacts of the development during the preparation and construction works and once the development is completed and operational. Mitigation measures are identified where appropriate to avoid, reduce or offset any adverse impacts identified and / or enhance likely beneficial impacts. Taking account of the mitigation measures, the nature and significance of the likely residual impacts are also described.

11.3 This chapter is supported by technical appendices which are contained in Volume 3 to this ES. The technical terms used in this chapter are described in **Appendix 11.1.**

Regulatory and Policy Context

Control of Pollution Act, 1974

11.4 Part III of the Control of Pollution Act 1974 (CoPA)[1] is specifically concerned with pollution. With regard to noise, it covers, construction sites, noise in the street, noise abatement zones, Codes of Practice and Best Practicable Means (BPM).

Environmental Protection Act, 1990, Part III

11.5 The Environmental Protection Act 1990[2], amongst many other controls, empowers Local Planning Authorities (LPAs) to issue a Noise Abatement Notice where a noise nuisance can be proven.

[1] The Stationery Office (1974): Control of Pollution Act, HMSO, London.
[2] UK Government (1990): 'The Environmental Protection Act', HMSO.

National Planning Policy Framework, 2012

11.6 The National Planning Policy Framework[3] (NPPF) seeks to conserve and enhance the local environment, including preventing developments from contributing to, and / or, being put at an unacceptable risk from, noise pollution. In support of this, the NPPF stipulates that planning decisions should seek to:

- *"…avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development; and*
- *…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."*

11.7 To assess the suitability of the site for noise sensitive development, guidance has been sought from BS 8233:2014[4], the World Health Organisation (WHO) 1999[5] *'Guidelines for Community Noise'* and ProPG, 2017[6]. These documents set out guideline internal and external noise limits which should be met by all residential dwellings.

National Planning Practice Guidance, 2014

11.8 The National Planning Practice Guidance (NPPG) for Noise[7] outlines qualitatively when noise could be a concern. It states:

> *"Noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment."*

11.9 Advice is provided concerning noise exposure and its impacts and puts into context the advice stated within the NPSE. The NPPG states that LPAs should take account of the acoustic environment and in doing so consider:

- *"whether or not a significant adverse effect is occurring or likely to occur;*
- *whether or not an adverse effect is occurring or likely to occur; and*
- *whether or not a good standard of amenity can be achieved."*

[3] Department of Communities and Local Government (2012): National Planning Policy Framework, DCLG, London.
[4] British Standard (BS) (2014); BS 8233:2014 '*Guidance on sound insulation and noise reduction for buildings*', British Standards Institute (BSI).
[5] World Health Organisation (WHO) (2000); '*Guidelines for Community Noise*', WHO, Geneva.
[6] Working Group (2017); '*ProPG: Planning & Noise New Residtial Development*', ANC, IOA, CIEH.
[7] DCLG (2014); '*National Planning Practice Guidance*', DCLG, London.

Noise Policy Statement for England, 2010

11.10 The Noise Policy Statement for England (NPSE)[8] sets out the long-term vision of Government noise policy as follows:

> *"Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development."*

11.11 The NPSE aims, through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development, to:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life.

11.12 The NPSE also sets out three terms with regard to noise impacts:

- No Observed Effect Level (NOEL);
- Lowest Observed Adverse Effect Level (LOAEL); and
- Significant Observed Adverse Effect Level (SOAEL).

11.13 The above terms are not defined in terms of absolute levels within the NPSE which acknowledges that these will change with regard to noise source and receiver types.

Swale Borough Council Local Plan, 2017

11.14 In the supporting text preceding Core Policy 7, paragraph 5.6.4 of the Local Plan notes that as well as providing attractive environments within which people will want to live, work, and invest, green infrastructure has multiple benefits to the health and wellbeing of both people and nature including, inter alia, countering *"the effects of noise and pollution".*

11.15 Section 6 of the Local Plan considers land allocations for new development and paragraph 6.6 refers to mixed use allocations, the first of which is land at north-west Sittingbourne. Land north of Quinton Road, which includes the application site and a significant proportion of the north-west Sittingbourne allocation, is discussed, commencing at paragraph 6.6.17.

[8] Defra (2010) Noise Policy Statement for England. Defra.

11.16 In the supporting text preceding Policy MU1, paragraph 6.6.18 notes that *"within the proposed allocation, it is proposed that a buffer of open land be secured along the A249. This would provide a number of benefits in terms of noise reduction and landscape enhancement".*

11.17 Policy MU 1 entitled "Land at north-west Sittingbourne" states that subject to several commitments and requirements, planning permission will be granted for mixed uses, comprising a minimum of 1,500 dwellings, community facilities and structural landscaping and open space adjacent to the A249. None of the commitments and requirements specifically refers to noise.

11.18 Under the heading "Conserving and enhancing the natural environment" and the subheading "Pollution, land contamination and unstable land", paragraph 7.7.4 provides the following guidance on noise and vibration:

> *"Assessing developments for noise and vibration – both from noise generated from new developments affecting existing development and new development close to existing noise sources – can be complex. The relevant British Standards and guidance, including BS 4142, BS 8233 and BS 7445 need to be considered. The Council's Environmental Protection Team has published a guidance document "Noise and Vibration: Planning Guidance Document, 2012" Developers should refer to this guidance, as well as the latest revised British Standards, in their planning applications."*

Other Guidance

ProPG: Planning and Noise, 2017

11.19 The Professional Practice Guidance (ProPG) on Planning & Noise was produced to encourage better acoustic design in line with the NPPF. The ProPG details a framework which can be used to dertermine whether a site is a risk and to help identify the risk to development suitability and costs at noisier sites. In particular, the ProPG strives to:

- "*advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;*
- *encourage the process of good acoustic design in and around new residential developments;*
- *outline what should be taken into account in deciding planning applications for new noise-sensitive developments;*
- *improve understanding of how to determine the extent of potential noise impact and effect; and*

- *assist the delivery of sustainable development.*"

British Standard (BS) 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

11.20 BS 8233:2014 provides guidance for the control of noise in and around both new and refurbished buildings applying for change of use. It has been updated since submission in October 2011. The guidelines recommend internal ambient noise criteria for a range of indoor spaces including residential land uses. Guideline indoor ambient noise levels for unoccupied spaces relevant to the proposed development are presented in **Table 11.1**.

Table 11.1 - BS 8233:2014 Guideline Values

Activity	**Location**	**Daytime Period (07:00 – 23:00)**	**Night-Time Period (23:00 – 07:00)**
Resting	Living room	35 dB $L_{Aeq,16h}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16h}$	-
Sleeping	Bedroom	35 dB $L_{Aeq,16h}$	30dB $L_{Aeq,8h}$
Objective	**Space**	**BS 8233: Design Range**	
Acoustic privacy in shared spaces	Open Plan Office	45 - 50dB $L_{Aeq,T}$	
	Restaurant	40 - 55dB $L_{Aeq,T}$	
Speech or telephone communications	Retail, Café	50 - 55dB $L_{Aeq,T}$	
	Corridor, Circulation Space	45 - 55dB $L_{Aeq,T}$	
Study and work requiring concentration	Meeting Room, Training Room	35 - 45dB $L_{Aeq,T}$	
	Executive Office	35 - 40dB $L_{Aeq,T}$	

11.21 Unlike the previous version, BS 8233:2014 does not provide recommendations in relation to maximum noise levels in residential bedrooms at night from individual noise events such as vehicle pass-bys or aircraft movements. Instead, it advises:

> *'Regular individual noise events…can cause sleep disturbance. A guideline value may be set in terms of SEL (Sound Exposure Level) or $L_{Amax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values.'*

11.22 BS 8233:2014 also adopts guideline external noise values provided by the World Health Organisation (WHO) for external amenity areas such as gardens, balconies and terraces. The Standard states:

> *'For traditional external areas that are used for amenity space, such as gardens or patios it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.'*

World Health Organisation Guidelines for Community Noise, 1999

11.23 The WHO Guidelines for Community Noise provides guidance on desirable levels of noise structured according to specific environments to ensure the critical effects of noise on sleep, annoyance and speech interference are guarded against. One of the tenets of the WHO guidelines is the protection of the most vulnerable and sensitive of the population, with the WHO guideline values for environmental noise set at the level of the lowest adverse health effect below which the occurrence rates of particular "effects" can be assumed to be negligible.

11.24 Specifically, the WHO recommends internal and external noise levels that will provide an acoustic environment that is conducive to uninterrupted speech and sleep. Daytime noise limits aim to prevent the majority of the population being moderately or seriously annoyed by noise, whereas night-time noise limits are intended to ensure a good night's sleep. Table 11.2 presents a summary of the WHO guideline values.

Table 11.2 - Summary of Recommended Environmental Noise Levels

Specific Environment	Critical Health Effects	L_{Aeq} (dB)	Time Base (hours)	$L_{Amax,fast}$ (dB)
Outdoor living area	Serious annoyance, daytime and evening	55	16	n/a
	Moderate annoyance, daytime and evening	50	16	n/a
Dwelling, indoors Inside bedrooms	Speech intelligibility and moderate annoyance, daytime and evening	35	16	n/a
	Sleep disturbance, night-time	30	8	45[1]
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

Notes: [1] For a reasonable standard in bedrooms at night, the WHO, 1999 guidelines recommend that individual noise events (measured with F time-weighting) should be limited to/not normally exceed 45 dB L_{Amax}. The term 'normally' is typically interpreted as no more than 10 – 15 times a night.

British Standard 4142 - Methods for Rating and Assessing Industrial and Commercial Sound, 2014

11.25 BS 4142[9] was used in the assessment of sound of an industrial and/or commercial nature. The standard provides an objective method for rating the likelihood of adverse impacts on nearby sensitive receptors, having regard to the context in which a sound occurs. This BS states:

> "*Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact*."

British Standard 5228 - Code of Practice for Noise and Vibration Control on Construction and Open Sites, 2014

11.26 British Standard (BS) 5228[10] provides guidance on the assessment of noise and vibration effects during the redevelopment of a site, including procedures for estimating noise levels from construction activities and vibration attributable to vibratory rolling and piling activities.

[9] British Standard (BS) 4142 (2014): '*Methods for rating and assessing industrial and commercial sound, BSI, Great Britain'*.
[10] British Standard (BS) 5228, BS 5228-1:2009+A1:2014 '*Code of practice for noise and vibration control on construction and open sites – Part 1*', BSI.

11.27 The guidance does not define acceptable limits. However, it does provide potential methods for assessing the significance of noise and vibration effects, which should be defined on a site-specific basis. BS 5228 also provides guidance on minimising potential effects through the use of mitigation and the adoption of BPM. Full details of the BS 5228 assessment criteria are presented in **Appendix 11.3.**

British Standard 6472 – Guide to Evaluation of Human Exposure to Vibration in Buildings, 2008

11.28 BS 6472:200811 provides guidance on the measurement and assessment of vibration within buildings that may cause adverse disturbance to human occupants. BS 6472 also introduces the concept of Vibration Dose Values (VDVs) for intermittent vibration assessment and reference curves for continuous vibration assessment. The assessment criteria relevant to the proposed development are presented in **Table 11.3**.

Table 11.3 - Criteria for Assessing the Effects of Vibration on Human Response

Land use	Low probability of adverse comment VDV ($m/s^{1.75}$)	Adverse comment possible VDV ($m/s^{1.75}$)	Adverse comment probable VDV ($m/s^{1.75}$)
Residential buildings 16-hour day.	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential buildings 8-hour night.	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

Calculation of Road Traffic Noise, 1988

11.29 The Calculation of Road Traffic Noise (CRTN)[12] describes procedures for predicting and measuring noise from road traffic noise in terms of the L_{A10} (the noise level exceeded for 10% of the time) and is suitable for environmental assessments of development proposals where road traffic noise may have a significant impact.

[11] BSI (2008): '*BS 6472:2008 Guide to evaluation of human exposure to vibration in buildings (Part 1: Vibration sources other than blasting)*', BSI.
[12] Department for Transport Welsh Office (1988): Calculation of Road Traffic Noise (CRTN)

Design Manual for Roads and Bridges

11.30 The Design Manual for Roads and Bridges (DMRB)[13] provides guidance on the assessment of the impacts that road projects may have on levels of noise and vibration. The latest revision provides updated advice on calculating night-time noise levels, determining the extent of the study area and selecting appropriate traffic speed data. DMRB states that where appropriate the standard may be applied to existing roads.

11.31 Within the introduction section it states that:

'*the standard must be used forthwith on all road projects for the assessment of noise and vibration impacts associated with construction, improvements, operation and maintenance associated with motorways and trunk roads.*'

IEMA Guidelines for Environmental Noise Assessment, 2014

11.32 The Institute of Environmental Management and Assessment (IEMA) 'Guidelines for Environmental Noise Assessment'[14] addresses the key principles of assessing noise effects and are applicable to all development proposals where noise effects may occur.

11.33 The guidance provides advice with regards to the collection of baseline noise data, prediction of noise levels and how noise should be assessed. The guidance recognises that the effect associated with a particular noise source will be dependent on a number of factors including, but not limited to, the sensitivity of the receptor, frequency and duration of the noise source and time of day. However, it stops short of providing specific assessment criteria which developments should achieve but instead suggests that the methodology adopted should be selected on a site by site basis with reference to relevant national and local standards.

Building BulletIn 93 – Acoustic Design of Schools: Performance Standards

11.34 Building Bulletin 93 (BB93)[15] sets out minimum performance standards for the acoustics of school buildings, and describes the normal means of demonstrating compliance with the Building Regulations.

[13] Highway Agency (2011); '*Design Manual for Road and Bridges*', Volume 11 Environmental Assessment, Section 3, Environmental Assessment Techniques, Part 7 Noise and Vibration.
[14] Institute of Environmental Management and Assessment (IEMA) (2014); 'Guidelines for Environmental Noise Impact Assessment', IEMA, London.
[15] Department for Education (2015); '*Acoustic design of schools:performance standards – Building bulletin 93*', DfE.

11.35 Table 11.4 sets out the recommended target internal noise level criteria to be achieved within schools premises.

Table 11.4 - BB93 Internal Ambient Noise Level Criteria within Schools

Area	Internal Ambient Noise Levels Criteria
	dB $L_{Aeq, 30mins}$
Teaching classrooms, study rooms, interview / counselling rooms, medical rooms, conference rooms and meeting rooms	35
Resource Areas, Science Labs, D&T and Art Rooms, Indoor Sports Hall, Dance Studio, Gym, Offices*, Staff rooms*	40
Dining Rooms, Atria, Circulation and stairs*, Entrance Lobby*, Changing Rooms*, Learning Street	45
Kitchens*, WCs*	50

*For these areas the performance standards are for guidance only (*Applied to under Part E - schedule 1 of the Building Regulation 2000*)

Development being Assessed

11.36 The assessment undertaken in this chapter is as described in Chapter 4 and includes the land between Quinton Road and Bramblefield Lane and at Pheasant Farm and Great Grovehurst Farm, Sittingbourne.

11.37 There is the intention to extract brick earth that lies beneath the land owned by G H Dean and Co Limited. The assessment therefore gives consideration to the implications of operating plant and machinery to extract the brick earth and dust issues on the north-eastern most part of the site.

11.38 The assessment of site preparation and construction noise has been determined using the closest potential distance from the works to the relative sensitive receptor. In this way, the absolute worst-case effects of the site preparation and construction works have been accounted for.

11.39 The assessment of residential and school amenity within the development has been based on the closest potential locations for those façades to the dominant noise sources (the A249 and the Southeastern railway lines). This inherently represents a 'worst-case' scenario in terms of noise as these façades would experience the highest noise levels.

Assessment Methodology and Significance Criteria

11.40 The assessment of likely significant noise impacts has involved the following staged process:

- identifying potentially sensitive existing and future receptors on and within the surrounding area of the site;
- establishing the baseline noise conditions currently existing at the site and at existing receptors surrounding the site using appropriate noise surveys (see below);
- assessing the suitability of the site for residential uses in terms of the prevailing baseline noise conditions;
- assessing likely noise levels generated during the ground preparation and construction works associated with the development;
- establishing design aims for plant and services associated with the development;
- assessing likely noise levels from the completed and operational development (with reference to current guidance as detailed earlier in this chapter);
- formulating proposals for mitigation (where appropriate); and
- assessing the likely significance of any residual noise impacts.

11.41 Long term noise monitoring was undertaken at four key locations on the periphery of the site over a six day period between Wednesday 20th May and Tuesday 26th May 2015, covering both a typical weekday and weekend period. It should be noted that at Great Grovehurst Farm the noise survey was undertaken in 2017. Additional concurrent short-term noise monitoring was also undertaken at key locations on the site, in the wider Survey Area and beyond in order to robustly quantify the existing noise climate across the site, whilst also providing a good representation of the noise environment experienced at adjacent potential sensitive receptors.

11.42 A summary of noise and vibration monitoring results can be found within **Appendix 11.2.**

Assessment Methodology

Ground Preparation and Construction - Noise

11.43 The generic ground preparation and construction sequence of works which are considered to be the most likely to give rise to significant noise impacts can be divided into five specific activities:

- Extraction of Brickearth
- Site Clearance / Preparation;
- Sub Structure Works;
- Construction Works; and
- Landscaping.

11.44 Noise levels associated with these works were estimated based upon the anticipated plant and typical source noise levels contained within BS 5228.

11.45 To assess the likely significant impacts of noise from preparation and construction works on existing sensitive receptors surrounding the site, the 'ABC Method' provided in BS 5228 was used. This method defines category threshold values which are determined by the time of day and existing monitored ambient noise levels. Noise likely to be generated by preparation and construction activities, (known as the 'total noise level') was then compared with the 'threshold value'. If the total noise level exceeds the 'threshold value', a significant impact is deemed likely to occur.

11.46 Noise threshold levels were established for the existing sensitive receptors based upon the monitored noise levels. Noise levels associated with the preparation and construction works were then predicted and assessed against the threshold levels. Calculations were carried out in accordance with the methodology prescribed within BS 5228. Calculations representing a worst-case scenario over a one-hour period with plant operating at the closest point to the nearest sensitive receptor and in the absence of mitigation are presented to provide the "greatest" environmental impact that might reasonably be expected. In practice, noise levels would tend to be lower owing to greater separation distances, screening impacts and periods of plant inactivity.

11.47 The likelihood of construction noise disturbance at future sensitive receptors forming a part of the development cannot be assessed in the same manner as at existing sensitive receptors, since future occupants 'investing' in the development will typically tolerate a higher level of noise which is temporary (such as that generated during the latter construction phases of the Development).

11.48 Full details of the predictions and assumptions of the assessment of likely noise associated with the preparation and construction works are contained within **Appendix 11.3.**

Ground Preparation and Construction - Vibration

11.49 Two aspects of demolition and construction vibration require consideration, the potential for construction vibration to cause disturbance to humans and the potential for vibration to damage buildings.

11.50 There are currently no British Standards that provide a methodology for predicting levels of vibration from construction activities other than BS 5228-2, which relates to percussive, or vibratory, rolling and piling only. However, as stated in BS 5228 2, and as generally accepted, the threshold of vibration perception for humans is typically in the peak particle velocity (PPV) range 0.14 mm/s to 0.3 mm/s at frequencies between 8 Hz and 80 Hz in residential environments. Based on professional judgment and field measurements undertaken by Waterman on other projects at developments similar to the development and having regard to information contained within BS 5228-2, Table 11.5 details the distance at which certain activities are likely to give rise to 'just perceptible' levels of vibration.

Table 11.5 - Potential Vibration Perceptibility of Construction Activity in Terms of Distance

Construction Activity	Distance from Activity when Vibration may Just be Perceptible (metres)[1]
Heavy vehicles	5 - 10
Excavation	10 - 15
Concreting	15 - 20
Earth moving	20 - 30

Notes: [1] Distances for perceptibility are only indicative and dependent upon a number of factors, such as the radial distance between source and receiver, ground conditions, and underlying geology.

11.51 It is a typical misconception that if vibration can be felt, no matter how light, then damage to property is likely. In reality vibration levels much higher than those noticed by humans are required to cause damage to buildings. A PPV limit of 10 mm/s is commonly adopted in-line with the guidance provided in BS 5228 when considering the potential for building damage to arise.

Ground Preparation and Construction - Traffic Noise

11.52 Noise level changes arising from preparation and construction traffic was undertaken using the calculation methodology detailed within the CRTN. This has involved the use of estimated preparation and construction traffic flow data

provided by the Applicant's transport consultant, Peter Brett Associates LLP (PBA).

Completed Development - Residential / School / Community Uses

11.53 To assess the suitability of the site for residential development, guidance was sought from BS 8233:2014, WHO guidelines and ProPG, 2017. The monitored baseline noise levels were used to assess the site suitability against the BS 8233 and WHO guidelines criteria. The primary and secondary school designs will be inline with the guidance set in BB93 2015.

Completed Development - Building Services Plant Noise

11.54 The significance of the sound of an industrial and/or commercial nature depends upon a number of factors including the margin by which a sound exceeds the background sound level, its absolute level, the time of day and change in the acoustic environment, as well as local attitudes to the source of the sound and the character of the neighbourhood.

11.55 BS 4142:2014 provides an assessment and rating method to assess adverse impacts from a range of industrial and/or commercial noise sources, including fixed building services plant. The measured or predicted noise level from the source in question, the 'specific noise' level (LAeq,T), immediately outside the dwellings was compared with the 'background noise' level (LA90,T). Where the sound contains certain acoustic features at the assessment location (e.g. tones, impulses, intermittency etc.), then a scaled character correction was added to the specific noise level to obtain the 'rating noise' level (LAr,Tr). The significance of impact is dependent on the context, having consideration to pertinent factors such as the sensitivity of the receptor, the absolute level of sound to the character and level of the residual sound compared to the character and level of the specific sound.

11.56 Based on the noise monitoring data detailed in **Appendix 11.2**, maximum plant emission levels were set in controlling fixed building services plant to an acceptable level. Noise limits apply at a position 1m from the façade of the nearest noise sensitive receptors and include the total contribution of noise from all plant items associated with the proposed Development that may run during any particular period.

Completed Development - Road Traffic Noise

11.57 The changes in noise levels, attributable to changes in operational road traffic flows and volumes resulting from the development were calculated using traffic

data provided by PBA (refer to **Appendix 11.4**). Traffic flow data was provided for the 'with' and 'without' development scenarios for a future year of the completion and operation of the development (2031) and included traffic associated with a cumulative scheme.

Limitations and Assumptions

Ground Preparation and Construction Noise

11.58 The BS 5228 calculation methods allow accurate noise levels to be determined for various preparation and construction activities. However, the value of any such predictions is necessarily limited by the number of assumptions that were made regarding the number and type of plant to be utilised, their location and detailed operating arrangements. Some of this information would be clarified as the detailed design progresses and later when resources are mobilised, but other information (such as exactly where the plant operates and for how long) would remain uncertain, even after works have commenced.

11.59 As a consequence, the available information is considered sufficient to perform a generic preparation and construction phase noise assessment, focussing on key activities operating at the site boundary, with the aim of identifying whether a significant, albeit temporary, noise impact is likely to arise at the nearest sensitive receptors.

Building Services Plant Noise

11.60 At this stage the number, location, specific type and configuration of fixed plant connected with the development are not defined. As a consequence, it is not possible to undertake predictions to determine whether appropriate standards might be met, so instead appropriate plant noise emission limits has been set.

Significance Criteria

Ground Preparation and Construction - Noise

11.61 As outlined earlier in this chapter, in order to assess the significance of noise impacts from the preparation and construction works on sensitive receptors, *'The ABC Method'* provided in BS 5228 was used. This method defines category threshold values which are determined by the time of day and existing monitored ambient noise levels. The noise level generated by the preparation and construction activities, (*the total noise level*) was then compared with the '*threshold value'*. If the total noise level exceeds the 'threshold value', a significant impact is deemed to occur. The criteria in **Table 11.6** were adopted to

provide transparency in the definition of the significance of identified impacts. Full details are provided in **Appendix 11.3**.

Table 11.6 - Significance Criteria for the Assessment of Ground Preparation and Construction Noise

Significance	Level Above Threshold Value dB(A)	Definition
Negligible	≤ 0 to 2.9	The impact is not of concern
Adverse impact of minor significance	3.0 to 4.9	The impact is undesirable but of limited concern
Adverse impact of moderate significance	5.0 to 9.9	The impact gives rise to some concern but is likely to be tolerable depending on scale and duration
Adverse impact of major significance	≥10	The impact gives rise to serious concern and it should be considered unacceptable

11.62 The criteria proposed for development mineral extraction works of the GH Dean land in the northern part of the site, are as detailed in Table 11.6 would also be appropriate for preparation and construction road traffic noise and have accordingly been adopted in assessment.

Ground Preparation and Construction - Vibration

11.63 Determining the magnitude of significance of vibration effects is complex owing to the highly variable nature and duration of vibration effects arising from preparation and construction work.

11.64 At this stage in the planning application, insufficient detail is available of the methods and equipment to be used during the preparation and construction works. Therefore, a detailed assessment cannot be undertaken. Consequently, the significance of vibration effects from preparation and construction work cannot be assessed quantitatively and was therefore determined using professional judgement based on the factors detailed in the assessment methodology above.

Ground Preparation and Construction - Traffic Noise

11.65 The criteria proposed for development generated road traffic noise as detailed in **Table 11.6** would also be appropriate for preparation and construction road traffic noise and have accordingly been adopted in assessment.

Completed Development - Residential / School / Community Uses

11.66 Given that the assessment of residential amenity for future residents within the development is not an impact assessment itself (*i.e. there are no existing residents on the site who would experience a 'change' in ambient noise levels as a result of the Development, or otherwise*), it is not appropriate to attach significance criteria to this particular component of the assessment. Rather, the assessment of amenity was undertaken with reference to relevant and accredited guidance on environmental noise, notably, ProPG, BS 8233:2014, WHO guidelines and BB93.

Completed Development - Building Services Plant Noise

11.67 Through consultation with SBC it was determined that plant noise that is greater than 5 dB above the existing background noise levels at the nearest residential receptor would be of particular concern to the Council. To avoid this scenario occurring and to prevent creeping background noise in the area a limit of 5 dB below the existing background noise level is recommended. A plant noise level 5 dB below background would, at worst, contribute 1.2 dB to the noise climate of the area, which would be imperceptible as to not materially affect or inconvenience user's amenity, thereby ensuring the acoustic acceptability of plant that may be introduced as part of the Development.

11.68 On this basis, the maximum noise limit of the cumulative plant forming a part of the development is taken as LA90 – 5 dB.

Completed Development - Road Traffic Noise

11.69 Existing sensitive receptors are currently exposed to a certain level of road traffic noise. In assessment terms, it is therefore the difference in noise level as a result of the development that is important.

11.70 The IoA / IEMA draft guidelines[16] provide an example of how changes or differences in noise levels may be categorised by significance, but caution that in any assessment the noise level threshold and significance statement should be determined by the assessor, based upon the specific evidence and likely subjective response to the noise. Hence, the scale of significance, as shown in Table 11.7, was used in this assessment.

11.71 The criteria were derived by considering how changes in noise levels can be categorised by significance, based on key benchmarks that relate to human perception of sound. For noise which is very similar in all respects except

[16] Institute of Acoustics (IOA) / IEMA (2002): Guidelines for Noise Impact Assessment. IOA / IEMA, London.

magnitude, a change or difference of 1dB is only just perceptible under controlled or laboratory conditions, whilst a change or difference of 3dB is the minimum perceptible under most normal environmental conditions. A 10dB change in noise corresponding roughly to a doubling or halving in the loudness of a sound.

Table 11.7 - Significance Criteria for Road Traffic Noise Assessment

Significance	Change or Difference in Noise Level, dB(A)
Adverse impact of major significance	> 5
Adverse impact of moderate significance	3.0 to 4.9
Adverse impact of minor significance	1.0 to 2.9
Negligible	-0.9 to +0.9
Beneficial impact of minor significance	-1.0 to -2.9
Beneficial impact of moderate significance	-3.0 to -4.9
Beneficial impact of major significance	> -5

Embedded Design Mitigation

11.72 The development includes a number of inherent design measures that will aid in the attenuation of noise both on existing sensitive receptors and future sensitive receptors forming a part of the Development.

11.73 The development incorporates a 3 m high earth bund running parallel to the A249 with a 1.8 m acoustic fence situated on top of the bund. The bund/barrier runs down the entirety of the western boundary of the site, without gaps. The bund/barrier will reduce the amount of road traffic noise coming from the A249 reaching the sensitive areas of the Development.

11.74 The nearest façades of the development to the A249 have been positioned at a distance of >30 m from the A249, allowing significant distance attenuation of noise.

11.75 During the operational period of the brickearth extraction, there is the temporary inclusion of a bund at Great Grovehurst Farm and house building processes.

Consultation

11.76 The Mid Kent Environmental Health team (covering Maidstone Borough Council, Tunbridge Wells Borough Council and Swale Borough Council) was consulted prior to the noise and vibration survey to agree monitoring locations, the

monitoring strategy and the assessment approach for residential amenity. While no response was received prior to the initial survey, follow up consultation confirmed receipt of the proposal and no issues were raised. This consultation is provided in **Appendix 11.5.**

11.77 The Environmental Health team also confirmed that they follow BS 8233:2014 guidelines with regard to residential internal noise criteria (as proposed) and also stated that:

> "*Though we follow the guidelines in BS 4142:2014, we would be particularly concerned in plant noise that is greater than 5 dB above background levels at the nearest residential property*."

Baseline Conditions

Sensitive Receptors

11.78 Table 11.8 presents existing potentially sensitive receptors (SRs) which may be affected by the Development. Future SR locations which are representative of sensitive uses proposed within the development may also have the potential to experience significant noise impacts due to the preparation and construction works and/or from the operation of the completed Development. The location of the existing SRs assessed are presented as **Figure 11.1 in Appendix 11.2**.

Table 11.8 - Existing Sensitive Receptors

Sensitive Receptor Number	Type of Receptor	Address / Name	Approximate Distance from Site Boundary
SR A	Existing residential	Quinton Road	15m north
SR B	Existing residential	Volate Drive	25m west
SR C	Existing residential	Bramfield Lane	20m north and south
SR D	Existing residential	Godwin Close	1m south

11.79 Where a number of SRs are located close to each other, the nearest sensitive receptor is given to represent the immediate area.

Baseline Noise Monitoring

11.80 The noise monitoring locations are shown on **Figure 11.1** and described below in Table 11.9. A summary of the measured daytime (07:00 to 19:00), evening (19:00 to 23:00) and night-time (23:00 to 07:00) noise levels at these locations

are presented in **Table 11.11**, with full results displayed graphically in time-history format in **Appendix 11.2**.

Table 11.9 - Noise Monitoring Locations

Monitoring Location (Figure 11.1)	Description	Observations and Predominant Noise Sources
LT1	Free-field measurement at the north-eastern site boundary adjacent to the railway lines. Microphone located 1.2m above the ground.	Noise climate dominated by constant vehicular traffic on the A249 and Swale Way along with train noise from the adjacent railway network. Natural wildlife (bird song), rustling of leaves, human activities and distant aircraft were evident and influence the noise climate to some extent.
LT2	Free-field measurement at the eastern site boundary adjacent to the railway lines. Microphone located 1.2m above the ground.	Noise climate dominated by constant vehicular traffic on the A249 along with train noise from the adjacent railway network. Natural wildlife (bird song), rustling of leaves, human activities and distant aircraft were evident and influence the noise climate to some extent.
LT3	Free-field measurement at the southern site boundary adjacent to the residential rear gardens off Quinton Lane. Microphone located 1.2m above the ground.	Noise climate dominated by constant vehicular traffic on the A249. Natural wildlife (bird song), rustling of leaves, human activities and distant aircraft were evident and influence the noise climate to some extent.
LT4	Free-field measurement at the western site boundary adjacent to the A249. The microphone was positioned 7m away from the road on the grass verge and located 1.2m above the ground.	Noise climate dominated by constant vehicular traffic on the A249. Distant aircraft were evident and influence the noise climate to some extent.

Table 11.10 - Summary of Baseline Noise Measurements (free-field)

Monitoring Location (Figure 11.1)	Period	Duration	$L_{Aeq,T}$ dB	$L_{A10,T}$ dB	$L_{A90,T}$ dB		$L_{AFmax,5min}$ dB	
			Ave[1]	Ave[2]	Range	Ave[2]	Range	90th Percentile[3]
T1	Day	12hr	55	56	41 - 57	50	52 - 87	71
	Evening	4hr	52	54	39 - 54	46	52 - 82	71
	Night	8hr	53	54	28 - 56	44	51 - 88	69
LT2	Day	12hr	50	51	36 – 54	44	47 – 89	69
	Evening	4hr	47	47	30 – 50	41	40 – 82	68
	Night	8hr	48	46	27 – 53	39	34 – 80	67
LT3	Day	12hr	57	59	53 - 57	55	60 - 72	69
	Evening	4hr	54	55	46 - 54	50	56 - 74	66
	Night	8hr	49	50	32 - 52	43	49 - 68	62
LT4	Day	12hr	80	84	54 – 76	69	88 – 103	93
	Evening	4hr	77	81	43 – 70	61	86 – 102	92
	Night	8hr	76	76	31 – 75	52	84 - 102	92
ST1	Day	15mins	62	63	59 - 59	59	67 - 79	78
ST2	Day	15mins	53	55	50 - 52	51	58 - 67	66
ST3	Day	15mins	56	57	53 - 54	53	61 - 66	66
ST4	Day	15mins	75	80	60 - 64	62	86 - 90	89

Notes: [1] Logarithmic average over the daytime/evening/night-time survey periods; [2] Arithmetic average over the daytime/evening/night-time survey periods. [3] The 90th percentile L_{AFmax} value (equivalent to the 10th highest measured L_{AFmax} level) is presented for the long term noise monitoring results and is considered to fairly represent typical L_{AFmax} levels being experienced, within the spirit of WHO and BS 8233 guidance. All figures rounded to nearest whole decibel.

11.81 The highest ambient ($L_{Aeq,T}$) noise levels, were measured at the western (LT4) site boundary adjacent to the A249 road, where ambient noise levels of 80 dB $L_{Aeq,12hr}$ were recorded during the daytime. Ambient noise levels reducing marginally (typically 1 to 6 dB) during the night-time period.

Baseline Vibration Monitoring

11.82 On Wednesday 20 May 2015, short-term attended vibration measurements were taken across the North West Sittingbourne site (as shown on Figure 11.1) to determine the magnitude of existing vibration from train passes on the railway lines adjacent to the eastern site boundary for a representative sample of train events.

11.83 Table 11.11 describes each measurement location and the nearest source of vibration, although this was largely imperceptible at all locations at the time of the vibration monitoring survey.

Table 11.11 - Existing Description of Vibration

Monitoring Location (Figure 11.1)	Description	Nearest Vibration Sources
V1	1000m South of Kemsley Station at ground level 10m from the railway lines.	Railway lines running north to south on the east boundary of the north west Sittingbourne site
V2	150m South of Kemsley Station at ground level stepped back 10m from measurement location V3.	
V3	150m South of Kemsley Station at ground level 10m from the railway lines.	
V4	450m North of Kemsley Station at ground level stepped back 10m from measurement location V5.	
V5	450m North of Kemsley Station at ground level at ground level 15m from the railway lines. The railway line is 8m below ground level.	

11.84 The typical levels of vibration attributable to train movements obtained from the monitoring undertaken are presented in **Table 11.12**.

Table 11.12 – Existing Vibration Levels Representative of the Development Site

Monitoring Location	Maximum Measured Vibration Dose Value ($m/s^{1.75}$)		
	x-axis	y-axis	z-axis
	VDV,d	VDV,d	VDV,b
V1	0.011	0.002	0.001
V2	0.011	0.006	0.004
V3	0.007	0.006	0.022
V4	0.005	0.002	0.003
V5	0.005	0.004	0.007

11.85 Tactile vibration was not knowingly perceived during any of the train events as is expected with such low magnitudes of measured vibration.

Assessment of Potential Impacts

Ground Preparation and Construction - Noise

11.86 The calculated 'worst-case' construction noise predictions in dB LAeq,1hr for the principal ground preparation and construction works at the nearest affected sensitive receptors are presented in Table 11.13, together with the associated level of significance, having regard to the adopted scale detailed in Table 11.5. Full details of the preparation and construction noise assessment are provided within **Appendix 11.3**. It should be noted that the assessment is based without the presence of mitigation.

11.87 The highest noise levels tend to be associated with plant associated with preparation activities, earthmoving and construction of the superstructure. During the fit-out, construction noise would be significantly lower. In practice, noise levels would tend to be lower owing to greater separation distances and screening effects. Noise would also tend to reduce over the working day owing to periods of inactivity. It should be noted that the threshold noise levels 65dB at each sensitive receptor.

Table 11.13 - Summary of Predicted Construction Noise Levels and Level of Significance (Without Mitigation)

Receptor	Assessment Parameter	Development Stage				
		Brickearth Extraction	**Ground Preparation Works**	**Sub Structure Works**	**Building Construction**	**Landscaping & External Infra Works**
Quinton Road	**Predicted Noise Level**	80	80	84	81	79
	Significance	**Short-term, local, adverse** and of **major significance**	**Short-term, local, adverse** and of **major significance**	**Short-term, local, adverse** and of **major significance**	**Short-term, local, adverse** and of **major significance**	**Short-term, local, adverse** and of **major significance**
Volante Drive	**Predicted Noise Level**	77	77	80	78	76
	Significance	**Short-term, local, adverse** and of **major significance**	**Short-term, local, adverse** and of **major significance**	**Short-term, local, adverse** and of **major significance**	**Short-term, local, adverse** and of **major significance**	**Short-term, local, adverse** and of **major significance**
Bramblefield Lane	**Predicted Noise Level**	78	78	82	79	78
	Significance	**Short-term, local, adverse** and of **major significance**	**Short-term, local, adverse** and of **major significance**	**Short-term, local, adverse** and of **major significance**	**Short-term, local, adverse** and of **major significance**	**Short-term, local, adverse** and of **major significance**
Godwin Close	**Predicted Noise Level**	85	85	88	86	84
	Significance	**Short-term, local, adverse** and of **major significance**	**Short-term, local, adverse** and of **major significance**	**Short-term, local, adverse** and of **major significance**	**Short-term, local, adverse** and of **major significance**	**Short-term, local, adverse** and of **major significance**

11.88 As mentioned previously within this chapter, there is an intention to extract brick earth that lies beneath the land owned by G H Dean and Co Ltd. The operational activity is understood to be required within the first year of the development. As such, the implications of operating plant and machinery to extract the brick earth associated with noise on the north-eastern most part of the site is considered to be short-term, adverse impacts of moderate significance.

Ground Preparation and Construction - Vibration

11.89 During the demolition and construction works, vibration impacts could arise at premises neighbouring the development where vibration generating activities (specifically concreting and piling) are carried out within approximately 20 m of the SRs identified in Table 11.9.

11.90 SR B is located in excess of 20 m from the site boundary and would therefore experience negligible impacts in relation to both human perception and building damage as a result of vibration generated during the demolition and construction works.

11.91 Given the remaining SRs' proximity to the site boundary (from 1 m to 20 m away) and in the absence of mitigation, there would be the potential for some short-term, adverse impacts of moderate significance to arise at these locations when considering human perception. Impacts relating to building damage are, however, likely to be negligible, given that vibration levels would need to be several orders of magnitude higher than those shown to cause damage to buildings.

11.92 There is also the potential for development related SRs to be affected by vibration if the works are to be carried out concurrently with completed and operational areas of the Development. Depending on the distances between these future SRs and the works there would be the potential for some short-term, adverse impacts of moderate significance to arise.

11.93 With regards to brickearth extraction traffic, it has been proposed that there would no traffic passing through any residential area.

Ground Preparation and Construction – Traffic Noise

11.94 In addition to construction plant operating on the site, there would be some movement of materials to and from the site by road. A Construction Traffic Management Plan would be agreed to minimise the temporary and intermittent adverse effects that construction traffic can cause. Peak levels of noise or vibration arising from construction vehicles should not be any greater than can presently arise from existing heavy duty vehicle movements on the existing roads, and would be less than those from the main construction works on the site, such as piling operations. As such, it is considered that the potential noise effects of construction traffic associated with the proposed development would be **negligible**.

Completed Development - Residential and Community Uses

Figures 11.2 and 11.3 in **Appendix 11.2** present the predicted future daytime and night-time noise levels across the un-occupied[17] site respectively. Noise levels are greatest adjacent to the transportation noise sources, decreasing with distance from these sources. Generally, where daytime noise levels are ≤55 dB LAeq,16h (light green) then no mitigation is required for external amenity. The results indicate that mitigation is likely to be required in all development parcels where residential use is proposed (Quinton Road and Pheasant Farm, Quinton Road adjacent to the A249 and Great Grovehurst Farm) in the form of a suitable glazing and ventilation strategy in order to provide suitable residential amenity. Although overall daytime noise levels are not considered to be excessively high away from the transportation noise sources, the predicted night-time noise levels across the un-occupied site predominantly exceed 45 dB LAeq,8h, indicating the requirement for mitigation.

11.95 The results presented in Figures 11.2 and 11.3 in **Appendix 11.2** are for an un-occupied site and thus would change once the development is fully built out due to screening afforded by the buildings. In light of this, once the development is completed and operational, areas of the site exposed to daytime noise levels of ≤55dB LAeq,16h and night-time noise levels of ≤45 dB LAeq,8h are expected to decrease. Mitigation requirements are set out later in this chapter.

Completed Development – School Amenity

11.96 To the south west of Kemsley railway station is an area designated for educational use. Figure 11.2 presents the predicted future daytime noise levels within this area. Almost the entirety of the proposed educational area (based on an unoccupied site) satisfies the ≤60 dB LAeq,T criteria and is therefore considered suitable for school amenity. Exceptions are along the western and eastern corners of the school site positioned closest to the transportation noise sources.

Completed Development - Vibration

11.97 BS 6472[18] states that the assessment of vibration impacts should be based on the axis along which the highest VDV is measured. In all measurement locations, the highest VDV was measured in the vertical (z) axis which was used for the EIA. Train induced vibration levels in the horizontal (x- y- axis) were negligible and therefore are not presented herein.

[17] Excludes buildings as locations and building footprints are unknown beyond Development Zone 1A. Buildings would afford a degree of screening to noise.
[18] British Standards Institute (BSI) (2008); BS 6472 'Guide to evaluation of human exposure to vibration in buildings (1Hz to 80Hz)', BSI.

11.98 Based on the maximum vibration values taken of single train passes (Table 11.14) and utilising the train timetables to estimate the number of train passes for the daytime and night-time period at each measurement location, an overall vibration dose value for the 16-hour daytime period (VDVday) and 8-hour night-time (VDVnight) period has been calculated as presented in Table 11.14. Levels have been predicted at ground level, with no correction made for building slabs. Dependent on the final building design there may be the potential for the presented levels to increase or decrease slightly due to amplification and dampening by the structure.

Table 11.14 - Maximum VDV and Corresponding Semantic Rating for Residential Buildings

Measurement Position	Period	Estimated Number of Train Passes	Maximum Vertical VDV ($m/s^{1.75}$)	BS 6472 '*Low Probability of Adverse Comment*' Range
V1	Daytime 16hr	32	0.029	0.2 – 0.4
	Night-time 8hr	16	0.024	0.1[1] – 0.2
V2	Daytime 16hr	32	0.031	0.2 – 0.4
	Night-time 8hr	16	0.026	0.1[1] – 0.2
V3	Daytime 16hr	32	0.053	0.2 – 0.4
	Night-time 8hr	16	0.044	0.1[1] – 0.2
V4	Daytime 16hr	32	0.012	0.2 – 0.4
	Night-time 8hr	16	0.010	0.1[1] – 0.2
V5	Daytime 16hr	32	0.018	0.2 – 0.4
	Night-time 8hr	16	0.015	0.1[1] – 0.2

Notes: [1] BS 6472-1:2008 states that adverse comment is not expected for VDVs below the ranges in Table 17.2.6.

11.99 These calculations indicate that the VDVs associated with train movements during both the day and night-time periods will be significantly below the "*low probability of adverse comment*" range as defined by BS 6472 within all areas of the development site.

Completed Development - Building Services Plant Noise

11.100 Any items of fixed plant associated with the operation of the development would have the potential to generate noise. At this stage in the design, specific details of the plant associated with the development are not yet known. Consequently, suitable limits to which plant should adhere have been set and are presented below in Table 11.15.

11.101 Based on the above principles and the likely distance separation between plant and existing and future sensitive receptors, it is recommended that noise from fixed building services plant is designed to a level 5 dB below the existing background noise level at a position 1 m from the façade of the nearest sensitive receptors (i.e. Plant LAr,T ≤ LA90,T – 5 dB). This is on the provision that a limiting plant noise level of 35 dB LAr,T is set where the prevailing background noise levels minus 10 dB(A) are below this value. Such a limiting criterion falls below credited absolute health-based guideline values to prevent harmful effects of noise (e.g. on rest/sleep with windows open), whilst ensuring standard abatement measures remain physically and economical viable.

11.102 Design to such a criterion would ensure that plant noise would, at worst, contribute 1.2 dB to the noise climate of the area, which would be imperceptible as to not materially affect or inconvenience user's amenity, thereby ensuring the acoustic acceptability of plant that may be introduced as part of the Development.

Table 11.15 - Plant Noise Limits at Nearest Sensitive Receptors

Location	Period	Representative $L_{A90,5min}$	Plant Noise Emission Limit $(L_{Aeq,T})^{1+2}$
Quinton Road	Daytime (07:00 and 23:00)	50	45
	Night-time (23:00 and 07:00)	44	39
Volante Drive	Daytime (07:00 and 23:00)	44	39
	Night-time (23:00 and 07:00)	39	35
Bramblefield Lane	Daytime (07:00 and 23:00)	55	50
	Night-time (23:00 and 07:00)	43	38
Godwin Close	Daytime (07:00 and 23:00)	69	64
	Night-time (23:00 and 07:00)	52	47

Notes: [1] If there is determined to be tonal or intermittent content emitting from plant then an acoustic feature correction should be applied to give the rating level as defined in BS 4142:2014. [2] Noise limits apply at a position 1m from the façade of the nearest noise sensitive properties and include the total contribution of noise from all noise generating plant that may run during any particular period.

11.103 In setting the plant noise emission limits regard was given to the results of the baseline noise survey (Table 11.10) and the noise requirements of SBC seeking to both preserve environmental noise quality where it is good, as in this instance, and ensure the acoustic acceptability of plant that may be introduced as part of the Development.

11.104 Based on the above noise emission limits for new building plant being achieved (and potentially being controlled by a standard planning condition), noise generated from new building plant would have an negligible impact on surrounding existing and future sensitive receptors.

Completed Development - Road Traffic Noise

11.105 The likely change in road traffic noise resulting from operational traffic associated with the development was determined in accordance with CRTN; full details of the results of which are presented in **Appendix 11.4**. The assessment considered two different opening years (2023 and 2033) for each phase of the Development. For each assessment, a baseline scenario 'without Development' was included that took into account traffic increases due to natural traffic growth and cumulative schemes. A scenario 'with Development' for each of the assessments was also included to compare to the baseline scenario and identify the likely impacts solely as a result of the Development.

11.106 For all road links assessed, the difference in operational road traffic noise (considering the 2023 and 2033 baseline situations for each phase both 'with' and 'without' Development) are for the majority no greater than +0.9 dB except along Quinton Road, Laxton Way and Sonora Way (B2006).

11.107 However, the significance of the impact on noise sensitive receptors on Quniton Road, Laxton Way and Sonora Way is expected to be negligible for the following reason:

- traffic flows on these roads are an order of magnitude less than nearby surrounding road links and constitute a very small percentage of the total traffic in the area and would therefore not make a significant contribution to the overall traffic noise.

Potential Mitigation / Management Techniques

Ground Preparation and Construction - Noise

11.108 An Outline Construction Environmental Management Plan (CEMP) has been prepared. This Outline CEMP has regard to appropriate legislation, guidance and measures to minimise preparation and construction noise, including:

- application of the principle of BPM as defined in Section 72 of the Control of Pollution Act 1974, carrying out all work in such a manner as to reduce any disturbance from noise to a minimum;
- identification and use of low noise techniques. Where construction plant is known to generate significant levels of noise then it is to be used sparingly and the construction activity is closely monitored to minimise noise levels;
- all plant brought on to site should comply with the relevant EC/UK noise limits applicable to that equipment or should be no noisier than would be expected based on the noise levels quoted in BS 5228: 2009. Plant should be properly

maintained and operated in accordance with manufacturers' recommendations;

- where feasible, all stationary plant should be located so that the noise at all occupied sensitive receptors is minimised and, if practicable, every item of static plant when in operation should be sound attenuated using methods based on the guidance and advice given in BS 5228 (e.g. local screening);
- items of plant on the site operating intermittently should be shut down in the intervening periods between use;
- adoption of a noise monitoring regime and the establishment of noise Action Levels in consultation with SBC, above which consideration would be given to the use of alternative techniques and / or other means of controlling noise levels;
- use of hoarding to the required height and density appropriate to the noise sensitivity of the site;
- implementation of a Construction and Logistics Plan (CLP) to pre-plan and manage traffic associated with the works to minimise disturbance to sensitive receptors.

Ground Preparation and Construction - Traffic Noise

11.109 With regard to construction traffic management during the preparation and construction works**,** all traffic logistics would be agreed with SBC. However, as the likely impact from preparation and construction traffic noise is assessed as negligible, no mitigation measures are considered necessary.

Completed Development - Residential / Schools / Community Uses Amenity

11.110 The noise monitoring results show areas of the site to be materially constrained by environmental noise, with specific environmental (e.g. barrier) and building design (e.g. façade system) noise control mitigation measures considered necessary to meet relevant and credited guideline indoor and outdoor design criteria levels.

Completed Development - Building Services Plant Noise

11.111 Provided the detailed design of fixed building plant achieves the proposed noise limits set out in **Table 11.15**, there would be no need for additional mitigation of building services plant noise associated with the Development.

Completed Development - Road Traffic Noise

11.112 For all road links assessed, the difference in operational road traffic noise (considering the 2033 baseline situation both 'with' and 'without' Development)

are for the majority no greater than +0.9 dB except along Quinton Road, Laxton Way and Sonora Way (B2006). However traffic flows on these roads are an order of magnitude less than nearby surrounding road links and constitute a very small percentage of the total traffic in the area and therefore do not make a significant contribution to the overall traffic noise. Because of this, no mitigation would be necessary.

Assessment of Residual Impacts

Ground Preparation and Construction - Noise

11.113 Accounting for the implementation of mitigation measues detailed earlier in this chapter, **Table 11.16** summarises the mitigated preparation and construction noise levels and the associated significance of likely impacts for the sensitive receptors assessed. The likely residual noise levels associated with the preparation and construction works are presented in **Appendix 11.2**.

Table 11.16 - Summary of Predicted Mitigated Construction Noise Levels and Level of Significance

Receptor	Assessment Parameter	Development Stage				
		Brickearth Extraction	**Ground Preparation Works**	**Sub Structure Works**	**Building Construction**	**Landscaping & External Infra Works**
Quinton Road	**Predicted Noise Level**	70	70	74	71	69
	Significance	**Short-term, local adverse** and of **moderate significance**	**Short-term, local adverse** and of **moderate significance**	**Short-term, local adverse** and of **moderate significance**	**Short-term, local adverse** and of **moderate significance**	**Short-term, local, adverse** and of **minor significance**
Volante Drive	**Predicted Noise Level**	67	67	70	68	66
	Significance	**Negligible**	**Negligible**	**Short-term, local adverse** and of **moderate significance**	**Short-term, local adverse** and of **minor significance**	**Negligible**
Bramblefield Lane	**Predicted Noise Level**	68	68	72	69	68
	Significance	**Short-term, local, adverse** and of **minor significance**	**Short-term, local, adverse** and of **minor significance**	**Short-term, local adverse** and of **moderate significance**	**Short-term, local, adverse** and of **minor significance**	**Short-term, local, adverse** and of **minor significance**
Godwin Close	**Predicted Noise Level**	75	75	78	76	74
	Significance	**Short-term, local, adverse** and of **major significance**	**Short-term, local, adverse** and of **major significance**	**Short-term, local, adverse** and of **major significance**	**Short-term, local, adverse** and of **major significance**	**Short-term, local adverse** and of **moderate significance**

11.114 Based on the implementation of mitigation measures as detailed above, the likely residual impacts from preparation and construction noise at sensitive receptors are mostly assessed as **short-term**, **local**, **adverse** and of **minor** to **moderate significance**, although at Godwin Close, the likely residual noise impacts are **short-term, local, adverse**, and of **major significance**, depending on the preparation and construction activity taking place. However, this conclusion is predicated on the basis that activities are concentrated on the boundary of the site closest to the sensitive receptor and that all plant operates simultaneously – a situation which in practice is seldom (if ever) likely to occur. By adopting all the mitigation measures described above and in the CEMP, it is anticipated that all preparation and construction activities can be undertaken whilst minimising disturbance to those living and working nearby. **Short-term, local, adverse** residual impacts of **minor to moderate significance** are therefore expected at all locations following the implementation of mitigation measures.

Ground Preparation and Construction - Vibration

11.115 During the construction works, vibration effects could arise at premises neighbouring the Development where vibration generating activities would be carried out within approximately 10m of the SRs identified in **Table 11.8**.

11.116 With the exception of SR D all identified SRs are located in excess of 40m from the Site boundary and would therefore experience insignificant effects in relation to both human perception and building damage as a result of vibration generated during the construction works.

11.117 However, when considering SR D, given its proximity to the Site boundary (approximately ~1m) and in the absence of mitigation, there would be the potential for some **temporary, short-term, adverse effects of moderate significance** to arise at these locations when considering human perception. Effects relating to building damage would be insignificant, given that vibration levels would need to be several orders of magnitude higher than those required to give rise to perceptible vibration levels.

Ground Preparation and Construction - Traffic Noise

11.118 With regard to construction traffic management during the preparation and construction works no mitigation measures are considered necessary. The likely residual impact would therefore be **negligible.**

11.119 With regards to brickearth extraction traffic, it has been proposed that there would no traffic passing through any residential area, therefore the likely residual impact would also be **negligible.**

Completed Development - Building Services Plant Noise

11.120 Provided the detailed design of fixed building plant achieves the proposed noise limits set out in **Table 11.15**, the likely residual noise impacts of building services plant associated with the development on sensitive receptors would be **negligible**.

Completed Development - Road Traffic Noise

11.121 The significance of the impact on noise sensitive receptors on the affected roads due to changes in road traffic associated with the development is expected to be **negligible**.

Summary

11.122 In conclusion the assessment of noise and vibration impacts has found that:

- The highest ambient ($L_{Aeq,T}$) noise levels, were measured at the western (LT4) site boundary adjacent to the A249 road, where ambient noise levels of 80 dB $L_{Aeq,12hr}$ were recorded during the daytime. Ambient noise levels reducing marginally (typically 1 to 6 dB) during the night-time period.
- Measured vibration levels associated with train movements have been used to predict levels within potential development buildings during both the day and night-time periods and will be significantly below the "*low probability of adverse comment*" range as defined by BS 6472 within all areas of the development site.
- An assessment of residential amenity for future residents of the development has been undertaken. The assessment results indicate that with mitigation measures relating to the façade design of the Development, the required internal noise levels as set out in BS 8233 would be achieved within all habitable areas of the Development.
- The likely residual impacts from preparation and construction noise at sensitive receptors, adopting all the mitigation measures described above and in the CEMP, are assessed as **short-term**, **local**, **adverse** and of **minor** to **moderate significance**..
- With regard to noise break-out from the non-residential land uses of the Development, provided that the final façade designs would allow an external noise level of 10dB(A) below the prevailing ambient noise level, no further mitigation is considered necessary and the likely residual impact would be **negligible**.
- Provided the detailed design of fixed building plant achieves the proposed noise limits set out in **Table 11.15**, the likely residual noise impacts of building

services plant associated with the development on sensitive receptors would be **negligible**.

- Road traffic noise generated by the development would largely not result in changes to noise levels that would be noticeable. The likely residual impact would be **negligible**.

Chapter 12

AIR QUALITY

12. AIR QUALITY

Introduction

12.1 This chapter assesses the likely significant air quality effects of the proposed development. Consideration is given in the assessment to the effects of dust and vehicle emissions from construction activities, as well as the effect of emissions from road traffic associated with the completed development. In addition, air quality conditions within the development itself have been considered.

12.2 This chapter provides a summary of the relevant legislation and guidance and a description of the methods used in the assessment. This is followed by a description of the relevant baseline conditions for the site and surrounding area, and an assessment of the likely significant effects of the development during the construction stage and once the development is completed and occupied. Mitigation measures are identified where appropriate to avoid, reduce, or offset any adverse effects identified and / or enhance likely beneficial effects. Taking account of the mitigation measures, the nature and significance of the likely residual effects are described.

12.3 This chapter is supported by technical appendices which are contained in Volume 3 to this ES.

Regulatory and Policy Context

EU Framework Directive 2008/50/EC, 2008

12.4 Air pollutants at high concentrations can give rise to adverse effects on the health of humans and ecosystems. European Union (EU) legislation on air quality forms the basis for UK legislation and policy on air quality.

12.5 The EU Framework Directive 2008/50/EC[i] on ambient air quality assessment and management came into force in May 2008 and was implemented by Member States, including the UK, by June 2010. The Directive aims to protect human health and the environment by avoiding, reducing, or preventing harmful concentrations of air pollutants.

Air Quality Standards Regulations, 2010

12.6 The Air Quality Standards Regulations[ii] implement Limit Values prescribed by the EU Framework Directive 2008/50/EC. The Limit Values are legally binding and the Secretary of State, on behalf of the UK Government, is responsible for their implementation.

The Environment Act 1995, 1995

12.7 In a parallel process, the Environment Act 1995[iii] required the preparation of a national air quality strategy setting health-based air quality objectives for specified pollutants and outlining measures to be taken by Local Authorities in relation to meeting these objectives (the Local Air Quality Management (LAQM) system).

The UK Air Quality Strategy, 2007

12.8 The current UK AQS, which was published in July 2007[iv] sets out objectives for local authorities in undertaking their LAQM duties. The 2007 UK AQS introduced a national level policy framework for exposure reduction for fine particulate matter. Objectives in the UK AQS are in some cases more onerous than the Limit Values set out within the relevant EU Directives and the Air Quality Standards Regulations 2010. In addition, objectives have been established for a wider range of pollutants.

12.9 Currently it is a local authority's responsibility to determine the effect of a development against the UK AQS objectives, as such the UK AQS objectives of air pollutants relevant to this assessment are summarised in Table 12.1.

12.10 With regards to the EU Limit Values, as set by the Air Quality Standards Regulations, whilst the development has not been assessed against these (as it is the UK Government's responsibility for their implementation), the Limit Values have been considered along with appropriate mitigation to ensure the development is not delaying compliance.

12.11 There are currently no statutory UK standards in relation to deposited dust and its propensity to cause nuisance. However, a deposition rate of 200mg/m^2/day (averaged over a month) is sometimes used as a threshold value for potentially significant nuisance effects[v].

Table 12.1 - Summary of Relevant UK AQS Objectives

Pollutant	Objective		Date by which Objective to be Met
	Concentration	Measured as	
For the Protection of Human Health			
Nitrogen Dioxide (NO_2)	200µg/m^3	1 hour mean not to be exceeded more than 18 times per year	31/12/2005
	40µg/m^3	Annual Mean	31/12/2005
Particulate Matter (PM_{10}) (a)	50µg/m^3	24-hour mean not to be exceeded more than 35 times per year	31/12/2004
	40µg/m^3	Annual Mean	31/12/2004
Particulate Matter ($PM_{2.5}$) (b)	Target of 15% reduction in concentrations at urban background locations	Annual Mean	Between 2010 and 2020
	25µg/m^3	Annual Mean	01/01/2020
For the Protection of Vegetation and Ecosystems			
Nitrogen Oxides (NO_x)	30µg/m^3	Annual Mean	31/12/2000

Note: (a) Particulate matter with a mean aerodynamic diameter less than 10 microns (or micrometres – µm)
(b) Particulate matter with a mean aerodynamic diameter less than 2.5 microns

National Planning Policy Framework, 2012

12.12 Paragraph 109 of the National Planning Policy Framework (NPPF)[vi] identifies that the planning system should aim to conserve 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 land, air, water or noise pollution or land instability.*"

12.13 Furthermore, paragraph 124 states:

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

National Planning Practice Guidance – Air Quality

12.14 This document provides several guiding principles on how the planning process can consider the impact of new development on air quality and explains how much detail air quality assessments need to include for proposed developments, and how impacts on air quality can be mitigated. It also provides information on how air quality should be considered by local authorities in both the wider planning context of Local Plans and neighbourhood planning, and in individual cases where air quality is a consideration in a planning decision.

Swale Borough Local Plan, 2017

12.15 The Swale Borough Local Plan, sets out the vision and overall development strategy for the area for 2014-2031 and how it will be achieved. It identifies where development will take place and how the borough's natural environment and built heritage will be protected and enhanced. The plan focuses on the allocation of major sites and locations for housing and employment to meet the needs of the borough's growing population in-line with national planning policy and practice.

12.16 Policy CP7 – Conserving and enhancing the natural environment, identifies transport and industry as the borough's main air pollution emitters, which have contributed to the declaration of several AQMAs.

12.17 This policy proposes the designation of AQMAs to be used as an indicator to demonstrate that the quality of the natural environment has been maintained or enhanced.

12.18 CP7 requires applicants proposing development to consult with the council when preparing an air quality impact assessment, and to refer to The Kent and Medway Air Quality Partnership's document "Air Quality and Planning Technical Guidance" published in July 2011.

12.19 Policy DM6 – Managing transport demand and impact, states that in assessing impacts on the highway network, development proposals will, '…*integrate air quality management and environmental quality into the location and design of, and access to, development and, in so doing, demonstrate that proposals do not worsen air quality to an unacceptable degree especially taking into account the cumulative impact of development schemes within or likely to impact on Air Quality Management Areas*.'

Other Guidance

UK Plan for Tackling Roadside Nitrogen Dioxide Concentrations Detailed Plan, 2017.

12.20 A recent High Court[vii] judgement requires the UK Government to release a new Air Quality Plan to meet the NO_2 Limit Value in the shortest timescale as possible. This document was adopted on the 26th July 2017[viii].

12.21 The plan focuses on reducing concentrations of NO_x and NO_2 around road vehicle emissions within the shortest possible time; the principal aims are to:

- reduce emissions of NOx from the current road vehicle fleet in problem locations now; and
- accelerate road vehicle fleet turnover to cleaner vehicles to ensure that the problem remains addressed and does not move to other locations.

12.22 The other aims include reducing background concentrations of NO_x from:

- Other forms of transport such as rail, aviation, and shipping;
- Industry and non-road mobile machinery; and
- Buildings, both commercial and domestic, and other stationary sources.

12.23 The revised plan provides additional measures to reduce NO_x and NO_2 concentrations in the UK, such measures include:

- Require Local Authorities to implement chosen measures to achieve statutory NO_2 limit values within the shortest possible time;
- Highways England action to improve air quality on the Strategic Road network in England, including network of charge points and other innovative solutions;
- More stringent laboratory testing requirements for statutory type approval of new light duty vehicles;
- New real driving emissions requirement to address real world NOx emissions for light passenger and commercial vehicles;
- Lorry emissions technology checks at roadside;
- Additional funding to accelerate uptake of low emission buses, including new buses and retrofitting older buses supported by a new accreditation scheme;
- Additional funding to accelerate the uptake of electric taxis;

- Additional funding to accelerate uptake of hydrogen vehicles and infrastructure;
- Regulatory changes to support the take up of alternatively fuelled light commercial vehicles;
- Exploring the appropriate tax treatment for diesel vehicles;
- Call for evidence on updating the existing HGV Road User Levy;
- Call for evidence on use of red diesel;
- Ensure wider environmental performance is apparent to consumers when purchasing cars;
- Updating Government procurement policy;
- Call for evidence on a new Aviation Strategy;
- New emissions standards for non-road mobile machinery;
- New measures to tackle NOx emissions from Medium Combustion Plants; and
- New measures to tackle NOx emissions from generators.

Environmental Protection UK & Institute of Air Quality Management Guidance; Land-Use Planning & Development Control: Planning for Air Quality, 2017

12.24 The Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) Guidance[ix] provides a framework for air quality considerations within local development control processes, promoting a consistent approach to the treatment of air quality issues.

12.25 The guidance explains how development proposals can adopt good design principals to reduce emissions and contribute to better air quality. The guidance also provides a method for screening the need for an air quality assessment and a consistent approach for describing the impacts at individual receptors.

12.26 The EPUK and IAQM Guidance, advises that:

"In arriving at a decision about a specific proposed development the local planning authority is required to achieve a balance between economic, social and environmental considerations. For this reason, appropriate consideration of issues such as air quality, noise and visual amenity is necessary. In terms of air quality, particular attention should be paid to:

- Compliance with national air quality objectives and of EU Limit Values;
- Whether the development will materially affect any air quality action plan or strategy;
- The overall degradation (or improvement) in local air quality; or

- Whether the development will introduce new public exposure into an area of existing poor air quality".

Kent and Medway Air Quality Partnership Air Quality Planning Guidance, 2015

12.27 The Kent and Medway Air Quality Partnership have produced an Air Quality and Development Control Guidance[x]. The document gives advice to developers, consultants, and local authorities on air quality issues with respect to development proposals in Kent. Regarding Air Quality Assessments, the guidance recommends that all assessments within Kent should follow similar methodologies.

Local Air Quality Management Policy Guidance LAQM PG (16), 2016

12.28 The Local Air Quality Management Policy Guidance LAQM PG (16)[xi] provides additional guidance on the links between transport and air quality. LAQM PG (16) describes how road transport contributes to local air pollution and how transport measures may bring improvements in air quality. Key transport-related Government initiatives are set out, including regulatory measures and standards to reduce vehicle emissions and improve fuels, tax-based measures and the development of an integrated transport strategy.

12.29 LAQM PG (16) also provides guidance on the links between air quality and the land use planning system. The guidance advises that air quality considerations should be integrated within the planning process at the earliest stage and is intended to aid local authorities in developing action plans to deal with specific air quality issues and create strategies to improve air quality. LAQM PG (16) summarises the means in which the land use planning system can help deliver compliance with the air quality objectives.

Institute of Air Quality Management: Guidance on the Assessment of Dust from Demolition and Construction, 2014

12.30 The IAQM Construction Dust Guidance[xii] provides guidance to consultants and Environmental Health Officers (EHOs) on how to assess air quality impacts from construction related activities. The guidance provides a risk-based approach based on the potential dust emission magnitude of the site (small, medium or large) and the sensitivity of the area to dust impacts. The importance of professional judgement is noted throughout the guidance. The guidance recommends that once the risk class of the site has been identified, appropriate levels of mitigation are implemented to ensure that the construction activities have no significant impacts.

Development being Assessed

12.31 The assessment undertaken in this chapter is as described in Chapter 4 and includes the land between Quinton Road and Bramblefield Lane and at Pheasant Farm and Great Grovehurst Farm, Sittingbourne.

12.32 There is the intention to extract brickearth on the land at Great Grovehurst Farm prior to development. The assessment therefore gives consideration to the implications of the brickearth extraction as part of the earthworks during the construction phase.

Assessment Methodology and Significance Criteria

12.33 The air quality assessment was undertaken using a variety of information and procedures as follows:

- a review of SBC's Air Quality Updating and Screening Assessment and Progress Reports published as part of the LAQM regime to determine baseline conditions around the site;
- review of the local area to identify sensitive receptor locations that could be affected by changes in air quality that may result from the Development;
- identification of air quality sensitive receptors within the site, to determine air quality conditions that future users of the site would be exposed to;
- review and use of relevant traffic flow data from the Applicant's transport consultant (Peter Brett Associates);
- dispersion modelling of pollutant emissions using the ADMS-Roads model to predict the likely pollutant concentrations at the site and the likely effect of the completed and operational development on local air quality in terms of traffic emissions generated. The latest NO_2 from NOx Calculator available from the LAQM Support website has been applied to derive the road-related NO_2 concentrations from the modelled NOx concentrations;
- comparison of the predicted air pollutant concentrations with monitored concentrations from SBC's diffusion tubes located near the site, and adjustment of modelled results where necessary (model verification details are provided in **Appendix 12.1**);
- determination of the likely significant effects of construction works and activities, and consideration of the environmental management controls likely to be employed during the works;

- determination of the likely significant effects of the operational phase of the development on air quality, based on the application of the EPUK guidance significance criteria to modelled results;
- identification of mitigation measures, where appropriate; and
- description of the likely residual effects taking account of any proposed mitigation measures.

12.34 The UK AQS identifies the pollutants associated with road traffic emissions and local air quality as:

- nitrogen oxides (NOx);
- particulate matter (as PM_{10} (particles with a diameter up to 10µm) and $PM_{2.5}$ (particles with a diameter up to 2.5µm));
- carbon monoxide (CO);
- 1, 3-butadiene (C_4H_6); and
- benzene (C_6H_6).

12.35 Emissions of total NO_x from motor vehicle exhausts comprise nitric oxide (NO) and nitrogen dioxide (NO_2). NO oxidises in the atmosphere to form NO_2.

12.36 The most significant pollutants associated with road traffic emissions, in relation to human health, are NO_2 and PM_{10}. SBC has declared five AQMA's within the entire Borough for annual NO_2 objectives, attributable to road traffic emissions (referred to later in this Report). SBC have declared two AQMA's in Sittingbourne, located at East Street and St Paul's Street. This assessment focuses on NO_2 and particulate matter (PM_{10} and $PM_{2.5}$).

Construction Phase

Dust Emissions

12.37 The assessment of the effects of the construction activities in relation to dust has been based on the guidance published by the IAQM (2014) and the following:

- consideration of planned construction activities and their phasing; and
- a review of the sensitive uses in the area immediately surrounding the site in relation to their distance from the site.

12.38 Following the IAQM guidance, construction activities can be divided into the following four distinct activities:

- Demolition – any activity involved in the removal of an existing building;
- Earthworks – the excavation, haulage, tipping and stockpiling of material, but may also involve levelling the site and landscaping;
- Construction – any activity involved with the provision of a new structure; and
- Trackout – the movement of vehicles from unpaved ground on a site, where they can accumulate mud and dirt, onto the public road network where dust might be deposited.

12.39 The IAQM guidance considers three separate dust effects, with the proximity of sensitive receptors being taken into consideration for:

- annoyance due to dust soiling;
- potential effects on human health due to significant increase in exposure to PM10; and
- harm to ecological receptors.

12.40 A summary of the four-step process which has been undertaken for the dust assessment of construction activities as set out in the IAQM guidance is presented in Table 12.2.

Table 12.2 - Summary of the IAQM Guidance for Undertaking a Construction Dust Assessment

Step		Description
1	Screen the Need for a Detailed Assessment	Simple distance based criteria are used to determine the requirement for a detailed dust assessment. An assessment will normally be required where there are 'human receptors' within 350m of the boundary of the site and / or within 50m of the route(s) used by construction vehicles on public highway, up to 500m from the site entrance or 'ecological receptors' within 50m of the boundary of the site and/or within 50m of the route(s) used by construction vehicles on public highway, up to 500m from the site entrance.
2	Assess the Risk of Dust Effects	The risk of dust arising in sufficient quantities to cause annoyance and/or health or ecological effects should be determined using three risk categories: low, medium and high based on the following factors: • the scale and nature of the works, which determines the risk of dust arising (i.e. the magnitude of potential dust emissions) classed as small, medium or large; and • the sensitivity of the area to dust effects, considered separately for ecological and human receptors (i.e. the potential for effects) defined as low, medium or high.
3	Site Specific Mitigation	Determine the site-specific measures to be adopted at the site based on the risk categories determined in Step 2 for the four activities. For the cases where the risk is 'negligible' no mitigation measures beyond those required by legislation are required. Where a local authority has issued guidance on measures to be adopted these should be considered.
4	Determine Significant Effects	Following Steps 2 and 3, the significance of the potential dust effects should be determined, using professional judgement, considering the factors that define the sensitivity of the surrounding area and the overall pattern of potential risks.

Vehicle Exhaust Emissions

12.41 The IAQM guidance on assessing construction impacts states that:
"*Experience of assessing the exhaust emissions from on-site plant and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed*".

12.42 It is estimated that during the peak construction period there will be approximately 24 HGV movements per day (12 in / 12 out) and therefore in accordance with the IAQM guidance (whereby a change of greater than 100 HGVs per day, outside an AQMA, would require quantitative assessment), it is considered that a quantitative assessment of the exhaust emissions from construction plant and traffic is not required, and a qualitative assessment is appropriate.

Operational (Occupation) Phase

ADMS Roads Model

12.43 The likely effects on local air quality from traffic emissions generated from the completed and operational development have been assessed using the atmospheric dispersion model ADMS-Roads. **Appendix 12.1** presents the details of the dispersion modelling.

12.44 For the purposes of modelling, traffic data for the relevant local road network has been provided by the Applicant's transport consultant (Peter Brett Associates (PBA)). Further details are provided in **Appendix 12.1**. The baseline year of 2015 has been assessed together with the 'without Development' and 'with Development' scenarios for the years 2023 and 2031, the anticipated years of completion of the Development.

12.45 The ADMS-Roads dispersion model predicts how emissions from roads, and small scale industrial sources combine with local background pollution levels, taking account of meteorological conditions, to affect local air quality. The model has been run for the following scenarios:

- The verification and baseline year (2015), using background data and vehicle emission rates for 2015 (which is consistent with the traffic data supplied by PBA) as inputs;

For the assessment year 2023:

- The future baseline, using background data and vehicle emission rates for 2023 as inputs, and using the CURED (see below) vehicle emission rates and background data to take account of the uncertainty in future predicted concentrations of NOx and NO_2 (i.e. the sensitivity analysis);
- The completion year of Land at Great Grovehurst Farm and Land at Pheasant Farm within the development (as 2023) using background data and vehicle emission rates for 2023 as inputs, and using the CURED vehicle emission rates and background data to take account of the uncertainty in future predicted concentrations of NOx and NO_2;

For the assessment year of 2031

- The future baseline, using background data and vehicle emission rates for 2031 as inputs, and using the CURED vehicle emission rates and

background data to take account of the uncertainty in future predicted concentrations of NOx and NO_2; and

- The completion year of the overall development (as 2031) using background data and vehicle emission rates for 2031 as inputs and using the CURED vehicle emission rates and background data to take account of the uncertainty in future predicted concentrations of NOx and NO_2.
- A cumulative assessment of the development and that being constructed on the land adjacent Quinton Farmhouse by Redrow Homes (as 2031) using background data and vehicle emission rates for 2031 as inputs and using the CURED vehicle emission rates and background data to take account of the uncertainty in future predicted concentrations of NOx and NO_2.

12.46 Pollutant concentrations have been modelled at locations representative of nearby sensitive receptors which are discussed further below and presented in Figures 12.1 – 12.3.

12.47 Full details of the dispersion modelling study, including the road traffic data used in the assessment, are presented within **Appendix 12.1.**

NO_2 Sensitivity Analysis

12.48 Analyses of historical monitoring data by Defra[xiii] have identified a disparity between actual measured NO_x and NO_2 concentrations and the expected decline associated with emission forecasts which form the basis of air quality modelling as described above. The precise reason for the disparity is not fully understood but is thought to be related to the on-road performance of certain vehicles compared to calculations based on Euro emission standards which inform emission forecasts. It is thought that there may be reduction in NO_x and NO_2 concentrations post 2015 when the Euro 6 emission standards begin to take effect.

12.49 The note 'Projecting NO_2 Concentrations'[xiv] published by Defra provides several alternative approaches that can be followed in air quality assessments, in relation to the modelling of future NO_2 concentrations, considering that future NO_x/NO_2 road-traffic emissions and background concentrations may not reduce as previously expected. This includes the use of revised background pollution maps, alternative projection factors and revised vehicle emission factors. However, the Defra note does not form part of statutory guidance and no prescriptive method is recommended for use in an air quality assessment.

12.50 This air quality assessment has been based on current guidance, i.e. using existing forecast emission rates and background concentrations to the completion

years of 2023 and 2031, which assumes a progressive reduction compared to the baseline year 2015. In addition, a sensitively analysis scenario has been modelled. Given that the overall masterplan is anticipated to be completed in 2031 it is considered that undertaking a sensitivity analysis considering the potential effects of the development against the current baseline 2015 conditions by applying the 2031 road traffic data to 2015 background concentrations and road traffic emission rates (i.e. no improvements beyond 2015) would result in overly conservative results which would be unrealistic. Therefore, the approach used in the sensitivity analysis has utilised the revised emissions data and background concentrations using the Air Quality Consultants Ltd Calculator Using Realistic Emissions for Diesels (CURED) spreadsheet[xv]. The spreadsheet has been designed to be provide a reasonable worst-case assumption for future vehicle emissions. The results of this sensitivity analysis, which represent a more conservative assessment scenario than that based on current guidance, are presented in **Appendix 12.1** but discussed within this chapter.

Background Pollutant Concentrations

12.51 To estimate the total concentrations due to the contribution of any other nearby sources of pollution (i.e. non-road traffic sources, and traffic sources other than the Development), background pollutant concentrations need to be added to the modelled concentrations. Full details of the background pollution data used within the air quality assessment are included in **Appendix 12.1**.

Model Verification

12.52 Model verification is the process of comparing monitored and modelled pollutant concentrations and, if necessary, adjusting the modelled results to reflect actual measured concentrations, to improve the accuracy of the modelling results. The model has been verified by comparing the predicted annual mean NO_2 concentrations for the baseline 2015, with the results from the monitoring study undertaken by SBC and Medway Borough Council (MBC). Modelled concentrations have then been adjusted accordingly. The verification and adjustment process is described in detail in **Appendix 12.1.**

Potentially Sensitive Receptors

12.53 The approach adopted by the UK AQS is to focus on areas at locations at, and close to, ground level where members of the public (in a non-workplace area) are likely to be exposed over the averaging time of the objective in question (i.e. over 1-hour, 24-hour or annual periods). Objective exceedances principally relate to annual mean NO_2 and PM_{10}, and 24-hour mean PM_{10} concentrations, so that

associated potentially sensitive locations relate mainly to residential properties and other sensitive locations (such as schools) where the public may be exposed for prolonged periods.

12.54 Table 12.3 presents existing sensitive receptors selected due to their proximity to the road network likely to be affected by the Development, these include both residential and educational uses and Swale Site of Scientific Interest (SSSI). This has included receptors within SBC and MBC AQMAs. Table 12.3 also presents future sensitive receptor locations which are representative of sensitive uses proposed within the development itself. The future sensitive receptor locations represent areas of the development that would likely be exposed to the worst-case air quality conditions, i.e. the locations within the development (proposed residential and school locations) that would be closest to road traffic, the A249 to the west. The location of the selected existing and future receptors assessed are presented in Figures 12.1 – 12.3.

Table 12.3 - Selected Receptor Locations

ID	Receptor Location	Receptor Type	OS Grid Reference	Height Above Ground (m)
1	150 Grovehurst Road	Residential	590454, 166528	0
2	97 Grovehurst Road	Residential	590519, 166259	0
3	Hurst Lane	Residential	590540, 166243	0
4	Sanstone Drive	Residential	590541, 166085	0
5	2 Blue House	Residential	590611, 165843	0
6	14 Donemowe Drive	Residential	590676, 165740	0
7	13 Grovehurst Road	Residential	590755, 165402	0
8	Yew Tree House	Residential	590804, 165359	0
9	2 Saffron Way	Residential	590782, 165325	0
10	96 North Street	Residential	590715, 165334	0
11	10 St Michaels Close	Residential	590902, 163704	0
12	1 Giles Young Court*	Residential	590374, 164401	0
13	4 St Pauls Street*	Residential	590259, 164408	0
14	1 St Pauls Street*	Residential	590180, 164395	0
15	20 St Pauls Street*	Residential	590212, 164407	0
16	14 Chalkwell Road	Residential	590119, 164405	0
17	1 Staple Close	Residential	590141, 164451	0
18	84 Crown Road	Residential	590157, 164454	0
19	75 Crown Road	Residential	590191, 164463	0
20	1a Crown Road	Residential	590381, 164596	0
21	31 Chalkwell Road	Residential	590087, 164390	0
22	3a Alexander Court	Residential	590090, 164430	0
23	10 Staple Close	Residential	590088, 164461	0
24	9 Staplehurst Road	Residential	590058, 164444	0
25	1 Windmill Road	Residential	589913, 164507	0
26	13 Pearl Walk	Residential	589176, 164747	0
27	29 Galena Close	Residential	589117, 164791	0

28	2 Pearl Walk	Residential	589185, 164848	0
29	4 Cherry Cottage	Residential	588623, 164990	0
30	Red Roofs	Residential	588717, 165030	0
31	Bobbing Village School	Educational	588767, 165070	0
32	Bobbing Kennels	Residential	589148, 165413	0
33	28 Lorimer Court	Residential	589270, 165297	0
34	14 Jack Close	Residential	589366, 165221	0
35	2 Sonora Way	Residential	589418. 165184	0
36	77 Quinton Road	Residential	589444, 165186	0
37	31 Vicarage Road	Residential	590039, 164950	0
38	193 High Street	Residential	590283, 164957	0
39	1 North Street	Residential	590286, 164958	0
40	191 High Street	Residential	590305, 164953	0
41	164b High Street	Residential	590354, 164904	0
42	Flat 12 Tylden House	Residential	590318, 164982	0
43	2 North Street	Residential	589185, 164848	0
44	114 East Street**	Residential	591402,163475	0
45	128 East Street**	Residential	591451,163465	0
46	1 Canterbury Road**	Residential	591489,163471	3
47	15 Canterbury Road	Residential	591553,163459	0
48	12 Key Street	Residential	588150,164227	0
49	56 High Street^	Residential	585936,164787	0
50	49a High Street^	Residential	585929,164800	0
51	60c High Street^	Residential	585961,164780	0
52	34 High Street^	Residential	585865,164802	0
53	Appletree Court^^	Residential	581842,165883	0
54	62 High Street^^	Residential	581571,165953	0
55	141 High Street^^	Residential	581918,165861	0
56	The Swale SSSI	Ecological	590897,167542	0
57	Proposed: Great Grovehurst Farm 1	Residential	590444, 166745	0

58	Proposed: Great Grovehurst Farm 2	Residential	590435, 166653	0
59	Proposed: Great Grovehurst Farm 3	Residential	590635, 166522	0
60	Proposed: Pheasant Farm 1	Residential	590341, 166425	0
61	Proposed: Pheasant Farm 2	Residential	590968, 166307	0
62	Proposed: Pheasant Farm 3	Residential	590124, 166145	0
63	Proposed: Redrow Homes 1	Residential	589427, 165248	0
64	Proposed: Redrow Homes 2	Residential	589616, 165288	0
65	Proposed: Redrow Homes 3	Residential	589347, 165348	0
66	Proposed: Persimmon Homes 1	Residential	589704, 165120	0
67	Proposed: Persimmon Homes 2	Residential	590029, 166022	0
68	Proposed: Persimmon Homes 3	Residential	590270, 165671	0
69	Proposed: Primary and Secondary Schools 1	Educational	590439, 166206	0
70	Proposed: Primary and Secondary Schools 2	Educational	590148, 166043	0
71	Proposed: Primary and Secondary Schools 3	Educational	590342, 165886	0

Note: Receptors have been modelled at ground level (i.e. 0m above ground) to represent the closest location of the receptor to the tailpipe vehicle emissions; Receptor 46 has been modelled at 3m to represent 1st floor level residential above commercial premises
Receptor 56 is representative of the Swale SSSI and therefore only the annual mean NOx is applicable
* Receptors located within the SBC St Paul's AQMA;
** Receptor located within the SBC East Street AQMA;
^ Receptor located within the SBC Newington AQMA;
^^ Receptor located within the MBC Rainham AQMA.

Determining Significance of Effects - Construction Phase

12.55 The significance of effects of construction activities on air quality have been assessed based on professional judgement and regarding the criteria set out in the IAQM guidance. Appropriate site-specific mitigation measures that would need to be implemented to minimise any adverse effect have also been considered. Details of the assessors' experience and competence to undertake the dust assessment is provided in **Appendix 12.1**.

12.56 The assessment of the risk of dust effects arising from each of the construction activities, as identified by the IAQM guidance, is based on the magnitude of potential dust emissions and the sensitivity of the area. The risk category matrix for each of the construction activity types, taken from the IAQM guidance, are presented in Table 12.4 to Table 12.7. Examples of the magnitude of potential dust emissions for each construction activity and factors defining the sensitivity of an area are provided in **Appendix 12.1**.

Table 12.4 - Risk Category from Demolition Activities

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

Table 12.5 - Risk Category from Earthworks Activities

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

Table 12.6 - Risk Category from Construction Activities

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

Table 12.7 - Risk Category from Trackout Activities

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

12.57 The risk category determined for each of the construction activity types is used to define the appropriate, site specific, mitigation measures that should be applied. The IAQM guidance recommends that significance is only assigned to the effect after considering mitigation and assumes that all actions to avoid or reduce the environmental effects are an inherent part of the proposed development, and that in the case of construction mitigation (secured through planning conditions, legal

requirements or required by regulations), this will ensure that potential significant adverse effects will not occur. However, to maintain consistency with the structure of the Environmental Statement (ES), pre-mitigation significance criteria based on professional judgement was applied (see Table 12.8).

Table 12.8 - Pre-Mitigation Significance Criteria for Demolition and Construction Assessment

Significance Criteria	Definition
Adverse Impact of Major Significance	Receptor is less than 20m from a major active construction or demolition site.
Adverse Impact of Moderate Significance	Receptor is 20m to 100m from a major active construction or demolition site, or up to 20m from a minor active construction or demolition site.
Adverse Impact of Minor Significance	Receptor is between 100m and 350m from a major active construction or demolition site or 20m to 100m from a minor active construction site or demolition site.
Insignificant	Receptor is over 200m from any minor active construction or demolition site or over 350m from any major active construction or demolition site.

12.58 IAQM outlines that experience of implementing mitigation measures for construction activities demonstrates that total mitigation is normally possible such that likely residual impacts would not be 'significant'. Therefore, it follows that, within this assessment, no post-mitigation matrix of significance criteria is provided for the likely residual impacts of the demolition and construction work.

Determining Significance of Effects - Operational (Occupation) Phase

Human Receptors

12.59 The EPUK / IAQM guidance provides an approach to assigning the magnitude of changes because of a development as a proportion of a relevant assessment level, followed by examining this change in the context of the new total concentration and its relationship with the assessment criterion to provide a description of the impact at selected receptor locations.

12.60 Table 12.99 presents the IAQM framework for describing the impacts (the change in concentration of an air pollutant) at individual receptors. The term Air Quality Assessment Level (AQAL) is used to include air quality objectives or limit values, where these exist.

Table 12.9 - Impact Descriptors for Individual Receptors

Long term average Concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Note: AQAL may be an air quality objective, EU limit value, or an Environment Agency 'Environmental Assessment Level (EAL)'
The table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers. Changes of 0% (i.e. less than 0.5%) are described as Negligible.
The table is only to be used with annual mean concentrations

12.61 The approach set out in the EPUK / IAQM guidance provides a method for describing the impact magnitude at individual receptors only. The Guidance outlines that this change may have an effect on the receptor depending on the severity if the impact and other factors that may need to be considered. The assessment framework for describing impacts can be used as a starting point to make a judgement on significance of effect. However, whilst there may be 'slight', 'moderate' or 'substantial' impacts described at one or more receptors, the overall effect may not necessarily be judged as being significant in some circumstances.

12.62 Following the approach to assessing significance outlined in the EPUK / IAQM guidance, the significance of likely residual effects of the completed development on air quality has been established through professional judgement and the consideration of the following factors:

- the geographical extent (local, district or regional) of effects;
- their duration (temporary or long term);
- their reversibility (reversible or permanent);
- the magnitude of changes in pollution concentrations;
- the exceedance of standards (e.g. AQS objectives); and
- changes in pollutant exposure.

Ecological Receptors

12.63 The Environmental Management Guidance[xvi] states that the Process Contribution (PC) can be considered insignificant if:

- the short-term PC is less than 10% of the short-term environmental standard; and
- the long-term PC is less than 1% of the long-term environmental standard.

12.64 If these criteria are exceeded the following guidance is provided on when further consideration of potential impacts may be useful:

- the short-term PC is less than 20% of the short-term environmental standard minus twice the long-term background concentration; and
- the long-term Predicted Environmental Concentration (PEC) (which includes the PC combined with the existing baseline concentration) is less than 70% of the long-term environmental standard.

12.65 If these criteria are achieved, then predicted impacts are insignificant.

Embedded Design Mitigation

12.66 The development includes several inherent design measures that will benefit air quality, these include:

- Electric Vehicle charging points in line with current guidance;
- Cycle paths to link with the wider cycle network, and provision of secure cycle storage;
- Pedestrian footpaths to encourage walking and the use of public transport;
- The provision of primary and secondary schools within the development area to reduce the need to travel to school by car; and
- The provision of green infrastructure to absorb dust and other pollutants.

Consultation

12.67 In addition to the consultation that took place at the formal ES Scoping Stage further consultation was undertaken with the Mid Kent Environmental Health Environmental Protection Team in May 2016 and October 2017 and a copy of this consultation is presented in **Appendix 12.1**. The outcome of this consultation confirmed that the proposed approach of the air quality assessment was acceptable.

Baseline Conditions

Swale Borough Council Review and Assessment Process

12.68 SBC have completed all earlier stages of the quality review and assessment as required under the LAQM regime.

12.69 The 2006 USA identified exceedances of the NO2 objective in Newington and after the completion of the Detailed Assessment in 2007 and further monitoring, an AQMA was declared in March 2009 which encompasses the entire length of the High Street and part of the adjoining London Road through Newington due to a narrow section of road which results in poor dispersion of pollutants.

12.70 It was concluded that road traffic was responsible for over 70% of the NO_2 concentration (within the road traffic contributions HGV contributed 40% and cars contributed 36 %) and therefore if compliance was to be achieved these two road sources should be targeted for reductions. Measures targeting general features of traffic flow could also contribute to reductions in emissions.

12.71 The fourth round of review and assessment identified measured exceedances of the annual mean NO_2 objective in Sittingbourne, and in Ospringe. The 2009 Detailed Assessment focussed Canterbury Road/ East Street and St Paul's Street in Sittingbourne. The 2010 Detailed Assessment focussed on Ospringe and an AQMA was subsequently declared for Ospringe in 2011.

12.72 The 2011 Progress Report found the further monitoring of the Canterbury Road/East Street and St Paul's Street areas in 2010 confirmed the findings of the 2009 Detailed Assessment. In 2013 AQMAs were declared based on exceedances of the annual mean NO2 concentrations, for East Street, Sittingbourne and St Paul's Street, Sittingbourne.

12.73 The 2014 Further Assessment for the new AQMAs in Sittingbourne concluded that exceedances in the St Paul's Street AQMA were centred between the Staplehurst Road roundabout and the junction with Millen Road. The Council may consider a contraction of the existing AQMA.

12.74 The 2015 USA stated that NO_2 diffusion tube and continuous monitoring in the Borough would continue to identify future changes in pollutant concentrations and that there is no need to proceed to a further Detailed Assessment. The 2015 USA has also proposed to extend the Ospringe AQMA to include the Mount along London Road.

12.75 The site is not located within any of the AQMAs declared by SBC, the nearest AQMA to the site is the St Paul's Street AQMA located approximately 0.7km southeast of the site boundary, while the East Street AQMA is located approximately 2.8km to the south-east, the Newington AQMA 4.5km to the southwest and the Ospringe AQMA 11km to the southeast.

Swale Borough Council Air Quality Action Plan

12.76 Following the declaration of the Newington AQMA Swale Borough Council produced an Air Quality Action Plan[xvii] (AQAP) which identifies measures to improve air quality within the Newington AQMA. The AQAP identified the following options as the most realistic / financially achievable and environmentally sound options to reduce are pollutants within the AQMA:

- Continuous Monitoring, Modelling, Further Assessments;
- Continued liaison between Planning and Environmental Health colleagues regarding the LDF process and on applications for planning permission, resulting in development which should not materially affect air quality in the AQMA;
- Supporting reduction in traffic impact projects and campaigns e.g. tyre inflation, fuel efficiency, smart driving courses etc;
- Promotional work with industry to encourage consideration of alternative fuels & vehicles, routes/times for traffic;
- Work with local rail, green taxi and bus companies, car share schemes;
- Work with schools re School Travel Plan and other projects;
- Investigate NOx absorbing materials;
- Work with the Co-op and shops in the High Street regarding lorry deliveries and emissions and use of parking; and
- Community trees and plants project.

Local Monitoring

12.77 SBC currently undertakes monitoring of NO_2 and PM_{10} at four locations within the Borough using automatic monitors. The automatic monitors are located:

- on St Paul's Street (ZW8) approximately 1.6km south-east from the centre of the site (monitoring NO2);
- on Canterbury Road (ZW7) approximately 2.8km south-east from the centre of the site (monitoring NO2);
- on A2 High Street, Newington (ZW6) approximately 4.5km south-west from the centre of the site (monitoring NO2); and

- on Water Lane, Ospringe (ZW3) approximately 11.3km south-east of the site (monitoring NO2 and PM10)

12.78 The results for the St Paul's Street monitoring location, the closest to the site and classified as a roadside location, are presented in Table 12.10 below from 2013 to 2014.

Table 12.10 - Measured NO_2 Concentrations at the SBC Roadside St Paul's Street Monitor

Pollutant	Averaging Period	AQS Objective	2013	2014	2015
NO_2	Annual Mean (µg/m^3)	40µg/m^3	33.6	35.1	37.7
	1-Hour Mean (No. of Hours)	200µg/m^3 not to be exceeded more than 18 times a year	0	0	1

Notes: Data obtained from 2015 Updating and Screening Assessment Swale Borough Council, 2015 data obtained from www.kentair.org.uk
Exceedances of the AQS Objectives shown in **bold** text.

12.79 The monitoring results in Table 12.10 indicate that the annual and 1-hour mean NO_2 objective of 40µg/m^3 were both met at the St Paul's Street roadside monitor in all years.

12.80 NO_2 is was also measured at fifty-seven locations in SBC using diffusion tubes. The results for the ten NO_2 roadside / kerbside diffusion tube locations closest to the centre of the site are presented in Table 12.11.

Table 12.11: Measured Concentrations at the ten SBC diffusion tubes closest to the centre of the site

Site ID	Location	Distance to Site (km)	Classification	2014*	2015^	2016†
SW65	5 Crown Road	1.4	Roadside	23.1	27.3	30.4**
SW71	o/s 8 Staple Close	1.5	Roadside	32.5	32.8	38.8
SW70	Stumble Inn, St Pauls Street	1.6	Roadside	27.8	26.8	30.2**
SW52	20/22 St Pauls Street	1.6	Roadside	33.3	35.3	37.7
SW51	14/16 St Pauls Street	1.6	Roadside	38.1	**40.6**	39.7
SW39	Giles Young Court	1.6	Roadside	27.1	27.0	31.8**
SW73	Adjacent to 14 Chalkwell Road	1.6	Roadside	29.7	31.2	32.6
SW82 (x3)	Conservative Club, St Pauls Street	1.6	Roadside	**57.4**	**55.6**	**55.9**
SW89 (x3)	St Paul's Air Quality Station	1.6	Kerbside	**40.4**	**41.9**	**44.9**
SW72	o/s 1 Alexander Court	1.6	Roadside	26.6	25.9	27.5**

Notes: Data obtained from www.kentair.org.uk
* Bias Adjustment factor = 0.81; ^ Bias Adjustment factor = 0.80;
† Bias adjusted data not available from SBC therefore the National Bias Adjustment Factor of 0.78 has been used
** Data capture 25% results should be treated with caution
Exceedances of the AQS Objectives shown in **bold** text.

12.81 The monitoring results in Table 12.11 indicate that the annual mean NO_2 objective of 40µg/m^3 was exceeded at locations SW82 and SW89 between 2014 and 2016, which is consistent with these locations being located within the St Pauls AQMA. The NO_2 objective was also exceeded at SW51 in 2015.

Assessment of Potential Impacts

Construction Phase

Dust Nuisance

12.82 Construction activities in relation to the development have the potential to affect local air quality through Demolition, Earthworks, Construction and Trackout activities. The land at Great Grovehurst Farm is vacant and cleared of all former structures and therefore demolition has not been considered further in this assessment.

12.83 The remainder of the land is in agricultural use and close to residential areas. The nearest residential properties to the site are on Bramblefield Road and the B2005. These residential properties bound the north-east of the site (i.e. within 20m of the site). Residential properties are also located within 50m on the other side of the railway line to the east and to the south on the other side of Quinton Road. Figure 12.4 shows the receptors within 350m of the boundary of the site.

12.84 As there are existing receptors within 350m of the boundary of the site and within 50m of the routes that would be used by construction vehicles on the public highway, it is therefore considered that a detailed assessment is required to determine the likely dust effects, as recommended by the IAQM guidance on construction dust. Results of this assessment are provided for each main activity (Earthworks, Construction and Trackout) below.

12.85 The sensitivity of the area to each main activity has been assessed based on the number and distance of the nearest sensitive receptors to the activity, and the sensitivity of these receptors to dust soiling, human health, and ecological effects. Based on the criteria set out in Table A1.1 to Table A1.5 in **Appendix 12.1.**

Earthworks

12.86 There are estimated to be >100 receptors within 20m of the earthwork activities. Sensitivity of the area to dust soiling due to earthworks is therefore assessed as high.

12.87 It is estimated that there are >100 residential properties within 20m of the proposed earthworks. The receptors experience annual mean concentrations of PM_{10} below 24µg/m^3. The sensitivity of the area to human health effects is therefore considered medium.

12.88 As previously noted, the area of the site is approximately 57.7 hectares (ha), or 577,000m^2. During the earthworks approximately 51,000m3 of brickearth would be extracted from the land at Great Grovehurst Farm. The duration of the brickearth extraction would last approximately 19 weeks. Based on this and considering the criteria in Table A1.1 in **Appendix 12.1**, the potential dust emissions during earthworks activities would be of large magnitude.

Construction

12.89 There are estimated to be >100 receptors within 20m of the construction activities. Sensitivity of the area to dust soiling due to construction is therefore assessed as high.

12.90 It is estimated that there are >100 residential properties within 20m of the construction activities. Based on the background concentrations presented in **Appendix 12.1**, the receptors experience annual mean concentrations of PM_{10} below 24µg/m^3. The sensitivity of the area to human health effects is therefore considered medium.

12.91 In the absence of the total volume of buildings to be constructed, it was estimated that the total volume of buildings to be constructed is over 100,000m^3. Based on this and considering the criteria in Table A1.1 in **Appendix 12.1**, the potential dust emissions during construction activities would be of large magnitude.

Trackout

12.92 There are estimated to be >100 receptors within 20m of the roads used to access the site. Sensitivity of the area to dust soiling due to trackout is therefore assessed as high.

12.93 It is estimated that there are between >100 residential properties within 20m of the roads used to access the site. The receptors experience annual mean concentrations of PM_{10} below 24µg/m^3. The sensitivity of the area to human health effects is therefore considered medium.

12.94 At this stage, the number of Heavy Delivery Vehicles (HDVs) associated with the development is not known. However, based on the size of the site, it is estimated that number of HDVs would range from 10-50 outward HDV movements in any one day. Based on this and considering the criteria in Table A1.1 in **Appendix 12.1**, the potential for dust emissions due to trackout activities would be of medium magnitude.

12.95 The dust risk categories, based on the potential magnitude of dust emissions and the sensitivity of the area to dust, are presented in Table 12.12.

Table 12.12 - Summary of Risk

Potential effect	Earthworks	Construction	Trackout
Dust Soiling	High Risk	High Risk	Medium Risk
Human Health	Medium Risk	Medium Risk	Low Risk
Ecological	Low Risk	Low Risk	Low Risk

12.96 The site is a **medium** to **high risk** site, regarding human health and dust soiling. In line with the assessment methodology described earlier in this Chapter, pre-mitigation impacts would likely be:

- **temporary**, **short-term**, **local** and of **major adverse** significance at receptors within 20m of the site.
- **temporary**, **short-term**, **local** and of **moderate adverse** significance at receptors within 20-100m of the site.
- **temporary**, **short-term**, **local** and of **major adverse** significance at receptors within 100-350m of the site; and
- **insignificant** significance at receptors over 350m of the site.

12.97 Consequently, mitigation would be required to ensure that adverse effects are avoided.

Construction Vehicle and Plant Emissions

12.98 Plant operating on the site and demolition and construction related vehicles entering and egressing the site from / to the local road network would have the potential to increase local air pollutant concentrations, particularly in respect of NO_2 and particulate matter (both PM_{10} and $PM_{2.5}$).

12.99 It is estimated that during the peak construction period there will be approximately 24 HGV movements per day (12 in / 12 out). Therefore, emissions from construction traffic would be relatively small compared to existing road traffic emissions on A249 (44,238 daily vehicles including 9.6% Heavy Goods Vehicles (HGVs)) and Grovehurst Road (13,734 daily vehicles including 5.6% Heavy Goods Vehicles (HGVs)). Further details on existing traffic flows is contained within **Appendix 12.1.**

12.100 Considering the current traffic movements and background pollutant concentrations around the site, it is considered that the likely effect of construction vehicles entering and egressing the site to air quality would in the worst-case, give rise to a temporary, local, **adverse effect** of **minor significance** during the construction period.

12.101 Any emissions from plant operating on the site would be very small in comparison to the emissions from traffic movements on the roads adjacent to the site. It is therefore considered that even in the absence of mitigation, their likely effect on local air quality would be **insignificant**.

Operational (Occupation) Phase

Complete Development 2023

12.102 Effects on local air quality associated with the completed and operational development would be likely to result from changes to traffic flows. The results of the ADMS-Roads air quality modelling, which has included operational traffic (based on current guidance, i.e. with reduced emission rates and background concentration to the completion year of 2023), for the complete development are presented in Table 12.13.

Table 12.13 - Results of the ADMS-Roads Modelling at Sensitive Receptors for Complete Development

	NO_2 Annual Mean ($\mu g/m^3$)				PM_{10} Annual Mean ($\mu g/m^3$)				PM_{10} – Number of Days >50$\mu g/m^3$				$PM_{2.5}$ Annual Mean ($\mu g/m^3$)			
	2015 Existing	2023 Without Development	2023 With Development	2023 Change	2015 Existing	2023 Without Development	2023 With Development	2023 Change	2015 Existing	2023 Without Development	2023 With Development	2023 Change	2015 Existing	2023 Without Development	2023 With Development	2023 Change
1	22.5	17.3	17.4	0.1	17.3	16.4	16.5	0.1	1	0	0	0	12.6	11.8	11.8	0.0
2	25.1	19.0	19.3	0.3	17.8	17.1	17.1	0.0	1	1	1	0	12.9	12.2	12.2	0.0
3	26.4	19.8	20.0	0.2	18.1	17.3	17.4	0.1	1	1	1	0	13.0	12.3	12.4	0.1
4	23.3	18.0	18.1	0.1	17.5	16.7	16.7	0.0	1	1	1	0	12.7	12.0	12.0	0.0
5	24.9	19.0	19.1	0.1	17.8	17.0	17.1	0.1	1	1	1	0	12.9	12.2	12.2	0.0
6	27.4	20.5	20.7	0.2	18.3	17.6	17.6	0.0	2	1	1	0	13.2	12.5	12.5	0.0
7	23.1	17.9	18.0	0.1	17.4	16.7	16.7	0.0	1	1	1	0	12.7	12.0	12.0	0.0
8	24.2	18.5	18.6	0.1	18.9	18.0	18.1	0.1	2	1	1	0	13.2	12.3	12.3	0.0
9	23.0	17.8	17.9	0.1	17.1	16.2	16.2	0.0	1	0	0	0	12.3	11.5	11.5	0.0
10	21.8	17.1	17.1	0.0	16.8	16.0	16.0	0.0	1	0	0	0	12.1	11.3	11.3	0.0
11	25.1	18.7	18.7	0.0	17.3	16.5	16.5	0.0	1	0	0	0	12.4	11.6	11.6	0.0
12*	32.0	22.3	22.4	0.1	18.4	17.6	17.6	0.0	2	1	1	0	13.0	12.1	12.1	0.0
13*	**41.6**	26.8	26.9	0.1	19.3	18.4	18.4	0.0	3	2	2	0	13.7	12.7	12.7	0.0
14*	36.6	24.2	24.3	0.1	18.6	17.7	17.7	0.0	2	1	1	0	13.1	12.2	12.2	0.0
15*	**40.2**	26.0	26.1	0.1	19.1	18.2	18.2	0.0	2	2	2	0	13.6	12.6	12.6	0.0
16	33.3	22.7	22.8	0.1	17.8	16.8	16.8	0.0	1	1	1	0	12.7	11.7	11.7	0.0
17	30.1	21.0	21.1	0.1	17.3	16.3	16.3	0.0	1	0	0	0	12.4	11.4	11.4	0.0
18	28.7	20.3	20.3	0.0	17.1	16.2	16.2	0.0	1	0	0	0	12.3	11.4	11.4	0.0
19	28.3	20.2	20.2	0.0	17.5	16.6	16.6	0.0	1	1	1	0	12.5	11.6	11.6	0.0
20	24.7	18.6	18.6	0.0	17.0	16.1	16.1	0.0	1	0	0	0	12.2	11.3	11.4	0.1

21	30.4	21.5	21.6	0.1	18.0	17.0	17.0	0.0	1	1	1	0	12.8	11.8	11.8	0.0
22	29.5	20.8	20.8	0.0	17.5	16.6	16.6	0.0	1	1	1	0	12.5	11.6	11.6	0.0
23	33.6	22.8	22.9	0.1	18.1	17.2	17.2	0.0	1	1	1	0	12.9	11.9	12.0	0.1
24	28.8	20.6	20.7	0.1	17.6	16.8	16.8	0.0	1	1	1	0	12.6	11.7	11.7	0.0
25	29.0	20.5	20.6	0.1	17.4	16.5	16.6	0.1	1	1	1	0	12.5	11.6	11.6	0.0
26	29.8	20.9	21.0	0.1	17.5	16.6	16.6	0.0	1	1	1	0	12.3	11.5	11.5	0.0
27	27.4	19.8	20.0	0.2	17.8	16.9	17.0	0.1	1	1	1	0	12.5	11.7	11.7	0.0
28	24.6	18.5	18.7	0.2	17.5	16.6	16.7	0.1	1	1	1	0	12.4	11.5	11.6	0.1
29	23.7	18.0	18.0	0.0	17.3	16.4	16.5	0.1	1	0	0	0	12.3	11.4	11.4	0.0
30	25.2	18.7	18.8	0.1	17.6	16.7	16.7	0.0	1	1	1	0	12.4	11.6	11.6	0.0
31	24.0	18.1	18.2	0.1	16.7	15.8	15.9	0.1	1	0	0	0	12.0	11.2	11.2	0.0
32	23.0	17.6	17.7	0.1	16.6	15.7	15.7	0.0	1	0	0	0	11.9	11.1	11.2	0.1
33	27.4	19.9	20.0	0.1	17.3	16.4	16.4	0.0	1	0	0	0	12.4	11.5	11.5	0.0
34	22.4	17.3	17.4	0.1	16.4	15.6	15.6	0.0	0	0	0	0	11.9	11.1	11.1	0.0
35	22.6	17.4	17.7	0.3	16.5	15.6	15.7	0.1	0	0	0	0	11.9	11.1	11.2	0.1
36	22.9	17.6	18.0	0.4	16.5	15.7	15.8	0.1	1	0	0	0	11.9	11.1	11.2	0.1
37	21.7	17.0	17.1	0.1	17.7	16.8	16.8	0.0	1	1	1	0	13.0	12.2	12.3	0.1
38	22.4	17.3	17.4	0.1	17.3	16.4	16.5	0.1	1	0	0	0	12.6	11.8	11.9	0.1
39	22.5	17.4	17.4	0.0	17.3	16.5	16.5	0.0	1	0	1	0	12.6	11.8	11.9	0.1
40	23.3	17.7	17.8	0.1	17.5	16.6	16.6	0.0	1	1	1	0	12.7	11.9	11.9	0.0
41	23.0	17.6	17.6	0.0	17.4	16.5	16.6	0.1	1	1	1	0	12.6	11.9	11.9	0.0
42	23.9	18.1	18.2	0.1	17.6	16.7	16.8	0.1	1	1	1	0	12.7	12.0	12.0	0.0
43	23.8	18.0	18.1	0.1	17.6	16.7	16.7	0.0	1	1	1	0	12.7	12.0	12.0	0.0
44**	35.6	23.6	23.6	0.0	18.6	17.6	17.6	0.0	2	1	1	0	13.4	12.5	12.5	0.0
45**	35.2	23.4	23.4	0.0	18.6	17.5	17.5	0.0	2	1	1	0	13.4	12.5	12.5	0.0
46**	31.1	21.3	21.4	0.1	18.1	17.1	17.1	0.0	1	1	1	0	13.1	12.2	12.2	0.0
47	25.8	19.0	19.1	0.1	17.9	17.0	17.0	0.0	1	1	1	0	12.9	12.1	12.1	0.0
48	33.2	22.9	23.0	0.1	19.2	18.3	18.3	0.0	3	2	2	0	13.7	12.8	12.9	0.1
49^	**51.0**	32.2	32.5	0.3	21.6	20.3	20.4	0.1	6	4	4	0	15.3	14.0	14.1	0.1
50^	35.3	23.7	23.8	0.1	19.0	18.0	18.0	0.0	2	1	1	0	13.6	12.7	12.7	0.0

51^	**50.7**	32.1	32.3	0.2	21.0	19.7	19.8	0.1	5	3	3	0	14.7	13.4	13.4	0.0
52^	29.4	20.7	20.7	0.0	17.6	16.6	16.6	0.0	1	1	1	0	12.6	11.6	11.6	0.0
53^^	34.6	22.6	22.7	0.1	17.8	16.7	16.7	0.0	1	1	1	0	12.7	11.7	11.7	0.0
54^^	**49.8**	30.3	30.5	0.2	19.7	18.3	18.4	0.1	3	2	2	0	13.9	12.6	12.7	0.1
55^^	34.2	22.4	22.5	0.1	19.8	18.9	18.9	0.0	3	2	2	0	13.2	12.2	12.2	0.0
56	23.8	18.1	18.1	0.0	19.0	18.2	18.2	0.0	2	2	2	0	12.6	11.8	11.8	0.0
57			19.2				18.6				2				12.1	
58			19.1				17.6				1				12.0	
59			16.7				17.0				1				11.6	
60			16.8				17.0				1				11.6	
61			16.3				16.8				1				11.5	
62			17.0				17.0				1				11.6	
63			17.3				16.4				0				11.8	
64			16.6				16.2				0				11.7	
65			18.7				16.8				1				12.0	
66			17.5				16.5				0				11.8	
67			17.1				16.3				0				11.8	
68			16.2				16.1				0				11.6	
69			16.6				15.4				0				11.0	
70			16.6				15.8				0				11.2	
71			16.3				15.7				0				11.2	

Nitrogen Dioxide (NO_2)

12.103 The results in Table 12.13 indicate that for 2015, the NO_2 annual mean AQS objective is exceeded at five receptor locations (Receptors 13, 15, 49, 51 and 54). This is consistent with the receptor locations being located within an AQMA. The maximum predicted concentration is 51.0µg/m^3 at Receptor 49.

12.104 As discussed in **Appendix 12.1**, the 1-hour mean objective for NO_2 is unlikely to be exceeded at a roadside location where the annual mean NO_2 concentration is less than 60µg/m^3. As shown in Table 12.13 the predicted annual mean NO_2 concentrations in 2015 are below 60µg/m^3 at all receptor locations. Accordingly, the 1-hour mean objective is likely to be met at these locations.

12.105 In 2023, both 'without' and 'with' Development, concentrations are predicted to meet the NO_2 annual mean objective value at all receptor locations. As such the operation of development does not cause any new exceedances of the objective. Table 12.13 illustrates that 'without' and 'with' the Development, the highest predicted annual mean NO_2 concentration (of 32.5µg/m^3 at Receptor 49) is less than 60µg/m^3 and, as such, the hourly objective is likely to be met in 2023 at all receptors surrounding the site.

12.106 Using the impact descriptors outlined in 12.9, the development is predicted to result in a 'negligible' impact at all receptor locations. Accordingly, it is considered that the development would also have a 'negligible' impact on hourly NO_2 concentrations.

12.107 Based on the above it is considered that the potential effect of development on NO_2 would be **insignificant**.

Particulate Matter (PM_{10} and $PM_{2.5}$)

12.108 As shown in Table 12.13, the annual mean concentrations of PM_{10} are predicted to be well below the annual mean objective of 40µg/m^3 and the daily mean PM_{10} objective of 35 days not exceeding 50µg/m^3 in 2015 and in 2023 both 'with' and 'without' development at all the receptor locations. The maximum predicted concentration in all situations tested is 21.6µg/m^3 at Receptor 49 in 2015. Using the impact descriptors outlined in Table 12.9, development is predicted to result in a 'negligible' impact at all receptor locations.

12.109 The results in Table 12.13 indicate that in 2015 and in 2023 both 'without' and 'with' Development, all receptor locations are predicted to be below the annual mean $PM_{2.5}$ objective value of 25µg/m^3. The maximum predicted concentration in all situations is 15.3µg/m^3 at Receptor 49 in 2015. Using the effect descriptors outlined in Table 12.9, the development is predicted to result in a 'negligible' effect at all receptors surrounding the site.

12.110 Based on the above it is considered that the potential effect of development on PM_{10} and $PM_{2.5}$ would be **insignificant**.

Air Quality Conditions within Complete Development

12.111 As shown by the results in Table 12.13 the predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for locations within the development itself are below the relevant objectives in 2023. As such, it is considered that for the NO_2, PM_{10} and $PM_{2.5}$ the potential effect of introducing residential and educational uses to the site would be **insignificant**. That is, the air quality conditions within development would be suitable for residential and educational use.

NO_2 Sensitivity Analysis Results

12.112 The results of the sensitivity analysis are presented in Table A1.12 in **Appendix 12.1.** The overall predicted concentrations are higher than those presented above for 2023 due to the higher background concentrations and vehicles emissions rates used in the assessment.

12.113 As shown in Table A1.12 in **Appendix 12.1,** in 2023 both 'without' and 'with' the Development, using the CURED NO_2 emission factors and background concentrations are predicted to exceed the NO_2 annual mean objective value of 40µg/m^3 at two receptor locations (Receptor 49 and 51). These two receptors are located within the Newington AQMA. The maximum predicted concentration is 41.3µg/m^3 at Receptor 49 'with' the development in place.

12.114 The predicted annual mean NO_2 concentrations in 2023 are predicted to be below 60µg/m^3 at all receptor locations. As such, the 1-hour mean objective is likely to be met at these locations.

12.115 Using the impact descriptors outlined in Table 12.9, the development is predicted to result in a 'moderate' impact at two receptor locations (Receptor 49 and 51). Although the change in concentration relative to the air quality assessment level at these receptors is small (1% of the AQS objective) it results in an increase in concentration where there is already an exceedance of

the annual mean NO_2 AQS objective. Therefore, this small change at these two receptors cannot be deemed as insignificant as, at worst, the development has the potential to delay the achievement of the annual mean NO_2 AQS Objective because in the existing scenario annual mean NO_2 concentrations are already, high attributed to the Newington AQMA road layout which results in poor dispersion of air pollutants.

12.116 When considering the predicted concentrations in Table 12.12, it is considered that the use of the CURED NO_2 emissions factors represents a reasonable worst-case assessment for future concentrations and may be overly conservative when considering the potential changes in future vehicle fleet (such as the uptake of electric or low emission vehicles) by 2023. Currently there is no standard or recognised methodology to take this benefit in vehicle emissions into account and therefore this scenario represents a conservative assessment of future impacts.

12.117 In addition, there is no methodology available to quantify the effectiveness of air quality mitigation measures, both proposed and those inherent to the development (such as the uptake of cycle use, the amount of ambient pollutant absorption and filtration from green planting and the increase in electric cars, discussed further below), given the development includes such measures (see Table 12.17) and does not restrict the ability of the SBC AQAP to be implemented (see details of the AQAP measures set out in paragraph 1.68), the impacts presented in the sensitivity analysis are likely to be lower than those presented in Table A1.12.

12.118 A ‘slight’ impact is predicted at one receptor location (Receptor 54), which is below the AQS Objective, and a ‘negligible’ impact at the remaining fifty-three receptors. Based on the above, using professional judgement, based on the severity of the impact and the concentrations predicted at Receptors 49 and 51 it is considered that the potential effect of the development pre-mitigation, on local air quality would be **significant**.

12.119 Table A1.12 in **Appendix 12.1** summarises the predicted annual mean NO_2 concentrations for locations within the site itself and identifies that when using the CURED NO_2 emission factors and background concentrations, predicted NO_2 concentrations meet the objective of 40µg/m^3 at all locations. Accordingly, based on professional judgement it is considered that using the CURED NO_2 emission factors, the air quality conditions within the site would be suitable for residential and educational use.

Annual Mean NOx

12.120 The modelling results for the predicted annual mean NO_x concentration at the ecological receptor due to traffic emissions using the CURED emission factors are summarised in Table 12.14.

Table 12.14 - Results of the ADMS-Roads Modelling at Sensitive Receptors for Complete Development

ID	Predicted Annual Mean NO_x Concentration ($\mu g/m^3$)		Proportion of the AQAL (%)	
	Process Contribution (PC)	Predicted Environmental Concentration (PEC)	PC	PEC
56	0.07	16.29	0.2	54.3

12.121 As shown in Table 12.14 predicted NO_x concentration is below the annual mean NOx objective of 30$\mu g/m^3$. The PC at The Swale SSSI is less than 1% and therefore the impact is negligible. As such, predicted effects on annual mean NO_x concentrations at The Swale SSSI are **insignificant**.

Completed Development 2031

12.122 The results of the ADMS-Roads air quality modelling, which has included operational traffic (based on current guidance, i.e. with reduced emission rates and background concentration to the completion year of 2031), for the complete development are presented in Table 12.15.

Table 12.15 - Results of the ADMS-Roads Modelling at Sensitive Receptors for Complete Development

ID	NO_2 Annual Mean ($\mu g/m^3$)			PM_{10} Annual Mean ($\mu g/m^3$)			PM_{10} – Number of Days >50$\mu g/m^3$			$PM_{2.5}$ Annual Mean ($\mu g/m^3$)		
	2031 Without Development	2031 With Development	2031 Change	2031 Without Development	2031 With Development	2031 Change	2031 Without Development	2031 With Development	2031 Change	2031 Without Development	2031 With Development	2031 Change
1	15.9	16.0	0.1	16.0	16.1	0.1	0	0	0	11.4	11.5	0.1
2	17.2	17.5	0.3	16.7	16.8	0.1	1	1	0	11.8	11.8	0.0
3	17.7	18.0	0.3	16.9	17.0	0.1	1	1	0	11.9	12.0	0.1
4	16.4	16.5	0.1	16.3	16.3	0.0	0	0	0	11.6	11.6	0.0
5	17.1	17.2	0.1	16.6	16.7	0.1	1	1	0	11.7	11.8	0.1
6	18.2	18.4	0.2	17.2	17.3	0.1	1	1	0	12.1	12.1	0.0
7	16.3	16.3	0.0	16.2	16.2	0.0	0	0	0	11.5	11.5	0.0
8	16.8	16.8	0.0	17.8	17.8	0.0	1	1	0	12.0	12.0	0.0
9	16.2	16.2	0.0	15.9	15.9	0.0	0	0	0	11.1	11.2	0.1
10	15.7	15.7	0.0	15.6	15.6	0.0	0	0	0	11.0	11.0	0.0
11	16.8	16.8	0.0	16.1	16.2	0.1	0	0	0	11.3	11.3	0.0
12	19.4	19.6	0.2	17.3	17.4	0.1	1	1	0	11.8	11.9	0.1
13	22.4	22.6	0.2	18.2	18.2	0.0	2	2	0	12.4	12.5	0.1
14	20.6	20.8	0.2	17.4	17.5	0.1	1	1	0	11.9	11.9	0.0
15	21.9	22.1	0.2	17.9	18.0	0.1	1	1	0	12.3	12.3	0.0
16	19.6	19.8	0.2	16.5	16.6	0.1	1	1	0	11.4	11.4	0.0
17	18.4	18.5	0.1	16.1	16.1	0.0	0	0	0	11.1	11.2	0.1
18	17.9	18.0	0.1	15.9	15.9	0.0	0	0	0	11.1	11.1	0.0
19	17.9	18.0	0.1	16.3	16.3	0.0	0	0	0	11.3	11.3	0.0
20	16.8	16.8	0.0	15.8	15.9	0.1	0	0	0	11.1	11.1	0.0
21	18.9	19.0	0.1	16.8	16.8	0.0	1	1	0	11.6	11.6	0.0

22	18.3	18.3	0.0	16.3	16.3	0.0	0	0	0	11.3	11.3	0.0
23	19.7	19.9	0.2	16.9	17.0	0.1	1	1	0	11.7	11.7	0.0
24	18.2	18.3	0.1	16.5	16.6	0.1	1	1	0	11.4	11.4	0.0
25	18.1	18.2	0.1	16.2	16.3	0.1	0	0	0	11.3	11.3	0.0
26	18.3	18.6	0.3	16.3	16.4	0.1	0	0	0	11.2	11.2	0.0
27	17.6	18.0	0.4	16.6	16.8	0.2	1	1	0	11.4	11.5	0.1
28	16.7	17.2	0.5	16.3	16.5	0.2	0	1	0	11.2	11.3	0.1
29	16.3	16.5	0.2	16.1	16.2	0.1	0	0	0	11.1	11.1	0.0
30	16.9	17.1	0.2	16.4	16.5	0.1	0	0	0	11.2	11.3	0.1
31	16.4	16.6	0.2	15.5	15.5	0.0	0	0	0	10.9	10.9	0.0
32	16.1	16.3	0.2	15.3	15.4	0.1	0	0	0	10.8	10.8	0.0
33	17.9	18.1	0.2	16.1	16.1	0.0	0	0	0	11.2	11.2	0.0
34	15.9	16.1	0.2	15.2	15.3	0.1	0	0	0	10.7	10.8	0.1
35	16.0	16.6	0.6	15.3	15.6	0.3	0	0	0	10.8	10.9	0.1
36	16.1	16.9	0.8	15.3	15.7	0.4	0	0	0	10.8	11.0	0.2
37	15.6	15.7	0.1	16.4	16.4	0.0	0	0	0	11.8	11.9	0.1
38	15.8	15.9	0.1	16.0	16.0	0.0	0	0	0	11.4	11.4	0.0
39	15.9	16.0	0.1	16.0	16.1	0.1	0	0	0	11.4	11.4	0.0
40	16.1	16.3	0.2	16.2	16.2	0.0	0	0	0	11.5	11.5	0.0
41	16.0	16.1	0.1	16.1	16.2	0.1	0	0	0	11.5	11.5	0.0
42	16.4	16.5	0.1	16.3	16.3	0.0	0	0	0	11.6	11.6	0.0
43	16.4	16.4	0.0	16.3	16.3	0.0	0	0	0	11.6	11.6	0.0
44	20.3	20.4	0.1	17.2	17.2	0.0	1	1	0	12.1	12.1	0.0
45	20.1	20.2	0.1	17.1	17.2	0.1	1	1	0	12.1	12.1	0.0
46	18.7	18.7	0.0	16.7	16.7	0.0	1	1	0	11.8	11.8	0.0
47	17.1	17.2	0.1	16.6	16.6	0.0	1	1	0	11.7	11.7	0.0
48	20.1	20.3	0.2	17.9	18.0	0.1	1	1	0	12.5	12.5	0.0
49	26.7	27.1	0.4	20.1	20.2	0.1	4	4	0	13.7	13.8	0.1
50	20.4	20.6	0.2	17.6	17.6	0.0	1	1	0	12.3	12.3	0.0
51	26.6	26.9	0.3	19.6	19.7	0.1	3	3	0	13.1	13.2	0.1

52	18.2	18.3	0.1	16.3	16.3	0.0	0	0	0	11.3	11.3	0.0
53	19.5	19.7	0.2	16.4	16.5	0.1	0	0	0	11.4	11.4	0.0
54	25.0	25.4	0.4	18.1	18.2	0.1	2	2	0	12.3	12.4	0.1
55	19.3	19.5	0.2	18.7	18.7	0.0	2	2	0	11.9	12.0	0.1
56	16.5	16.6	0.1	18.0	18.1	0.1	1	1	0	11.6	11.6	0.0
57		17.4			18.5			2			11.8	
58		17.3			17.4			1			11.7	
59		15.5			16.7			1			11.3	
60		15.7			16.8			1			11.4	
61		15.1			16.5			0			11.2	
62		16.3			17.0			1			11.5	
63		16.0			16.0			0			11.4	
64		15.4			15.8			0			11.3	
65		17.1			16.5			0			11.7	
66		16.9			16.4			0			11.6	
67		16.3			16.1			0			11.5	
68		15.1			15.6			0			11.2	
69		15.5			15.1			0			10.7	
70		15.7			15.6			0			11.0	
71		15.2			15.4			0			10.9	

Nitrogen Dioxide (NO_2)

12.123 The results in Table 12.15 indicate that in 2031, both 'without' and 'with' the Development, concentrations are predicted to meet the NO_2 annual mean objective value at all receptor locations. Table 12.15 illustrates that 'without' and 'with' the Development, the highest predicted annual mean NO_2 concentration (of 27.1µg/m^3 at Receptor 49) is less than 60µg/m^3 and, as such, the hourly objective is likely to be met in 2031 at all receptor locations.

12.124 Using the impact descriptors outlined in Table 12.9, the development is predicted to result in a 'negligible' impact at all receptors surrounding the site. Accordingly, it is considered that the development would also have a 'negligible' impact on hourly NO_2 concentrations.

12.125 Based on the above it is considered that the potential effect of the development on NO_2 would be **insignificant**.

Particulate Matter (PM_{10} and $PM_{2.5}$)

12.126 As shown in Table 12.15, the annual mean concentrations of PM_{10} are predicted to be well below the annual mean objective of 40µg/m^3 and the daily mean PM_{10} objective of 35 days not exceeding 50µg/m^3 in 2031 both 'with' and 'without' the development at all receptor locations considered. The maximum predicted concentration in all situations tested is 20.2µg/m^3 at Receptor 49 with the development in 2031. Using the impact descriptors outlined in Table 12.9, the development is predicted to result in a 'negligible' impact at all receptor locations.

12.127 The results in Table 12.15 indicate that in 2031 both 'without' and 'with' the Development, all receptor locations are predicted to be below the annual mean $PM_{2.5}$ objective value of 25µg/m^3. The maximum predicted concentration in all situations is 14.1µg/m^3 at Receptor 49 in 2031. Using the effect descriptors outlined in Table 12.9, the development is predicted to result in a 'negligible' effect at all receptor locations.

12.128 Based on the above it is considered that the potential effect of the development on PM_{10} and $PM_{2.5}$ would be **insignificant**.

Air Quality Conditions within Complete Development

12.129 As shown by the results in Table 12.15 the predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for locations within the development are below the relevant

objectives in 2031. As such, it is considered that for the NO_2, PM_{10} and $PM_{2.5}$ objectives the potential effect of introducing residential and educational uses to the site would be **insignificant**. That is, the air quality conditions within the development would be suitable for residential and educational use.

NO_2 Sensitivity Analysis Results

12.130 The results of the sensitivity analysis are presented in Table A1.12 in **Appendix 12.1.** The overall predicted concentrations are higher than those presented above for 2031 due to higher background concentrations and vehicles emissions rates used in the assessment.

12.131 As shown in Table A1.12 in **Appendix 12.1,** in 2031 both 'without' and 'with' the Development, using the CURED NO_2 emission factors, concentrations are predicted to meet the NO_2 annual mean objective value of 40µg/m^3 at all receptor locations. The maximum predicted concentration is 37.7µg/m^3 at Receptor 49 'with' the development in place.

12.132 The predicted annual mean NO_2 concentrations in 2031 are predicted to be below 60µg/m^3 at all receptor locations. As such, the 1-hour mean objective is likely to be met at these locations.

12.133 Using the impact descriptors outlined in Table 12.9, the development is predicted to result in a 'negligible' impact at all receptor locations considered. based on the above it is considered that the potential effect of the development on local air quality would be **insignificant**.

12.134 Table A1.12 in **Appendix 12.1** summarises the predicted annual mean NO_2 concentrations for locations within the development itself and identifies that when using the CURED NO_2 emission factors, predicted NO_2 concentrations meet the objective of 40µg/m^3. Accordingly, based on professional judgement it is considered that when using the CURED NO_2 emission factors, the air quality conditions within the development would be suitable for residential and educational use.

Annual Mean NOx

12.135 The modelling results for the predicted annual mean NO_x concentration at the ecological receptor due to traffic emissions using the CURED emission factors are summarised in Table 12.16.

Table 12.16 - Results of the ADMS-Roads Modelling at Sensitive Receptors for Complete Development

ID	Predicted Annual Mean NO_x Concentration ($\mu g/m^3$)		Proportion of EQS (%)	
	PC	PEC	PC	PEC
56	0.11	14.95	0.4	49.8

12.136 As shown in Table 12.16 predicted NO_x concentration is below the annual mean NOx objective of 30µg/m^3. The PC at The Swale is below the EA criteria for insignificant impacts. As such, predicted effects on annual mean NO_x concentrations at The Swale are **insignificant**.

Assessment of Residual Impacts

Construction Phase

Nuisance Dust

12.137 As noted earlier in this chapter, the development would give rise to a high-risk construction site in relation to nuisance dust, accordingly, a range of environmental management controls would be developed to minimise dust nuisance with reference to the IAQM guidance for high-risk sites. The management controls would prevent the release of dust entering the atmosphere and/or being deposited on nearby receptors. The management controls would form an integral part of the site-specific Construction Environmental Management Plan (CEMP). The management controls would be likely to include:

- develop and implement a stakeholder communications plan, including community engagement before work commences on site;
- record all dust and air quality complaints, identify causes, take appropriate measures to reduce emissions in a timely manner, and record the measures taken, make the log available to the local authority;
- hold regular liaison meetings with other high-risk construction sites within 500m of the site boundary to ensure plans are coordinated and emissions minimised;
- plan the site layout so that machinery and dust causing activities are located away from receptors, as far as possible;
- erect barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site;

- fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period;
- avoid site runoff of water or mud;
- keep site fencing, barriers and scaffolding clean using wet methods;
- remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site
- cover, seed or fence stockpiles to prevent wind whipping, where practicable;
- ensure all vehicles switch off engines when stationary – no idling vehicles;
- avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable;
- impose and signpost a maximum speed limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas;
- produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials and implement a Travel Plan that supports and encourages sustainable travel;
- only use cutting, grinding or sawing equipment fitted, or in conjunction, with suitable dust suppression techniques such as water sprays or local extraction;
- ensure adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- used enclosed chutes and conveyors and covered skips;
- minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate;
- ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods;
- use water -assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site;
- avoid dry sweeping of large areas;
- ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport;
- inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable;
- record all inspections of haul routes and any subsequent action in a site log book;
- implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable);

- 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; and
- access gates to be located at least 10m from receptors where possible.

12.138 As the site is considered a High-Risk site monitoring measures would be considered as part of the construction phase and would be detailed in a CEMP. Such measures may include:

- Undertake daily on-site and off-site inspections, 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;
- Carry out regular site inspections to monitor compliance with the CEMP, record inspection results, and make the inspection log available to the local authority when asked. Increase the frequency of site inspections when activities with a high potential to produce dust are being carried out during prolonged dry or windy conditions; and
- Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Commence baseline monitoring three months before work commences on site.

12.139 Following the employment of appropriate environmental management controls which are routinely and successfully applied throughout the UK, **insignificant** residual effects would arise from construction-related dust emissions arising from the Development.

Construction Vehicle and Plant Emissions

12.140 The route management strategy for HGVs associated with demolition and construction activities would be developed in consultation with SBC. It is anticipated that following the implementation of mitigation, the likely residual effect of construction vehicles entering and leaving the site would be at worst **temporary, short-term, local** and of **minor adverse significance**, during peak construction periods, and of **insignificant** at all other times, in the context of local background pollutant concentrations and existing local road traffic emissions.

12.141 The likely residual effects of exhaust emissions from plant operating on the site would be **insignificant** in the context of existing adjacent road traffic exhaust emissions.

Operational (Occupation) Phase

12.142 As identified earlier in this chapter, even in the absence of mitigation, the effect of operational traffic for the development is predicted to have an insignificant potential effect on local air quality at relevant receptors surrounding the site, and therefore the residual effect would remain **insignificant**. Accordingly, mitigation measures would not be required.

12.143 Notwithstanding this, Table 12.17 presents the measures inherent to the development and additional mitigation measures to be included during the construction and operational phases of the development which are likely to benefit local air quality. These measures are consistent with those identified by SBC and the Kent and Medway Air Quality Partnership.

12.144 However, there is no standard or recognised methodology to enable the reduction in pollutant concentrations that these measures would result in to be quantified within this air quality assessment.

Table 12.17 - Summary of Mitigation Measures

Phase	Mitigation Measures
Construction Works	Environmental management controls developed in accordance with the IAQM construction guidance and set out in the CEMP. Avoidance, or limited use of, traffic routes in proximity to sensitive routes (i.e. residential roads etc.). All construction traffic logistics would be agreed with SBC. Avoidance (or limited) use of roads during peak hours, where practicable.
Inherent with the Design of the Development	Electric Vehicle charging points in line with current guidance. Cycle paths to link to the wider cycle network. Design of the development to encourage walking and the use of public transport. Provision of primary and secondary school within the development area to reduce the need to travel to school by car. Provision of secure cycle storage. Green infrastructure, particularly trees, to absorb dust and other pollutants. Inclusion of a primary and secondary school to be operated according to school travel plans, to reduce daily vehicle trips associated with the operation of a residential development in this area.
Operational Phase	A Travel Plan will be implemented which will present smarter travel choices which will influence people's travel behaviour. This will include measures such as public transport information and marketing initiatives, car sharing and car clubs, plus measures that reduce the need to travel.

Cumulative Effects

Construction Phase

Nuisance Dust

12.145 As noted the main effects to air quality because of construction works would be in relation to dust nuisance. Based on professional judgement, owing to the typical dispersal and deposition rates of dust with distance from their source only those schemes within 350m of the site boundary would have the potential to cause a cumulative effect.

12.146 It is assumed that, as per the Development, all other cumulative schemes would implement their own CEMPs to mitigate dust nuisance effects. As a result, it is considered that cumulative dust effects from the development and the cumulative schemes would likely be **insignificant**.

Construction Vehicle and Plant Emissions

12.147 Exhaust emissions from the combined construction traffic of the development and the cumulative schemes could give rise to cumulative residual effects on local air quality. However, this would depend upon the extent to which the implementation of the development and the cumulative schemes overlap. It is generally the case that demolition and construction traffic adds a very small proportion of additional traffic to the local highway network. As noted in Chapter 12: Air Quality, it is assumed that appropriate traffic management measures would be implemented to reduce as much traffic disruption as is practically possible. In the worst-case scenario, whereby the demolition and construction of the cumulative schemes overlap with the construction of the Development, and use the same, or nearby construction traffic routes, the likely residual cumulative effect would be **temporary, short-term, local, adverse** and of **minor** significance.

12.148 Regarding exhaust emissions from plant operating on the and cumulative scheme sites concurrently, it is considered that even in a combined situation, the likely residual cumulative effects would be **insignificant** in the context of the existing adjacent road traffic and exhaust emissions.

Operational (Occupation) Phase

Completed Development 2031

12.149 Cumulative effects on local air quality associated with the completed and operational development and the development on the land adjacent Quinton Farmhouse by Redrow Homes would be likely to result from changes to traffic flows and emissions. The results of the ADMS-Roads air quality modelling, which has included operational traffic (based on current guidance, i.e. with reduced emission rates and background concentration to the completion year of 2031), for the complete development are presented in Table 12.18.

Table 12.18 - Results of the ADMS-Roads Modelling at Sensitive Receptors for Complete Development

ID	NO_2 Annual Mean ($\mu g/m^3$)			PM_{10} Annual Mean ($\mu g/m^3$)			PM_{10} – Number of Days >50$\mu g/m^3$			$PM_{2.5}$ Annual Mean ($\mu g/m^3$)		
	2031 Baseline	2031 Cumulative Assessment	2031 Cumulative Change	2031 Baseline	2031 Cumulative Assessment	2031 Cumulative Change	2031 Baseline	2031 Cumulative Assessment	2031 Cumulative Change	2031 Baseline	2031 Cumulative Assessment	2031 Cumulative Change
1	15.9	16.0	0.1	16.0	16.1	0.1	0	0	0	11.4	11.5	0.1
2	17.2	17.5	0.3	16.7	16.8	0.1	1	1	0	11.8	11.8	0.0
3	17.7	18.0	0.3	16.9	17.0	0.1	1	1	0	11.9	12.0	0.1
4	16.4	16.5	0.1	16.3	16.3	0.0	0	0	0	11.6	11.6	0.0
5	17.1	17.2	0.1	16.6	16.7	0.1	1	1	0	11.7	11.8	0.1
6	18.2	18.4	0.2	17.2	17.3	0.1	1	1	0	12.1	12.1	0.0
7	16.3	16.3	0.0	16.2	16.2	0.0	0	0	0	11.5	11.5	0.0
8	16.8	16.8	0.0	17.8	17.8	0.0	1	1	0	12.0	12.0	0.0
9	16.2	16.2	0.0	15.9	15.9	0.0	0	0	0	11.1	11.2	0.1
10	15.7	15.7	0.0	15.6	15.6	0.0	0	0	0	11.0	11.0	0.0
11	16.8	16.8	0.0	16.1	16.2	0.1	0	0	0	11.3	11.3	0.0
12	19.4	19.6	0.2	17.3	17.4	0.1	1	1	0	11.8	11.9	0.1
13	22.4	22.7	0.3	18.2	18.3	0.1	2	2	0	12.4	12.5	0.1
14	20.6	20.8	0.2	17.4	17.5	0.1	1	1	0	11.9	11.9	0.0
15	21.9	22.1	0.2	17.9	18.0	0.1	1	1	0	12.3	12.3	0.0
16	19.6	19.8	0.2	16.5	16.6	0.1	1	1	0	11.4	11.4	0.0
17	18.4	18.5	0.1	16.1	16.1	0.0	0	0	0	11.1	11.2	0.1
18	17.9	18.0	0.1	15.9	15.9	0.0	0	0	0	11.1	11.1	0.0
19	17.9	18.0	0.1	16.3	16.3	0.0	0	0	0	11.3	11.3	0.0
20	16.8	16.9	0.1	15.8	15.9	0.1	0	0	0	11.1	11.1	0.0
21	18.9	19.0	0.1	16.8	16.8	0.0	1	1	0	11.6	11.6	0.0

22	18.3	18.4	0.1	16.3	16.3	0.0	0	0	0	11.3	11.3	0.0
23	19.7	19.9	0.2	16.9	17.0	0.1	1	1	0	11.7	11.7	0.0
24	18.2	18.3	0.1	16.5	16.6	0.1	1	1	0	11.4	11.5	0.1
25	18.1	18.2	0.1	16.2	16.3	0.1	0	0	0	11.3	11.3	0.0
26	18.3	18.6	0.3	16.3	16.4	0.1	0	0	0	11.2	11.2	0.0
27	17.6	18.1	0.5	16.6	16.8	0.2	1	1	0	11.4	11.5	0.1
28	16.7	17.3	0.6	16.3	16.6	0.3	0	1	1	11.2	11.4	0.2
29	16.3	16.5	0.2	16.1	16.2	0.1	0	0	0	11.1	11.1	0.0
30	16.9	17.1	0.2	16.4	16.5	0.1	0	0	0	11.2	11.3	0.1
31	16.4	16.6	0.2	15.5	15.6	0.1	0	0	0	10.9	10.9	0.0
32	16.1	16.3	0.2	15.3	15.4	0.1	0	0	0	10.8	10.8	0.0
33	17.9	18.1	0.2	16.1	16.2	0.1	0	0	0	11.2	11.2	0.0
34	15.9	16.1	0.2	15.2	15.3	0.1	0	0	0	10.7	10.8	0.1
35	16.0	16.7	0.7	15.3	15.6	0.3	0	0	0	10.8	11.0	0.2
36	16.1	17.0	0.9	15.3	15.7	0.4	0	0	0	10.8	11.0	0.2
37	15.6	15.8	0.2	16.4	16.4	0.0	0	0	0	11.8	11.9	0.1
38	15.8	15.9	0.1	16.0	16.1	0.1	0	0	0	11.4	11.4	0.0
39	15.9	16.0	0.1	16.0	16.1	0.1	0	0	0	11.4	11.5	0.1
40	16.1	16.3	0.2	16.2	16.2	0.0	0	0	0	11.5	11.5	0.0
41	16.0	16.1	0.1	16.1	16.2	0.1	0	0	0	11.5	11.5	0.0
42	16.4	16.5	0.1	16.3	16.3	0.0	0	0	0	11.6	11.6	0.0
43	16.4	16.4	0.0	16.3	16.3	0.0	0	0	0	11.6	11.6	0.0
44	20.3	20.4	0.1	17.2	17.2	0.0	1	1	0	12.1	12.1	0.0
45	20.1	20.2	0.1	17.1	17.2	0.1	1	1	0	12.1	12.1	0.0
46	18.7	18.7	0.0	16.7	16.7	0.0	1	1	0	11.8	11.8	0.0
47	17.1	17.2	0.1	16.6	16.6	0.0	1	1	0	11.7	11.7	0.0
48	20.1	20.4	0.3	17.9	18.0	0.1	1	1	0	12.5	12.5	0.0
49	26.7	27.1	0.4	20.1	20.3	0.2	4	4	0	13.7	13.8	0.1
50	20.4	20.6	0.2	17.6	17.7	0.1	1	1	0	12.3	12.3	0.0
51	26.6	27.0	0.4	19.6	19.7	0.1	3	3	0	13.1	13.2	0.1

52	18.2	18.3	0.1	16.3	16.3	0.0	0	0	0	11.3	11.3	0.0
53	19.5	19.7	0.2	16.4	16.5	0.1	0	0	0	11.4	11.4	0.0
54	25.0	25.4	0.4	18.1	18.3	0.2	2	2	0	12.3	12.4	0.1
55	19.3	19.5	0.2	18.7	18.8	0.1	2	2	0	11.9	12.0	0.1
56	16.5	16.6	0.1	18.0	18.1	0.1	1	1	0	11.6	11.6	0.0
57		17.4			18.5			2			11.8	
58		17.3			17.4			1			11.7	
59		15.5			16.7			1			11.3	
60		15.7			16.8			1			11.4	
61		15.1			16.5			0			11.2	
62		16.3			17.0			1			11.5	
63		16.2			16.1			0			11.5	
64		15.4			15.8			0			11.3	
65		17.1			16.5			0			11.7	
66		16.9			16.4			0			11.6	
67		16.3			16.2			0			11.5	
68		15.1			15.6			0			11.2	
69		15.5			15.1			0			10.7	
70		15.7			15.6			0			11.0	
71		15.2			15.4			0			10.9	

Nitrogen Dioxide (NO_2)

12.150 The results in Table 12.18 indicate that in 2031, concentrations are predicted to meet the NO_2 annual mean objective value at all receptor locations. Table 12.18 illustrates that the highest predicted annual mean NO_2 concentration (of 27.1µg/m^3 at Receptor 49) is less than 60µg/m^3 and, as such, the hourly objective is likely to be met in 2031 at all receptor locations.

12.151 Using the impact descriptors outlined in Table 12.9, the development is predicted to result in a 'negligible' impact at all receptors surrounding the site. Accordingly, it is considered that the development would also have a 'negligible' impact on hourly NO_2 concentrations.

12.152 Based on the above it is considered that the potential cumulative effect on NO_2 would be insignificant.

Particulate Matter (PM_{10} and $PM_{2.5}$)

12.153 As shown in Table 12.18, the annual mean concentrations of PM_{10} are predicted to be well below the annual mean objective of 40µg/m^3 and the daily mean PM_{10} objective of 35 days not exceeding 50µg/m^3 in 2031 both 'with' and 'without' the development at all receptor locations considered. The maximum predicted concentration in all situations tested is 20.3µg/m^3 at Receptor 49 with the development in 2031. Using the impact descriptors outlined in Table 12.9, the development is predicted to result in a 'negligible' impact at all receptor locations.

12.154 The results in Table 12.18 indicate that in 2031 all receptor locations are predicted to be below the annual mean $PM_{2.5}$ objective value of 25µg/m^3. The maximum predicted concentration in all situations is 13.8µg/m^3 at Receptor 49 in 2031. Using the impact descriptors outlined in Table 12.9 a 'negligible' cumulative impact is predicted at all receptor locations.

12.155 Based on the above it is considered that the potential cumulative effect on PM_{10} and $PM_{2.5}$ would be insignificant.

Air Quality Conditions within Complete Development

12.156 As shown by the results in Table 12.18 the predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for locations within the development are below the relevant objectives in 2031. As such, it is considered that for the NO_2, PM_{10} and $PM_{2.5}$ objectives the potential cumulative effect of introducing residential uses to the

site would be insignificant. That is, the air quality conditions within the development would be suitable for residential and educational use.

NO_2 Sensitivity Analysis Results

12.157 The results of the sensitivity analysis are presented in Table 12.19. The overall predicted concentrations are higher than those presented above for 2031 due to higher background concentrations and vehicles emissions rates used in the assessment.

12.158 As shown in Table 12.19, in 2031 when using the CURED emissions factors, concentrations are predicted to meet the NO_2 annual mean objective value of 40µg/m^3 at all receptor locations. The maximum predicted concentration is 37.8µg/m^3 at Receptor 49.

12.159 The predicted annual mean NO_2 concentrations in 2031 are predicted to be below 60µg/m^3 at all receptor locations. As such, the 1-hour mean objective is likely to be met at these locations.

12.160 Using the impact descriptors outlined in Table 12.9, a 'moderate' cumulative impact is considered at one receptor location (Receptor 49), a 'slight' cumulative impact at two receptor locations (Receptors 51 and 54) and a 'negligible' cumulative impact at the remaining 53 receptor locations considered. Using professional judgement, based on the severity of the impact and the total concentrations predicted at the sensitive receptors (all receptors are below the annual mean AQS objective of 40µg/m^3) it is considered that the potential cumulative effect would be insignificant.

12.161 Table 12.19 summarises the predicted annual mean NO_2 concentrations for locations within the development itself and identifies that when using the CURED emissions factors predicted NO_2 concentrations meet the objective of 40µg/m^3. Accordingly, based on professional judgement it is considered that when assuming no improvements in future NO_x and NO_2, the air quality conditions within the development would be suitable for residential use.

Table 12.19 - Results of the ADMS-Roads Modelling at Sensitive Receptors for Complete Development

ID	2031		
	Baseline	Cumulative Assessment	Cumulative Change
1	18.3	18.5	0.2
2	20.6	21.1	0.5
3	21.6	22.0	0.4
4	19.1	19.3	0.2
5	20.4	20.5	0.1
6	22.5	22.7	0.2
7	18.9	19.0	0.1
8	19.8	19.9	0.1
9	18.7	18.8	0.1
10	17.7	17.8	0.1
11	19.9	19.9	0.0
12	24.7	25.1	0.4
13	30.2	30.6	0.4
14	26.9	27.2	0.3
15	29.2	29.6	0.4
16	25.1	25.3	0.2
17	22.9	23.0	0.1
18	22.0	22.1	0.1
19	22.0	22.1	0.0
20	19.8	19.9	0.1
21	23.7	23.9	0.2
22	22.6	22.8	0.1
23	25.3	25.6	0.3
24	22.5	22.7	0.2
25	22.3	22.5	0.2
26	22.8	23.3	0.5

27	21.4	22.2	0.7
28	19.7	20.8	1.0
29	19.1	19.3	0.2
30	20.1	20.5	0.4
31	19.3	19.6	0.3
32	18.7	19.0	0.3
33	22.3	22.6	0.3
34	18.3	18.7	0.4
35	18.3	19.7	1.4
36	18.6	20.2	1.6
37	17.7	17.9	0.2
38	18.1	18.3	0.2
39	18.2	18.3	0.1
40	18.7	18.9	0.2
41	18.4	18.7	0.3
42	19.1	19.3	0.2
43	19.0	19.2	0.2
44	26.5	26.7	0.2
45	26.2	26.4	0.2
46	23.5	23.6	0.1
47	20.5	20.6	0.1
48	26.1	26.6	0.5
49	37.2	37.8	0.6
50	26.3	26.6	0.3
51	37.0	37.8	0.6
52	22.4	22.6	0.2
53	25.3	25.6	0.3
54	35.4	36.0	0.6
55	25.0	25.4	0.4
56	19.6	19.7	0.1

57	-	21.1	-
58	-	20.8	-
59	-	17.4	-
60	-	17.9	-
61	-	16.7	-
62	-	19.1	-
63	-	18.8	-
64	-	17.4	-
65	-	20.7	-
66	-	19.9	-
67	-	19.2	-
68	-	16.7	-
69	-	17.4	-
70	-	17.8	-
71	-	16.8	-

Annual Mean NOx

12.162 The modelling results for the predicted annual mean NO_x concentration at the ecological receptor due to traffic emissions are summarised in Table 12.20.

Table 12.20 - Results of the ADMS-Roads Modelling at Sensitive Receptors for Complete Development

ID	Predicted Annual Mean NO_x Concentration ($\mu g/m^3$)		Proportion of EQS (%)	
	PC	PEC	PC	PEC
56	0.12	14.96	0.4	49.9

12.163 As shown in Table 12.20 predicted NO_x concentration is below the annual mean NOx objective of 30$\mu g/m^3$. The PC at The Swale SSSI is below the EA criteria for insignificant impacts. As such, predicted cumulative effects on annual mean NO_x concentrations at The Swale SSSI are **insignificant**.

Summary

12.164 The main effect on local air quality during construction relates to nuisance that can be caused by dust. Nuisance caused from dust, however, would only likely be experienced by people living or using premises closest to the site and only for a temporary period. A range of measures to minimise or prevent dust have been identified and would be implemented to minimise the effect on the neighbouring community.

12.165 Any emissions from equipment and machinery operating on the site during construction would be small in comparison to the emissions from the existing traffic on roads in the surrounding area of the site and would not detrimentally affect air quality.

12.166 It is anticipated that the effect of construction vehicles entering and leaving the site during the period of greatest vehicles movements would have a minor effect in the context of local background pollutant concentrations and existing local road traffic emissions. Appropriate measures would be discussed with SBC to ensure that the effect would minimised. During all other periods effects from construction traffic would be insignificant.

12.167 Computer modelling has been carried out to predict the effect of future traffic-related exhaust emissions and the likely changes in local air quality following the completion of the Development. The effect of the development on local air quality has been predicted for several existing residential and ecological receptors surrounding the site and for future dwellings and educational facilities within the Development.

12.168 Following completion of the Development, considering uncertainty in future NO_x and NO_2 reductions using the CURED emission factors and the commitment to reduce emissions through the proposed mitigation measures, the development is predicted to have an insignificant effect on NO_2, PM_{10} and $PM_{2.5}$ concentrations, at all existing receptors considered.

12.169 When considering uncertainty in future NO_x and NO_2 concentrations using the CURED emission factors, the impact of NO_2, PM_{10} and $PM_{2.5}$ concentrations on future users of the development are insignificant.

References

i Council Directive 2008/50/EC of 21 May 2008 on ambient air quality and cleaner air for Europe.
ii Defra, 2010, The Air Quality Standards (England) Regulations.
iii Office of the Deputy Prime Minister (ODPM), 1995, 'The Environment Act' 1995.
iv Defra, 2007. 'The Air Quality Strategy for England, Scotland, Wales & Northern Ireland'.
v Bate, K.J. and Coppin, N.J. 1991, 'Dust impacts from mineral workings', Mine and Quarry, 20 (3), 1991, pp31 – 35.
vi Department for Communities and Local Government, 2012, 'National Planning Policy Framework'. DCLG, London.
vii https://www.judiciary.gov.uk/judgments/clientearth-v-secretary-of-state-for-the-environment-food-and-rural-affairs/
viii Defra (2017) Improving Air Quality in the UK: Tackling nitrogen dioxide in our towns and cities. Draft UK Air Quality Plan for Tackling Nitrogen Dioxide (Consultation Document)
ix Environmental Protection UK & Institute of Air Quality Management (2017), 'Land-Use Planning & Development Control: Planning for Air Quality', EPUK & IAQM, London.
x Kent and Medway Air Quality Partnership (2015) 'Air Quality Planning Guidance'
xi Defra (2009), 'Local Air Quality Management Policy guidance PG(09)', DEFRA, London.
xii Institute of Air Quality Management, 2014, 'Guidance on the Assessment of dust from demolition and construction.
xiii http://laqm.defra.gov.uk/faqs/faqs.html.
xiv Defra, 2012, Local Air Quality Management: Note on Projecting NO_2 Concentrations.
xv Air Quality Consultants Ltd (2016) Calculator Using Realistic Emissions for Diesels (CURED) Spreadsheet. CURED V2A August 2016
xvi Environment Agency (2006), Technical Guidance on Detailed Modelling approach for an Appropriate Assessment for Emissions to Air AQTAG 06
xvii Swale Borough Council (2010) Newington Air Quality Management Area Action Plan 2009-10

Chapter 13

NATURAL ENVIRONMENT

13. NATURAL ENVIRONMENT

Introduction

13.1 This chapter of the ES assesses the effects of the development proposals on the ecology and biodiversity of the proposed development area. It has been produced by The Ecology Partnership Limited and undertaken by qualified and experienced ecologists.

13.2 This chapter of the ES

- Explains the methodology used to assess the impacts, together with details of consultation and the implications of policy and guidance;
- Sets out the baseline survey information collected on the 'existing environment';
- Assesses potential impacts during the construction and operational phases of the development;
- Identifies mitigation and enhancement measures in response to predicted impacts; and
- Considers the residual effects of the proposed development and provides a summary of the assessment.

Regulatory and Policy Context

13.3 As well as considering the relevant nature conservation legislation, the mitigation, compensation, and enhancement measures recommended within this chapter and set out in specific reports, are in line with national and local planning policy requirements and aim to support national and local biodiversity objectives and initiatives.

13.4 In summary, the legislative framework for ecology and nature conservation is as follows:

- Town and Country Planning (Environmental Impact Assessment) Regulations, 2011;
- The Conservation of Habitats and Species Regulations, 2010 (as amended);
- The Natural Environment and Rural Communities Act, 2006;
- The Countryside and Rights of Way Act, 2000;
- The Hedgerows Regulations, 1997;
- The Wild Mammals (Protection) Act, 1996.

- The Protection of Badgers Act, 1992;
- Wildlife and Countryside Act, 1981 (as amended);

13.5 In relation to Special Protection Areas (SPAs) and Special Areas of Conservation (SACs), these receive statutory protection under the Conservation of Habitats and Species Regulations 2010 (the Regulations). These Regulations transpose into UK legislation the 'Habitats Directive' 1992 (92/43/EEC) and the 'Birds Directive' 2009 (2009/147/EC). The Regulations impart a duty on Local Planning Authorities (competent authorities) to carefully consider whether any proposals may have a significant effect on a European designation, either alone or in combination with other plans or projects. In most circumstances, permission may only be given for a plan or project to proceed if it has been ascertained that it will not have an adverse effect on the integrity of any such designation.

National Planning Policy Framework, 2012

13.6 Policy guidance is provided by the NPPF which sets out national planning policies for England and how they should be applied. Section 11 of the document is entitled 'Conserving and Enhancing the Natural Environment' highlights that the planning system should contribute to and enhance the natural and local environment by:

- Protecting and enhancing valued landscapes, geological conservation interests and soils;
- Recognising the wider benefits of ecosystem services;
- Minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;
- Preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability; and
- Remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

Swale Borough Local Plan, 2017

13.7 The Swale Borough Local Plan, 2017 allocates the land at North-West Sittingbourne potential development under Policy MU1 and provides that planning permission will be granted or mixed uses, and will comprise a minimum of 1,500 dwellings, community facilities and structural landscaping and open space adjacent the A249 in accordance with national or local planning policy. In addition, the following policies are relevant:

- Policy CP 7: Conserving and enhancing the natural environment and providing for green infrastructure requires that natural assets are protected and enhanced, ensuring there is no adverse effect on the integrity of a SAC, SPA or Ramsar sites. Along or in combination with other objectives set out within the Local Plan, development should contribute to the objectives of Nature Partnerships and enhance the biodiversity and landscape and promote the expansion of Swale's natural assets.
- Policy DM 28: Biodiversity and Geological Conservation requires that development proposals will conserve, enhance, and extend biodiversity, provide for net gains in biodiversity and where possible minimize any adverse impacts and compensate where impacts cannot be mitigated.
- Policy DM 29: Woodlands, Trees and Hedges states that the Borough Council will seek to ensure the protection, enhancement and sustainable management of woodlands, orchard trees and hedges.

13.8 In terms of the Local Plan allocation, Policy MU 1 contains the following two provisions relating to nature conservation and wildlife. The full text to the policy is reproduced in Chapter 2.

> *2. Be in accordance with Policy CP4 and in particular, achieve an integrated landscape strategy to provide a minimum of 22 ha natural and semi natural greenspace and other open space as a continuous buffer along the A249 that will form part of the important local countryside gap between Sittingbourne and Bobbing Iwade in accordance with Policy DM25 and Policy New A17 for Iwade, as well as contributing toward an appropriate link between the two via Bramblefield Lane/old Sheppey Way. This area will link to a network of green spaces and corridors throughout the allocation to achieve the minimum open space provision;*
>
> *3. Ensure that, through both on and off-site measures, any significant adverse impacts on European sites through recreational pressure will be mitigated in accordance with Policies CP7 and DM28, including a financial*

contribution towards the Strategic Access Management and Monitoring Strategy;

Development being Assessed

13.9 The development being assessed is described in Chapter 4. The assessment has been undertaken in combination with the development proposed on the remainder of the north-west Sittingbourne allocation.

Assessment Methodology and Assessment Criteria

13.10 The site was surveyed to assess its ecological value and to ensure compliance with national and local plan policies. The report has been produced with reference to current guidelines for preliminary ecological appraisal (CIEEM 2013) and in accordance with BS 42020:2013 Biodiversity – Code of Practice for Planning and Development.

Assessment Scope

13.11 The scope of the Environmental Impact Assessment (EIA) has been agreed through consultation with Swale Borough Council. Kent County Council ecologists have been consulted with regards to The Swale SPA, Ramsar and SSSI is located approximately 1km north-east of the site and the Medway and Marshes SPA, Ramsar and SSSI is located approximately 2.2km to the north of the site.

Baseline Study Methodology

Desk Study

13.12 A desktop study search was completed using an internet-based mapping service, MAGIC, for statutory designated sites, and two internet-based aerial mapping services (Bing Maps and Google Maps) were used to understand the habitats present in and around the survey area and habitat linkages and features (ponds, woodlands etc.) within the wider landscape.

13.13 Kent Biological Records were purchased in 2017 and prior to this in 2012.

Phase 1 Habitat Survey

13.14 The site including land at Pheasant Farm, and the land between Quinton Road and Bramblefield Lane, and the land at Quinton Road, was initially surveyed by The Ecology Partnership (then known as PJC Ecology) on the 24th July 2012. In 2015, The Ecology Partnership undertook an updated phase 1 walkover survey and the site was surveyed on 24th April 2015. An update PEA of the land adjacent Quinton Farmhouse was undertaken in 2016. A walkover of the site, including the land adjacent Quninton Farmhouse, was conducted on the 29th October 2017.

13.15 The land at Great Grovehurst Farm, has been extensively surveyed by Ecosulis and URS Scott Wilson. The findings of these surveys were summarised within the original phase 1 report from 2012.

13.16 The surveyors identified the habitats present, following the standard 'Phase 1 habitat survey' auditing method developed by the Joint Nature Conservancy Council (JNCC). The Phase 1 report and update walkover survey conducted by The Ecology Partnership is contained in Appendix 13.1. The Preliminary Ecological Appraisal (PEA) conducted in 2012 by Lloyd Bore (2012) is included in Appendix 13.2 and updated PEA / site walkover was conducted in January 2018 by Ecosulis and is found in Appendix 13.3. The sites were surveyed the site on foot and the existing habitats and land uses were recorded on an appropriately scaled map (JNCC 2010). In addition, the dominant plant species in each habitat were recorded, as was any evidence of protected species. The potential for the site to support protected species was also assessed.

13.17 The site was inspected for indications of the presence of protected species as follows:

- Evidence of badger, including setts, runs, snuffle holes and hairs;
- The presence of features such as roof voids, bridges and/or trees with fissures, holes, loose bark and ivy or building basements, cladding etc. indicating potential for roosting bats;
- Scrub/grassland mosaic and potential hibernation sites for common reptiles;
- Relevant habitat for dormice such as dense deciduous woodland, coppice and thick shrubbery;
- The presence of suitable breeding places (water bodies) and hibernation features for great crested newts (GCNs);
- The presence of suitable freshwater habitat for white-clawed crayfish;
- The presence of ditches for water voles;

- The presence of fresh water stream/rivers for otters;
- Suitable nesting places for birds; and
- Other potential protected species.

13.18 The likelihood of occurrence is ranked as follows and relies on the current survey:

- Unlikely – while presence cannot be absolutely discounted, the site includes very limited or poor-quality habitat for a particular species or species group. The site may also be outside or peripheral to known national range for a species;
- Low – on-site habitat of poor to moderate quality for a given species/species group. Presence cannot be discounted on the basis of national distribution, nature of surrounding habitats, habitat fragmentation, recent on-site disturbance etc;
- Medium – on-site habitat of moderate quality, providing all of the known key-requirements of given species/species group. Factors limiting the likelihood of occurrence may include small habitat area, habitat severance and fragmentation, disturbance;
- High – on site habitat of high quality for a given species/species group. Good quality surrounding habitat and good connectivity; and
- Present – presence confirmed from the current survey or by recent, confirmed records.

13.19 The purpose of this assessment is to identify whether more comprehensive species surveys for protected species or habitats (Phase 2) are to be recommended.

Protected Species Surveys

13.20 Species specific surveys were undertaken with respect to bats, badgers, great crested newts, reptiles and breeding birds. A summary of the work is set out in the table below. Detailed survey methodologies are provided in the baseline ecological reports found in Volume 3.

Table 13.1 - Protected Species Surveys – Land at Pheasant Farm, Quinton Road, and Bramblefield Lane

Faunal Group	Survey Methodology	Date of Surveys	Guidance
Bats – tree inspection	As part of the habitat surveys, any trees supporting particular features likely to be of value to bats, such as splits, cracks, rot holes, coverings of ivy, peeling bark or similar, were recorded. The potential for the trees to support roosting bats has been assessed in accordance with the criteria set out in the Bat Conservation Trust guidelines (BCT, 2012)	24th July 2012 24th April 2015	Natural England Standing Advice: Bats'; 'Bat Mitigation Guidelines' (English Nature, 2004); 'Bat Surveys – Good Practice Guidelines' (Bat Conservation Trust, 2012);
Bats – activity surveys	Several dusk surveys and the use of remote recording (anabat surveys) across the site using transect methods and stops for recording activity as per Bat Conservation Trust guidelines (BCT, 2012)	23rd July 2014 4th August 2014 21st July 2015 11th August 2015 Anabat Express was deployed on site and recorded data from the 21st July to the 28th July 2015.	The surveys followed BCT guidelines (2012).
Great crested newt – HSI	The survey involves assessing pond characteristics in the field, which are factors thought to affect GCNs. These factors include location, a count of the number of ponds within 1km of the pond being assessed, pond area, pond drying, macrophyte cover, shading, presence of fish and waterfowl, water quality and surrounding terrestrial habitat.	26th July 2012	Suitability of ponds on site will also be assessed through a Habitat Suitability Index (HSI) Assessment. The HSI was developed by Oldham et al. (2000), as a means of evaluating habitat quality and quantity for GCNs.
Great crested newt – eDNA	Waterbodies not subject to barriers to dispersal and within the zone of influence of the site were subject to an environmental DNA survey	30th June 2015 (on site pond 1 and ditch) 20th April 2017 (ponds 2 and 3) (Highways Ponds located on the edge of the A249)	All water samples were analysed by NatureMetrics in accordance with the protocol set out in Appendix 5 of Biggs et al. (2014).

Reptiles	The refugia were placed around the edges of the site adjacent to areas of scrub, hedgerow and within the rough grassland field margins. Mats were set up prior to the commencement of the reptile survey. A total of seven survey visits were made to the site to check the refugia for the presence of reptiles during each survey. Visits were only carried out if the weather conditions were suitable for locating reptiles. On each visit to the site, a minimum of one circuit to check all refugia was carried out. Natural refugia were also surveyed during these visits. Any natural refugia, such as log piles and brash piles, were lifted and hand searched for evidence of reptiles.	17th September to the 5th October 2012 18th July to the 8th September 2015	The timing and number of surveys completed were based on guidelines produced by Froglife (1999) and Gent and Gibson (1998).
Breeding birds	Breeding bird surveys involved walked transects of part of the Site, under suitable weather conditions. Observations of all bird species were noted, and territories mapped.	15th July 2015 29th July 2015 17th August 2015.	British Trust for Ornithology (BTO) Common Bird Cenuss (Gibbons et al, 1994)
Wintering bird	Wintering bird surveys involved walked transects of part of the Site, under suitable weather conditions. Observations of all bird species were noted, and territories mapped. Tied in with tidal movements.	27th October 2017 15th November 2017 6th December 2017	British Trust for Ornithology (BTO) Common Bird Cenuss (Gibbons et al, 1994)
Badgers	During the survey, all habitats potentially suitable for badgers were systematically examined for evidence of badger activity. Particular attention was paid to areas where the vegetation and/or the topography offered suitable sett sites such as embankments and wooded areas.	July 2012 April 2015	The evaluation of badger activity was based on methodology developed for the National Survey of Badgers (Creswell et *al*., 1990).

Table 13.2 - Protected Species Surveys – Land at Great Grovehurst Farm

Faunal Group	Survey Methodology	Date of Surveys	Guidance
Bats – tree inspection	As part of the habitat surveys, any trees supporting particular features likely to be of value to bats, such as splits, cracks, rot holes, coverings of ivy, peeling bark or similar, were recorded. The potential for the trees to support roosting bats has been assessed in accordance with the criteria set out in the Bat Conservation Trust guidelines (BCT, 2012)	January 2018 August 2012	Natural England Standing Advice: Bats'; 'Bat Mitigation Guidelines' (English Nature, 2004); 'Bat Surveys – Good Practice Guidelines' (Bat Conservation Trust, 2012);
Bats – internal and external building surveys	The buildings were assessed externally for their suitability to offer roost sites for bats. This was undertaken by determining the style and construction of the building and presence of features such as roof voids as well as cracks and holes in brickwork/tiling. The buildings were then rated as having negligible, low, medium or high suitability as roost sites	3rd July 2017 2015	Bat Mitigation Guidelines (English Nature, 2004), the Bat Workers' Manual (JNCC, 2004) and the Bat Surveys Good Practice Guidelines (Bat Conservation Trust, 2016).
Bats – activity surveys	Several emergent and dawn re entry surveys as per Bat Conservation Trust guidelines (BCT, 2016)	3, 4, 24th July 2017 1, 2 and 21st August 2017 6th September 2017 2015.	The surveys followed BCT guidelines (2016).
Great crested newt – HSI	The survey involves assessing pond characteristics in the field, which are factors thought to affect GCNs. These factors include location, a count of the number of ponds within 1km of the pond being assessed, pond area, pond drying, macrophyte cover, shading, presence of fish and waterfowl, water quality and surrounding terrestrial habitat.	September 2012	Suitability of ponds on site will also be assessed through a Habitat Suitability Index (HSI) Assessment. The HSI was developed by Oldham et al. (2000), as a means of evaluating habitat quality and quantity for GCNs.

Great crested newt – newt presence / likely absence	In order to determine presence, the Great Crested Newt Mitigation Guidelines(English Nature 2001) requires three survey techniques to be employed where possible, including: bottle-trapping, torch searches and egg searches.	18th April – 16th may 2016	Great Crested Newt Mitigation Guidelines(English Nature 2001)
Reptiles	Scoping survey and records review	January 2018 August 2012	Walkover survey
Wintering bird	Wintering bird surveys involved walked transects of part of the Site, under suitable weather conditions. Observations of all bird species were noted, and territories mapped. Tied in with tidal movements.	9th January 11th and 27th February	British Trust for Ornithology (BTO) Common Bird Cenuss (Gibbons et al, 1994)
Badgers	During the survey, all habitats potentially suitable for badgers were systematically examined for evidence of badger activity. Particular attention was paid to areas where the vegetation and/or the topography offered suitable sett sites such as embankments and wooded areas.	January 2018 August 2012	The evaluation of badger activity was based on methodology developed for the National Survey of Badgers (Creswell et *al*., 1990).

Assessment methodology

13.21 This assessment has been carried out with reference the CIEEM Guidelines for Ecological Impact Assessment (EcIA) (CIEEM, 2016). This document provides best practice guidance in identifying whether an EcIA is required and where it is required, guidance on determining the value of ecological features and resources including those that have been designated for nature conservation, and the impact magnitude, including description of baseline conditions and cumulative impact assessment.

13.22 The baseline condition of the site is taken to be the situation as found by The Ecology Partnership and Ecosulis / Llyod Bore during site surveys that have been undertaken over several years. Surveys conducted in the wider landscape have been reviewed to help assess the cumulative impact scenarios.

13.23 The future baseline is taken to be the year of completion of the project (anticipated 2031). The assessment considers the 'worst case' development permitted within the parameters being applied for.

13.24 The methodology below defines how the criteria for how the assessment is to be made. This includes identifying the importance of ecological features (the 'receptor') within the site and around the site, the significance of the impact in which the assessment addresses the importance of the receptor and the extent, magnitude, duration of the impact on that receptor.

The Level of Importance of a Receptor

13.25 The evaluation of ecological features and resources should be based on sound professional judgement whilst also drawing on the latest available industry guidance and research. The approach taken in this report is based on that described in 'Guidelines for Ecological Impact Assessment in the UK and Ireland' published by the Chartered Institute of Ecology and Environmental Management (CIEEM 2016) whereby important ecological features are identified, and these are considered within a defined geographical context using the following frame of reference:

13.26 A receptor is defined as a feature affected by an impact. This receptor may be of negligible nature conservation value, or it may have a value at local, county, national or international level.

- International; Features of **international** importance are those protected by international treaties, legislation, agreements and designations. Examples include Ramsar sites, Special Protection Areas (SPA) and Special Areas of Conservation (SAC). Certain species are also protected under international law, such as those listed in the Habitats Directive (1992).
- National / Regional; Features of importance at the **national** level include those with statutory protection, such as National Nature Reserves (NNRs), Sites of Special Scientific Interest (SSSIs) and species with legal protection, such as BAPs/ Red Data Book species.
- County / District; Features that are important at **County or District** level may be protected by local development framework policies. Sites can also have local statutory designations as Local Nature Reserves (LNRs) or local non-statutory designations such as the Sites of Nature Conservation Importance (SNCI)
- Local; Features that are important at a **local** level may be of particular value in the context of the site itself.
- Site (not of elevated importance at a local level).

13.27 Features considered to be of importance at the site level only have been scoped out of this assessment (with the exception of protected species which are considered in terms of mitigation and any legislative requirements).

Assessment of Impacts and Significance

13.28 The CIEEM publication also sets out a methodology for the assessment of potential effects arising from development.

13.29 The impacts which are set out below are those which arise after taking account of the design mitigation. The impacts on ecology are assessed by (a) determining the level of importance/sensitivity of the receptor, for example national, county, or local; (b) determining the type, magnitude and timescale of the impact; and then (c) using this information on the receptor and impact to determine the significance of the impact: described as major, moderate, or minor significant, or not significant. For example, a moderate or small impact on an internationally important feature is likely to be significant, while a similar impact on a feature of local value is less likely to be significant.

13.30 Based on this context, the nature of the effect is characterised and considered under the following parameters:

- Positive or negative – will the activity lead to an adverse, beneficial or neutral effect;
- Extent – the size or amount of an impact, the area of habitat or number of individuals affected;
- Duration – the time for which the impact is expected to last prior to recovery or replacement, i.e. short-term or long-term;
- Reversibility – an effect may be irreversible in that recovery is not possible within a reasonable timescale or there is no reasonable chance of action being taken to reverse it, i.e. permanent or temporary;
- Timing and frequency – some changes may only cause an impact if they coincide with critical life-stages or seasons, whilst frequent events may cause a greater effect than a single event.

13.31 Based on these parameters, the scale of effect (or magnitude) can be summarised as follows. This is in relation to adverse effects, although a similar scale can be applied to beneficial effects.

Table 13.2 - Criteria for determining impact magnitude

Magnitude	Criteria
Major	Loss of over 50% of a site feature, habitat or population. Adverse change to all of a site feature, habitat or population. For benefits, an impact equivalent in nature conservation terms to gain of over 50% of a site feature, habitat or population.
Moderate	Loss affecting 20-50% of a site feature, habitat or population. Adverse change to over 50% of a site feature, habitat or population. For benefits, an impact equivalent in nature conservation terms to a gain of 20-50% of a site feature, habitat or population.
Minor	Loss affecting 5-19% of a site feature, habitat or population. Adverse change to 20-50% of a site feature, habitat or population. For benefits, an impact equivalent in nature conservation terms to a gain of 5-19% of a site feature, habitat or population.
Negligible	Loss affecting up to 5% of a site feature, habitat or population. Adverse change to less than 20% of a site feature, habitat or population. For benefits, an impact equivalent in nature conservation terms to a gain of up to 5% of a site feature, habitat or population.

13.32 Based on the nature of the effect, an assessment is then made whether the effect on a habitat or species is likely to be ecologically 'significant'. CIEEM guidance defines a 'significant effect' as *"an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general"*, going onto state that *"significant effects encompass impacts on structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution)."*

Habitats Regulations Assessment

13.33 In Great Britain the Habitats Regulations implement the requirements of the Habitats Directive. The Regulations aim to protect sites in the UK that have rare or important habitats and species in order to safeguard biodiversity. Under these Regulations, the LPA have a duty to assess whether there is a risk of any plan or proposal having a significant impact on the integrity of the SPA, SAC and Ramsar.

13.34 The proposed development is located approximately 1k from the Swale and approximately 2km from Medway Estuary and Marshes, both sites designated as SPAs, Ramsar sites and SSSIs.

13.35 Any proposals which are considered to impact, either directly or indirectly, on such designated sites would require an HRA assessment. Guidance on the process and procedures for assessment are contained in a number of documents, principally:

- National Planning Policy Framework (NPPF) and the accompanying ODPM/DEFRA Circular (ODPM 06/2005, DEFRA 01/2005);
- Managing Natura 2000 sites 'The Provisions of Article 6 of the 'Habitats' Directive 92/43/EEC. April 2000;
- Assessment of plans and projects significantly affecting Natura 2000 sites. European Commission November 2001.

13.36 The first stage is to identify whether the proposals are directly connected with or necessary to site management for conservation. The second stage examines whether the proposals will result in any 'likely significant effect' on the designated features of the European sites, either alone or in combination with other plans or projects. Should it be determined that a plan or project will result in 'likely significant effects' on a European site, a full 'Appropriate Assessment' of the likely effects of the plan or project should be undertaken. Finally the assessment included mitigation measures and alternative solutions, which aims to show alternative solutions and measures to avoid significant impacts.

Limitations of the Assessment

13.37 It should be noted that whilst every effort has been made to provide a comprehensive description of the site, no single investigation could ensure the complete characterisation and prediction of the natural environment. However, the survey area was visited on a number of occasions over the optimal period, ensuring that detailed habitat information could be gathered. It is therefore considered that the survey work has allowed a robust assessment of habitats and botanical interest across the site.

13.38 The specific protected species surveys were undertaken at the appropriate time of year and during suitable weather conditions to an appropriate level of survey effort. Any specific limitations are noted in the relevant sections above or discussed in the results section.

Table 13.3 - Matrix for determining impact significance

		Levels of importance of the receptor				
		International	**National**	**County/ District**	**Local**	**Site**
Effect magnitude	**Major**	Major	Major	Moderate	Minor	Negligible
	Moderate	Major	Moderate	Minor	Minor	Negligible
	Minor	Moderate	Minor	Minor	Negligible	Negligible
	Negligible	Minor	Minor	Negligible	Negligible	Negligible

Embedded Design Mitigation

13.39 The ecological survey results have informed the approach to the layout of the proposed development which seeks to avoid where possible the existing field margins, linear features such as tree lines and the off-site, but adjacent woodland areas along the A259 and the off-site but adjacent linear ditch feature. The Great Grovehurst Farm site also supports areas of permanent terrestrial habitat retention for great crested newts as part of the licence requirements. These areas are of some ecological interest and will be further safeguarded during the construction phase by via the implementation of mitigation measures using best practice.

Consultation

13.40 In addition to the consultation that was undertaken at the formal ES Scoping Stage local authority ecologists have been consulted with regards to The Swale SPA, Ramsar and SSSI located approximately 900m north-east of the site and the Medway and Marshes SPA, Ramsar and SSSI located approximately 2km to the north of the site.

Baseline Conditions 2017

Desktop study

13.41 The site does not fall within any statutory designated areas. Some designated sites are present within 10km of the site. Sites within the local area include:

- The Swale SPA Ramsar & SSSI – located 900m north of site;
- Medway and Marshes SPA, Ramsar & SSSI – located 2km north of site;
- Elmley NNR – located 2.2km north east of site;

13.42 In addition, several SNCIs are present within 10km of the site:

- Milton Creek SNCI – located approximately 1km east of site;
- Hawes Wood and Wardwell Wood SNCI – located approximately 2.5km west of site;
- Highstead Quarries SNCI – located approximately 2.9km south of site;

13.43 One area of ancient woodland is located within 2km of site. Details are listed below:

- Rook Wood area of ancient and semi-natural woodland – located approximately 1.3km to the west of site.
- Protected species records within 2km of the site and within the last ten years (as such are considered to be relevant) are summarised in Table 13.4.

Table 13.4: Records of protected species within 2km of the site from Kent Biological Records Centre

Common Name	**Scientific Name**	**Approximate Distance and Direction**	**Date of Record / Comments**
Great crested newt	*Triturus cristatus*	1.80km East	11/06/2008 Church Marshes Country Park. Eight adults recorded
Smooth newt	*Lissotriton vulgaris*	1.22 South-West	2011
Slow worm	*Anguis fragilis*	1.03km South-East	2011 Private residence
Common lizard	*Zootoca vivipara*	1.92km East	2010 Private Residence
Grass snake	*Natrix natrix*	0.41 South	2009 Private residence
Bluebell	*Hyacinthoides non-scripta*	Great than 1km from site (TQ9063)	22/04/2015 Sittingbourne
Stag beetle	*Lucanus cervus*	1.85km South	28/06/2006
Common frog	*Rana temporaria*	1.1km South	18/02/2007
Serotine	*Eptesicus serotinus*	0.8km South-East	04/06/2011
Daubenton's bat	*Myotis daubentonii*	1.6km South-East	30/09/2010
Pipistrelle bat	*Pipistrellus sp*	1.2km North-East	20/08/2012
Common pipistrelle	*Pipistrellus pipistrellus*	1.2km North-East	07/06/2007
European water vole	*Arvicola amphibius*	1.4km East	25/07/2013 Brick Pits Drain, Milton Creek CP
Red kite	*Milvus milvus*	Within 2km (TQ8964)	27/04/2011
Marsh harrier	*Circus aeruginosus*	Within 2km (TQ9165)	09/06/2012
Hen harrier	*Circus cyaneus*	Within 2km (TQ9063)	18/11/2011
Avocet	*Recurvirostra avosetta*	Within 2km (TQ9165)	04/03/2012
Firecrest	*Regulus ignicapillus*	Within 2km (TQ8864)	13/03/2012

Ecological Surveys on Nearby and Adjacent Land

EH Nicholls Ltd Site

13.44 URS Scott Wilson undertook extensive surveys on the EH Nicholls Ltd site which lies to the north of the proposed development area.

13.45 Low numbers of water vole were recorded to the north of the EH Nicholls Ltd site, a small population (peak count of 3 adults within the pond) of great crested newt were recorded within an adjacent waterbody to the EH Nicholls Ltd site (adjacent to Swale Way). This waterbody was considered to be relatively isolated due to the busy B2005 and Swale Way, being present. GCNs were considered likely to use the ditch to the north east of the EH Nicholls Ltd site to disperse. A good population of slow worm and common lizard were recorded. A single juvenile grass snake was also recorded indicating their presence on the EH Nicholls Ltd site.

13.46 Surveys undertaken by URS Scott Wilson in 2011 and 2012 as the baseline for an Environmental Statement for land at EH Nicholls Ltd site (north of Great Grovehurst Farm site) identified several bird species within their application site to the north of Swale Way. These included green woodpecker, mistle thrush and dunnock, as well as goldfinch and chaffinch, which were recorded foraging within tall ruderal vegetation along the main drainage ditch. Redwings were observed within the hedgerow boundary on one visit. Lapwing were also recorded, albeit on one occasion. Skylark and song thrush were also recorded on one occasion. Following survey findings, the EH Nicholls Ltd site surveyed by URS Scott Wilson Ltd was considered to have low value for wintering birds, due to the low numbers of individual species and a non-diverse assemblage of wintering bird species present.

13.47 This development has since been initiated and works to the site, including the recommendations for enhancement works within the ecological section of the EIA, are assumed to have been completed. Ponds have been created along the northwester aspect of the EH Nicholls Ltd site and to the very north of the EH Nicholls Ltd site.

Ecological Surveys on the Site

Land at Great Grovehurst Farm

13.48 Ecosulis carried out extensive survey work at land at Great Grovehurst Farm in 2006, which is located the opposite side of Grovehurst Road (the B2005), but forms part of the wider MU 1 application.

13.49 The accompanying Extended Phase 1 Habitat survey report identified that the Great Grovehurst Farm site supported largely arable habitat with fringing grassland, scattered scrub, hard standing and buildings. A wooded embankment was present along the edge of the railway line. The habitats were considered to be largely common and widespread.

13.50 The report identified presence and potential presence of a number of protected species. The survey report detailed the presence of a great crested newt breeding pond located between the B2005 and the Ecosulis survey boundary within the curtilage of Great Grovehurst Farm. A reptile survey was recommended, as was bat surveys of the buildings at Great Grovehurst Farm. An active badger sett was present within the wooded area on the railway embankment.

13.51 Lloyd Bore undertook an ecological appraisal in 2012. The flora of the site was considered to be of relatively low abundance, with no notable species identified. The site was considered to have low botanical interest. Recommendations for further bat surveys were made. The previous badger sett was not identified in 2012 due to dense vegetation. The site was considered to have suitability for hedgehogs and reptiles. A single siting of a grass snake in 2012 during a site visit was made. Recommendations for additional surveys on adjacent ponds were also made. The site was not considered to be of significance for birds or invertebrates.

13.52 Ecosulis undertook a GCN surveys in 2016. Two ponds were surveyed, pond 1, being located to the south of Great Grovehurst Farm in the residential curtilage of the farm building. Pond 2 s located just north of the B2005. A third pond, located adjacent to Featherbed House on Highways Land, was not accessed. Pond 1 peak count of 6 males and 6 female GCNs in bottle traps with a peak count of 9 females and 7 males using torching surveys. Pond 1 was considered to have a small population present. This population was a breeding population. Pond 2 peak count using bottle trapping was 4 females and 13 males, with torching yielding 9 females and 8 males. Pond 2 supported a medium population and was identified as being a breeding population.

13.53 Bat surveys were undertaken by Ecosulis in 2017. An update internal survey was undertaken on the 3rd July 2017. Bat droppings were recorded within buildings 4 and 5. Bat surveys were conducted identifying species of common and soprano pipistrelle, noctule and brown long eared bat using the site. Building 5 was confirmed as a night feeding roost and a low impact bat licence would be required for its demolition. The buildings at Great Grovehurst Farm have been since demolished including foundations and hardstandng. All materials have been removed n accordance with Prior Notification Approval fro Swale BC and under a low impact license (bats)

13.54 Ecosulis updated the PEA in January 2018 and a further wintering bird surveys were conducted in January and February 2018.

Land between Quinton Road and Bramblefield Lane and at Pheasant Farm

13.55 Initial surveys were conducted by the Ecology Partnership in 2012. These surveys included a PEA, bat surveys, badger surveys, reptile surveys, eDNA and HIS surveys. Summer and wintering birds surveys, have also been conducted. In summary;

- Badgers: no definitive evidence of badgers was found in the wider allocated site. Mammal push throughs were noted along the scrub edges. No latrines, hairs or other evidence of badgers found. Considered likely badgers are using the wider allocated site for foraging and commuting. Update surveys and sensitive clearance of areas of dense scrub recommended.
- Bats: no trees on site were considered to have high potential for bats, several low potential trees identified. No confirmed bat roosts on the wider allocated site. Maned transects and anabat surveys identified low level use of the wider allocated site by bats, dominated by species common and widespread. The most activity was associated with back garden habitats in the area of Bramblefield and the central ditch line / tree line within the center of the site.

- Great crested newts (GCNs): one defunct pond was identified to the rear of properties in Bramblefield, with a further two ponds associated with highways land. Ponds adjacent to the A249 did not support any GCN DNA and were not considered suitable for GCNs. The defunct pond was largely dry and could not support a breeding population of GCNs. The pooled areas of the ditch were also tested and came back as negative for eDNA. GCNs not considered to be in the water bodies on the wider allocated site or immediately adjacent to the wider allocated site. During the walkover a new pond, located in the garden of a property in Bramblefield was recorded. This was considered to have fish and not suitable for GCNs.
- Reptiles: Slow worms and common lizards were located around the edges of the wider allocated site. These were restricted to arable field margins and scrub areas. Large numbers, an 'exceptional' population of slow worms were identified across the entire wider allocated site.
- Breeding birds: The bird survey identified only a single pair of skylarks using the wider allocated site on one occasion during the 2015 surveys in the largest field of the wider allocated site. The number of birds breeding on site was considered to be limited and largely restricted to the hedgerows and dense scrub areas.
- Wintering birds: Wintering bird surveys have not identified (October and November 2017) species using the wider allocated site which are associate with the SPA and Ramsar sites. However, skylarks were recorded using the wider site for foraging.
- Other species: The wider allocated site did not support evidence of water voles. Rabbit holes /warrens were identified within the boundaries of the wider allocated site.

Phase 1 Habitat Survey

Land between Quinton Road and Bramblefield Lane and at Pheasant Farm

13.56 The Ecology Partnership undertook an initial phase 1 habitat survey on 26th July 2012 and have since updated the phase 1 survey work undertaken on 24th April 2015. This area was re assessed by a walkover on the 27th October 2017 to assess any changes to the land use.

13.57 The site largely comprises arable fields with a network of hedgerows, tree line and ditches. The ecological interest on site is largely restricted to the field margins as the site is actively cultivated for arable crops. The information from the update walkover survey is included, both reports are within Volume 3. It was noted that the habitats on site had not significantly between the surveys in 2012 and 2017.

13.58 The dominant habitats present on site included:

- Arable Fields: The majority of the site comprises arable fields. These are species poor and are considered to be a monoculture. The arable fields are extensive within the red line boundary and are the dominant habitat present. This habitat is considered to be common and widespread. Arable fields are considered to be of ***negligible ecological importance.***

- Species poor hedgerows and standard trees Several hedgerows are present as boundary features within the site. Theses hedgerows are generally species-poor and defunct with scattered deciduous trees. Where hedgerows are present (predominantly extending north to south through the centre of the site and as boundary features in the north of the site), they predominantly comprise hawthorn and blackthorn with frequent elder and bramble. ***Species poor hedgerows are considered to be of local importance due to the landscape linkages and features that these comprise.***

- Planted broadleaved trees: The western boundary of the site, adjacent to the main A249 comprises newly planted broadleaved trees, including oak, ash, sweet chestnut, Prunus sp and sycamore. ***Planted broadleaved woodland is considered to be of local importance due to the landscape linkages and features that these comprise.***

- Semi-improved grassland: Areas are scattered throughout the site but are predominantly located around the margins of the barley field to the north-east of the site, particularly at the northern end of this field. In this area typical plant species include; cock's-foot, Yorkshire-fog, false oat-grass, smooth tare, common vetch, mugwort, poppy, common mallow, spotted medick, brome, yarrow, common ragwort, bristly oxtongue and wall barley. ***This habitat is considered to be of site level importance only.***

- Tall ruderal vegetation and scrub: predominantly common nettle with mugwort, thistles, dock and umbellifers were present throughout the site. These areas were predominantly located on the boundaries of arable fields. The base of the hedgerows are generally fringed with tall ruderal vegetation comprising common nettle, umbellifers and prickly sow-thistle and herbs, such as scarlet pimpernel, hedge mustard, common field speedwell, shepherd's purse, field penny-cress, burdock and pineappleweed. Areas of scrub were also present throughout the site, predominantly comprising bramble and elder. A large dense area of predominantly blackthorn, hawthorn and elder scrub with scattered semi-mature deciduous trees, including oak and hazel and tall ruderals, comprising common nettle, umbellifers, mugwort, burdock and thistles is present in the centre of the site, adjacent to the line of planted poplars. ***This habitat is considered to be of site level importance only.***

- Water filled drainage ditch extends south-west to north-east through the centre of the site. At the southern end of the ditch, the immediate banksides are very shallow with limited marginal, emergent or submerged vegetation present. The north-eastern side of the ditch then rises and becomes steeper with semi-mature deciduous trees present at the top of the embankment. The water within the ditch channel is very shallow and slow flowing with large amounts of leaf litter and fallen dead wood present. As the ditch extends towards the north-east through the site, the ditch channel becomes more vegetated in places with species including fool's water cress. Some sections of the ditch channel, particularly adjacent to the culvert, were completely covered in bramble scrub and tall ruderals. As the ditch extends north through the site, with the exception of the embankments by the culvert, the northern embankment predominantly comprises a species-poor hedgerow with deciduous trees. The southern embankment predominantly comprises tall ruderal vegetation and areas of scrub. In areas that could be accessed, the water filled ditch was identified as having low potential for great crested newts and no potential for water voles or otters. ***The ditch is considered to be of local importance due to the landscape linkages that this feature provides and the presence of some diversity of habitat within the landscape.***

- Ponds: A small pond was identified adjacent to residential properties in the south-eastern corner of the most northerly arable field within the site. The pond comprised shallow embankments, which were overgrown with sedges and yellow iris, which extended into the pond. Water within the pond was shallow, with very few open areas visible on the day of survey. During the subsequent DNA surveys this pond was dry. A new pond, identified in the 2017 October walkover survey was identified to the northern aspect of the residential area of Bramblefield Lane within adjacent residential curtilage. This pond supported netting and bird scarers and was considered to be stocked with fish. This pond was considered to have 'poor' suitability to support GCNs. No further surveys are recommended. ***These habitats are considered to be of site level importance only.***

Land at Great Grovehurst Farm

- Buildings and hardstanding: These habitats included a number of buildings and stores and a yard. The buildings and hardstanding were considered to be common and widespread habitats of ***negligible ecological importance.*** These buildings and hardstanding areas have been subsequently removed under prior notification approval and under a Natural England low impact (bat) license.

- Arable: the majority of the site is planted with arable crop. The PEA conducted (2012) the crop was wheat, the update survey (2018) identified this area as ploughed land. This habitat is considered to be common and widespread. Arable fields are considered to be of ***negligible ecological importance.***

- Improved and amenity grassland: A small area of improved grassland and a patch of amenity grassland is present around the building. These habitats are considered to be common and widespread and these habitats are considered to be of low botanical interest. ***This habitat is considered to be of site level importance only.***

- Scrub (scattered and continuous) and trees: The site boundaries support a scrub layer consisting predominantly of bramble and common nettle. Other species present include elder and blackthorn. This habitat is considered to be common and widespread. A low number of mixed conifers are also present, with other trees such as hawthorn and elder present. ***This habitat is considered to be of site level importance only.***

- Ruderal: Ruderal patches of habitat were present around the arable fields and scattered within the areas of hardstanding. Dominant species included dock, perennial ryegrass, dandelion and ragwort, which are common and widespread species. This habitat was considered to be of low botanical interest. ***This habitat is considered to be of site level importance only.***

- Ponds: there were no ponds present on site, however, there are three water bodies located within 100m of the site boundaries: one immediately adjacent to the south-western corner, one approximately 38m west of the north-western corner, and one approximately 55m north of the north-western corner. These have all been subsequently surveyed for GCNs (see species below).

Table 13.4 – Summary of on-site habitats and levels of importance

Habitat Type	**Description**	**Level of importance**
Arable fields	Monoculture	Site
Hedgerows	Species poor hedgerows	Local
Planted broadleaved trees	Semi mature trees planted along the A249 Present along the railway line in Great Grovehurst Farm	Local
Semi improved grassland	Localised and fragmented around field margins	Site
Improved and amenity grassland	Present within the Great Grovehurst Farm	Site
Scrub /ruderal	Localised and fragmented around field margins and within pockets within the site.	Site
Water filled ditch	Centre of the site, fringed with mature trees and scrub areas. Large green linear feature	Local
On site pond	Not functioning and as pond – dry during summer months	Site
Former buildings and hardstanding areas (Great Grovehurst Farm)	Previously developed land	Site

Protected Species Surveys

13.59 Several protected species surveys were undertaken across the site from 2012 to 2017. The surveys are summarised below and full details of the surveys are found in Volume 3 of this ES.

- Badgers: The larger site, land between Quinton Road and Bramblefield Lane, and Land at Pheasant Farm, appears to be used extensively by dog walkers and evidence of human activity was found within an area of dense blackthorn scrub on the boundary between arable fields in the centre of the site. Several mammal holes, areas of fresh digging and mammal paths were identified within the site, no conclusive evidence of badgers, such as latrines or setts were identified within the site during the survey period or the update walkover of the site (October 2017). The survey undertaken at Grovehurst Farm by Ecosulis ltd in 2006 identified an active badger sett with four active holes on the outside the eastern boundary of their survey area, located on the railway embankment. Fresh spoil was noted outside of the entrances and several well-worn paths radiated from the sett into the site and adjacent woodland. It is therefore likely that badgers are using the site for foraging. However, the updated survey undertaken by Lloyd Bore (2012) and Ecosulis (2018) did not confirm the presence of this sett. Ecosulis (2018) report identified a potential badger sett within the railway embankment adjacent to the site although no access was possible. Within the larger allocation there were areas which could not be fully accessed, particularly along the water-filled drainage ditch in the centre of the site, and in the dense vegetation around the edges of the site, due to dense scrub and as such, it is possible that evidence of badgers, such as single entrance setts or latrines could have been missed due to the inaccessibility of parts of the site. ***In view of the low nature conservation value of the species and the limited extent of the activity (restricted to historic evidence in Grovehurst Farm) badgers are considered to be of site importance only.***

- Bat Transect Surveys Quinton Road and Bramblefield Lane, and Land at Pheasant Farm: Bat transect surveys across Quinton Road and Bramblefield Lane, and Land at Pheasant Farm were undertaken in June and August 2014. The site was considered to be of low quality for foraging bats and the activity surveys identified very low numbers of bats using the site. No bats were recorded using the edge adjacent to the A259. Only individual common pipistrelles were recorded around the back gardens of the houses of Bramblefield Lane. The second survey identified one noctule which was recorded flying over the site, and only limited activity of common and soprano pipistrelles. Only several passes of these species were recorded and these were associated with the tree lines and hedgerows around the site. In 2015 update surveys were undertaken in July and August Quinton Road and Bramblefield Lane, and Land at Pheasant Farm following walked transect routes. In July only low numbers of common pipistrelles were recorded within the site, using features such as the central and southern hedgerow. Several common and soprano pipistrelle bats were recorded flying along the central hedgerow between the red and yellow transects, and along the hedgerows between the red and blue transects Again, no bats were heard along the A249. 17 common pipistrelle passes were recorded along the railway line corridor on the south-eastern boundary from 21.25 and heading north past the residential area until 22.01. Surveys conducted in 2017 on land at Great Grovehurst Farm identified four species using the site for foraging and commuting, including common and soprano pipistrelle, noctule and brown long eared bat. Surveys were undertaken in July, August and September 2017.

- Anabat surveys Quinton Road and Bramblefield Lane, and Land at Pheasant Farm: Anabat Express recorded data from the 21st July to the 28th July 2015. The Anabat was deployed in the small wooded copse along the central hedgerow. The environment surrounding it was fairly cluttered. The majority of the bat calls recorded belonged to common pipistrelles, with approximately 60-300 calls recorded per night. These numbers were lower on the 23rd, 24th and 27th July due to suboptimal weather conditions. The first calls were heard approximately 20-30 minutes after sunset. The Anabat also recorded several calls from serotine bats, soprano pipistrelles, noctules and myotis bat species. These bats were recorded in much lower numbers. There were usually between 2 and 5 noctule calls a night, and the same number for soprano pipistrelles. Serotines were more common, often occurring alongside other species and forming fainter calls than the pipistrelles. ***Considering the relatively low number of bats recorded during the walked transect routes and the low levels of bats recorded on the remote recording, the low suitability of the habitats present on site, it is considered that bats are of site level importance only.***

- Bat Building Surveys: In June 2017, Ecosulis was commissioned by G H Dean & Co. Ltd to undertake an update Preliminary Ecological Assessment for bats on the five buildings on site, and bat emergence and re-entry surveys on Buildings 3, 4 and 5 on land at Great Grovehurst Farm. Previous surveys in 2015 did not identify any bat roosts within the buildings. Internal surveys on the 3rd July identified scattered bat droppings in building 4 and 5. The remaining buildings did not support any evidence of bats. Emergence and dawn surveys were undertaken on the 3rd, 4th and 24th July, 1st, 2nd and 21st August and 6th September 2017. Buildings 1 – 4 were not considered to be constrained by bats and these can be removed without a license. Building 5 was considered to be a night roost for brown long eared bats. As such a license (under the low impact license scheme) will be required for the demolition. Compensation measures, using bat boxes, would be required***. Considering the use of the site is by common and widespread species and that the roost if of low conservation importance, and that the site was considered to have generally low activity, it is considered that the bat activity and roosting is of site level importance only.*** Subsequently all of the buildings on site, including foundations and hardstanding, have been demolished and removed under prior notification and under license.

- Breeding Bird Survey The surveys recorded several bird species using the site for breeding, including; great tit, skylark, white throat, wren, of which one species, the skylark, is considered to be a farmland specific species, however these were only recorded once during the survey period. Other birds recorded using the site included: blackbirds, carrion crow, chaffinch, collard dove, dunnock, goldfinch, goldcrest, house sparrow, jay, long tailed tit, magpie, pheasant, robin, swallow, wood pigeon. The area adjacent to Quinton Farmhouse, Quinton Road supported breeding sparrowhawk and blue tit. ***Considering the relatively low numbers of species and the low levels of breeding pairs within the farmland habitats, it is considered that the birds are of local value only.***

- Wintering Bird Survey: Wintering bird surveys were undertaken across the Quinton Road and Bramblefield Lane, and Land at Pheasant Farm 27th October 2017, 14th November 2017, 6th December 2017, 22 January 2018 and 14th February 2018. Gulls (black headed, common and herring) were recorded on each visit, however, most species were confined to the hedgerows and boundary scrub. A wintering population of skylarks were recorded (max count of 17 birds). Species of conservation concern included staling, redwing and fieldfare, and kestrel and meadow pipit. The site was not considered to be significant in terms of wintering bird populations of species associated with the SPA and no effect on the conservation objective of either SPAs in the local area. The presence of skylarks were considered to be of local significance. A wintering bird survey was completed at Great Grovehurst Farm area with visits conducted in January and February 2018. Based on the survey results the wintering bird assemblage on site was considered to be at most local value only.

- Reptile survey Quinton Road and Bramblefield Lane, and Land at Pheasant Farm. Reptile surveys in 2012 found a small population of slow worms and a good population of common lizards present on the site. No other reptile species was found. The updated 2015 reptile survey identified a peak count of 126 adult slow worms, on the 8th September 2015 across the whole of the site. During the surveys carried out in July, an average of 34 slow worms were recorded each visit. All of the slow worms were noted along the boundaries, with keys areas located along the railway embankment, along the southern aspect of the ditch and along the northern edges of the northern and north eastern arable fields. During the last two visits, common lizards were also recorded in low numbers. ***The site supports an 'exceptional' population of slow worms and a 'low' populations of common lizards and as such reptiles are considered to be of local interest.***

- Reptile survey Great Grovehurst Farm: No specific reptile surveys have been undertaken across this section of the site, however, a single grass snake has been observed during the site surveys. As such it is considered that reptiles are present on site and a mitigation strategy would be required. Considering the largely sub optimal habitats on site for reptiles it is considered that the mitigation strategy would aim to retain the reptiles on site. The mitigation would tie in with the required mitigation for GCNs in the adjacent but off-site pond. ***It is considered that reptiles are likely to be of site interest only,***

- Great crested newt surveys on Quinton Road and Bramblefield Lane, and Land at Pheasant Farm. The ponds on and adjacent to site were assessed using the Habitat Suitability Index (HSI) assessment. The waterbodies on site were considered to be 'below average' or below and were not considered suitable to support breeding populations of great crested newts. eDNA surveys were recommended to support the HSI results. It must be noted that during the visit on the 30th June 2015, the pond on site, (P1), was completely dry and supported no water. As such it was considered that the pond would not support breeding GCNs. This pond was therefore considered to be sub optimal for GCNs. Water was also taken across the ditch network. A large proportion of the ditch was dry, however, several areas along the ditch were recorded to support pooled water. These were sampled for eDNA. Results from the samples taken from the ditch indicate GCN absence within the ditch network. All samples tested negative for any GCN DNA. 2017 the pond on the A249 and the pond on adjacent to the Grovehurst Farm roundabout were sampled for eDNA.. The 2017 eDNA results show no GCN DNA was present in either ponds 2 and 3 around the edges of the site. This suggests GCN absence in both ponds. ***The site does not support breeding ponds or evidence of GCN DNA in any ponds adjacent to the site as such GCNs are not considered to be on site. GCNs are of negligible interest.***

- Great crested newts on land adjacent to Great Grovehurst Farm: Ecosulis undertook a GCN surveys in 2016. Two ponds were surveyed, pond 1, being located to the south of Great Grovehurst Farm in the residential curtilage of the farm building. Pond 2 s located just north of the B2005. A third pond, located adjacent to Featherbed House on Highways Land, was not accessed during this survey (albeit has been accessed in 2017 for eDNA). Pond 1 peak count of 6 males and 6 female GCNs in bottle traps with a peak count of 9 females and 7 males using torching surveys. Pond 1 was considered to have a small population present; this population was a breeding population. Pond 2 peak count using bottle trapping was 4 females and 13 males, with torching yielding 9 females and 8 males. Pond 2 supported a medium population and was identified as being a breeding population. The off-site ponds are located approximately 250m apart from each other and they are fragmented by a road, The Swale Way, which would be considered a barrier to dispersal. It is unlikely there is significant genetic flow between the two ponds, however, this cannot be ruled out. It is considered that these ponds are likely to form two separate populations. ***These ponds which support the GCNs are considered to be of local value.***

- Other species Due to the nature of the site and a lack of suitable habitat, no potential for any other protected species, would be located within the red line boundary. The ditches were investigated for signs of water voles during the phase 1 survey, the update walkover survey and the eDNA sampling survey and no evidence was observed. All trees, scrub, hedgerows, and the arable fields, have the potential to support nesting birds. Rabbit warrens were identified within the field margins.

Table 13.5 - Faunal Groups and levels of importance

Faunal Group/Species	Description	Level of importance
Bats – roosting	No bat roosts identified within the trees on site. One bat roost located in building 5 at Great Grovehurst Farm. This has been demolished under licence.	n/a Low impact, a night roost of brown long eared bats. As such low conservation significance. Of local interest only
Bats – foraging	Limited foraging habitat on site, limited use, common species only	Local
Badgers – sett	Historic sett-record adjacent to railway line in Great Grovehurst Farm (2006) 2012 and 2018 update surveys could not confirm presence of Great Grovehurst Farm Sett located on the railway embankment to the east of the site No confirmed use of Quinton Road and Bramblefield Lane, and Land at Pheasant Farm site by badgers	N/A N/A N/A
Badgers – foraging	Potential for local use by badgers	Site
Reptiles	Slow worms and common lizards associated with the arable field margins on the Quinton Road and Bramblefield Lane, and Land at Pheasant Farm Grass snake observed to the north of Great Grovehurst Farm. Limited habitat present	Local Site
Great crested newts	Ponds 1, 2 and 3 did not support any eDNA from GCNs Offsite ponds at Nichols site and south of Great Grovehurst Farm support low numbers of GCNs.	N/A Local

Birds	One species of arable farmland bird species using the site in summer month. Other species limited to hedgerows, tree lines and scrub	Local
	Wintering bird surveys completed across the allocation. No impacts considered on the qualifying features of the SPA resulting in the proposals.	Site
	Wintering skylark population present	Local

Off-site habitats

13.60 The following off-site habitats are considered within the wider context. The sites below are considered in the context of the development. Sites in the wider landscape, beyond 3km of the red line boundary, have been scoped out of the EIA due to the distances involved and lack of ecological networks and linkages between the habitats within the red line boundary and those habitats off site.

13.61 The most significant in terms of off-site habitats are those designated at an international level.

13.62 The site itself does not support any designation. Nor does the site lie adjacent to any designated sites.

Table 13.6 - Off site habitats

Designated Site / Distance from red line	**Description / reason for designation**
The Swale SPA, Ramsar & SSSI – located 860m north of site	*"A complex of brackish and freshwater, floodplain grazing marsh with ditches, and intertidal saltmarsh and mudflat. These habitats together support internationally important numbers of wintering waterfowl. Rare wetland birds breed in important numbers. The saltmarsh and grazing marsh are of international importance for their diverse assemblages of wetland plants and invertebrates.*
Medway and Marshes SPA, Ramsar & SSSI – located 1.9km north of site	*The Medway Estuary and Marshes form the largest area of intertidal habitats which have been identified as of value for nature conservation in Kent and are representative of the estuarine habitats found on the North Kent coast. A complex of mudflats and saltmarsh is present with in places grazing marsh behind the sea walls which is intersected by dykes and fleets. The area holds internationally important populations of wintering and passage birds and is also of importance for its breeding birds. An outstanding assemblage of plant species also occurs on the site."*
Elmley NNR – located 1.9km north east of site	*Elmley is an internationally important fresh water grazing marsh wetland renowned for significant populations of over-wintering and breeding birds, and also hare, watervoles, rare invertebrates and flora. Conservation efforts across the reserve are focused towards breeding waders including lapwing and redshank.*
Milton Creek SNCI and Country Park – located approximately 1km east of site	*Milton Creek is a shallow tidal inlet which runs north-east from Sittingbourne to Elmley reach. The site supports slow worms, common lizards and grass snakes, and has been enhanced to support great crested newts, with ponds being constructed. The park supports migratory species such as reed and sedge warblers and Cettis warbler. The country park supports options for local people to fish (there are two fishing lakes) and play areas for local residents.*
Rook Wood area of ancient and semi-natural woodland located approximately 1.3km to the west of site;	*Area of semi natural ancient woodland. Private ownership, located to the north of the A249.*
Hawes Wood and Wardwell Wood SNCI –located approximately 2.5km west of site	*Area of semi natural ancient woodland. Private ownership, located to the north of the A249.*
Highstead Quarries SNCI – located approximately 2.9km south of site	*The site is an old quarry and supports lowland deciduous woodland and abuts ancient woodland. This site has also been designated an open green space. This site is not open to the public.*

Future baseline (2025)

13.63 Future baseline conditions are conditions which would be likely to arise if present conditions continue and none of the proposed alternatives are implemented.

13.64 Future baseline conditions of the site will be described as the maintenance of the site as farmland. It is considered that this would include use of the fields under a crop rotation, management of the hedgerows and tree lines as per current management, the pockets of ruderal vegetation are likely to vary across the site under current conditions. However, it is considered that materially the habitats on site are likely to remain as per current conditions.

Assessment of Potential Impacts

Construction Phase

13.65 Construction is considered to involve the following:

- Removal of large areas of arable farmland and semi improved grassland, ruderal edges and scrub;
- Removal of some trees on site;
- Breaking of some sections of tree lines for the construction of access roads;
- Culverting sections over the ditch line for the construction of access roads;
- Construction of new buildings, hard standing and infrastructure;
- Tree and shrub planting and landscaping within the scheme; and
- Disturbance - construction lighting and plant / vehicle noise, vibration, movement and general activity.

Effects on Habitats and Ecological Features

13.66 The construction process will involve the clearance of habitats, such as arable farm land, semi improved, grassland, tall ruderal vegetation and scrub and removal of sections of hedgerow/tree lines and the development of new roads, buildings, residential gardens, communal greenspace and associated infrastructure.

Habitats:

- Buildings and hard standing: removal of these habitats is considered to be Direct, long term and negative impact resulting in ***negligible significance***. A license for building 5 at Great Grovehurst Farm for bats will be required prior to demolition (see species impacts). These buildings have been removed under license and in agreement with the local planning authority.

- Arable: All of this habitat is to be lost as a result of the development. None of this habitat will be retained on completion. This habitat on site was not considered to be of importance with regard to plant species diversity. The habitat is of site level importance only. Direct, long term and negative impact resulting in ***negligible significance***.

- Species poor hedgerows. Several hedgerows are present as boundary features as well as one extending north to south through the centre of the site. Small sections of central hedgerow are to be lost on site during the construction phase. None of the hedgerows on site were considered to be species rich, however they are considered to be 'important' under the regulations due to the presence of protected species such as reptiles. Direct, and minor impact resulting in ***negligible significance***. There is potential to increase the quality and length of hedgerows with new planting within the master plan.

- Planted broadleaved woodland. The western boundary (adjacent to the A249) are newly planted trees which are semi mature. These are likely to be retained as they form a boundary feature adjacent to the edge of the site. Other mature trees include a row of poplar extending south west to south east along the field boundary at the centre of the site. Trees within the site will be retained, where possible. Notwithstanding this, retained trees can be harmed during development, for example tree roots can be damaged by storage of material in the root zone. This can lead to permanent damage and death to trees. Direct and minor impact resulting in ***negligible significance***. There is potential to increase the cover of trees with new planting within the master plan.

- Improved and amenity grassland: This habitat on site was not considered to be of importance with regard to plant species diversity and was considered to be small in extent and located just within the Great Grovehurst Farm site. This habitat is likely to be lost albeit, such habitat will be reestablished as a result of the development. Loss of this habitat is of ***negligible significance***.

- Semi improved grassland. This area of habitat is located on the field margins across the site, largely in the field to the north east of the site on land at Pheasant Farm. This habitat on site was not considered to be of importance with regard to plant species diversity and was considered to be small in extent and fragmented around the site. This habitat is likely to be lost in patches around the site. Loss of this habitat is of ***negligible significance***.

- Tall ruderal and scrub This habitat was largely limited to the edges of the arable fields and largely to be removed during construction. This habitat on site was not considered to be of importance with regard to plant species diversity and was limited in extent. Loss of this habitat is of ***negligible significance***.

- Water filled ditch. This is located across the centre of the site running south west to north east. The ditch within the site will be retained throughout development and will form the green corridor, however, small sections will be impacted upon for road crossings and construction. Impacts include direct and long term, albeit minor impacts of ***negligible significance***. Indirect impacts resulting from construction due to pollution events would result in a short term and potentially temporary negative impact of ***minor significance***. This is largely due to the off-site connectivity with other habitats in the wider landscape.

- On site pond: It is considered that this pond was not functioning as a true pond during the update surveys. As such it is not considered important or viable. ***No impacts are predicted.***

Fauna:

- Bats roosting (trees): No bat roosts have been identified on the trees on site. Several trees, largely the poplars, were identified as supporting ivy covering, which were considered to be of 'low' potential for bats. It is considered that these are to be largely retained within the scheme. However, individual trees which are to be lost should be re surveyed prior to felling and either soft felled or felled under ecological supervision. If bat roosts are identified on site prior to trees being felled, then further works, including a license would be required. Currently no bat roosts on site and as such loss of individual trees would be of ***negligible significance***.

- Bat roosting (buildings): A single bat roost, a day roost for brown long eared bats, is present within building 5 of Great Grovehurst Farm. Compensation for the loss of this roost is a legal requirement. ***The roost is of low conservation significance and as such is considered negligible significance.*** A licence has been granted and the building has been demolished subject to the licence conditions.

- Bats foraging Whilst there is to be some loss of trees, hedgerow and scrub habitat, the amount of habitat is not considered to be significant in terms of the overall habitat present on site and is not considered likely to affect the favourable conservation status of bats in the local area. Indeed, low levels of bats were recorded using the site and all species recorded were considered to be common and widespread. Commuting routes will be retained through the maintenance of the mature tree lines within the site and the central corridor of trees, hedgerow and scrub which lie on either edge of the ditch, albeit some removal of sections are to occur. The central corridor is considered to be the most diverse area for bats and where activity was recorded. The site itself was considered to be of low commuting value for bats. Increase in lighting levels may have indirect impacts. Locally foraging bats are unlikely to be disrupted by noise during development from construction operations, particularly as site activity will be limited at dawn/dusk in the spring and summer when bats' foraging is at its peak. Construction impacts are considered to be of ***negligible significance***.

- Badgers: There are no badger setts on the Quinton Road and Bramblefield Lane, and Land at Pheasant Farm site and such no impacts on badger setts are predicted from construction. A historic record of a badger sett is located on the Great Grovehurst Farm site, adjacent to the railway line. This was confirmed in 2006 but not identified in 2012 or 2018 surveys. It is considered unlikely that the sett is still present, however, it will be maintained on site due to the location of the historic sett being present on the railway embankment adjacent to the eastern site boundary and outside the development area. ***As such no impacts on badger setts are predicted.***

- Badgers foraging: Badgers are known to be present in the local landscape. Whilst no confirmation of badger's using the site for foraging was recorded (no latrines, dung pits etc) it is likely that badger cross the site or use areas of the site for foraging habitat. The loss of a large area of sub optimal habitat (arable) is unlikely to impact badgers. The loss of edge habitats would potentially reduce foraging territory size. However, the nature of the development is for the retention of 22ha of open space/ green space (which will remain un developed) within the Quinton Road and Bramblefield Lane, and Land at Pheasant Farm site and the undeveloped area within the Great Grovehurst Farm site will ensure that badgers can move across the site and utilize the site for foraging habitats. Construction impacts are considered to be of ***negligible significance***.

- Reptiles: There are two species of reptiles, slow worm and common lizard on the Quinton Road and Bramblefield Lane, and Land at Pheasant Farm site. Both species are largely present on the very edges of the site (not located within the arable fields) on the field margins of the site. Grass snake are known to be present on the GreatGrovehurst Farm site. A reptile translocation will be undertaken to ensure that these species are removed from areas of suitable habitat which are to be developed. This will be undertaken by hand trapping these animals and moving them to a receptor site, for which the species will be held on site during the construction phase. Once construction is complete these species will be released from this area, allowing them to make use of the suitable habitat maintained on site post development. It is considered if this process is carried out that reptiles will not be affected by the construction phase of the project. Construction impacts are considered to be of ***minor significance***.

- Great crested newts: No ponds on site or adjacent to Quinton Road and Bramblefield Lane, and Land at Pheasant Farm site, with the balancing ponds adjacent to the A249 supporting no GCN DNA. No GCN DNA in pooled ditch water. GCNs have been located in the balancing pond adjacent to The Swale Way. This pond is separated from both the Quinton Road and Bramblefield Lane, and Land at Pheasant Farm site and the Great Grovehurst Farm site by a significant barrier to dispersal. No impacts on this pond or GCN population are predicted. The off-site but adjacent pond to Great Grovehurst Farm supports a low population of GCNs. A license will be required from Natural England to disturb a resting site. The site will have to be trapped and translocated into a suitable receptor site. It is considered that the license will be secured based on mitigation measures proposed, including a temporary receptor site, a 1.3ha receptor site of replacement terrestrial habitat and the construction of new ponds. It is considered if this process is carried out that reptiles will not be affected by the construction phase of the project. Construction impacts are considered to be of ***minor significance***.

- Birds: Only one pair of skylark were identified breeding on site. No schedule 1 species were identified using the site. Tree- lines were notable in terms of BoCC Red List and UK BAP species such as house sparrow, including the central tree line associated with the ditch habitat. These are to be largely retained, however, small areas will be lost for access. These areas need to be cleared outside bird nesting season. Significant new planting is proposed within the scheme. Construction impacts are considered to be of ***minor significance***. Wintering bird surveys are ongoing, however, no species associated with the SPA or Ramsar site have been identified using the site in the October and November 2017 surveys. The site is not considered to be of importance to over wintering birds. The construction therefore would be of ***negligible significance.***

- Other species: Hedgehogs maybe present within the edges of the site, rabbit warrens are also identified. These are largely restricted to habitats around the edges of the site, not the arable land. These habitats are to be sensitively cleared. Construction impacts are considered to be of ***negligible significance***.

Table 13.7 - Summary of Predicted Impacts and recommended mitigation measures

Receptor	Value	Nature of Impact	Impact Significance	Mitigation measures
Medway Estuary and Marshes (SPA, Ramsar, SSSI)	International	There will be no direct impacts, however there has potential for indirect impacts during the construction phase due to pollution events. The ditch that flows through site, flows into the south eastern area of the Swale, which is in turn connected to the Medway Estuary designated sites. Short-term, indirect, negative	Major	Management of pollution and dust etc through CEMP
The Swale (SPA, Ramsar, SSSI)	International	There will be no direct impacts, however there has potential for indirect impacts during the construction phase due to pollution events. The ditch that flows through site, flows into the south eastern area of the Swale Short-term, indirect, negative	Major	Management of pollution and dust etc through CEMP
Elmley (NNR)	National	There will be no direct impacts, however there has potential for indirect impacts during the construction phase due to pollution events. The ditch that flows through site, flows into the south eastern area of the Swale Short-term, indirect, negative	Major	Management of pollution and dust etc through CEMP
Milton Creek SNCI	Local	There will be no direct impacts, however there has potential for indirect impacts during the construction phase due to pollution events. The ditch that flows through site, flows into the south eastern area of the Swale Short-term, indirect, negative	Minor	Management of pollution and dust etc through CEMP
Hawes Wood and Wardwell Wood SNCI	Local	SNCI suitably removed from the Site by distance and intervening land uses such that no significant effects are anticipated.	N/A	None required for construction. There will be no impact.

Highstead Quarries SNCI	Local	SNCI suitably removed from the Site by distance and intervening land uses such that no significant effects are anticipated.	N/A	None required for construction. There will be no impact
Arable	Site	Removal of habitat Permanent, direct, negative	Negligible	New diverse habitat developed through new planting
Improved and amenity grassland	Site	Removal of habitat Permanent, direct, negative	Negligible	New diverse habitat developed through new planting
Semi-improved grassland and ruderal habitats including scrub	Site	Significant loss of habitat Permanent, direct, negative	Negligible	New diverse habitat developed through new planting
Broadleaved Woodland	Local	Damage of roots during construction, dust and pollution events, removal of trees and small sections of planting	Minor	Retention of woodland, root protection areas enforced, new panting
Ditch	Local	Indirect impacts from pollution event including spills Ditch to be culverted in several locations for access so small scale direct impacts	Minor	Management of pollution etc through CEMP, improved management and new planting Protection of retained vegetation
Bats - foraging	Local	Partial loss of foraging habitat Permanent, indirect, negative	Negligible	Retention of trees and hedgerows, improved management, new planting
Bats – roosting	Local	Felling of trees with bat roost potential and destruction of a bat roost Demolition of building 5 which supports a brown long eared bat day roost of low conversation significance. Permanent, direct, negative	No roosts currently on site no impacts Minor impact if roosts identified Negligible	Further survey work, a Natural England licence obtained if roost is discovered Licence secured from Natural England.

Badgers	Local	Partial loss of badger foraging habitat. No loss of setts. Historic sett only no confirmation of active setts. Permanent, direct, negative	Negligible	improved habitat creation and new planting
Breeding birds	Local	Total loss of arable habitat for farmland birds Partial loss of some suitable habitat and disturbance Permanent, direct, negative	Minor Minor	Removal of vegetation outside of bird breeding season. Bird boxes and new planting to provide new opportunities.
Wintering birds	Local	No species which are considered to be qualifying features of the SPAs were found present on site. Gulls were identified in low numbers and not considered to be significant. Skylarks were identified using the site for foraging over winter, with a resident population of approx. 17 birds.	Negligible Minor	Improved habitat creation and new planting Residual impact predicted
Reptiles	Local	Partial loss of suitable habitat Permanent, direct, negative	Minor	Translocation of reptiles following best practice. New planting and sensitive habitat management.
Great crested newts	Local	Partial loss of suitable habitat within Great Grovehurst Farm Permanent, direct, negative No ponds on Quinton Road and Bramblefield Lane, and Land at Pheasant Farm. No impacts predicted	Minor N/A	Secure Natural England licence. Trapping, compensation and mitigation measures required. N/A

Off-site habitats

13.67 The development will not have any direct impacts on national or local wildlife sites or nature reserves as there is no land take, no isolation or fragmentation of protected habitats; **Policy CP7** indirect impacts must be considered as part of the application, with reference to **Policy DM28** seeks to protect and enhance woodlands, orchards, trees and hedges, including the creation of these habitats where possible, with reference to the green infrastructure network.

13.68 With regard to designated sites identified immediately adjacent to or in close proximity to the site, indirectly, there are potential issues in relation to dust and pollution, particularly water pollution via the on-site ditch during the construction phase of the scheme; however, these will be reduced by applying site specific mitigation measures and included within the CEMP. Further details on pollution prevention in terms of hydrology and air pollution can be found in the relevant chapters of this EIA.

13.69 The connectivity of Milton Creek to the onsite ditch network also needs to be considered within the CEMP. Again dust, pollution events could have an indirect and negative impact on the integrity of the SNCI. Working practises and construction management, as to be detailed in the CEMP, will reduce the impacts.

13.70 With regards to the locally designated wildlife sites (Hawes Wood, Highstead Quarry), these are of sufficient distance from the site and are separated by significant infrastructure as to not be impacted, directly or indirectly by the development process.

Construction Mitigation Measures

13.71 Mitigation for the protection of protected species and important ecological features on site has been developed and has been included in detail within the species-specific reports. Please see Volume 3 for full details.

13.72 To minimise effects of construction, standard mitigation measures will be put in place during the construction phase. These measures could be included within a Construction Environmental Management Plan (CEMP) at the detailed stage, and will include:

- Natural England low impact license for the demolition of building 5 (secured and implemented);
- Natural England GCN license for works impacting land at Great Grovehurst Farm;
- Erection of reptile fencing around retained suitable reptile habitats in line with standard industry guidelines;
- Erection of tree protection fencing around retained hedgerows and trees in accordance with BS5837:2012;
- Shrub, tree and hedgerow clearance to be undertaken outside nesting bird season, or checked by a suitably qualified person prior to removal;
- Damping down of dust sources and covering of loose materials to reduce dust deposition within adjacent habitats;
- Use of lighting in the vicinity of retained habitats and along the central green corridor to be kept to a minimum, with use of directional lighting or screening as required to reduce lightspill;
- Storage of chemicals and hazardous materials in line with best practice guidelines;
- Pollution control measures, such as petrol/water interceptors and temporary silt traps, should be used where appropriate to minimise the risk of polluted surface water runoff entering on site ditch habitats and the potential for off-site habitats;
- General house-keeping rules, including litter removal, maintenance of fence lines etc.

Bats

13.73 Several mature trees on site have been identified as having ‘low’ potential to support roosting bats. Once the trees that are to be removed have been finalised, they are to be resurveyed for the potential to support roosting bats. If a bat potential tree is identified it will be subject to an aerial inspection and climbed by an ecologist. If evidence of bats is found or there is a reasonable likelihood that bats would use the feature, then further surveys will be undertaken. This could include up to three surveys (2 evening and 1 dawn survey). If a roost is confirmed, then a license from Natural England will be applied for to fell the tree. If no evidence of the tree being used by bats was recorded then the tree will be removed using reasonable avoidance measures, as described above.

13.74 Building 5 at Great Grovehurst Farm supports a brown long eared bat day roost. This roost is of low conservation significance. A Natural England low impact bat licence has been secured prior to the demolition of the buildings. All buildings have been demolished under license and with prior notification.

13.75 Mitigation for bats is included within the design of the site. This includes retaining features for bats to use as for commuting and foraging. The tree line and ditch in the centre of the site will be largely retained and enhanced, by filling in the gaps with native species planting to ensure a linear vegetative link across the site to allow bats to easily move across the landscape. Additional planting including planting that will benefit bats will be included within the retained open space areas and around SUDs schemes. This will include planting of native species and the use of bat boxes on retained trees. The enhancement of retained hedgerows and the use of the POS and enhancement of the ponds, would all provide the opportunities to support bats in the local area.

13.76 A sensitive lighting scheme will also be employed for this scheme post development for the operational stage. This will be installed at the construction stage. This will shield features of importance for bats such as retained bat potential trees and commuting and foraging features such as woodland, hedgerows, tree lines and waterbodies such as the stream and ponds.

13.77 Furthermore, enhancements to the site for bats should include the installation of bat boxes which will enhance the number of roosting opportunities for bats in the local area. Boxes should be hung on mature and semi-mature trees and have clear flight paths. Recommended boxes include:

- Schwegler 2F – This box simulates crevices inside to allow suitable habitats for crevice-dwellers;
- Schwegler 1FD – This box is a larger version of the 2F; and
- Schwegler 1FW – This box is suitable for maternity or hibernation roosts.

Reptiles

13.78 Rank and tussoky grassland, tall ruderal vegetation and scrub within the site was considered to have potential to support common reptile species. As such, a reptile presence/likely absence survey was commissioned, whereupon the site was identified as supporting a population of common lizards and slow worms. Grass snakes are also recorded on Great Grovehurst Farm.

13.79 A reptile translocation strategy will therefore be employed. Translocation of reptiles involves erecting temporary reptile exclusion fencing around the perimeter of the works area to prevent captured reptiles from re-entering the site and any additional reptiles from accessing the site as well as protecting the retained reptile habitat. This fencing is to be erected under ecological watching brief and in accordance with best practice guidelines published by the Amphibian and Reptile Group.

13.80 Once the fencing has been erected, artificial refugia in the form of 0.5m2 tiles of roofing felt (will be located within areas of suitable reptile habitat within the site. Reptiles will be caught by hand during suitable weather conditions, between March and September in accordance with best practice guidelines, with any captured reptiles relocated to a previously surveyed area of suitable off-site or on-site habitat. As the capture operation progresses, in order to increase capture efficiency, habitat 'islands' may be created through strimming of grassland and scrub under ecological watching brief.

13.81 Once reptiles have been successfully moved out of the working areas, remaining on-site habitats may then be destructively searched under ecological watching brief to render the site unsuitable for reptiles. Once this has been achieved, the site may be developed as planned.

13.82 Suitable reptile receptor sites will be enhanced as part of the reptile mitigation strategy. This will include the construction of log piles and hibernacula, to provide reptiles will opportunities for additional cover within the retained habitats. Long terms habitat management for reptiles will be developed as part of the operational management plan for the site.

Ditch enhancement

13.83 The existing ditch network is to be retained. However, small areas of the ditch and surrounding vegetation are to be removed and the ditch disturbed to culvert to allow for road access. The trees and vegetation which are to remain will be protected by tree protection fencing (in line with the arboriculturalist requirements). The sections of ditch which are to be impacted upon will be cleared under ecological supervision, outside nesting bird season where possible. Controls to manage sediment levels and pollution events will be in place in line with the CEMP.

13.84 The retained ditch, particularly within amenity areas, are to be planted to enhance amphibian and invertebrate species on the site in line with national planning policy. These should be planted with species of ecological value including; water mint; common reed; soft rush; water plantain; meadowsweet and yellow flag iris. Detailed planting schedules should be conditioned as part of the planning.

Badgers

13.85 Although no conclusive evidence of badgers, such as latrines or setts were identified within the site, mammal 'push throughs' and paths were identified within the site, and record of badger setts (historic 2006) were identified to the east of Great Grovehurst Farm area on the railway line embankment. It is therefore considered that a repeat badger survey should be undertaken to assess badger use on site at the detailed design stage and prior to any works on site.

13.86 A tool box talk will be given to construction staff prior to works and measures regarding badgers will be included within the CEMP including covering deep trenches at night, to prevent badgers falling and getting trapped.

13.87 It is recommended fruit trees are planting around site to increase food sources for badgers. Improving the water quality of the ditch on site, will provide more water sources for badgers and further enhancements such as wildflower planting and log piles will provide habitat for invertebrates which can be preyed upon by badgers. The green central corridor within the site will ensure that badgers can move across the site and into the local landscape and therefore will be able to access foraging habitats in the local area.

Birds

13.88 The UK breeding season for most bird species takes place between March and September. Any works affecting the suitable bird habitat on site are to be carried out outside of this period. If this is not possible, buildings and areas suitable vegetation and ground will be checked for active nests no more than 48 hours prior to clearance. Should active nests be discovered, any works in the vicinity of the nest must cease until the birds have fledged the nest.

13.89 Bird boxes are to be hung on suitable retained trees to increase the number of breeding opportunities throughout the site. Recommended boxes include:

- Schwegler 1N Deep Nest Box – give added nest protection from predators; and
- Schwegler 1B Bird Box – general purpose bird box, suitable for many species.

Great Crested Newts

13.90 Land at Quinton Road and Bramblefield Lane, and Land at Pheasant Farm site is not considered to be constrained by the presence of GCNs. None of the ponds associated with the edges of this section of the site support GCNs. The habitats present are largely suboptimal for GCNs. No specific mitigation measures for GCNs across this section of the site is considered a requirement. Reptile clearance will ensure there is sensitive processes in place and if in the unlikely event of a GCN being located within this section of the site, works will stop and a suitably qualified person consulted.

13.91 GCN ponds are present off site, located to the north of The Swale Way. This pond is considered to be separated from both the Quinton Road and Bramblefield Lane, and Land at Pheasant Farm site and the Great Grovehurst Farm Site and as such no impacts directly or indirectly are considered.

13.92 The pond adjacent to Great Grovehurst Farm supports a low population of GCNs. The pond will not be directly impacted upon but GCN terrestrial habitat will be removed as a result of the development. A licence from Natural England will be required within the Great Grovehurst Farm site prior to any development. The licence will detail mitigation measures and compensation measures including trapping the site, translocation of the GCNs, creation of habitat and enhancement of retained habitat. Dropped curbs and amphibian friendly gully pots (dependent on design) will be required as part of the construction process. The creation of a more diverse habitat in the receptor site for GCNs, including creation of grassland and scrub habitat, refugia and pond habitats will ensure that the favourable conservation status of the species is not impacted upon by the development.

Table 13.8 - Summary of construction mitigation measures

Mitigation measure	How it will be implemented and when
Completion of an update bat survey of any trees which are required for removal	Prior to construction activities on site. If evidence of bats is identified, an appropriate bat mitigation strategy will be required as part of the planning application and to inform a Natural England Licence, if deemed necessary.
Clearance of vegetation outside of breeding bird season or under ecological watching brief	The vegetation clearance will be subject to a nesting bird check which is a legal requirement and likely to be required as part of the planning permission. The timing of the inspections are to be incorporated into the CEMP.
Translocation of reptiles	Prior to construction operations to remove suitable reptile habitat enhancement works to the receptor habitat pre-translocation would be required. A reptile mitigation strategy will be required as part of the planning permission and will be implemented as part of the CEMP.
Translocation of GCNs	Natural England licence must be granted prior to any development works at Great Grovehurst Farm. A GCN mitigation strategy will be required as part of the licence and potentially as planning permission and will be implemented as part of the CEMP
Update badger survey	Prior to construction activities on site. This will form part of the CEMP.
Species-specific habitat creation, placement of bird/bat boxes	As part of construction operations. Timetable of works will be implemented through the CEMP.
Lighting scheme / planting scheme	Both schemes should be conditioned and implemented as part of the construction activities on site.

Operation (Occupation) Phase

Operational impacts include the following:

- Management of public open space, including play areas and amenity areas;
- Management of newly created and retained habitats such as enhanced grassland habitats including receptor sites (for reptiles and GCNs, ditch network, hedgerow networks, shrub and tree planting;
- Management of SUDs ponds and swales;
- Increase in local population and the associated pressure on both on off-site habitats in terms of recreation;
- Increase in local pet population and the associated pressure on the on-site habitats in terms of disturbance and predation;

- Water resource management including every day site use including pollution run off and water resources such as waste water requirements; and
- Increase in air emissions.

13.93 Operational activities will include the management of existing and newly created habitats and open spaces within the development. It is considered that the management of public open space and areas of recreational use will not be significant in terms of ecology and biodiversity.

13.94 The key operational impact is the introduction of a large resident population to the site. The impacts this can cause, in ecological terms, includes increased recreational pressure on both on site habitats and designated sites in the surrounding area, as well as a potential increase in bird and reptile predation and disturbance through the increase in local domestic pets. The disturbance of an increase in local residents and pets will also have to be considered as potentially impacting upon other species such as badgers.

13.95 Furthermore, additional issues which must be considered are the impacts on water quality which may arise from the operational effects, such as waste water treatment and pollution events, which can have an effect on downstream habitats, the designated sites, and the on-site habitats such as the ditch and ponds, as well as operational effects through increased emissions into the air. These are discussed below.

13.96 In accordance with the guidance detailed within the air quality chapter, the air quality chapter concludes that there is not likely to be any significant effect as a result of NOx emissions and that any impacts on ecological receptors as a result of the development will be negligible.

Operational Effects on Habitats and Ecological Features

13.97 The operational stage will involve the use of the new roads, buildings, residential gardens, communal greenspace and associated infrastructure. This also includes the management of the open spaces and linear park and other enhanced ecological features.

Habitats:

13.98 Arable and ruderal habitats: are to be completely lost as a result of the development. This would result in the long term negative impact of ***negligible significance.***

13.99 Species poor hedgerows and standard trees: these hedgerows are located on the edges of the site and adjacent to the central ditch network. These features are largely retained and enhanced as part of the construction process. These will be managed appropriately to encourage wildlife and to ensure their longevity. It is considered that the operational impact on these features would be of neutral with ***negligible significance.***

13.100 Woodland habitats, which are semi mature, will be protected and managed in the long term. Standard trees and new tree planting, will also be managed under a management plan. This would result in the ***long term positive impact of minor significance.***

13.101 Improved and amenity grassland: this habitat will be lost during construction and subsequently reinstated within the development. This habitat is likely to be recreated in back garden habitat and is considered to be of limited ecological value. This would result *in the* ***long term positive impact of negligible significance.***

13.102 Semi improved grassland: this habitat is to be largely lost as a result of the development proposals however, new areas of semi improved grassland will be reinstated across the open space and linear park. Indeed, the grassland is to be enhanced, including areas of species rich grassland, wildflower grassland and tussock forming grassland within the linear park and areas of open space. These areas are likely to be impacted upon by recreational pressure, however areas of the park land, including the linear park feature, will be designed to ensure areas for recreational are managed appropriately and areas to be managed for wildlife are continually managed. The management plan will ensure impacts to these habitats are not significant and that the long-term management of a variety of newly created grassland habitats would be considered a as ***long term positive impact of minor significance.***

13.103 The ditch: The ditch habitat will be enhanced through planting and the management of associated edges. The maintenance of green features (including the central ditch and tree line within the site) and the enhancements provides dark corridors within the site and around the edges of the site which reduce the operational impact. This would result in the **l*ong term positive impact of minor significance.***

13.104 There is the possibility of changes in hydrology on site with regards to the ditch and ponds, due to the increase in buildings, hardstanding and landscaping. This potential change in water run-off and the potential for a pollution event has been dealt with through the design of swales and SUDs systems. As such it is considered that there will be no significant changes to hydrology as a result of the development. This will be addressed in detail in section 8 of the EIA. The use of new ponds and swales within the site provides new habitats of site interest. The creation of these new habitats would result in the ***long term positive impact of minor significance.***

13.105 Further impacts with regards to water pollution and the off-site designated sites also have to be considered in the operational phase. With regard to designated sites, an increase in water pollution is of concern with regards to The Swale, Medway Estuary and Marshes SPA, Ramsar and SSSI and Elmley NNR. These water-based habitats within these designated areas are particularly noted for their sensitivity to waterborne pollution. It is considered that operationally any pollution event will be managed through the swale system as well as the designs of permeable paving and therefore any impact on downstream habitats are not considered to be significant. This is further disused below under 'off site habitats' and well as within section 8 of the EIA.

Fauna

13.106 Badgers: increase in human recreational pressure and disturbance from dogs may impact how badgers use the site. However, tit is considered that green links, edges and central green corridor will allow badgers to move across the site and into the wider landscape. Furthermore, the creation of new grassland habitats and the planting of a range of native species will provide new opportunities for badgers in the local area. The large areas of green space within the development are considered to be sufficient to ensure that badgers can still use the site during the operational period. It is considered that operational impacts are of **negligible significance.**

13.107 Bats (foraging and commuting): Bat species are nocturnal and light sensitive. Bat activity was considered to be limited and located in certain areas, including the central tree line / ditch line and the very edges of the site. Light levels around these features could impact upon how bats are using the site. Lighting levels are to reflect this, will minimising light spill around the edges of the site and on such central features. New planting, enhanced edges and the creation of gardens may provide new opportunities for foraging bats. It is considered that operational impacts are of **negligible significance.**

13.108 Bats (roosting) The erection of bat boxes within the mature trees on site (notably within the central tree line) may provide some new opportunities for roosting bats. It is considered that the potential new roosting provision would be of **negligible significance.**

13.109 Birds: It is considered likely that an increase in local human population will have an increase in local population of domestic cats and dogs. Cats are known to predate on some species such as birds, and this can be difficult to prevent. However, only few bird species were recorded using the site for ground nesting, with birds largely contained within the trees and hedgerow habitats of the site. These are to be maintained where possible, with further planting created within the design. The creation of new opportunities for common bird species, including creation of new hedgerows and planting within open areas, linear parks, gardens and POS. As such it is considered that impacts would not be considered significant. The use of bird boxes within the scheme, with ones which are designed to be more robust against predators, would provide potential mitigation. Operational impacts are considered to be of **negligible significance.**

13.110 Reptiles: The population of reptiles on site will have been moved into areas designated for wildlife enhancement, largely around the edges of the site. These areas will be managed for their wildlife and as such these habitats will continue to support reptiles in the further. There may be some predation resulting from dogs and cats, however, it is considered that there is sufficient space for reptiles on site and that the enhanced habitats, including rock and rubble piles and the use of log piles, will provide suitable features for reptiles to utilize. Operational impacts are considered to be of **negligible significance.**

13.111 Great Crested newts: These were not present on Land at Quinton Road and Bramblefield Lane, and Land at Pheasant Farm site. The population of GCNs on the Great Grovehurst Farm site will have been moved into areas designated for wildlife enhancement, largely around the edges of the site to the south and eastern aspect of the site. These areas will be managed for their wildlife and as such these habitats will continue to support GCNs in the future. There maybe some predation resulting from dogs and cats, however, it is considered that there is sufficient space for GCNs on the receptor site and that the enhanced habitats, including rock and rubble piles and the use of log piles, and the creation of wildlife ponds will provide suitable features for GCNs to utilize. The Great Grovehurst Farm site will support amphibian friendly dropped curbs and gully pots to prevent GCNs being killed during operation. Monitoring of the pond will be required as part of the license. Any concerns with the changes of population (negatively) would have to be addressed as part of the license. Operational impacts are considered to be of **negligible significance.**

Operational (Occupation) Impact on Off Site Habitats

13.112 The Medway Estuary and Marshes, the Swale and Elmley NNR are located downstream from the south east of site. Medway Estuary & Marshes SPA, Ramsar and SSSI, and The Swale SPA, Ramsar and SSSI are two SPAs which form part of a wider network of contiguous SPAs, collectively named the 'North Kent Marshes' SPAs The ditch located adjacent to the site feeds directly into the Marshes, which in turn flows into these designated areas. The site has potential to be directly negatively affected by waste water and pollution events on site.

13.113 Waste water and pollution events are considered within the master plan and are detailed in the relevant sections of the EIA. The use of SUDs schemes, maintenance of the off-site ditch and the associated green infrastructure around the ditch, will ensure that pollution events are unlikely and that appropriate measures are in place for impacts to be negated.

13.114 The potential of an increase in the local population has been considered as part of the masterplan and within the MU1 designation and development to ensure that disturbance to bird populations and 'wear and tear' from visitor pressure is reduced as much as possible. The provisions of public open space and park areas within the red line boundary and linking to the wider parkland areas within the designated MU 1 site, provides local recreational opportunities on site, where day to day recreation (such as dog walking) can occur without the need for individuals to access off site habitats. However, it is considered that designated sites could be subject to some degree of impact from the increase in users due to its location in relation to the SPAs.

13.115 With regard to local designated sites, an increase in activities such as walking and dog walking would lead to the disturbance of birds which for which the sites have been notified, furthermore, increased widening and wear of paths, increased levels of dog fouling and littering and the potential to harm the biodiversity of the area through the destruction of habitats and disturbance to wildlife. The SAC, SPA and Ramsar habitats, such as saltmarsh and mudflats are considered to be especially rare and sensitive.

13.116 As set out in the Baseline Ecological Appraisal, the Site is considered unlikely to support species associated with the North Kent Marshes SPAs with any regularity. There are significant areas of grassland and marsh land associated with the SPA and not separated from the SPA by large scale development and infrastructure as is the case in this site. As such the loss of the habitats on site are not considered to be significant in terms of the SPA integrity and as the development in itself is considered to have a negligible effect on the SPA.

13.117 Research commissioned by the North Kent Environmental Planning Group (NKEPG) has identified recreational disturbance as a potential cause of declines of SPA qualifying species at the North Kent Marshes SPAs. The research report subsequently advises that mitigation measures need to be considered for development that falls within 6km of the North Kent Marshes SPAs. This was supported by Footprint Ecology's work undertaken in 2011 with regards to visitor surveys and bird disturbance surveys in 2010/2011.

13.118 The North Kent Environmental Planning Group, in association with Medway Council, has recently commissioned a consultant to further refine the work on the 6km buffer, the tariff and the relevance of the mitigation measures. The outcome of this work will provide options and models for the commissioning and monitoring of strategic access management projects. These will be designed to mitigate recreational impacts generated by proposed new development and to provide a recommendation on governance arrangements between the Councils along the north Kent coast.

13.119 In the Statement of Common Ground between Natural England and Swale Borough Council (SBC/PS/029) Natural England agrees that the approach being taken by Swale and the NKEPG, is the most appropriate one. With policy DM28 considered by the Council to be an appropriate strategy for the protection of biodiversity within the borough, especially with regard to internationally designated sites.

13.120 The proposed development incorporates a high level of open space with the design, approximately 22ha including a linear park located across the whole of the MU 1 site, of which the linear park within the red line boundary of the Quinton Road site will form a link to. This park land and open space has been designed to encourage recreational use so as to reduce recreational pressure on the SPA. The open space is well spread across the site such that all residents can readily access it on foot, whilst it also connects to existing footpath links, which increases the opportunity for circular walks of varying lengths and provides opportunities for residents to link to other footpaths and cycle routes within the wider landscape.

13.121 Furthermore, there are no direct linkages from the site to the off-site designated areas, with no direct footpaths or walkways. The nearest designated area is located over 900m north, of which several roads would have to be crossed and direct access to the nearest region of the SPA is not possible. Access to the SPA sites, therefore must consider car use.

13.122 The SPA can be accessed near the Sheppey crossing, linking to the Saxon Shore Way, with other footpaths in this area. There are no official parking areas, however. Church Marshes and Milton Creek provide a local and closer experience and have been designed for dog walking and well as recreational opportunities for children. It is considered that this space, which supports facilities (currently under construction) would be considered closer and having improved facilities compared with that of the SPA.

13.123 In conclusion, the embedded mitigation in the form of on-site open space is considered to avoid any likely significant effect on the North Kent Marshes SPA. Further SAMMS contributions which are to be formalized, will also ensure that impacts on the SPA are negligible.

13.124 In terms of Habitats Regulations Assessment, it is not considered that the proposed development, in isolation, would result in a likely significant effect on European designations, and therefore no Appropriate Assessment is required in this regard. Cumulative effects are considered separately in the relevant section.

Table 13.9 - Summary of Operational Impacts

Receptor	Receptor Importance	Nature of Impact	Impact Significance	Mitigation measures
Medway Estuary and Marshes (SPA, Ramsar, SSSI)	International	Indirect impacts resulting from increase in recreational pressure Indirect impacts from pollution events Long-term, indirect, negative	Major	Creation of open space within the design of the site to provide recreational facilities within the site. SUDS, swales will be designed to minimise any pollution event. Access management (SAMMS) fund per household to support wardening and monitoring projects
The Swale (SPA, Ramsar, SSSI)	International	indirect impacts resulting from increase in recreational pressure Indirect impacts from pollution events Long-term, indirect, negative	Major	Creation of open space within the design of the site to provide recreational facilities within the site.. SUDS, swales will be designed to minimise any pollution event. Access management (SAMMS) fund per household to support wardening and monitoring projects
Elmley (NNR)	National	NNR suitably removed from the Site by distance and intervening land uses such that no significant effects are anticipated from recreational pressure Indirect impacts from pollution events Long-term, indirect, negative	Major	Creation of open space within the design of the site to provide recreational facilities within the site.. SUDS, swales will be designed to minimise any pollution event.
Milton Creek SNCI	Local	Indirect impacts resulting from increase in recreational pressure Indirect impacts from pollution events Long-term, indirect, negative	Minor	Creation of open space within the design of the site to provide recreational facilities within the site.. SUDS, swales will be designed to minimise any pollution event.

Hawes Wood and Wardwell Wood SNCI	Local	SNCI suitably removed from the Site by distance and intervening land uses such that no significant effects are anticipated.	N/A	None required for operation. There will be no impact.
Highstead Quarries SNCI	Local	SNCI suitably removed from the Site by distance and intervening land uses such that no significant effects are anticipated.	N/A	None required for operation. There will be no impact
Improved and amenity grassland	Site	Creation of new areas of similar grassland habitat. Largely contained within back gardens Permanent, direct, positive	Negligible	None required for operation. There will be no impact
Semi-improved grassland, wildflower grassland and scrub/shrub planting	Site	Creation of new areas of grassland, including wildflower grassland and tussocky grassland habitat. Permanent, direct, positive	Minor positive	New diverse habitat developed through new planting. Long term management plan developed to support a range of species and diversity of grassland habitats
Broadleaved Woodland Newly planted trees	Local	Long term management of on-site woodland. Maintenance of woodland Disturbance from recreational pressure	Minor positive	Retention of woodland, root protection areas enforced, new panting, long term management. Including litter removal, tree guards removal, thinning etc
Ditch	Local	Indirect impacts from pollution event including spills. Long term management and enhancement works Disturbance from recreational pressure	Minor positive	Management of pollution etc through swales, SUDS systems, improved management and new planting.
Bats (foraging and commuting)	Local	Maintenance of linear features within the site and around the edges of the site Low level lighting New habitat creation	Negligible	Retention of trees and hedgerows, improved management, new planting
Bats (roosting)	Local	Use of bat boxes within the scheme	Negligible	Retention of bat boxes, monitor and replace if necessary.

Badgers	Local	Newly created habitats which support foraging habitat for badgers.	Negligible	improved habitat creation and new planting including species which badgers can forage from. Green edges and links allow badgers tom move across the wider landscape.
Breeding birds	Local	Newly created habitat include shrubs, garden habitats, POS, linear park features.	Negligible	Bird boxes and new planting to provide new opportunities. Creation of new habitats within the site for birds and sensitive long term management.
Wintering birds	Local	Newly created habitat include shrubs, garden habitats, POS, linear park features	Negligible	Creation of new habitats within the site for birds and sensitive long term management.
Reptiles	Local	Partial loss of suitable habitat Permanent, direct, negative	Negligible	Translocation of reptiles following best practice. New planting and sensitive habitat management.
Great crested newts	Local	No impact on the the Quinton Road and Bramblefield Lane, and Land at Pheasant Farm site Great Grovehurst Farm Partial loss of suitable terrestrial habitat Permanent, direct, negative	N/A Negligible	Great crested newts have not been identified within the site and therefore, no impacts (either direct or indirect) are anticipated Receptor site maintained and enhanced as part of the construction phase, will be sensitively managed. Monitoring of the site post development as a requirement of the licence. Ensure mitigation measures as prescribed are effective.

Potential Mitigation / Management Techniques

13.125 A long-term management plan for open spaces and on-site habitats will be developed (as a condition of planning) which will prescribe the management requirements for each habitat area for a period of 5 years. After the initial 5 years a review of the management plan will be implemented. Public open space areas will be managed as per site plan ensuring that publically accessible areas can be enjoyed by the local residents as well as being beneficial to wildlife. This will include:

- Long-term management of wildlife habitat areas will also allow for remedial action or alleviation of any recreational issues;
- Monitoring plan for GCNs population in the pond to the south of Great Grovehurst Farm, remedial measures to be implemented based on results. This is a requirement for the license;
- Long term management plan for areas dedicated for recreational use to ensure the habitats is well managed and that access through these areas is well signed;
- Well managed areas of children's play to ensure that such features are well used and enjoyed by local residents, reducing potential off site recreational impacts;
- A SUDS scheme will be implemented to manage run-off from built development areas. The use of SUDS features will help to reduce the potential effect of point source pollution incidents from garden chemicals and/or domestic chemicals.
- Attenuation areas are also proposed to control surface water runoff rates to the required greenfield rate and to attenuate pollutants prior to discharge into the wider surface water network.

13.126 The design of the development has incorporated significant mitigation measures to reduce any potential impacts on off-site habitats. It is considered likely that an increase in local human population will have an increase in local population of domestic cats and dogs. Cats are known to predate on some species such as dormice and birds, and this can be difficult to prevent. This has the potential to have a significant adverse effect on the population of reptiles and birds present on site and in the local landscape.

13.127 With regards to cat predation of bird species, leaflets to new local residents will be made identifying the importance of the habitats on site, the species present on site and why they are protected. The management of pets, such as the use of bells on cats, will also be documented, encouraging owners to have a responsibility to wild animal welfare.

13.128 The creation of enhanced habitats, with generous native species planting, the establishment of wildlife boxes, the creation maintenance of connectivity around the site, will provide more optimal conditions for a range of species present on site and in the local area. Thus, the new planting will enhance the local carrying capacity for these species. It is therefore considered that any increase in local predation will be off set through the provision of new and more complex quality habitats.

13.129 Mitigation with regard to visitor pressure on locally designated sites has been included within the development. The development provides 22ha of publicly accessible open space including a children's' play area. Management of these habitats will be achieved by a financial contribution to the landowners for management of these habitats or through a Section 106 agreement. Management will include but not be limited to the planting of scrub species, coppicing, the use of dog bins and wildlife boxes.

Table 13.10 - Summary of operational mitigation measures

Mitigation measure	How it will be implemented and when
Management of areas of public open space and improved management and monitoring of existing and crested habitats	Landscape plan/strategy implementation Use of ANGSt and SANGS requirements to inform the recreational aspect of the development.
Monitoring of specific GCN populations and terrestrial habitats as part of the licence application	Monitoring of GCNs will form part of the licence application. Monitoring would be undertaken 2 and 4 years post development.
Education of local residential about cat and dog management	Educational leafleting as buildings become occupied
Creation of new habitats within the site	During construction – planting of public greenspaces, tree/shrub planting, Green infrastructural development. Creation of new swales, ponds and ditch systems for wildlife.
Creation of signed pathways through development providing recreational opportunities	Landscape plan/strategy implementation Use of ANGSt and SANGS requirements to inform the recreational aspect of the development.
Mitigation measures for adjacent designated sites	To be conditioned as part of the planning application Likely to form SAMMS payments

Assessment of Residual Impacts

13.130 Residual impacts are finally considered taking the development, construction and operational impacts, alongside mitigation measures. The outcome of the layout of the site and the mitigation measures employed throughout the construction and operational stages of the development aim to removal, where possible, any residual impacts.

Table 13.11 - Residual Effects During Construction and Operation

Receptor	Receptor Importance	Significance before mitigation	Mitigation	Residual Impacts
Medway Estuary and Marshes (SPA, Ramsar, SSSI)	International	Major	Creation of open space within the design of the site to provide recreational facilities within the site. SUDS, swales will be designed to minimise any pollution event. Access management (SAMMS) fund per household to support wardening and monitoring projects	Negligible
The Swale (SPA, Ramsar, SSSI)	International	Major	Creation of open space within the design of the site to provide recreational facilities within the site. SUDS, swales will be designed to minimise any pollution event. Access management (SAMMS) fund per household to support wardening and monitoring projects	Negligible
Elmley (NNR)	National	Minor	Creation of open space within the design of the site to provide recreational facilities within the site. SUDS, swales will be designed to minimise any pollution event.	Negligible
Milton Creek SNCI east of site;	Local	Minor	Creation of open space within the design of the site to provide recreational facilities within the site. SUDS, swales will be designed to minimise any pollution event.	Negligible
Hawes Wood and Wardwell Wood SNCI	Local	N/A	N/A	N/A.
Highstead Quarries SNCI	Local	N/A	N/A	N/A
Habitats lost: including arable, ruderal habitats and pockets of scrub, improved and amenity grassland	Site	Minor negative	N/A	Negligible
Newly created habitats including:	Site	Negligible	Long term management plan	Minor positive

Semi-improved grassland, wildflower grassland and scrub/shrub planting				
Broadleaved Woodland Newly planted trees	Local	Negligible	Long term management plan	Minor positive
Ditch	Local	Minor positive	Long term management plan Removal of litter, links with SUDS	Minor positive
Bats	Local	Negligible	Retention of trees and hedgerows, improved management, new planting Implementation of sensitive lighting scheme providing dark corridors Erection of bat boxes	Negligible
Badgers	Local	Negligible	improved habitat creation and new planting including species which badgers can forage from. Green edges and links allow badgers tom move across the wider landscape.	Negligible
Breeding birds	Local	Minor negative	Bird boxes and new planting to provide new opportunities. Creation of new habitats within the site for birds and sensitive long term management.	Negligible
Wintering birds	Local	Minor negative	Creation of new habitats within the site for birds and sensitive long term management.	Negligible
Reptiles	Local	Minor negative	Translocation of reptiles following best practice. New planting enhancements and sensitive habitat management post development	Minor positive
Great crested newts	Local	Minor negative	Translocation of GCNs following best practice and under Natural England licence. . New planting enhancements and sensitive habitat management post development Monitoring of population 2 and 4 years post development in line with the licence requirements and to ensure mitigation measures are effective.	Negligible

Cumulative Effects

13.131 The consented developments are all required, as a result of the planning process, to minimise effects on ecology through mitigation measures. The granting of planning permission for these sites must have been a result of assessing potential impacts on the surrounding habitats, including the Natura 2000 sites, as required by law and policy. This includes assessing the impacts alone and in combination with other projects and plans within the local landscape.

13.132 In April 2015, AECOM (formerly URS) undertook HRA for the Bearing Fruits 2031: Swale Borough Local Plan - publication version which was submitted for examination. The 2015 HRA for the Local Plan identified that there would be no likely significant effects upon internationally designated sites (principally the North Kent Marshes Internationally Designated Sites) as a result of increases in recreational pressure, provided that residential development within 6km of the internationally designated sites (and particularly large developments beyond 6km) pay appropriate financial contributions towards delivery of the Strategic Access Management and Monitoring Strategy (SAMMS) for the Swale SPA and Ramsar site, and Medway Estuary and Marshes SPA and Ramsar site. No impact pathways relating to recreational pressure stem from jobs target numbers. Air quality and water quality impacts were scoped out during the Local Plan HRA process. Proximity impacts do potentially exist, depending on the allocated sites in question, and were fully examined during the Local Plan HRA.

13.133 In September 2015 AECOM undertook an analysis of the implications of the Swale Housing Scenarios on the North Kent Marshes Internationally Designated Sites Ultimately this concluded that under Scenario B/C (the scenarios with providing for the largest increase in population), would probably not increase visitor pressure on the SPA to such an extent that it could not be addressed by the additional SAMMS contributions that would be made by those dwellings.

13.134 In June 2016 AECOM undertook a Habitats Regulations Assessment: Bearing Fruits 2031: The Swale Borough Local Plan: Proposed Main Modifications report. The main element of the report was to address concerns over an increase in the overall quantum of housing and employments delivered across the Swale. This document identifies a target for housing provision of 13,192 dwellings to the end of the plan period up from 10,800.

13.135 The Policy MU 1 land at north west Sittingbourne, has only been subject to minor changes that do not have HRA implications. MU 1 is the largest of the strategic allocations in the Swale Local Plan. The allocation of this site includes areas of POS, linear parks, and areas of swales and SUDS. It is considered that the allocation and the master planning of the site is in line with local plan policies including policies embedded within the local plan to reduce and minimise impacts on the designation sites. The land at Quinton Road, only forms part of the larger allocation site. However, it is considered that the full allocation has been assessed in combination with the sites in the wider landscape.

13.136 The provision of new dwellings in The Swale Borough Local Plan: Proposed Main Modifications June 2016 document is less than the worst-case scenario assessed in the September 2015 Housing Scenario analysis, and this overall increase in housing provision of new dwellings identified within the Proposed Main Modifications document can be screened out providing the SAMMS strategy is contributed to appropriately.

13.137 With regards to the expansion at Iwade (Local Plan Policy A17), this site is located immediately adjacent to the Swale SPA and Ramsar site and has the provision of 572 new dwellings. The text within the allocation of the site states that the masterplan must be informed by an HRA to include on site mitigation in the form of SANS provision and off-site contributions for residual impacts. This policy also provides for 'existing/new footpath and cycle routes' which have potential to lead to an increase in recreational pressure on the designated site dependant on where these routes are located. These would therefore require careful designing at the planning application stage. Other consideration for this particular site includes that of over wintering birds, recreational disturbance, disturbance from noise, lighting and visual intrusion. Mitigation of these must be considered.

13.138 An HRA was undertaken across all new allocated sites reflecting increases in houses per site and new additional housing areas, including sites such as Milton Pipes, Mill Way, Sittingbourne. All the sites were provided for within the scenarios previously tested (as above) and as such the changes within the housing policies do not require further consideration.

13.139 In terms of on-site habitats, it is considered that cumulative impacts resulting from developing in the wider landscape are not significant in terms of loss of habitats within the site boundaries, which are considered to be common and widespread. In terms of species that are known to be using the site, it is considered that development outside the red line boundary would not impact the species within the site boundaries. The site itself is well contained and as such does not support a wide range of species. No cumulative impacts are predicted.

Summary

13.140 The land at north west Sittingbourne, was identified as supporting habitat types are common and widespread throughout the UK, largely dominated by arable fields. The areas of scrub, grassland, ruderal edges were limited in nature and extent. The semi mature broadleaved woodland, scattered trees, tree lines and hedgerows were of site value only. The ditch was of local interest due to the linkages this provides across the landscape. The presence of several protected species were identified.

13.141 No badger setts were identified on the Quinton Road and Bramblefield Lane, and Land at Pheasant Farm site. However, historic records of a badger sett are present adjacent to the Great Grovehurst Farm site along the eastern railway embankment. Update surveys cannot confirm absence and the 2018 surveys recommended an update walkover prior to works commencing on site. It is considered that the development would not impact how badgers move across the site and there is potential to increase more optimal foraging habitat on the site post development.

13.142 Regarding foraging bats, small areas of foraging habitat such as sections of hedgerow are to be lost, however large areas are to be retained along with the on-site ditch, tree lines and woodland, which all provide suitable foraging habitat. Roosting opportunities will be created by installing bat boxes and a sensitive lighting scheme employed at the operational stage to ensure no negative effect on bats through light spill. It is considering that residual effects for bats will result in indiscernible changes for roosting and commuting and foraging bats on site.

13.143 A single bat roost, a brown long eared bat day roost, considered to be of low conservation significance, was identified in building 5 at Great Grovehurst Farm. It is considered a licence from Natural England will be required for demolition and this would be granted under the low impact scheme. Compensation will be required.

13.144 Minor impacts on breeding birds will be incurred through loss of the arable habitat however, impacts on birds may be mitigated through best practice procedure, such as clearance of vegetation outside of the bird breeding season or, if this is not possible, under ecological watching brief. The clearance of sections of vegetation will not be significant as these practices will only occur if no nests are found therefore reducing any potential impacts on local bird populations. Compensation for breeding and nesting birds will be implemented through additional landscape planting of native species and placement of bird boxes on suitable retained trees, ensuring an indiscernible residual effect.

13.145 Common lizards and slow worms are present around the very edges of the field margin, with grass snakes recorded at Great Grovehurst Farm These individuals will be translocated outside any development footprint. Areas which will be maintained and managed for wildlife, including reptiles are included within the scheme and as such no impacts are predicted on reptiles. It is likely that the reptile habitat will include enhancements for reptiles in the local area.

13.146 None of the ponds on or adjacent to the Quinton Road and Bramblefield Lane, and Land at Pheasant Farm site or the on-site ditch supported evidence of use by GCN with all eDNA samples supporting negative results.

13.147 A low population of GCNs were in the pond adjacent to the Great Grovehurst Farm site. A mitigation strategy will be detailed in a Natural England license. It is considered that the habitat creation within the site and the creation of new breeding opportunities within the site will provide sufficient habitat for the maintenance of the favorable conservation status of GCNs in the local area. The pond off site, to the north of The Swale Way, supports a medium population of GCNs. It is considered that this pond, over 250m from the Great Grovehurst pond and separated by barriers to dispersal, will not be impacted upon.

13.148 It is considered that the development is likely to have a negative effect on surrounding designated sites without mitigation. Dust and pollution on these habitats will be prevented by the employment of the CEMP. Long term impacts resulting from increased recreational pressure have been scoped out due to the design of the site and the linear park and recreational facilities on site. It is considered that financial contributions will be required in keeping with policy.

References

Anon (1981 & subsequent amendments). *Wildlife and Countryside Act.* HMSO, London.

Anon (1994). *The Conservation (Natural Habitats &c) Regulations.* HMSO, London.

Anon (2012) *National Planning Policy Framework*. Communities and Local Government, London

Bat Conservation Trust (2008) *Bats and lighting in the UK*, version 2 January 200B, http://www.bats.org.uk/publications_download.php/243/BATSANDLIGHTINGINTHEUKJan0B.pdf

Bat Conservation Trust (2012). *Bat Surveys – Good Practice Guidelines* (2nd Edition). Bat Conservation Trust, London.

Cresswell, P, Harris, S & Jefferies, D J (1990). *The history, distribution, status and habitat requirements of the badger in Britain*. Nature Conservancy Council, Peterborough.

English Nature (2001). *Great Crested Newt Mitigation Guidelines.* English Nature, Peterborough

English Nature (1999) *Habitats Regulations guidance note 3: the determination of likely significant effect under the Conservation (Natural Habitats &c) Regulations 1994.*

English Nature (1997) *Habitats Regulations guidance note 1: The Appropriate Assessment (Regulation 48) The Conservation (Natural Habitats &c) Regulations, 1994*

Froglife (1999) *Advice Sheet 10 - Reptile Survey: An introduction to planning, conducting and interpreting surveys for snake and lizard conservation*. Froglife, Peterborough.

Gent, T and Gibson, S (1998) *Herpetofauna Workers' Manual*. JNCC, Peterborough

Gilbert, G., D.W. Gibbons and J. Evans (1998) *Bird Monitoring Methods*, RSPB.

Harrison, C., Burgess, J., Millward, A. and Dawe, G. (1995) *Accessible natural greenspace in towns and cities: A review of appropriate size and distance criteria*. English Nature Research Report 153.

IEEM (2006) *Guidelines for Ecological Impact Assessment in the UK*, Institute of Ecology and Environmental Management, http://www.ieem.net/ecia

JNCC (2007) *Handbook for Phase 1 habitat survey - a technique for environmental audit*, Joint Nature Conservation Committee

ODPM (2005) *A Practical Guide to the Strategic Environmental Assessment Directive*

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), 143-155.

Chapter 14

CULTURAL HERITAGE

14. CULTURAL HERITAGE

Introduction

14.1 This Chapter contains an assessment of the likely significant environmental effects of the proposed development upon the Historic Environment. It considers the likely effects of the proposed development on archaeological remains and built heritage assets within the north-west Sittingbourne allocation and the wider area.

14.2 Built Heritage Statements (See Appendices 14.1 and 14.4) have been produced to support this Chapter. The statements provide a detailed assessment of the proposed development and its impact on built heritage assets and should be read in conjunction with this chapter.

14.3 An Archaeological Desk Based Assessment (See Appendix 14.2) and a Geophysical Survey Report (See Appendix 14.3) have also been produced for the land between Quinton Road and Bramblefield Lane and at Pheasant Farm. A separate Archaeological Evaluation Report has been produced for the land at Great Grovehurst Farm (See Appendix 14.5). The assessment considers the impact of the proposed development upon archaeological assets and should be read in conjunction with this Chapter.

Regulatory and Policy Context

Planning (Listed Buildings and Conservations Areas) Act, 1990

14.4 Legislation regarding buildings and areas of special architectural and historic interest is contained within the Planning (Listed Buildings and Conservation Areas) Act 1990. The relevant legislation in this case is set out in Section 66 of the 1990 Act, which states that special regard must be given by the planning authority in the exercise of planning functions to the desirability of preserving or enhancing listed buildings and their settings.

National Planning Policy Framework, 2012

14.5 The National Planning Policy Framework (NPPF), published 27th March 2012, sets out the Government's planning policies for England and how these are expected to be applied.

14.6 Paragraph 17 of the NPPF sets out the core planning principles and states that planning should "*conserve heritage assets in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of this and future generations*".

14.7 Section 12 of the NPPF, entitled 'Conserving and Enhancing the Historic Environment' provides policy on the conservation and assessment of heritage assets. Annex 2 of the NPPF defines 'Heritage Assets' as: "*A building, monument, site, place, area, or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest. Heritage asset includes designated heritage assets and assets identified by the local planning authority (including local listing)*".

14.8 Paragraphs 126 - 141 of Section 12 relate to the historic environment and the impact that developments may affect it. These paragraphs provide a framework for the preparation of policies for the historic environment and guidance for planning authorities, property owners, developers, and others on the conservation of heritage assets. Overall the objectives of Section 12 of the NPPF can be summarised as seeking the: Delivery of sustainable development; Understanding the wider social, cultural, economic, and environmental benefits brought by the conservation of the historic environment; Conservation of England's heritage assets in a manner appropriate to their significance; and Recognition that heritage contributes to our knowledge and understanding of the past.

14.9 Section 12 of the NPPF further recognises that intelligently managed change may sometime be necessary if heritage assets are to be maintained for the long term. Paragraph 128 of the NPPF states that local planning authorities in determining applications for development, should require applicants to describe the significance of the heritage assets affected and the contribution made by their setting. The paragraph indicated that the level of detail provided should be proportionate to the significance of the asset and sufficient to understand the impact of the proposal on this significance.

14.10 The NPPF policy states clearly that the more important the heritage asset, the greater level of protection is given to that asset. This means that listed buildings, scheduled monuments, protected wreck sites, battlefields, grade I and II* registered parks and gardens and World Heritage Sites are afforded the highest level of protection. Paragraph 132 states:

"When considering the impact of a proposed development on the significance of a designated heritage asset, great weight should be given to the asset's conservation. The more important the asset, the greater the weight should be. Significance can be harmed or lost through alteration or destruction of the heritage asset or development within its setting. As heritage assets are irreplaceable, any harm or loss should require clear and convincing justification. Substantial harm to or loss of a grade II listed building, park or garden should be exceptional. Substantial harm to or loss of designated heritage assets of the highest significance, notably scheduled monuments, protected wreck sites, battlefields, grade I and II listed buildings, grade I and II* registered parks and gardens, and World Heritage Sites, should be wholly exceptional*".

14.11 Paragraph 132 notes that significance can be harmed or lost through development within the setting of a heritage asset. Paragraph 133 provides a test for assessing harm in relation to designated heritage assets: *Where the application will lead to substantial harm or total loss of significance, local planning authorities should refuse consent*; Paragraph 134 notes that where development will lead to *less than substantial harm ….* the public benefits should be weighed against the loss.

Swale Borough Local Plan, 2017

14.12 The Swale Borough Local Plan, 2017 allocates the land at North-West Sittingbourne potential development under Policy MU1 and provides that planning permission will be granted or mixed uses, and will comprise a minimum of 1,500 dwellings, community facilities and structural landscaping and open space adjacent the A249 in accordance with national or local planning policy. In addition, the following policies are relevant:

- Policy CP8: Conserving and enhancing the historic environment requires that development sustains and enhances the significance of designated and non-designated heritage assets whilst creating for all areas a sense of place and special identity.
- Policy DM 32: Relates to development involving Listed Buildings and or its setting and sets out criteria for the determination of planning and listed building applications.
- Policy DM 34: Scheduled Monuments and Archaeological Sites set out criteria for the determination of development proposals affecting Scheduled Monuments and Archaeological Sites.

National Planning Practice Guidance, 2014

14.13 The Planning Practice Guidance was produced to support the NPPF. It reiterates that conservation of heritage assets in a manner appropriate to their significance is a core planning principle. It also states that conservation is an active process of maintenance and managing change, requiring a flexible and thoughtful approach.

14.14 Key elements of the guidance relate to assessing harm. It states, an important consideration should be whether the proposed works adversely affect a key element of the heritage asset's special architectural or historic interest. Adding, 'it is the degree of harm, rather than the scale of development that is to be assessed'. The level of 'substantial harm' is stated to be a high bar that may not arise in many cases. Essentially, whether a proposal causes substantial harm will be a judgment for the decision taker, having regard to the circumstances of the case and the NPPF.

14.15 The guidance states that harm may arise from works to the asset or from development within its setting. Setting is defined as *'the surroundings in which an asset is experienced and may be more extensive than the curtilage'*. A thorough assessment of the impact of proposals upon setting needs to consider, and be proportionate to, the significance of the heritage asset and the degree to which proposed changes enhance or detract from that significance and the ability to appreciate it.

Historic England – Conservation Principles, Policies and Guidance, 2008

14.16 Conservation Principles outlines Historic England's approach to the sustainable management of the historic environment. While primarily intended to ensure consistency in Historic England's own advice and guidance through the planning process, the document is recommended to local authorities to ensure that all decisions about change affecting the historic environment are informed and sustainable.

14.17 This document remains relevant with that of the current policy regime in the emphasis placed upon the importance of understanding significance to properly assess the effects of change to heritage assets. The guidance describes a range of heritage values which enable the significance of assets to be established systematically, with the four main 'heritage values' being: evidential, historic aesthetic and communal. The Principles emphasise that '*considered change offers the potential to enhance and add value to places… it*

is the means by which each generation aspires to enrich the historic environment' (Paragraph 25).

Historic England Good Advice Notes in Planning

14.18 On the 25th March 2015 Historic England (formerly English Heritage) withdrew the PPS5 Practice Guide. This document has been replaced with three Good Practice Advice in Planning Notes (GPAs), 'GPA1: Local Plan Making' (Published 25th March 2015), 'GPA2: Managing significance in Decision-Taking in the historic Environment' (Published 27th March 2015) and 'GPA3: The Setting of Heritage Assets (Published 25th March 2015).

14.19 Historic England has issued a Second Edition of GPA3 (22nd December 2017) however; the Built Heritage Statement produced to support this Chapter (See Appendix 14.1) was prepared prior to this and therefore, adheres to the GPA3 March 2015 guidance.

14.20 The GPAs provide supporting guidance relating to good conservation practice. The documents particularly focus on the how good practice can be achieved through the principles included within national policy and guidance. As such, the GPAs provide information on good practice to assist LPAs, planning and other consultants, owners, applicants, and other interested parties when implementing policy found within the NPPF and PPG relating to the historic environment.

14.21 In addition to these documents Historic England has published three core Advice Notes (HEAs) which provide detailed and practical advice on how national policy and guidance is implemented. These documents include; 'HEA1: Understanding Place: Conservation Area Designation, Appraisal and Management' (25th February 2016), 'HEA2: Making Changes to Heritage Assets' (25th February 2016) and 'HEA3: The Historic Environment and Site Allocations in Local Plans' (30th October 2015).

Historic Environment Good Practice Advice in Planning: Note 3 (GPA3): The Setting of Heritage Assets, 2015

14.22 As with the NPPF the document defines setting as 'the surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve'. Setting is also described as being a separate term to curtilage, character, and context. The guidance emphasises that setting is not a heritage asset, nor a heritage designation, and that its

importance lies in what it contributes to the significance of the heritage asset. It also states that elements of setting may make a positive, negative, or neutral contribution to the significance of the heritage asset.

14.23 While setting is largely a visual term, with views considered to be an important consideration in any assessment of the contribution that setting makes to the significance of an asset, setting, and thus the way in which an asset is experienced, can also be affected by other environmental factors including noise, vibration and odour, while setting may also incorporate perceptual and associational attributes pertaining to the asset's surroundings.

14.24 This guidance describes that the protection of the setting of a heritage asset need not prevent change and that decisions relating to such issues need to be based on the nature, extent, and level of the significance of a heritage asset, further weighing up the potential public benefits associated with the proposals. It is stated that changes within the setting of a heritage asset may have positive or neutral effects. The guidance describes that the contribution made to the significance of heritage assets by their settings will vary depending on the nature of the heritage asset and its setting and that different heritage assets may have different abilities to accommodate change within their settings without harming the significance of the asset and therefore setting should be assessed on a case-by-case basis.

14.25 Although not prescriptive in setting out how this assessment should be carried out, noting that any approach should be demonstrably compliant with legislation, national policies and objectives, Historic England recommend using the 'five-step process' to assess the potential effects of a proposed development on the setting and significance of a heritage asset:

1. Identification of heritage assets which are likely to be affected by proposals;
2. Assessment of whether and what contribution the setting makes to the significance of a heritage asset;
3. Assessing the effects of proposed development on the significance of a heritage asset;
4. Maximising enhancement and reduction of harm on the setting of heritage assets; and
5. The final decision about the acceptability of proposals.

Development being Assessed

14.26 The development being assessed is described in Chapter 4. The assessment is undertaken in combination with the development proposed on the remainder of the north-west Sittingbourne allocation.

Assessment Methodology and Significance Criteria

14.27 In accordance with the NPPF and local planning policy, an Archaeological DBA/Archaeological Evaluation Report and Built Heritage Statements have been prepared to inform the preparation of this chapter.

14.28 The baseline assessments contained in Volume 3, Appendix 14, combine both an examination of all available information (from sources such as the local Historic Environment Record), site visits and professional judgement to establish the known or potential baseline conditions within the area being assessed by this ES.

14.29 The archaeological desk-based assessment incorporated a search of Kent Historic Environment Record covering the north-west Sittingbourne allocation and a 750m buffer zone around it, and an examination of cartographic and documentary evidence in the Kent History and Library Centre and National Archives. The methodology followed relevant guidance issued by the Chartered Institute for Archaeologists (CIfA). Site visits were undertaken in 2012 and 2016, where the topography and evidence for archaeological remains on the site was assessed.

14.30 In addition, a geophysical survey was undertaken in 2016/17 to identify the potential for buried archaeological features on land between Quinton Road and Bramblefield Lane and the proposed School Site (Appendix 14.3). The methodology followed relevant guidance issued by the Chartered Institute for Archaeologists (CIfA). The scope of the survey was agreed in advance with Kent County Council's Principal Archaeological Officer. A separate evaluation was also undertaken for the land at Great Grovehurst Farm (see Appendix 4.5). The land at Pheasant Farm was excluded from the geophysical survey due to the presence of deep deposits of made ground recorded in geotechnical site investigations.

14.31 The Built Heritage Statements (see Appendices 14.1 and 14.4) have been prepared in accordance with the NPPF, Standards and Guidance prepared by Historic England including 'GPA3: The Setting of Heritage Assets March 2015' and 'Seeing History in View', as well as best practice.

14.32 The extent of the 1 km search area for the Built Heritage Statements was considered proportionate to the scale and nature of the proposal. It has been established manually through a combination of desk-based study and site visits, which were undertaken in August 2015 and April 2017.

14.33 The site was visited and assessed with permission from the land owner and the surrounding heritage receptors assessed from public accessible routes. The site visits were undertaken in spring and summer months and therefore, assumptions were made on the loss tree foliage during autumn and winter periods.

14.34 The consideration and forecasting of potential development effects is based upon an assessment of data relating to designated and non-designated heritage assets, undertaken by professionals with extensive desk and field-based experience in the identification, assessment, and mitigation of development-related effects on the historic environment.

14.35 The Significance of the Effect is dependent on the important of the heritage asset or its setting and the magnitude of the effect.

Significance Criteria

14.36 The assessment of likely significant effects because of the development has considered both the enabling, demolition and construction phases and post-completion and occupied phases.

14.37 The NPPF refers to the consideration of the 'significance' of heritage assets. However, in the context of an Environmental Impact Assessment (EIA), the term significance is used to denote the magnitude of likely environmental effects. Therefore, to avoid confusion, when referring to the NPPF, the term importance or sensitivity (rather than significance) is used within this assessment.

14.38 The determination of the importance of these assets is based on statutory designation and/or professional judgement including four values as given below:

- **Evidential value**: The potential of the physical remains to yield evidence of past human activity. This might consider: date, rarity, state of preservation, diversity/complexity, and contribution to published priorities, supporting documentation, collective value, and comparative potential;
- **Historic value:** The ways in which past people, events and aspects of life can be connected through heritage assets to the present, such as a connection often being illustrative or associative;
- **Aesthetic value:** This derives from the ways in which people draw sensory and intellectual stimulation from the heritage asset, considering what other people have said or written; and
- **Communal value:** This derives from the meanings of a heritage asset for the people who know about it, or for whom it figures in their collective experience or memory. Communal values are closely bound up with historical, particularly associative, and aesthetic values, along with educations, social or economic values.

Determining Receptor Sensitivity

Table 14.1 – Definition of Receptor Sensitivity

Sensitivity	Example
Very High	Internationally important archaeological sites or monuments. Internationally important areas, structures and other buildings designated as World Heritage Sites.
High	Ancient Monuments scheduled under the Ancient Monuments and Archaeological Areas Act 1979, or archaeological sites and remains of comparable quality, assessed with reference to the Secretary of State's non-statutory criteria. Scheduled Monuments with standing remains; Grade I, II* and II Listed Buildings; Conservation Areas containing very important buildings;
Medium	Archaeological sites and remains which, while not of national importance, score well against most of the Secretary of State's criteria. Historic (unlisted) buildings that can be shown to have exceptional qualities in their fabric or historic associations; Conservation Areas containing buildings that contributes significantly to its historic character; and Historic Townscape or built up areas with important historic integrity in their buildings.
Low (or lower)	Archaeological sites that score less well against the Secretary of State's criteria. 'Locally listed buildings' and undesignated built heritage of local significance.
Negligible	Areas in which investigative techniques have produced no or only minimal evidence for archaeological remains, or where previous large-scale disturbance or removal of deposits can be demonstrated.

Determining Magnitude of Impact

14.39 The magnitude of impact is determined as the predicted change to the existing baseline environment during and following the construction of the development. The impact can either be adverse or beneficial, direct, or indirect and the criterion for assessing the magnitude of impact.

14.40 Direct impacts are those that arise from the scheme itself. Indirect impacts arise away from the scheme or through complex pathways. Impact on setting can be defined as a direct impact if they arise from the scheme in a straightforward way, and impact directly upon the significance of the asset.

Table 14.2 – Determining the Magnitude of Impact

Magnitude		Example
Major	Adverse	Demolition of a built heritage asset. Complete removal of an archaeological site.
	Beneficial	Arrest of physical damage or decay to a built heritage asset or structure. Alteration to a built heritage asset resulting in significant beneficial impact. Arrest of physical damage or decay to an archaeological site resulting in significant beneficial impact.
Moderate	Adverse	Harmful alteration (but not demolition) of a built heritage asset. Removal of a major part of an archaeological site and loss of research potential.
	Beneficial	Alterations to a built heritage asset resulting in moderate beneficial impacts. Land use change resulting in improved conditions for the protection of archaeological remains plus interpretation measures (heritage trails, etc.).
Minor	Adverse	Alterations to a built heritage asset resulting in minor harm. Removal of an archaeological site where a minor part of its total area is removed but the site retains a significant future research potential.
	Beneficial	Alterations to a built heritage asset resulting in minor beneficial impacts Land use change resulting in improved conditions for the protection of archaeological remains
Negligible	Adverse	Negligible impact from changes in use, amenity, or access. Negligible direct impact to the built heritage asset Negligible impact from changes in use, amenity, or access to an archaeological asset.
	Beneficial	Very minor benefit.
No Change		No change would be perceptible, either positive or negative.

Determining Significance of Effect

14.41 The assessment of significance of any effect in EIA terms is founded on a professional judgement of the heritage important of a given asset or group of assets, as informed by policy guidance, when taken against the magnitude of effect.

Table 14.3 – Determining Significance of Effect

		Magnitude of Impact				
		No Change	***Negligible***	***Minor***	***Moderate***	***Major***
Receptor Sensitivity	***Very High***	Neutral	Slight	Moderate	Large	Very Large
	High	Neutral	Slight	Moderate	Large	Large
	Medium	Neutral	Slight	Slight	Moderate	Large
	Low	Neutral	Slight	Slight	Slight	Moderate
	Negligible	Neutral	Neutral	Neutral	Neutral	Neutral

Embedded Design Mitigation

14.42 There is no direct embedded design mitigation in relation to the historic environment. Indirectly, Local Plan Policy MU1 has specified that development of the North-West Sittingbourne allocation must provide a minimum of 22 ha natural and semi natural greenspace and other open space as a continuous buffer along the A249, creating an important local countryside gap between the settlements of Sittingbourne, Bobbing and Iwade. The creation of an appropriate link between Bramblefield Lane/Old Sheppey Way and the network of green spaces and corridors throughout the allocation. Therefore, the proposals are likely to include the implementation of a landscape strategy plan, which is reflected by the masterplan prepared for the allocation.

Consultation

14.43 No specific issues were raised at the ES Scoping Stage in relation to the built heritage aspects of the development however Swale Borough Council recommended that there was liaison with the Conservation Officer.

14.44 Following consultation with the Principal Archaeological Officer at Kent County Council it was confirmed that a programme of archaeological fieldwork comprising in the first instance of a pre-determination geophysical survey was required for the land between Quinton Road and Bramblefield Lane. Based on the results of the geophysical survey, further consultation with the Principal Archaeological Officer has determined that further archaeological investigations can most appropriately be completed post determination. The Principal Archaeological Officer has also requested that in the detailed design of the proposed school site, potential below ground impacts are kept to a

minimum along the line of the World War 1 Chatham Land Front defences, to achieve preservation in situ of this non-designated archaeological asset.

14.45 A separate programme of archaeological investigation was undertaken in relation to the land at Great Grovehurst Farm in consultation with the Principal Archaeological Officer at Kent County Council.

Baseline Conditions

Built Heritage

14.46 There are no built designated or non-designated heritage assets located within the area being assessed for the purposes of this ES. Several built heritage assets are located outside of the site. The Built Heritage Statements provide an assessment of the baseline conditions and potential impact of the proposed development on several built heritage assets within 1 km of the north-west Sittingbourne allocation.

14.47 The Built Heritage Statements found that the following built heritage assets are likely to be affected by the development; Church of Holy Trinity (Grade I listed), Bramblefield Farmhouse (Grade II listed), Great Grovehurst Farmhouse (Grade II listed) and Featherbed House (non-designated built heritage asset).

14.48 Full details of the baseline conditions and impact of the proposed development on the built heritage assets are found in Appendix 14.1 BHS. The following provides a brief synopsis of their significance and setting of the built heritage assets. Distances between the Site and the built heritage assets have been centred from OS National Grid Reference: TQ 900 658.

Listed Buildings:

14.49 Holy Trinity Church is located 965 metres south-east of NGR 900 658. Its significance derives from evidential, historic, aesthetic, and communal values. The evidential and historic values are experienced in a close setting of its surrounding graveyard and immediate urban vicinity. Its aesthetic and communal values are appreciated in an extended setting, accentuated by the broad and prominent stature of its western tower.

14.50 To varying degrees and subject to topography and vegetation, the church tower is visible from the Site, located amongst the surrounding urban form of Milton Regis and is recognised as a local landmark. Views afforded from Milton

Creek Country Park, located south-east of the church afford some resemblance of the building's historic separation from the urban form of Milton Regis and the Site forms a distant rural backdrop in some of these views. Therefore, the Site forms a small part of a wide, extended setting to the church however; its contribution to experiencing the significance of the church is relatively low.

14.51 Bramblefield Farmhouse is located 430 metres north-east of NGR TQ 900 658. The asset possesses evidential value as a timber-framed building, but this is not principally experienced from its exterior. The building possesses some historical value as a vernacular former farmhouse, albeit it lacks the traditional and recognisable farmstead. The building has stronger aesthetic value in its use of vernacular materials and architectural detailing, although these have experienced changes during the twentieth century.

14.52 A portion of the north-west Sittingboure allocation forms part of the extended setting to Bramblefield Farmhouse. However, the fields surrounding the asset do not represent the traditional orchard character which has been the historic land use around the farmhouse. Instead the building is now experienced principally as historic residence, located within a mixture of twentieth century houses and a surrounding agricultural character which provides secondary contributor to its aesthetic significance by providing a functional agricultural context.

14.53 Great Grovehurst Farmhouse is located 850 metres north-east of NGR TQ 900 658. The building possesses historical and evidential value representing a gentrified farmhouse derived from wealth generated by agriculture. In addition, its polite styled architectural character elevates its aesthetics design value, contrasting the vernacular styled farmhouses in the wider vicinity.

14.54 The farmhouse is experienced in a reduced agricultural setting having been separated from wider farmland by the construction and character of modern roads. In addition, modern former agricultural buildings located away from the farmhouse and coniferous planting convey a weakened experience of traditional agricultural character to the asset. The few fields to the north, north-east and the study site to the west possess some historical association and convey a degree of functional agricultural context to the farmhouse. This provides a low contribution to elements of the historic and aesthetic significance of the asset however; the altered state of the study site and road-related visual and noise intrusions have reduced the agricultural context and

therefore, the study site provides a secondary contributor to the overall setting of Great Grovehurst Farmhouse.

Table 14.4 – Summary of Designated Built Heritage Assets Sensitivity

National Heritage List Entry Number	Heritage Asset	Designation	Sensitivity
1061036	Church of Holy Trinity	Grade I	High
1061040	Bramblefield Farmhouse (excluding outbuildings)	Grade II	High
1057685	Great Grovehurst Farmhouse	Grade II	High

Non-designated Built Heritage Assets

14.55 Featherbed House is located 980 metres north-east of NGR TQ 900 568. The building has a low degree of historical and evidential value as a pair of traditional cottages altered into a single dwelling. It possesses greater aesthetic value in its use of vernacular materials. Featherbed House has had historical associations, as former cottages related with Great Grovehurst House (Grade II listed) and Pheasant Farmhouse (Grade II listed).

14.56 Modern highway building has enclosed, altered, and visually divorced the buildings from its historic farmland setting and contemporary buildings. To this extent it is experienced within an enclosed environment, which is reinforced by its surrounding dense planting and the altered topography. The study site to the south provides a very low contribution to the aesthetic significance of this asset.

Table 14.5 – Summary of non-designated built heritage asset's sensitivity

Historic Environment Record Number	Designation	Sensitivity
TQ 96 NW 1151	Non-designated Built Heritage Asset	Low

Archaeological Assets

14.57 There are no Scheduled Monuments, Registered Parks and Gardens or Battlefields within the area being assessed for the purposes of this ES or a 750m buffer zone around it. However, the crash site of a World War II Messerschmitt is designated as a Protected Military Remains Crash Site, at Bobbing Farm c. 700m south-west of the site.

14.58 A non-designated archaeological asset representing Post-Medieval Gravel Washing Mills are recorded on the Kent Historic Environment Record in the south-east of the site (TQ 86 NE 134; TQ 8981 6538). Additionally, a non-designated archaeological asset representing World War 1 Chatham Land Front defences are mapped crossing the north of the site from south-west to north-east.

14.59 This section reviews the archaeological/historical background of the general area and considers the potential for as yet undiscovered archaeological evidence on the site. In addition, this section considered the heritage importance of historic hedgerows on the site.

Prehistoric

14.60 No finds of Palaeolithic material are recorded within the 750m of the site. Overall the archaeological potential of the site for this period for both in situ or derived remains is thought to be low.

14.61 Areas of higher drier ground such as the site were favoured hunter gatherer campsite locations, from which the lower lying marshland to the north could be exploited. Large Mesolithic flint assemblages indicating camp sites are recorded at Milton Regis (TQ 96 NW 26; TQ 900 650) and Lower Halstow (TQ 86 NE 8: TQ 8678 6857, TQ96 NW 26: TQ 8633 6770, TQ 86 NE 39; TQ 870675, TQ 86 NE 40, TQ 860 670, TQ 86 NE41; TQ 860 670 and TQ 86 NE 43: TQ 860 670). Both the Milton Regis and Lower Halstow camp sites are in topographically similar positions overlooking tributaries of the Swale (The Milton Creek and the Halstow Creek).

14.62 The electricity substation site north east of the study site is thought to be the location of an extensive and important Neolithic activity site recorded from 1871 (TQ 96 NW6, TQ 9088 6666). The site was first discovered during brickearth quarrying and by 1898 was marked on Ordnance Survey maps. The precise details of the find are unclear. The site was originally interpreted as a

permanent settlement within sunken floored roundhouses represented by circular hollows c.3m to 3.6m in diameter, and c.0.90m deep, containing 'occupation' debris including evidence for wattle and daub superstructures. It is now thought the features are more likely to represent a pit complex associated with ceremonial activity. The Neolithic remains were probably largely destroyed by 1898 by which date most of what is now the area of the electricity substation site had been quarried. It is unlikely that the Grovehurst Neolithic settlement extends into the study site.

14.63 Archaeological interventions at Great Grovehurst Farm (Wessex Archaeology, 1996) and adjacent and east of the study area (Canterbury Archaeological Trust, 2003/Museum of London Archaeology Service, 2003 and 2004), revealed no certain in situ Mesolithic or early Neolithic material, and a very few residual artefacts of possible late Neolithic date (MacKinder, 2006). Archaeological investigations on land north of Swale Way recorded a possible Neolithic pit, and residual Neolithic pottery (Wessex Archaeology 2013). The archaeological potential of the site for the Mesolithic and Neolithic periods can therefore probably be defined as low.

14.64 An archaeological evaluation and fieldwalking exercise around Great Grovehurst Farm (Wessex Archaeology, 1996) and more recent investigations (Wessex Archaeology, 2017) have revealed evidence for low density late Bronze Age and Iron Age activity with evidence suggesting agricultural land use. Middle Bronze Age field boundaries were recorded during archaeological investigations north of Swale Way (Wessex Archaeology 2013).

14.65 Archaeological excavations at Iwade, to the north-west of the study site, revealed Middle Bronze Age pits and a well shaft, with a trackway and field-system established by the late Bronze Age. The site was then abandoned until the Late Iron Age when it was occupied by a farmstead with three roundhouses (Bishop & Bagwell, 2005).

14.66 At the Kemsley Fields Distributor Road and Northern Housing Area excavation to the east of the study site (MacKinder, 2006), Late Bronze Age activity was recorded along the Ridham Avenue frontage, which could be a continuation of the mid to Late Bronze Age occupation found to the south east at Kemsley Down (Hutchings and Willson 2001). Late Bronze Age flintwork was observed across this site. On the highest part of the Northern Housing Area in the south-west there was a small Middle Iron Age settlement, comprised of four penannular ditches representing roundhouses. A probable trackway led down to the marshes in the north (MacKinder, 2006). The settlement in this area was

observed at levels between c. 15m AOD on the south and c. 12m AOD on the north.

14.67 Overall the archaeological potential of the study site for the Bronze Age and Iron Age can probably be defined as low to moderate across the site with low density agricultural activity most likely to be represented. It is perhaps unlikely that additional Bronze and Iron Age settlement sites will be represented within the study site given the proximity of the Iwade and Kemsley settlements.

Roman

14.68 The archaeological evaluation to the north of the site revealed evidence for Roman agricultural activity (Wessex Archaeology, 1996) in the form of a Roman ditch.

14.69 An archaeological evaluation, from the railway bridge to the road junctions, 3, 5 and 6 of the Kemsley Fields Distributor Road in 2002, revealed three late Iron Age or early Roman ditches in Trench 35/36 (Allen 2002, Fig. 3). These were thought to represent a rural track or 'Hollow way' and a possible field boundary.

14.70 The excavation at Kemsley Fields Distributor Road and Northern Housing area, east of the study site, revealed several small pits or postholes along the Ridham Avenue frontage containing Late Iron Age/early Roman artefacts. There were several ditches. A major one running north west to south east, was probably a field boundary and it contained a large amount of pottery. Although no structures were found, there was clearly Roman settlement nearby, probably located on the crest of the higher ground to the south (MacKinder, 2006).

14.71 Archaeological excavations at Iwade recorded only a temporary re-use of an Iron Age enclosure in the 2nd century (Bishop & Bagwell, 2005).

14.72 Overall the archaeological potential of the site for this period can probably be defined as low to moderate across the remainder of the study site. Evidence of land division and agricultural activity may be represented.

Medieval

14.73 None of the archaeological interventions, on or nearby to the study site have encountered any evidence of early Medieval activity.

14.74 Early-medieval burials were recorded from Milton Regis in 1916, associated with finds including glass beads, gold pendants and a cross, and a hoard of silver Sceattas (dating to c.700 AD) (TQ 96 SW 56, TQ 9049 6477).

14.75 During the later Medieval period the whole of the study site would have lain in agricultural land. Overall the archaeological potential of most of the study site for the Medieval periods can be defined as low and moderate for evidence of agricultural activity.

Post-Medieval

14.76 The site lies within the historic parishes of Bobbing and Milton-Next-Sittingbourne.

14.77 The Andrews, Drury and Herbert Survey of 1769 shows the site lying with farmland to the east of Howt Green. The map clearly identifies a farmstead at ‘Grove Hurst’ a precursor to the existing farm complex. The 1797 Hasted map shows the line of Bramblefield Lane crossing through the study site. The 1797 Ordnance Survey map shows the detail of field boundaries on the study site and several Orchards in the north, centre and south of the study site. The Bobbing Tithe map and Award of 1840 records the south-west of the study site as occupying fields comprising a mix of arable and pasture. The Milton Next Sittingbourne Tithe Map and Award of 1841 record the land at the study site as a mixture of Arable, Pasture and Orchards. Bramblefield Barn and Yard are recorded off Bramblefield Lane in the centre of the study site, and a building complex is recorded north of Great Grovehurst Farm. Cottages and gardens are recorded in the south-west of the study site on ‘Quinton Street’.

14.78 The first edition Ordnance Survey map of 1865 shows the study site in detail. The ancillary buildings of a farm complex known as ‘Great Grovehurst’ are shown in the north of the site with Orchards to the north-west. Further Orchards are shown surrounding Bramblefield Barn in the centre of the site. In addition, Orchards are shown surrounding Quinton Farm and Quinton Cottages.

14.79 By 1896 further Orchards are shown in the centre and north of the study site. By 1906 possible quarries and tracks relating the Gravel Washing Mill are shown in the south-east of the site. Post-Medieval Gravel Washing Mills are recorded on the Kent HER in the south-east of the study site (TQ 86 NE 134; TQ 8981 6538). By 1947 two buildings at the Gravel Washing Mill are marked on the Ordnance Survey map and Orchards are shown across most of the site. The 1961 Ordnance Survey map shows an area of marshland in the east of the study site north of the former Gravel Washing Mill. Between 1961 and 2012 the Orchards were removed from the study site, and most of the historic field boundaries were removed.

14.80 The Hedgerow Regulations 1997 (Paragraph 1) determine that hedgerows surviving along Parish boundaries are important however the section of hedgerow lining a ditch which runs along the parish boundary in the south of the study site is now removed.

14.81 Vertical aerial photographs were consulted at the Kent County Council Historic Environment Record Office, Maidstone and no crop marks or earthworks were observed on the study site. Aerial photographs dating to the 1960's show most of the study site as Orchards. The absence of archaeological features on aerial photographs may reflect the local geology and does not preclude the potential for buried archaeological features to be represented.

14.82 Overall, the archaeological potential of the study site for Post-Medieval and Modern evidence would be confined to the existing Barn at Bramblefield Lane, and any below ground remains of the World War 1 Chatham Land Front defences in the north of the site, and any below ground remains of the 20th century quarry Gravel Washing Mill in the south-east of the study site.

Geophysical Survey and Ground Conditions

14.83 The geophysical survey detected an arc of positive responses in the north-west of the site, which approximates to the location of some of the WWI defences shown on the Great Grovehurst plot. The anomaly is closest to the crenelated symbol on the Grovehurst plot. In addition, former field boundaries were identified probably of post-medieval origin, as were some modern pipes.

14.84 A geotechnical site investigation report detailing the ground conditions of land at Pheasant Farm in the northernmost part of the site, between Bramblefield Lane and Grovehurst Farm was recently undertaken (LEAP Environmental, February 2016). The geotechnical site investigation records deep made ground

landfill deposits up to 3.5m thick, which were placed on this part of the site during the cutting and construction of the Iwade Bypass A249 in the 1990's.

Assessment of Archaeological Significance

14.85 Significance as defined in the NPPF centres on the value of an archaeological or historic asset for its 'heritage interest' to this or future generations. There are no designated archaeological assets on or near the study site. However, there are two non-designated archaeological assets on the site itself, represented by potential for buried remains of World War 1 land defences in the north of the study site and potential for buried remains of post-medieval Gravel Washing Mills in the south of the site, considered to be of low-medium and low significance respectively. The geophysical survey identified evidence for potentially a small section of WW1 defensive trenches and probable post-medieval field boundaries. The archaeological desk-based assessment concludes that, based on the HER evidence and other relevant material, there is a low to moderate potential for archaeological assets dating from the later prehistoric and Roman periods in the north of the study site and a moderate potential for medieval and post-medieval agricultural evidence across the site. These potential archaeological assets are of low significance.

Table 14.6 – Summary of Archaeological Assets Sensitivity

Archaeological Asset	Designation	Sensitivity
Potential for buried remains of World War 1 Chatham Land Front Defences	Non-designated archaeological asset	Low to Medium
Potential for buried remains of Post-Medieval Gravel washing mills	Non-designated archaeological asset	Low
Potential for buried remains of Post-Medieval field boundaries	Non-designated archaeological asset	Low
Potential for buried remains of prehistoric and Roman date	Non-designated archaeological asset	Low

Assessment of Potential Impacts

Construction Phase

Direct Effects – Archaeology

14.86 The site is considered to have a theoretical archaeological potential for prehistoric and Roman evidence, and below ground remains of Post-Medieval Gravel Washing Mills in the south of the site and WW1 defences in the north of the site. Construction groundworks and landscaping for the residential and school development, access roads and supporting infrastructure have the potential to remove these archaeological remains from the site. The resultant effect significance is Minor Adverse given the low-medium sensitivity of the potential archaeological assets and the Minor Adverse magnitude of effect.

14.87 Proposed development on the site would not affect any below ground designated archaeological assets.

Direct Effects – Built Heritage

14.88 Potential direct effects which may occur during the construction phase to the settings of surrounding designated a built heritage assets and non-designated built heritage assets include increased noise, vibration, dust, and visual effects in association with construction related traffic and associated construction infrastructure.

14.89 These direct effects will potential affect designated built heritage receptors of high sensitivity including Bramblefield Farmhouse (Grade II listed), and Great Grovehurst Farmhouse (Grade II listed). These construction direct effects are not considered to affect Holy Trinity Church owing to the distance of the receptor from the Site.

14.90 These direct effects would also have the potential to affect the non-designated built heritage asset of Featherbed House which is a receptor of low sensitivity.

14.91 These direct effects would be short-term and fully reversible and managed by adherence to standard good practices and the likely implementation of a CEMP. The effects are not considered to impair the amenity use, accessibility, or appreciation of the receptors. Therefore, the resultant likely significance of effect on the receptors is slight, given the high sensitivity of the receptors and the negligible adverse magnitude of impact.

Indirect effects – Archaeology

14.92 There are not considered to be any indirect effects on archaeology assets during the construction phase.

Indirect effects – Built Heritage

14.93 There are not considered to be any indirect effects on the built heritage assets during the construction phase.

14.94 Table 14.7 is a summary table of the significance of direct effects during construction for built heritage assets. These direct effects are short-term and fully reversible.

Table 14.7 - Significance of Effects during Construction

Built Heritage Assets			
Receptor	**Value**	**Magnitude of Effect**	**Likely Significance of Effect**
Bramblefield Farmhouse (Grade II listed)	High	Negligible	Slight
Great Grovehurst Farmhouse (Grade II listed)	High	Negligible	Slight
Featherbed House	Low	Negligible	Slight
Archaeology Assets			
Receptor	**Value**	**Magnitude of Effect**	**Likely Significance of Effect**
Potential for buried remains of World War 1 Chatham Land Front Defences	Low to Medium	Minor Adverse	Low
Potential for buried remains of Post-Medieval Gravel washing mills	Low	Minor Adverse	Low
Potential for buried remains of Post-Medieval field boundaries	Low	Minor Adverse	Low
Potential for buried remains of prehistoric and Roman date	Low	Minor Adverse	Low

Operational (Occupation) Phase

Direct Effects – Archaeology

14.95 There would be no effect on archaeological assets during the occupation because impacts and effects would be mitigated at the construction stage.

Direct Effects – Built Heritage

14.96 Potential direct effects during the operational phase to the settings of surrounding designated and non-designated built heritage assets include visual changes and the introduction, noise, and pollution. These direct effects are long term but not permanent.

Holy Trinity Church (Grade I listed)

14.97 The proposed Development has the potential to produce a direct visual effect by the introduction of a developed character onto a small part of the receptors extended rural setting, which makes a very low contribution to the significance of the receptor. The effect is not considered to impair the receptors amenity use, accessibility, or appreciation. The effect is long-term but not permanent and the implementation of the embedded landscape strategy, will screen and soften the visibility of the Development. Therefore, the resultant likely significance of effect on the receptor is slight, given the high sensitivity of the receptor and the negligible adverse magnitude of impact.

Bramblefield Farmhouse (Grade II listed)

14.98 The proposed development has the potential to produce direct visual, noise, and pollution effects to the setting of the receptor derived from the new access road, which is proposed to be located west of the receptor. The effects will introduce a developed character to the agricultural setting of the receptor, which provides a secondary contribution to the significance of the receptor. These effects are long-term but not permanent and the proposed implementation of the landscape strategy, for example the retention of field hedgerows and shelterbelt planting would screen and soften the impact of the road. Therefore, the resultant likely significance of effect on the receptor is moderate, given the high sensitivity of the receptor and the minor adverse magnitude of impact.

Great Grovehurst Farmhouse (Grade II listed)

14.99 The proposed Development has the potential to produce direct visual, noise, and pollution effects towards the setting of the receptor derived from the new access road. The new access road is likely to be lower than the existing Grovehurst Road following the extraction of brickearth but the effects will extend this developed character of the receptor's agricultural setting, which provides a secondary contribution to the significance of the receptor. These direct effects would be long-term but not permanent on the setting and the proposed implementation of the embedded landscaping strategy would screen and soften the impact of the road. Therefore, the resultant likely significance of effect on the receptor is slight, given the high sensitivity of the receptor and the negligible adverse magnitude of impact.

Featherbed House (non-designated built heritage asset)

14.100 The proposed Development has the potential to produce direct visual, noise, and pollution effects to the setting of the receptor derived from the new access road, which is proposed to be located south of the receptor. The effects will increase the enclosure and developed character to a part of its setting, which provides a very low contribution by means of agricultural function context to the significance of the receptor. These effects are long-term but not permanent and the proposed implementation of the landscape strategy would screen and soften the impact of the road. Therefore, the resultant likely significance of effect on the receptor is low, given the low sensitivity of the receptor and the minor adverse magnitude of impact.

Indirect Effects – Archaeology

14.101 There would be no indirect effect on archaeological assets during the occupation because impacts and effects would be mitigated at the construction stage.

Indirect Effects – Built Heritage

14.102 There are not considered to be any indirect effects on the built heritage assets during the operational phase.

Table 14.8 – Significance of Effect during Operation

Receptor	Value	Magnitude of Effect	Likely Significance of Effect
Holy Trinity Church (Grade I listed)	High	Negligible Adverse	Slight
Bramblefield Farmhouse (Grade II listed)	High	Minor Adverse	Moderate
Great Grovehurst Farmhouse (Grade II listed)	High	Negligible Adverse	Slight
Featherbed House	Low	Minor Adverse	Low

Cumulative Impacts

Land Adjacent to Quinton Farmhouse

14.103 A 7.9 ha field immediately south-west of the Site forms part of the overall allocation and is being brought forward by Redrow Homes. The proposals for this area will involve the construction of 155 dwellings, together with public open and amenity space, associated landscaping, footpaths and cycleways, parking, utilities, and service infrastructure. A new access would be constructed from Quinton Road to the west of the junction formed by Quinton Road and Sonora Way and located between Quinton Farmhouse (Grade II listed) and Quinton Cottage (Grade II listed).

14.104 There will be no cumulative impacts on archaeological assets because of the proposed developments on land adjacent to Quinton Farmhouse, as any archaeological effects resulting from these developments will have be mitigated ahead of construction.

Construction Phase

Direct Effects

14.105 There will be no cumulative impacts on the built heritage assets during the construction phase because of the proposed development on the Land Adjacent to Quinton Farmhouse, as direct effects resulting from the development are anticipated to have been managed through adherence to standard good practices and the likely implementation of a CEMP.

Indirect Effects

14.106 There are not considered to be any cumulative indirect effects towards built heritage assets during the construction phases of the development on Land Adjacent to Quinton Farmhouse.

Operational (Occupation) Phase

Direct Effects

14.107 Potential direct effects from the cumulative impact of the proposed development on the Land Adjacent to Quinton Farmhouse to the setting of Bramblefield Farmhouse (Grade II listed) would be an increase in visual, noise and pollution effects derived from connection of the respective access roads. These effects are long-term but not permanent and proposed alternative access and exit routes would reduce the potential cumulative increases. Therefore, the resultant likely significance of effect on the receptor would still be moderate, given the high sensitivity of the receptor and the minor adverse magnitude of impact.

Indirect Effects

14.108 There are not considered to be any indirect effects towards built heritage assets during the operation phase of the development on the land Adjacent to Quinton Farmhouse.

Table 14.10 – Significance of Effect during Operation

Receptor	Value	Magnitude of Effect	Likely Significance of Effect
Bramblefield Farmhouse (Grade II listed)	High	Minor Adverse	Moderate

Land at Great Grovehurst Farm

14.109 A 4.8 ha area of agricultural land north-east of Great Grovehurst Farmhouse (Grade II listed) forms part of the overall allocation but is being brought forward by a G H Dean and Co. The proposals for the land at land at Great Grovehurst Farm will involve the construction of up to 110 dwellings together with public open and amenity space, associated landscaping, footpaths and cycleways, parking, utilities, and service infrastructure. New road access is proposed on

the eastern side of Grovehurst Road in addition to an emergency access road link.

14.110 There will be no cumulative impacts on archaeological assets because of the proposed developments on land adjacent to Great Grovehurst Farm and the land adjacent to Quinton Farmhouse resulting from these developments will have be mitigated ahead of construction.

Construction Phase

Direct Effects

14.111 There will be no cumulative impacts on the built heritage assets during the construction phase because of the proposed development on the land at Great Grovehurst Farm as direct effects resulting from the development are anticipated to have been managed through adherence to standard good practices and the likely implementation of a CEMP.

Indirect Effects

14.112 There are not considered to be any cumulative indirect effects towards built heritage assets during the construction phases of the development on the land adjacent to Quinton Farmhouse.

Operational (Occupation) Phase

14.113 Potential direct effects from the cumulative impact of the proposed development on the land at Great Grovehurst Farm to the setting of Great Grovehurst Farmhouse (Grade II listed) would be an increase in visual, noise and pollution effects derived from traffic using the existing Grovehurst Road, running west of the receptor. These effects are long-term but not permanent and the cumulative increase is anticipated to be low, owing to the size of the development. Therefore, the resultant likely significance of effect on the receptor would still be slight, given the high sensitivity of the receptor and the negligible adverse magnitude of impact.

14.114 The potential cumulative increase of the effects to the setting of Featherbed House (non-designated built heritage asset) is also anticipated to be low and therefore, the resultant significance of effect on this receptor is also considered to remain slight, given the low sensitivity of the receptor and the negligible adverse magnitude of impact.

Table 14.11 – Significance of Effect during Construction

Built Heritage Assets			
Receptor	Value	Magnitude of Effect	Likely Significance of Effect
Great Grovehurst Farmhouse (Grade II listed)	High	Negligible Adverse	Slight
Featherbed House	Low	Negligible Adverse	Slight

Indirect Effects

14.115 There are not considered to be any indirect effects towards built heritage assets during the construction phases of the development on land at Great Grovehurst Farmhouse.

Potential Mitigation / Management Techniques

14.116 Construction groundworks for the proposed development have the potential to effect below ground archaeological remains. Therefore, it is anticipated that a programme of archaeological work will be required. This would take the form of a phased programme of archaeological investigation and recording. A pre-determination phase of geophysical survey was undertaken between 2016 and 2017.

14.117 The second phase of archaeological investigation would comprise a trial trench evaluation targeted on geophysical anomalies where appropriate. Depending on the results of the evaluation, this investigation would be followed by a strip, map, and record exercise on areas of significant archaeological deposits, as appropriate, representing preservation by record of archaeological assets where preservation in situ is not possible.

Assessment of Residual Impacts

14.118 There will be no residual effects on archaeological assets following the completion of the development; all effects will have been mitigated at the design and construction stage.

14.119 There will be no residual effect on built heritage assets following the completion of the development, as all effects will have been mitigated at the design, construction, and operation stages.

Table 14.13 Summary of Impacts

Impact Description	Receptor Sensitivity	Magnitude of Impact (with incorporated mitigation)	Short / medium / long-term	Pre-mitigation effect	Further mitigation	Magnitude of impact (with additional mitigation)	Residual Effect
Potential impact of construction groundworks upon potential archaeological remains	Low to Medium	Minor Adverse	Short term	Minor Adverse	Archaeological investigation and recording	Minor Adverse	N/A
Holy Trinity Church. Grade I Listed Building NHLE Entry: 1061036.	High	Neutral	N/A	N/A	N/A	N/A	None
Bramblefield Farmhouse (excluding farm buildings). Grade II listed. NHLE Entry: 1061040.	High	Minor Adverse	Long-term Non-permanent	Moderate	None	Moderate	None
Great Grovehurst Farmhouse. Grade II listed. NHLE: 1057685.	High	Negligible Adverse	Long Term Non-permanent	Slight	None	Slight	None
Featherbed House. Non-designated Built Heritage Asset. HER: TQ 96 NW 1151.	Low	Negligible Adverse	Long Term Non-permanent	Slight	None	Slight	None

Chapter 15

SOCIO-ECONOMIC EFFECTS

15. SOCIO ECONOMIC EFFECTS

Introduction

15.1 This Chapter sets out the results of an assessment of the socio-economic effects of the proposed development upon the local community. A description of the development being assessed in given in Chapter 4.

15.2 The social benefits and effects have been assessed in terms of their impact upon local services. The economic benefits and effects have been assessed in terms of net employment gains and value added to the local economy.

15.3 In assessing the socio-economic effects this chapter also considers the findings of other ES Chapters which have some relevance to the understanding the effects on communities in the socio-economic assessment.

Regulatory and Policy Context

National Planning Policy Framework, 2012

15.4 The NPPF has sustainable development at its core, stating that the policies in paragraphs 18-219 taken constitute the Government's view of what sustainable development in England means in practice for the planning system[1]. It recognises that sustainable development has three dimensions: economic, social and environmental, and these dimensions are reflected in the 12 'Core Planning Principles'. Those of relevance to this socio-economic impact assessment are to:

- Proactively drive and support sustainable economic development to deliver the homes, business and industrial units, infrastructure and thriving local places that the country needs; and
- Take account of and support local strategies to improve health, social and cultural wellbeing for all, and deliver sufficient community and cultural facilities and services to meet local needs.

15.5 These underpin the 13 ways of 'delivering sustainable development', the most relevant to this Socio-Economic Impact assessment being listed below:

[1] Para 6, NPPF 2012

- Building a strong, competitive economy (1);
- Supporting a prosperous rural economy (3); and
- Promoting healthy communities (8).

15.6 In relation to (1) it is stated that "the Government is committed to ensuring that the planning system does everything it can to support sustainable economic growth. Planning should operate to encourage and not act as an impediment to sustainable growth. Therefore, significant weight should be placed on the need to support economic growth through the planning system" (paragraph 19).

15.7 Paragraph 21 further states that "investment in business should not be over-burdened by the combined requirements of planning policy expectations and planning policies should recognise and seek to address potential barriers to investment, including a poor environment or any lack of infrastructure, services or housing". It also involves ensuring that town centres remain vibrant (paragraph 23), by recognising the role that residential development can play in ensuring vitality of centres.

15.8 Social sustainability encompasses the delivery of a wide choice of high quality homes (paragraphs 47 - 55) to meet market and affordable needs and identifying key sites critical to deliver housing. Social sustainability also includes the need to promote healthy communities (paragraphs 69 - 78), planning positively for inclusive places, and the provision and use of community facilities, such as schools, local services, open spaces, including sports and recreation.

Swale Borough Local Plan, 2017

15.9 In July 2017, Swale Borough Council adopted a new Local Plan. This sets out the vision and overall strategy for the area and how it will be achieved for the period 2014-2031. The Local Plan's Core Objectives, as set out in Statement One, seek to support economic success, improve community wellbeing, bring a better quality of life and opportunities for healthy lifestyles to communities, diversify the economy, promote investment in skills, bring economic growth and regeneration, and provide the right housing to support demographic change. Additionally, Statement One seeks to re-establish Sittingbourne as the principal town with investment in retail, leisure, culture and community services and further education, within new and improved green spaces and streets. Several policies in the Local Plan seek to facilitate these Core Objectives.

15.10 The building of a strong and competitive economy which attracts inward investment, as well as the promotion of healthy communities are some of the key

foci of Policy ST1 – Delivering Sustainable Development in Swale. This policy additionally recognises the centre role of Sittingbourne within the Borough's settlement hierarchy. Moreover, Policy ST1 seeks to deliver a wide choice of quality homes by meeting the full objectively assessed need for the housing market area and providing a range of housing types to meet varying local needs. Targets to provide additional employment floorspace and 13,192 dwellings between 2014 and 2031 are set out under Policy ST2 – Development Targets for Jobs and Homes.

15.11 Policy ST5 – The Sittingbourne Area Strategy sets out specifically how development proposals should shape the town going forward. This policy seeks to increase the supply and quality of existing strategic employment sites, allocations, within the town centre regeneration area, or where the need for office floorspace can be additionally met. The Policy also seeks to create, where appropriate, mixed use and healthy communities and address disparities and housing market variances between communities north and south of the A2 through high quality design, new facilities, and new jobs as appropriate. Reducing deprivation in the most deprived wards in Sittingbourne is another focus of Policy ST5.

15.12 Policy CP1 seeks to build a strong and competitive economy, particularly through encouraging home-grown business creation and inward investment, retaining young people in Swale and their skillsets, improving the visitor economy, and the expansion of the pharmaceutical and science sectors and educational facilities within the Borough.

15.13 Policy CP5 concerns health and wellbeing and indicates that the Borough Council will work in conjunction with relevant organisations, communities, and developers to promote, protect and improve the health of Swale's population and reduce inequalities. Measures to achieve this within Policy CP5 include the provision of new community and health facilities, the safeguarding of existing facilities, and the promotion of social interaction and healthy lifestyles through the design of new developments.

15.14 Policy MU1 refers specifically to the north-west Sittingbourne allocation and refers at Point 11 to the provision of appropriate community facilities and other infrastructure to meet the needs of future residents particularly those relating to health care, leaning and skills

Development being Assessed

15.15 The development being assessed is as described in Chapter 4 and encompasses the Land between Quinton Road and Bramblefield Lane and at Pheasant Farm and Great Grovehurst Farm. This assessment has been undertaken having regard to the development proposed on the land adjacent Quinton Farmhouse which also forms part of the north-west Sittingbourne allocation.

Assessment Methodology and Significance Criteria

15.16 There are no defined significance criteria relevant to socio-economic effects, consequently significance criteria have been developed based upon experience of similar projects and the use of professional judgement. The following table therefore sets out the significance criteria that have been used.

Table 15.1 – Receptor Sensitivity

Sensitivity	Definition
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, 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, 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.

15.17 The magnitude of the effect on the baseline is then assessed based upon the scale, extent of change, nature, and duration of the effect to determine the potential impact.

15.18 Table 15.2 below defines the impact magnitude that has been used for the purposes of this socio-economic chapter.

Table 15.2 – Impact Magnitude

Magnitude	Definition
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 like the existing situation.
Negligible	Very minor alteration to one or more key characteristics of the baseline (current and forecast future) conditions. Change barely distinguishable.

15.19 Using these definitions, a combined assessment of sensitivity and magnitude has been undertaken to determine how significant an effect is, as demonstrated in Table 15.3 below. The shaded areas indicate where the effects are significant in EIA terms. The effects can either be beneficial or adverse.

Table 15.3 - Significance of Effect

		Magnitude of Impact				
		No Change	***Negligible***	***Minor***	***Moderate***	***Major***
Receptor Sensitivity	***High***	Neutral	Slight	Moderate	Large	Large
	Medium	Neutral	Slight	Slight	Moderate	Large
	Low	Neutral	Slight	Slight	Slight	Moderate
	Negligible	Neutral	Neutral	Neutral	Neutral	Neutral

Embedded Design Mitigation

15.20 The proposed development has been designed to ensure its impacts upon the local community are minimised. Construction will be programmed wherever possible to minimise disturbance and disruption.

15.21 The proposed development will be designed to promote health and wellbeing and incorporate public open space and amenity areas to serve the needs of future occupants. A primary and secondary school will be constructed to serve the wider north-west Sittingbourne allocation along with a local centre incorporating land for a convenience store to cater for every day needs.

Consultation

15.22 No additional consultation has been undertaken other than that which occurred at the ES Scoping Stage. Separate discussions have, however, been held with Kent County Council and the National Health Service in relation to education and health care provision which will be made in conjunction with the advancement of the proposals for the north-west Sittingbourne allocation.

Baseline Conditions

15.23 The baseline has been established using a range of evidence sourced from national data sets (e.g. ONS, DCLG, Census) alongside regional and locally obtained evidence from Kent County Council and Swale Borough Council.

15.24 Sittingbourne contains several electoral Wards: The Meads, Milton Regis, Kemsley, Murston, Roman, Woodstock, Homewood, Chalkwell and Borden and Grove Park. Data for these Wards is contained in the Swale Lower Super Output Areas when using ONS sources.

Population

15.25 In 2011 the Census recorded that there were 45,214 residents in Sittingbourne. Using the same Lower Super Output Areas, the ONS's most recent population estimates (2015) state that the population of Sittingbourne is 48,262. This represents approximately a third of the population of Swale and represents an increase in the population of Sittingbourne of some 5.3%.

15.26 When considering the population of Sittingbourne by age, Table 15.4 below shows that whilst most residents are aged between 16 and 64 there are also a considerable number of under 16's as well as over 65's. This picture is mirrored across Swale and Kent.

Table 15.4 Population by Age

	Sittingbourne	Swale	Kent
Under 16	9,229	25,709	330,184
16 – 64	29,319	88,430	1,099,502
65 +	6,666	21,696	297,979
Total	45,214	135,835	1,727665

Source: ONS 2011

Household Type

15.27 The following table provides details of the types of household that exist in Sittingbourne, Swale, and Kent. This is a useful measure and can provide an insight into other issues such as health and deprivation. The table indicates that approximately one quarter of all households in Sittingbourne are single person households, which is reflected across Swale and Kent.

Table 15.5 Household Type

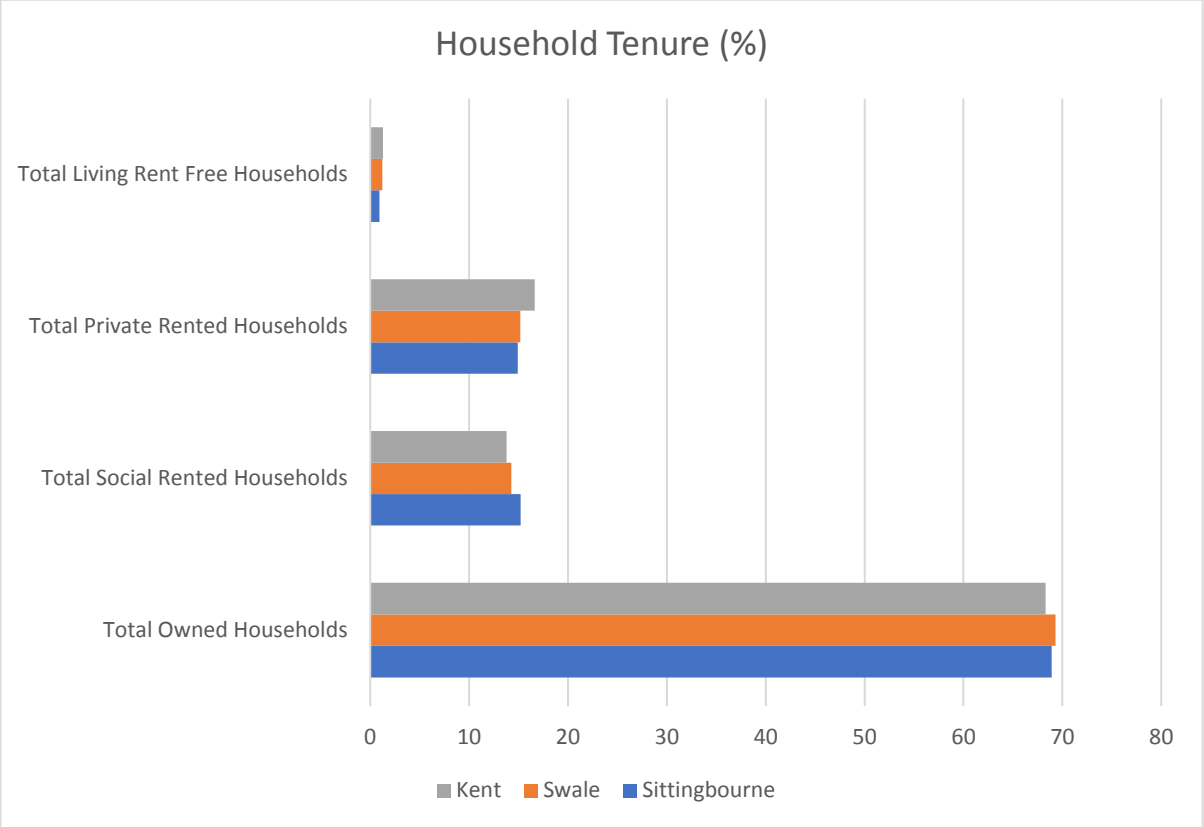
	Sittingbourne	Swale	Kent
Single person households	4,986	15,128	203,765
Lone pensioner households	2,056	6,797	91,178
Households with children	6,262	17,417	257,071
Households with no children	3,506	11,279	11,279
Total households	18,586	55,585	784,089

Source: ONS 2011

Household Tenure

15.28 Figure 15.1 below provides household tenure details for Sittingbourne, Swale, and Kent. As can be seen, home ownership represents the most significant type of household tenure across all three geographies.

Figure 15.1 Household Tenure



Housing and Market Conditions

15.29 The Land Registry's House Price Index is a good measure of the changes in the values of residential properties in England, using data collected from house sales whether for cash or with a mortgage. Swale's House Price Index was £229,141 as of March 2017, which represents an increase of 8% on March 2016 (which was £212,097). Given the national average increase in house prices over this period was 4%, it can be inferred that house prices in Swale have increased over the past year.

15.30 The House Price Index for Swale is not dissimilar to that for Kent. In March 2017 the House Price Index for Kent was £276,850, whereas the House Price Index in

March 2016 was £258,044; representing an increase of 7.3% over this period. Average house prices within Swale are however, according to the House Prices Index, lower than those for Kent. This may be attributable to the fact that Swale includes the Isle of Sheppey which contains several of the most deprived lower super output areas in England. As such, it is possible that the House Price Index may not fully reflect house prices in the town of Sittingbourne itself accurately.

15.31 Zoopla, an online real estate website, inferred that in May 2017, the average price paid for a property in Sittingbourne was £255,421, whereas the average value of property in Sittingbourne was £283,028. This suggests that house prices in Sittingbourne may be more aligned to average prices in Kent.

Educational Attainment

15.32 Table 15.6 sets out the qualifications of all residents aged sixteen and over in Sittingbourne, Swale, and Kent. The table demonstrates that there are a high number of people in Sittingbourne with either no qualifications or qualifications at Level 1 and Level 2 than those with Level 4(+) qualifications. This reflects the general pattern in Swale, although the figures suggest that there is generally a greater proportion of the population in Kent with Level 4(+) qualifications.

Table 15.6 Educational Attainment

	Sittingbourne	Swale	Kent
No Qualifications	9,269	29,703	313,552
Apprenticeships	1,555	4,777	54,849
Level 1 Qualifications	6,254	17,640	208,638
Level 2 Qualifications	6,493	18,442	238,280
Level 3 Qualifications	4,373	12,202	172,337
Level 4(+) Qualifications	6,127	20,535	331,486
Other Qualifications	1,833	5,240	71,555

Source: ONS 2011

Employment

15.33 Table 15.7 provides details of economically active and economically inactive persons in Sittingbourne based upon the Lower Super Output Areas. The figures are derived from the Office for National Statistics Economic Activity Measure (QS601EW), based on the 2011 census. It is important to note that economically inactive persons include those who are retired, long-term sick and disabled, and students. Economically active persons include those who work full time, part time and the self-employed.

Table 15.7 Employment

	Sittingbourne	Swale	Kent
Economically Active Persons	23,746	67,913	875,862
Economically Inactive Persons	9,058	30,694	183,865

Source: ONS 2011

15.34 Table 15.8 provides an indication of the number of working age persons who are claiming out-of-work benefits as of November 2016.

Table 15.8 Out of Work Benefit Claimants

	Swale	Swale (%)	South East (%)	Great Britain (%)
Total Claimants	11,670	13.2	8.3	11.0
Job Seekers	1,260	1.4	0.7	1.1
ESA and Incapacity Benefits	5,450	6.1	4.4	6.1
Lone Parents	1,300	1.5	0.8	1.0
Carers	2,190	2.5	1.3	1.7
Others on Income Related Benefits	210	0.2	0.1	0.2
Disabled	1,100	1.2	0.8	0.8
Bereaved	170	0.2	0.2	0.2
Main Out-of-Work Benefits	8,210	9.3	6.1	8.4

Source: Dept. for Work and Pensions

Occupation

15.35 Table 15.9 provides details of the occupations engaged in by all usual residents aged 16 to 74. It would appear most residents in Sittingbourne work in 'lower managerial, administrative and professional occupations', as is also the case in Swale and Kent. The proportion of the population in Kent engaged in these occupations is however greater than in Swale or Sittingbourne.

Table 15.9 Occupation

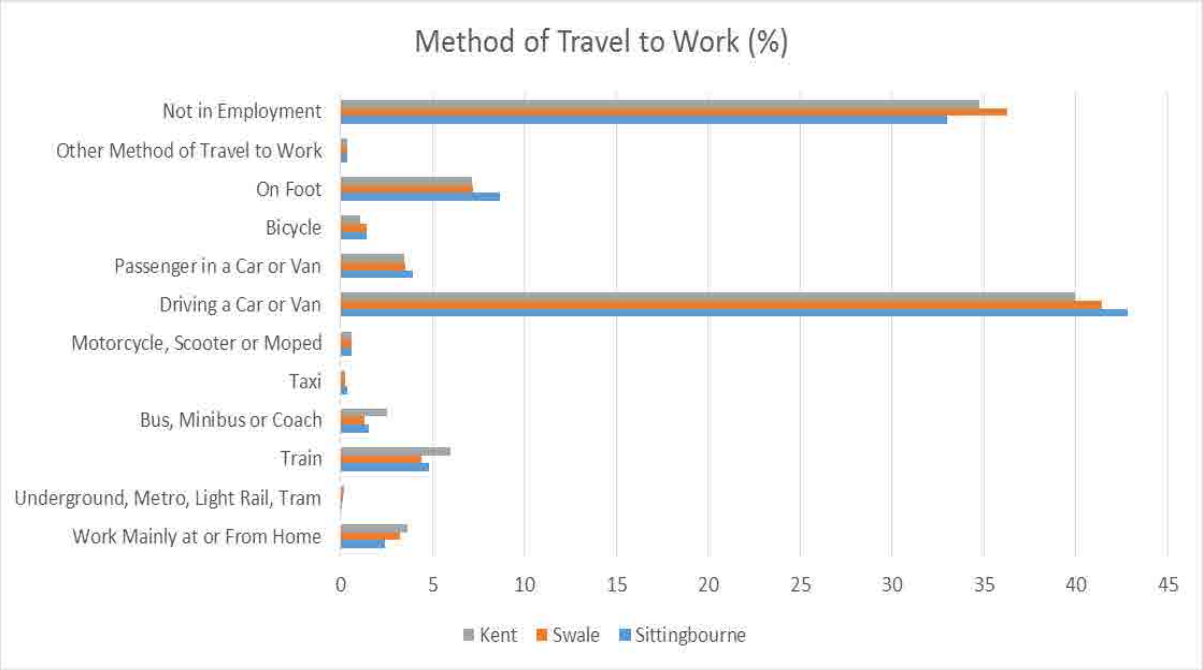
	Sittingbourne	Swale	Kent
All Usual Residents Aged 16 to 74	32,804	98,607	1,249,555
1. Higher Managerial, Administrative and Professional Occupations	2,304	7,483	118,425
1.1 Large Employers and Higher Managerial and Administrative Occupations	658	2,103	29,359
1.2 Higher Professional Occupations	1,646	5,380	89,066
2. Lower Managerial, Administrative and Professional Occupations	6,150	18,889	267,143
3. Intermediate Occupations	4,960	13,604	173,357
4. Small Employers and Own Account Workers	2,970	10,519	132,735
5. Lower Supervisory and Technical Occupations	2,836	8,136	90,757
6. Semi-Routine Occupations	5,267	14,941	179,443
7. Routine Occupations	4,603	13,682	133,250
8. Never Worked and Long-Term Unemployed	1,703	5,623	56,547
L14.1 Never Worked	1,131	3,860	36,609
L14.2 Long-Term Unemployed	572	1,763	19,938
Not Classified	2,011	5,730	97,898
L15 Full-Time Students	2,011	5,730	97,898
L17 Not Classifiable for Other Reasons	0	0	0

Source: ONS 2011

Travel to Work

15.36 Figure 15.2 below shows, as percentages, the method of travel which people use to get to work in Sittingbourne, Swale, and Kent. It is evident that the overwhelming method people use to travel to work is by car or a van with relatively low levels of public transport use.

Figure 15.2 Method of Travel to Work



Health and Well Being

15.37 There are 13 GP practices in Sittingbourne as detailed in Table 15.10. Table 15.10 also provides over information on the number of GP's, and patients.

Table 15.10 GP Practices

GP Surgery	Number of GP's	Number of Patients
Grovehurst Surgery, Grovehurst Road, Kemsley, Sittingbourne	11	7001
The Chestnuts Surgery, 70 East Street, Sittingbourne	7	9,451
Dr H Beerstecher Practice, Canterbury Road Surgery, 111 Canterbury Road, Sittingbourne	3	1,814
London Road Medical Centre, The Medical Centre 32 London Road, Sittingbourne	8	8,026
The Meads Medical Practice, 29 Quartz Way, The Meads, Sittingbourne	4	9,235
Teynham Medical Centre, 72 Station Road, Teynham Sittingbourne	4	1,439
Iwade Health Centre, 1 Monins Road, Iwade, Sittingbourne	8	5,951
Memorial Medical Centre, Bell Road, Sittingbourne	14	15,870
Dr Rb Kumar Practice, The Surgery, London Road, Teynham, Sittingbourne	2	2,297
Milton Regis Surgery, 95 High Street, Milton Regis, Sittingbourne	6	2,736
Lake Medical Centre, 53 Todd Crescent, Kemsley, Sittingbourne	7	2,339
Dr Dn Venkatachalem Practice, Hollybank Surgery 31 London Road, Sittingbourne	5	Not Listed
Turning Point Sittingbourne, 6-8 Park Road Sittingbourne	1	Not Listed

Source: NHS, April 2017

15.38 Since the 2011 Census, people have been able to self-report their health. The Kent Public Health Observatory has assessed this self-reporting against the electoral wards of the respondents. Table 15.10 shows the percentage of respondents in each of the Sittingbourne Wards who identified their health as being either good or very good (NB: The figures for some wards are unavailable due to boundary changes in 2015).

15.39 The average percentage of respondents in Swale reporting their health as being either good or very good is 80%, whilst in Kent it is 81%.

Table 15.11 Health Reporting

Ward	Percentage
The Meads	Not available
Kemsley	86.1
Milton Regis	78.3
Murston	80.1
Roman	77.4
Woodstock	79.8
Homewood	Not available
Chalkwell	81.9
Borden and Grove Park	84.5

Education

15.40 There are 25 Primary Schools and five Secondary Schools in Sittingbourne. Table 15.12 provides an indication of current capacity, however the wider development proposals for the north-west Sittingbourne allocation provide for the construction of a new primary and secondary school to cater for the anticipated population change.

Table 15.12 School Capacity

School Name	Type	Capacity	Pupils
Lower Halstow Primary School	Primary	170	155
Rodmersham School	Primary	70	95
Canterbury Road Primary School	Primary	210	210
Minterne Community Junior School	Primary	360	385
The Oaks Community Infant School	Primary	270	280
Holywell Primary School	Primary	210	200
Newington Church of England Primary School	Primary	210	180
Teynham Parochial Church of England Primary School	Primary	210	195
Bapchild and Tonge Church of England Primary School	Primary	210	210
Borden Church of England Primary School	Primary	126	125
Bredgar Church of England Primary School	Primary	106	105
Hartlip Endowed Church of England Primary School	Primary	105	105
Tunstall Church of England (Aided) Primary School	Primary	295	265
Westlands Primary School	Primary	540	525
Regis Manor Primary School	Primary	360	445
Lynsted and Norton Primary School	Primary	105	135
Milstead and Frinsted Church of England Primary School	Primary	70	95
Grove Park Primary School	Primary	510	425
Kemsley Primary Academy	Primary	210	210
Milton Court Primary Academy	Primary	238	225
South Avenue Primary School	Primary	420	420
Bobbing Village School	Primary	210	215
Iwade School	Primary	480	510
St Peter's Catholic Primary School	Primary	210	210
Lansdowne Primary School	Primary	360	320
Westlands School	Secondary	1604	1635
Highsted Grammar School	Secondary	806	835
Fulston Manor School	Secondary	1104	1275
Sittingbourne Community College	Secondary	1350	1200
Borden Grammar School	Secondary	802	845
Meadowfield School	Special School	250	240
ISP School (Kent)	Independent School		45
Swale Inclusion Service	Pupil referral unit		25

Source: Dept. for Education / Kent County Council, April 2017

Open Space and Amenity Areas

15.41 An audit of open space and amenity areas was undertaken in conjunction with the preparation of the recently adopted Swale Borough Local Plan, 2017. Supplementary information was also produced to support the designation of Local Green Spaces. Table 15.13 records the availability of open space and amenity areas within the vicinity of the north-west Sittingbourne allocation and the planning application site.

Table 15.13 Open Space and Amenity Areas

Location	Distance miles	Approximate Size (ha)
East of Cherry Close	0.3	7.91
Milton Creek Country Park, Grovehurst Road	1.0	29.7
Kemsley Recreation Ground, Grovehurst Avenue	1.3	2.4
North of Eleanor Drive	1.0	0.53
North of Manisty Court	2.5	0.24
East of Eadred Way	1.6	0.6
East of Merleburgh Drive	1.2	0.77
Moonstone Square	0.4	0.33
North of Balas Drive	0.5	0.48
Maylam Gardens	2.2	0.93
Tavistock Close	2.1	0.77
King George V Playing Field, Park Drive	2.6	6.15
East of Albany Road	2.6	4.27
South of Commonwealth Close	2.9	5.97
North of George Street, Elm Grove	2.6	0.15
Mere Court Lane	3.7	1.24
East of Oak Road	3.7	5.02
South of Cavell Way	1.8	0.23
	TOTAL	**67.69**

Assessment of Potential Impacts

Construction Phase

15.42 The development being assessed for the purposes of this ES will be constructed over a period of 13 – 14 years. Consequently, the generation of construction related employment will be spread over time. Aside from direct construction job creation, there would be indirect effects through the supply of materials from local businesses and the expenditure of wages in the wider area, contributing to the Gross Value Added (GVA) to the economy.

15.43 Due to the scale and complexity of the construction industry there is no single source of data that provides comprehensive information about economic activity and operations. A Study[2] conducted in 2015 suggested that for every dwelling that is built, 1.5 Full Time Jobs (FTE) are involved in its construction. Furthermore, for every 1 FTE position involved in construction a further 0.5 FTE indirect jobs are supported in the supply chain.

15.44 At its predicted peak in 2021/22 it is anticipated that 210 dwellings will be constructed across the entire north-west Sittingbourne allocation. Based upon this peak 'build out' rate the proposed development could generate employment for approximately 315 FTE's during the construction period and support some 157.5 FTE positions in the supply chain.

15.45 It is anticipated that those employed in the construction of the development would be drawn from the south-east however some of the construction workers would be employed from the Kent labour market, generating beneficial effects on the area. Significant effects on population, housing, education, health, and other community facilities are not expected during the construction period, apart from the potential need for temporary housing.

15.46 It can be concluded in the light of the above that the potential direct and indirect effects of construction upon job creation and expenditure would be **temporary**, and of **slight to moderate** beneficial significance.

Operational (Occupation) Phase

Population

15.47 The average household size in Swale is 2.4 people per household. On this basis it is expected that the resident population arising from the proposed development could be some 3,160 persons, or 3,650 persons for the entire north-west Sittingbourne allocation once it is complete. A growth of some 3,650 persons would represent an increase in the total population of Sittingbourne of some 8.1%.

15.48 The additional population figure assumes that all residents of the new dwellings would come from outside Swale. In reality, a significant proportion of the new homes are likely to be occupied by existing residents buying first homes,

[2] The Economic Footprint of UK House Building, March 2015, Home Builders Federation

residents trading up or downsizing, or people on the waiting list for affordable housing. Such relocation of existing residents would free up existing dwellings for occupation by other new residents, not necessarily adding to the total population. To assess the maximum significance of effects, it has been assumed that all the population increase would be additional to the local area.

15.49 The effects of such population growth will depend on a range of other factors, such as education and health provision. The direct effects of the proposed development in isolation or in combination will not necessarily be negative provided adequate levels of community infrastructure are provided to meet the additional needs generated by the proposed development and those of the wider north-west Sittingbourne allocation. In addition, the income and spend of the new residents in the local economy will increase local Gross Value Added (GVA) which will have positive indirect effects upon the local economy.

15.50 In June 2017, Arcadis Design and Consultancy released their report *Building Homes Making Places – The economic benefit of better housing.* The report considered the effect building new homes has on both the local and national economy. The headline figure is that £316,000 is generated by every single new house for the national economy.

15.51 On this basis, the effect of the population increase would be **permanent**, and of **moderate** beneficial significance, provided the necessary social infrastructure such as education, health, community facilities and open space are delivered.

Housing

15.52 The proposed development will involve the construction of an additional 1,520 on the entire north-west Sittingbourne allocation thereby having a direct impact on the housing market by an increase in the current housing stock. The number, type and tenure of the homes would have a beneficial impact in terms of contributing towards meeting the housing needs of the area. In addition, the provision of affordable homes will enhance the beneficial impacts of the development and contribute directly to the known need in Swale.

15.53 Overall the provision of new homes would be consistent with the objectives of the NPPF and the objectives of the recently adopted Swale Borough Local Plan, 2017. The application proposals in combination with those for the entire north-west Sittingbourne allocation will result in substantial and demonstrable benefits in terms of meeting the need for new homes in a sustainable manner, thereby

fostering economic development and further supporting the long-term sustainability of Sittingbourne and the wider area.

15.54 On this basis both the direct and indirect effects of the proposed development on the local and regional housing market would be **permanent**, and of **large** beneficial significance.

Health and Well Being

15.55 The proposed development would place additional demand on existing and planned health service provision within the area. There is an existing medical centre in Kemsley and others are located nearby. To mitigate the potential impacts arising from the proposed development an appropriate financial contribution would be made to the provision of additional services if a need is demonstrated.

15.56 To promote health and wellbeing an appropriate movement strategy and travel plan will be implemented to support sustainable travel options across the entire north-west Sittingbourne allocation. A range of green infrastructure proposals, including circular walks, open space, and amenity areas, will be provided to satisfy the requirements of Local Plan Policy MU1 as outlined in the Health Impact Assessment (HIA) produced to accompany the planning applications (see Appendix 15.1). Overall, the HIA concludes that from a built environment perspective the proposals will have a positive effect upon the health and wellbeing of existing and future residents.

15.57 The impacts will be **permanent**, and therefore be of **moderate** beneficial significance as the proposals in combination with others will contribute to the provision of new facilities which may also potentially benefit the wider community.

Education

15.58 The development of additional dwellings will give rise to a demand for additional primary and secondary school places. The assessment of Baseline Conditions provided in this ES chapter has established there is limited capacity at primary and secondary school levels within the immediate catchment.

15.59 Kent County Council (KCC) has produced a formula for calculating the number of school age children likely to result from new developments for each of the different education stages. These are contained in the KCC Guide to Developer Contributions and the Provision of Community Infrastructure 2007.

15.60 Table 15.14 sets out what would be generated by the proposed development of the entire north-west Sittingbourne allocation.

Table 15.14 Education Requirements

	Age Range	Pupil Product Ratio	Pupil Numbers
Nursery School	0 - 4	0.09	137
Primary School	5 - 11	0.28	426
Secondary School	11 - 16	0.20	304
Total			867

Source Kent County Council

15.61 The development of the north-west Sittingbourne allocation would therefore yield 426 children within the primary age range, and 304 children within the secondary age range. This presents a need for one, two- form entry primary school, and a six-form entry secondary school. To mitigate the potential impact of the proposed development land for a new primary and secondary school is being provided in association with the development of the north-west Sittingbourne allocation.

15.62 Overall, it is expected that the proposals for the north-west Sittingbourne allocation will have a **permanent** effect of **moderate** beneficial significance.

Open Space and Amenity Areas

15.63 Within the proposed development and the wider north-west Sittingbourne allocation a well-connected network of open spaces and amenity areas will be established to cater for the needs of future residents. In addition, equipped play areas will be provided in several locations within the development. These amenity areas will link with those proposed on the land being developed adjacent Quinton Farmhouse which will also feature an area planted as a community orchard and allotment gardens.

15.64 Overall, the impact on open space and leisure provision is expected to be **permanent** and of **moderate** beneficial significance to existing and future residents.

Potential Mitigation / Management Techniques

15.65 The proposed development will provide a range of housing as well as social and physical infrastructure / contributions to such infrastructure as is necessary to support the development so that it will provide for the needs of existing and future residents. These include open space and amenity areas, a community orchard, allotments, and education facilities. The potential adverse socio-economic effects of providing new housing will therefore be mitigated by the comprehensive nature of the proposals.

Assessment of Residual Impacts

15.66 Table 15.15 provides an assessment of the potential residual impacts that would arise from the proposed development of the north-west Sittingbourne allocation.

Table 15.15 Assessment of Residual Impacts

Construction Phase

Description of Effect	Magnitude of Impact	Mitigation Measure	Receptor Sensitivity	Significance of Effect
Temporary increase in service / housing needs from workforce	Minor	Temporary increase in local employment and economic activity.	Medium	Slight
Increase in local supplier activity	Moderate	Possible enhancement through local procurement strategy / policies.	Low	Slight
A temporary increase in employment related to construction	Moderate	Could increase employment in construction sector locally.	Medium	Moderate (beneficial)
Impact on the local and national economies.	Minor	Development has the potential to benefit the national and local economy	Low	Slight / Moderate (beneficial)

Operational (Occupation) Phase

Description of Effect	Magnitude of Impact	Mitigation/ Measure	Receptor Sensitivity	Significance of Effect
Increase in population	Moderate	None required	Medium	Moderate
Increase in housing supply	Moderate	None required	High	Large
Health and Well Being.	Moderate	None required as there is an existing health centre nearby.	Medium	Moderate
Education	Moderate	A new primary and secondary school are to be constructed to serve the development	Medium	Moderate (beneficial)
Open Space and Amenity Areas	Moderate	Open space and amenity areas will be part of the development	Medium	Moderate (beneficial)

Chapter 16

CUMULATIVE IMPACT AND CONCLUSIONS

16. CUMULATIVE IMPACTS AND CONCLUSION

Cumulative Impacts

16.1 Cumulative effects or impacts are the additional changes caused by a development proposal in conjunction with similar developments or the combined effects of developments taken together.

16.2 There is no accepted methodology for the purposes of conducting a cumulative impact assessment however the potential cumulative effects of the proposed development have been considered within the individual topic chapters contained within this ES. This has involved considering the impact of the proposals in combination with the development proposed on the land adjacent Quinton Farmhouse and other committed schemes which have planning permission or are allocated in the Local Plan.

16.3 The significance of cumulative effects has been determined by the interaction between the magnitude of change and the sensitivity of the receptor concerned. Magnitudes of change are rated as Major, Moderate, Minor, Negligible or involve no change at all; the change can be direct or indirect.

16.4 Cumulation will affect the development site and its surroundings to varying degrees depending on the sensitivity of the receptor. The sensitivity of receptors corresponds to their importance. The sensitivity of receptors to the effects of the proposed development is classified as Very High, High, Medium, Low, or Negligible. Table 16.1 demonstrates how the significance of cumulative effects has been determined having regard to the magnitude of change and the sensitivity of the receptor concerned.

Table 16.1: Significance (Importance)

		Magnitude				
		No Change	***Negligible***	***Minor***	***Moderate***	***Major***
Sensitivity	***Very High***	Neutral	Slight	Moderate	Large	Very Large
	High	Neutral	Slight	Moderate	Large	Large
	Medium	Neutral	Slight	Slight	Moderate	Large
	Low	Neutral	Slight	Slight	Slight	Moderate
	Negligible	Neutral	Neutral	Neutral	Neutral	Neutral

16.5 The nature, scope and assessment of the cumulative impacts has been set out within each topic chapter of this ES.

16.6 The proposed development in combination with that envisaged on the remainder of the north-west Sittingbourne allocation will result in the loss of some 75ha of best and most versatile agricultural land. The effect on agricultural land will therefore be significant.

16.7 The impact of the development in combination with that proposed on the entire north-west Sittingbourne allocation and that proposed at Iwade has been modelled but the impacts would not be significant for all the junctions considered and in relation to most junctions the impact would be slight to moderate.

16.8 The impact of development on the entire north-west Sittingbourne allocation would be high and the significance of effect would be substantial, but this would reduce over time because of the proposed treatment to the A249 boundary.

16.9 No significant cumulative effects have been identified in in respect of the Water Environment, Ground Conditions, Noise and Vibration, Air Quality, the Natural Environment, or Cultural Heritage. In relation to Air Quality and the Natural Environment consideration has also been given to the impact of the proposals upon the wider environment.

16.10 Overall, the cumulative socio-economic effects are assessed as being moderately beneficial in significance terms.

Conclusions

16.11 This Environmental Impact Assessment has found that the proposed development would have few adverse residual effects of more than moderate significance.

16.12 Table 16.2 provides a summary of the significance of effects prior to mitigation, the relevant mitigating measures, and the categorisation of the significance of residual effects.

Table 16.2: Summary of Significance of Effects

Area of Effect	Significance of Effect	Mitigation Measures	Significance of Residual Effect
Landscape and Visual Effects	Minor	Additional planting	Minor
Land and Agriculture	Minor	Management of soils to permit re-use	Minor
Water Environment	Negligible	Management of construction activities. Provision of SuDS	None of significance
Ground Conditions	Negligible	Management of construction activities	None of significance
Traffic and Transport	Low	Travel Plan. Off-site junction improvements	None of significance
Noise and Vibration	Negligible	Management of construction activities. Construction of acoustic barrier adjacent A249. Double glazing to dwellings.	None of significance
Air Quality	Negligible	Management of construction activities. Provision of vehicle charging points. Use of Travel Plan	None of significance
Natural Environment	Negligible	Additional planting and habitat creation. Developer contribution to SPA	Minor
Cultural Heritage	Negligible	None identified / necessary	Neutral
Socio-Economic Effects	Moderate	Appropriate Developer contributions if need identified	Moderate (Beneficial)

List of Abbreviations

List of Abbreviations

ALC	Agricultural Land Classification
AQMA	Air Quality Management Area
AQS	Air Quality Standards
CA	Conservation Area
BAP	Biodiversity Action Plan
BS	British Standard
CEMP	Construction Environment Management Plan
CROW	Countryside and Rights of Way Act
dB	Decibel
DBA	Desk Based Assessment
DEFRA	Department for Environment, Food, and Rural Affairs
DCLG	Department for Communities and Local Government
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
EIA	Environmental Impact Assessment
EcIA	Ecological Impact Assessment
EPS	European Protected Species
ES	Environmental Statement
FRA	Flood Risk Assessment
FTE	Full Time Equivalent
GCA	Great Crested Newt
GIF	Growth and Infrastructure Framework
GLVIA	Guidelines for Landscape and Visual Assessment
GVA	Gross Value Added
GSPZ	Groundwater Source Protection Zone
HRA	Habitats Regulation Assessment
Ha	Hectares

HighE	Highways England
HistE	Historic England
HER	Historic Environment Record
HDV	Heavy Duty Vehicle
HGV	Heavy Goods Vehicle
HSI	Habitat Suitability Index
IDB	Internal Drainage Board
IEMA	Institute of Environmental Management and Assessment
IAQM	Institute of Air Quality Management
KCC	Kent County Council
Km	Kilometres
LAQM	Local Air Quality Management
LCA	Landscape Character Assessment
LDV	Light Duty Vehicle
LLFA	Lead Local Flood Authority
LNR	Local Nature Reserve
LPA	Local Planning Authority
LTP	Local Transport Plan
LVIA	Landscape and Visual Impact Assessment
LWS	Local Wildlife Site
m	Metres
MAFF	Ministry for Agriculture Fisheries and Food
N/A	Not Applicable
NE	Natural England
NNR	National Nature Reserve
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
NPPF	National Planning Policy Framework

NSR	Noise Sensitive Receptor
PM_{10}	Particulate Matter
PRoW	Public Right of Way
RDB	Red Data Book
SA	Sustainability Appraisal
SAC	Special Area of Conservation
SANGs	Suitable Alternative Natural Green Space
SAM	Scheduled Ancient Monument
SBC	Swale Borough Council
SFRA	Strategic Flood Risk Assessment
SNCI	Site of Nature Conservation Importance
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage System
TA	Transport Assessment
TP	Traffic Plan
UKBAP	UK Biodiversity Action Plan
WCA	Wildlife and Countryside Act
WRA	Water Resources Act
WSI	Written Scheme of Investigation
ZTV	Zone of Theoretical Visibility

Environmental Statement – Volume 2

North West Sittingbourne

Land between Quinton Road and Bramblefield Lane
and at Pheasant Farm and Great Grovehurst Farm

jb planning associates

Prepared by:
JB Planning Associates
Chells Manor
Chells Lane
STEVENAGE
SG2 7AA

PERSIMMON
Together, we make a home

Prepared for:
Persimmon Homes South East
Scholars House
60 College Road
MAIDSTONE
ME15 6SJ

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