# Environmental Statement Volume 1: Text

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# Environmental Statement Volume 2: Figures

See separate A3 folder

# Environmental Statement Volume 3 (Parts i to iii): Appendices

See separate A4 folders
1.0 INTRODUCTION

Background

1.1 This Environmental Statement is submitted in support of two outline planning applications for a sustainable urban extension of Peterborough of up to 5350 new homes, known as Great Haddon. The Great Haddon proposal has evolved over the last five years: proposals for a ‘strategic southern expansion’ of Peterborough were originally conceived in response to the inclusion of Peterborough in the government’s London-Stansted-Cambridge Growth Area and since 2004 significant work has been undertaken on the development concept for Great Haddon, including the preparation of a Technical Assessment (submitted to the City Council in January 2006) setting out the main environmental issues relating to the site, prepared in response to the City Council’s request for Expressions of Interest for potential development sites as a precursor to the LDF process.

1.2 The evolution of the proposals since May 2004 has been documented in a series of Working Papers (1-11), which have been forwarded under separate cover to the Council (and additional copies are available if required). These Working Papers also form part of the Statement of Community Involvement and have been included within the appendices to that document, also submitted in support of this application.

1.3 This Environmental Statement (ES) has been prepared by David Lock Associates Ltd with input from Peter Brett Associates, LDA Design, David Shaw Planning, CGMS SQW, King Sturge and EFM Ltd on behalf of the joint applicants O&H Properties Ltd, the Marlborough Group and David Wilson Homes.

Need for Environmental Impact Assessment

1.4 The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 require that before consent is granted for certain types of development, an environmental impact assessment must be undertaken. The Regulations set out the forms of development which must always be subject to Environmental Impact Assessment (Schedule 1 development) and other developments which may require assessment if they give rise to significant environmental effects. ‘Urban development projects of over 0.5 hectares’ fall into this latter (Schedule 2) category.

1.5 Schedule 3 to the Regulations describes the criteria for determining whether a Schedule 2 development should in fact be subject to environmental impact
assessment. With regard to Great Haddon, the scale and nature of the proposed
development may be such as to be deemed of more than local importance, and the
location of the proposed development might have significant environmental effects, in
view of the scale of the project and of the proximity to neighbouring residential
development and adjoining wildlife habitat. It therefore requires an Environmental
Impact Assessment to be undertaken and an Environmental Statement submitted.

Timing of this Application

1.6 The proposals for Great Haddon have been (and continue to be) promoted alongside
the emerging Local Development Framework (LDF) for Peterborough. During Spring
/ Summer 2008 the Council published its consultation document Core Strategy
Preferred Options which will form the basis of the Core Strategy for the LDF in due
course, part of which will identify strategic areas for growth.

1.7 However, this part of the LDF is not due for adoption until 2011. Thus, because of
the long lead in time necessary to bring forward development projects of the scale
proposed for Great Haddon, it is imperative that work continues on the design and
planning of the new community in advance of the policy framework which will secure
its designation for development. Whilst this necessitates a degree of risk on the part
of the landowners and promoters of the new community, the preparation of the
background technical work necessary to support the outline planning applications,
together with an environmental assessment, will ensure that the planning applications
can be lodged with the Council at the earliest appropriate time, to help the Council
deliver the RSS requirements.

Approach to the Impact Assessment

1.8 This Environmental Statement has been produced in accordance with the
requirements of the Town and Country Planning (Environmental Impact Assessment)
(England and Wales) Regulations 1999. There is no statutory provision as to the
form of an Environmental Statement. It must contain the information specified in Part
II of the Regulation and such relevant information in Part I of Schedule 4 as is
reasonably required to assess the effects of the project. This Environmental
Statement has however been structured broadly in line with the guidance in Circular
02/99: Environmental Impact Assessment and the Department for Communities and
Local Government Environmental Impact Assessment: A guide to good practice and
procedures (Consultation Paper June 2006).
Scope of the Assessment

1.9 A Scoping Report was submitted to Peterborough City Council (PCC) on 3 June 2008 setting out the intended approach and scope of the ES. After consultation during the statutory period (formally extended to 25 July 2008 at PCC’s request), a Scoping Opinion was issued by PCC on 25 July. A copy of the adopted Scoping Opinion is attached at ES Volume 3: Appendices (Appendix 1.1), and has formed the basis for this EIA.

Format of Environmental Assessment Material

1.10 The format of the Environmental Statement is set out below:

a) **Non-Technical Summary**: published separately and free of charge, providing a concise non-technical explanation of the contents and conclusions of the Environmental Statement;

b) **Environmental Statement Volume 1: Statement** (this document): setting out the assessment methodology and likely impacts for each topic requested in the Scoping Opinion (listed in paragraph 1.12 below) and setting out proposed mitigation for any impacts identified;

c) **Environmental Statement Volume 2: Figures**: comprising the plans associated with the relevant chapters and specialist information detailed in Volume 1; and

d) **Environmental Statement Volume 3: Technical Appendices**: comprising baseline survey material and technical data and plans used in the assessments by specialist consultants. Due to the size of the plans and documents include within the document, limited paper copies of this Volume have been submitted to the City Council, with the remainder provided in CD format.

Method Statement

1.11 The scope of this Environmental Statement has been confirmed through the Scoping Opinion issued by Peterborough City Council, who as part of that process consulted with the relevant statutory consultees on the issues for each topic (see copy of the scoping opinion in Appendix 1.1 of ES Volume 3).
1.12 The key issues identified in the Scoping Opinion to be addressed are:

- Socio Economic Issues
- Landscape and Visual;
- Archaeology and Cultural Heritage;
- Transportation and Access;
- Air Quality;
- Minerals and Waste
- Noise and Vibration;
- Ground Conditions;
- Flood Risk, Water and Drainage;
- Ecology; and
- Energy and Utilities.

Structure of the Environmental Statement

1.13 Each section of this Environmental Statement examines the impact of the development for each of these topic areas under the following headings:

- **Introduction**: this describes the approach to the assessment;

- **Reference Material and Assessment Method**: this describes key relevant planning policies and reference material relied upon or referred to in the chapter and the methodology used for the impact assessment;

- **Assumptions, Limitations and Technical Difficulties**: where these have been encountered they are described as well as any assumptions that may need to be taken into account;

- **Impact Assessment Criteria**: if appropriate, these have been formulated to provide the basis by which the significance of the effect has been assessed;

- **Baseline Conditions**: this describes the baseline condition of the application sites as it currently exists;

- **Potential Impacts arising from the Framework Plan**: a description of the impacts that would be experienced if the new application proposals were to be implemented and their significance;

- **Mitigation Measures**: a description of proposed mitigation measures to avoid or ameliorate any adverse effects;

- **Residual Impacts**: identification of the effects (if any) after the mitigation is incorporated.
1.14 Where appropriate, summary matrices have been provided which summarise the overview of the effects, the interest that would be affected, details of the timescale, duration and geographical spread of the effect if appropriate, and also details of its mitigation and significance.

The Assessment Team

1.15 The consultant team assembled to undertake the environmental impact assessment on behalf of the Great Haddon Consortium comprises the following specialist consultant organisations:

- David Lock Associates Ltd – co-ordination of the Environmental Statement, town planning, master planning and urban design, socio-economic issues;
- Peter Brett Associates – highways and transportation, minerals and waste management, energy and utilities, ground conditions, flooding, air quality, noise and vibration;
- LDA Design – ecology, landscape and visual assessment;
- CGMS – archaeology and cultural heritage.
- King Sturge – retail impact assessment
- Segal Quince Wicksteed and BBP Regeneration – socio-economic issues; and

1.16 The team has submitted a separate Design and Access Statement and Transportation Assessment with the outline applications. In addition, a series of documents have been prepared by the team and submitted in support of the outline applications. These include:

- Planning Statement;
- Framework Travel Plan, Stage 1 Safety Audit (access junctions/off site works) and Designers Response;
- Flood Risk Assessment (included as a Technical Appendix, see ES Volume 3);
- Energy Strategy;
- Statement of Community Involvement;
- Draft Sustainability Statement; and
- Retail Impact Assessment.
Public Comment

1.17 A copy of this *Environmental Statement Volumes 1, 2 and 3, and the Non-Technical Summary* is available to view at the following locations during normal office hours, and is also available to view on the Great Haddon website ([www.greathaddon.com](http://www.greathaddon.com)).

- Peterborough Central Library
  - Broadway
  - Peterborough
  - PE1 1RX
- Customer Service Centre
  - Peterborough City Council
  - Bayard Place
  - Broadway
  - Peterborough
  - PE1 1FB
- O&H Hampton Ltd
  - Hempsted Barn
  - 285 London Road
  - Peterborough
  - PE7 0LD

1.18 Written comment on the Environmental Statement should be made to Peterborough City Council Planning Department in order that comments can be lodged and considered as part of the consultation on the outline planning applications.

1.19 CD copies of this Environmental Statement, Plans and Appendices can be purchased for £5.00 on request from David Lock Associates, 50 North Thirteenth Street, Central Milton Keynes, Buckinghamshire MK9 3BP.

1.20 Paper copies of the Environmental Statement *Non-Technical Summary* are available free of charge on request.
2.0 APPLICATION SITE AND PROJECT DESCRIPTION

Assessment Area

2.1 The area assessed for the purposes of the EIA is located in the south of the Peterborough district, lying between the A1(M) to the west and the western boundary of the Hampton development to the east. The site is bounded to the south east by the A15 London Road. The existing urban area of Yaxley (Huntingdonshire district) lies to the west.

2.2 The northern boundary of the development area is formed by the A1139 Fletton Parkway, with the Alwalton Hill strategic employment site (consented for strategic B8 employment) immediately to the west.

2.3 Immediately to the east of the Great Haddon development area lies the Orton Pit Special Area for Conservation (SAC) (designated for its large populations of Great Crested Newts and charophyte (stonewort) species). The Stanground Lode watercourse crosses west to east through the centre of the development area.

2.4 The Great Haddon development area is approximately 390 hectares in size and currently comprises a mix of agricultural land and farm buildings, blocks of mature woodland and several waterbodies.

2.5 For the purposes of the environmental assessment, the area assessed represents the geographical area of the baseline assessment work. Any assessment work undertaken outside this area will be detailed in the specialist reports.

Land Ownership

2.6 The Great Haddon application sites are under the control of three landowners: O&H Properties Ltd, Marlborough Oasis Ltd and David Wilson Homes Ltd. There are a number of smaller landholdings within the assessment area, but none of these are proposed for development as part of the application proposals.

2.7 The majority landholder, O&H Properties, has a proven track record of delivery of large scale development within Peterborough at Hampton. The company and its consultant team have a good working relationship with officers within the City Council, and the Great Haddon Consortium as a whole is experienced in delivering development on this scale both within Peterborough and elsewhere.
Application Sites

2.8 The Great Haddon scheme comprises two application sites—the Great Haddon Core Area and the Great Haddon Employment Area. Although for legal reasons it is necessary to submit two separate applications, these are to be considered and implemented jointly, and as such all supporting material sets out the details of the overall Great Haddon scheme.

2.9 Land ownership of the Core Area application includes all three principal owners (O&H 69%, Marlborough 20% and David Wilson Homes 11%). O&H Properties Ltd is the sole landowner of the Great Haddon Employment Area.

2.10 The two application sites together comprise the Great Haddon development area, totalling 390 hectares in size and comprising a mix of agricultural land and farm buildings, blocks of mature woodland and several waterbodies.

Great Haddon Core Area

2.11 The Great Haddon Core Area is 302.8ha in size and forms the southern part of the Great Haddon development area. Its southern boundary is formed by the A15, the northern boundary of the Norman Cross Scheduled Ancient Monument (SAM) and residential properties at Norman Cross, and residential properties on the north western edge of Yaxley. The old Great North Road and the A1(M) lie to the west. The Orton Pit Site of Special Scientific Interest (SSSI)/Special Area for Conservation (SAC) designated for its large populations of Great Crested Newts and charophyte (stonewort) species lies to the north of the Core Area, together with an area of existing woodland (Chambers Dole and Two Pond Coppice) boundary.

2.12 The Stanground Lode watercourse crosses west to east through the northern part of the Core Area (see Environmental Assessment Volume 2: Figures Figure 8.2 Environmental Designations for details).

Great Haddon Employment Area

2.13 The Great Haddon Employment Area is 87.23ha in size and forms the northern part of the Great Haddon development area. Its northern boundary is formed by the A1139 Fletton Parkway, with the Alwalton Hill strategic employment site (consented for strategic B8 employment) immediately to the west (planning application reference 06/00346/OUT).

2.14 To the immediate east of the Employment Area lies the Orton Pit SSSI/SAC.
2.15 A public bridleway (Bridleway No 1) runs north-south through the centre of the Employment Area (see ES Volume 2: Figure 8.2 Environmental Designations for details).

Project Description

2.16 For the purposes of the Environmental Assessment a joint description of development is used, as the Great Haddon scheme has been assessed as a whole. Thus, all references to ‘the site’ within this Environmental Statement relate to the area of both applications unless otherwise stated.

2.17 The two outline planning applications seek permission for:

“Development of an urban extension comprising:

- up to 5350 residential dwellings at an average density of 40 dwellings per ha (ranging between 10dph in low density areas to 100 dph in the district centre);
- up to 65 hectares of employment land (a mix of B1, B2 and B8 uses);
- a site for a household recycling centre within the employment area;
- a district centre (with up to 9,200 square metres (99,031 sq.ft) retail floor space) and two neighbourhood centres (with up to 2,300 square metres (24,758 sq.ft) retail floor space in total), comprising district/Neighbourhood retail (A1-A5), community and health (C2, D1), leisure (D2), residential (C3) and commercial (B1) uses;
- provision for education facilities (sites for three primary and one secondary school);
- sports and recreational facilities;
- site for 5 gypsy and traveller pitches;
- a range of strategic open spaces including new landscaping, woodland and allotments;
- provision of land for a cemetery extension;
- associated highway infrastructure (including pedestrian, bridleway and cycle routes), public transport infrastructure, and car parking for all uses;
- utilities and renewable energy infrastructure;
- foul and surface water drainage networks (including SuDS and lakes).”

All the above is as set out in the Great Haddon Development Framework Plan ref: PST021/DFP/01 rev I.
**Housing Development**

2.18 A full range of housing densities is proposed to ensure a full range of accommodation is delivered to meet the needs of a new community. The average density will be 40 dwellings per hectare but the range will include low density family housing and self build plots (from 10dph), through to high density apartments within the district centre (up to a maximum of 100dph). The range of housing provision is explained in further detail in the Great Haddon Design and Access Statement submitted as part of the outline planning applications.

**Employment Development**

2.19 The Great Haddon proposals make provision for a range of employment development. In the Employment Area, 65 ha of employment land is proposed, capable of accommodating strategic employment opportunities on large/medium sites. A mix of B2 (general industrial) and B8 (storage and distribution) is proposed for this area, with ancillary B1 office uses if required. This area will provide employment opportunities for residents throughout the urban area of Peterborough and opportunities for local businesses to expand and develop on less constrained sites without having to relocate away from the city. The Employment Area also includes provision of a site for a household recycling centre in a location shown on the DFP (the precise site size will be determined through the s106 negotiations). The range of employment provision is explained in further detail in the Great Haddon Design and Access Statement submitted as part of the outline planning applications.

**District and Neighbourhood (Local) Centres**

2.20 One district and two neighbourhood centres are proposed at Great Haddon. Within these centres (all of which lie within the Core Area), a mix of uses is proposed, focused on non-residential uses on the ground floor with residential on the upper storeys.

2.21 Within the District Centre, provision has been made for a supermarket and a series of smaller retail uses, interspersed with community facilities and other commercial activities. Within each of the two Neighbourhood Centres, small scale retail, community and commercial uses (such as small offices, a pub or restaurant) to serve the immediate needs of the development will be provided on the ground floor, with residential uses above. Further information on the proposed district and neighbourhood centres is set out in the Great Haddon Design and Access Statement submitted as part of the outline planning applications.
Open Space

2.22 An extensive open space framework is proposed for Great Haddon, creating visual and functional links between the SAC, existing woodland and lakes in the north of the site with the Fens to the south, and centred around the Stanground Lode corridor which runs in an east-west direction through the site. New woodlands and lakes will be established, together with measures to protect and enhance existing trees, hedgerows, water courses and areas of ecological significance.

2.23 A comprehensive formal and informal sports and recreation strategy is proposed as part of the wider landscape framework, comprising a network of equipped and unequipped play areas, informal open space, allotments, community orchards, and a variety of sports pitches, courts and greens.

2.24 Further information on the details and design of proposed open space is set out in Chapter 8 of this document and in the Great Haddon Design and Access Statement submitted as part of the outline planning applications.

Education Facilities

2.25 The Development Framework Plan for Great Haddon allocates sites for three primary schools and a secondary school to serve the needs of the development generated by the residential development proposed (all within the Core Area). The size of the primary school sites includes an allowance for early years (pre-school) provision, and the secondary school site includes provision for 2 ha of all-weather pitches and in its location is designed to allow use of the school facilities by the wider community out of school hours. Further details are referred to in Chapter 14 of this document.

Access

2.26 There will be a number of new access points into the development area from the north along the A1139 Fletton Parkway at Junctions 1 and 2 and to the south off the A15 London Road. The access points into the development will also allow for public transport services connecting residential, employment, education and local centre facilities within the site and also within the wider community. Off-site highway proposals are proposed in and around Yaxley to support and prioritise public transport aspirations, local transport movements and deliver a sustainable development.

2.27 These proposals are further described in Chapter 9 of this document and also supported by the Transport Assessment, Travel Plan and Stage 1 Safety Audit submitted with the applications. Further information on the access arrangements is...
set out in the Great Haddon Design and Access Statement submitted as part of the outline planning applications.

Infrastructure

2.28 Further information on the design of strategic infrastructure is set out in the Great Haddon Design and Access Statement submitted as part of the outline planning applications.

Utilities and Renewable Energy Infrastructure

2.29 Chapter 13 of this document provides an analysis of service and utility requirements for the proposed development, including the potential for use of energy-renewable sources. The Energy Strategy submitted in support of the outline applications also considers the contribution which renewable energy can make to the Great Haddon development.

Foul and Surface Water Drainage Networks (including SuDS and lakes)

2.30 Issues relating to flood risk, surface water management and water resource issues related to the application proposal are outline in Chapter 5 of this document. A Flood Risk Assessment has also been submitted in support of the application. (Environmental Assessment Volume 3: Appendices Appendix 5.1)

Existing Woodland in Third Party Ownership

2.31 Two areas of existing woodland are excluded from the application areas as they are in third party ownership and changes to their current use and status are not proposed as part of the development. As with other areas of interest adjacent or near to the sites, the impact of the proposed development on these woodlands has been assessed as part of this EA.

Conformity of the Proposed Development with Planning Policy

2.32 An assessment of the proposals against planning policy is set out in the accompanying Planning Statement.

Development Framework Plan

2.33 The Development Framework Plan (DFP) (Plan ref: PST021/DFP/01 Rev I) represents the result of discussions on the form, quantum and nature of development which have occurred within the consultant team, stakeholders, the local population and the City Council since May 2004. It is this Development Framework Plan and Land Use Budget (LUB) (reproduced at ES Volume 2: Chapter 2) which have formed
the basis for the environmental assessment work and upon which the application details are based.

2.34 The Great Haddon Design and Access Statement accompanying the applications sets out the urban design and master planning principles which form the rationale for, and underpin, the Development Framework Plan.

Assessment of Alternatives

2.35 The case for the level of growth required in Peterborough has been made through the preparation of the Regional Spatial Strategy, and the suitability of this area as a general location for development has been established through several strategic growth studies, the Sub-Regional Strategy and the emerging Local Development Framework Core Strategy.

2.36 Given the proposed allocation of the Great Haddon site in the LDF for the type and scale of development proposed by the applicant - and the consultation (now closed) on the Core Strategy and its Strategic Environmental Assessment which will confirm the acceptability of the principle of development in this location - no further analysis of alternative sites through the Great Haddon EIA process is considered necessary.
3.0 ASSESSMENT METHODOLOGY

3.1 This chapter outlines the basis of the assessment method and the key technical constraints which have been identified as part of the environmental assessment.

Assessment and Predictive Techniques

3.2 Predictive techniques used to establish the effects of the proposed development vary depending on the factors being considered. Where established techniques exist, then they have been identified and implemented, and the source documents referenced.

3.3 Some of the potential environmental effects are either highly localised or widespread. Such effects may be positive or negative, short or long term, temporary or permanent and may occur immediately or at some point in the future.

3.4 For the purposes of this environmental assessment, it is assumed that:

   ‘Short term’ should be considered as a period of less than 5 years;

   ‘Medium term’ should be considered as 5-10 years;

   ‘Long term’ should be considered as over 10 years.

3.5 When assessing the particular significance of effects, it has been agreed that the following reasoning is used in the determination of impacts:

   a) Which risk groups will be affected and how?

   b) Is the effect reversible or irreversible, repairable or non-repairable?

   c) Does the effect occur over the long or short term, is it continuous or temporary and will it increase or decrease over time?

   d) Is the effect local, district-level, regional, national or global in extent?

   e) Will the consequence be controversial due to the setting of a precedent or the threatening of environmental and health standards and objectives?

   f) Are mitigation measures available and if so how costly are they?

3.6 For most environmental topics, ‘significance criteria’ have been developed. There are instances, however, when the standard of baseline information, the regulations or guidelines available, or the nature of the topic has precluded this approach. Where required, the significance criteria have been based on a five or six point scale, including both adverse and beneficial effects. These are identified in each chapter as appropriate.
3.7 It should be noted that where recognised significance criteria exist (defined by specialist groups as an Environmental Assessment ‘industry standard’), then these have been noted and employed.

**Cumulative Impacts**

3.8 Consideration has been given to the need for appropriate cumulative impact assessment of other major developments as outlined in the Scoping Opinion under each separate topic and the approach taken for each topic is outlined in the relevant chapter.

**Assumptions and Technical Deficiencies**

3.9 Every reasonable effort has been made to obtain data concerning the existing baseline conditions and to accurately predict the effects of the proposed development. However, due to factors such as survey periods or the preliminary nature of the design of development, these may generate some technical deficiencies in the Environmental Statement. Where these deficiencies are known, or where it has been necessary to make assumptions, then these are documented within the individual topic chapters.

3.10 Assumptions adopted are often of importance to environmental assessments. Typically these assumptions are implicit, being largely dependent upon expert judgement. The approach adopted in the environmental assessment is one of making assumptions explicit wherever possible in order that they may be understood and critically evaluated by external parties.

**Presentation of Environmental Effects**

3.11 To aid the identification of environmental effects, an italic typeface has been used to highlight the significance of predicted effects. If considered appropriate, where residual effects following mitigation arise, then a ‘residual effects table’ has been prepared.
4.0 GROUND CONDITIONS

Introduction and Scope of Assessment

4.1 This chapter of the Environmental Statement considers issues related to ground conditions at the application sites and how the near surface strata and groundwater has been potentially affected by previous land use. The specific ground related issues considered encompass geotechnics (including foundation design and construction) and geoenvironmental considerations associated with the natural bedrock geology or historical use of the sites. The chapter describes the baseline conditions and considers both the effects of the ground conditions on the development proposals for the sites and requirements to mitigate remnant affects left by previous activities on both construction workers and ultimate end users, and controlled waters.

4.2 This chapter of the Environmental Statement has been prepared by Peter Brett Associates LLP and is supported by the Phase 1 (Ground Condition) Assessment Report provided in ES Volume 3: Appendices, Chapter 4 Appendix 4.01 [Ref 4.01] and a Preliminary Ground Investigation Report comprising a combined geotechnical and Phase 2 Geo-environmental Study (presented in separate factual and interpretative documents) provided as Appendices 4.02 and 4.03 [Refs 4.02 and 4.03]. This chapter should be read in conjunction with Chapters 5 (Flood Risk, Water and Drainage), 6 (Ecology), 7 (Archaeology and Cultural Heritage), 12 (Minerals and Waste) and Chapter 13 (Energy and Utilities).

Reference Material and Assessment Method

4.3 A summary of current contaminated land legislation, definitions and criteria routinely used for assessment purposes at the time of preparation of this Environmental Statement is included at the end of this Chapter as Annex 4.1. As outlined in the annex, the planning system uses a slightly different definition for contaminated land which is currently provided within Annex 2 of Planning Policy Statement 23: Planning and Pollution Control [Ref. 4.04]).

4.4 The principle of risk assessment underlines the determination of whether the land is contaminated land. The risk assessment includes the development of a conceptual site model (CSM) which describes the types and locations of contamination source(s), potential receptor(s) and potential migration/transportation pathway(s) which may link the identified source(s) to the identified receptor(s). The methodology is endorsed in relevant technical guidance (e.g. DETR, 2000 [Ref 4.04], EA, 2002 [Ref 4.05] and EA, 2006 [Ref 4.06]. A tiered approach to land assessment is outlined as follows:
• **Tier 1 Preliminary Risk Assessment** - a qualitative assessment informed by a Phase 1 study comprising of a desk study and walkover;

• **Tier 2 Generic Risk Assessment** - a quantitative assessment of site specific data by comparison to generic assessment criteria (GAC) informed by a Phase 2 study comprising intrusive investigation and laboratory testing; and

• **Tier 3 A Detailed Quantitative Risk Assessment (DQRA)** - comprising a quantitative risk assessment by comparison to site-specific assessment criteria (SSAC).

4.5 The guidance for the assessment methodology advocates that each tier of assessment should be undertaken in a stepwise approach until the level of risk posed by the site is fully understood and deemed to be acceptable. Thus if a Tier 1 assessment concludes that the risks associated with the site are acceptable, no further assessment is required. Similarly, where unacceptable risks can be ruled out by a Tier 2 assessment, then there is no need for a Tier 3 assessment.

4.6 Under PPS23 it is necessary to determine whether there are likely to be any contamination issues on the site prior to submitting an application for planning consent. The first part of the assessment is to review evidence for potential ‘sources’ of contamination at the site by means of a Phase 1 desktop study. These potential sources can then be verified or eliminated as part of a Phase 2 intrusive investigation with analytical testing of recovered soil, groundwater, surface water and/or soil gas samples, together with soil gas monitoring.

**Limitations and Technical Difficulties**

4.7 The baseline ground investigation was subject to some restrictions and limitations imposed by the tenant farmers of the land and by existing ecological considerations. Specifically, the tenant farmers restricted ground investigation work on the agricultural land within the application sites to the time window between harvesting of crops and the replanting of the next crop. This restricted the sinking of exploratory holes to the period around late August/early September. Subsequent soil gas and groundwater monitoring works were unaffected.

4.8 In addition, no exploratory holes were positioned within a 30m corridor of the reported position of the former government oil pipeline (see Chapter 13). Ecological considerations also restricted the positioning of exploratory holes to cultivated areas only. No exploratory holes were located in verges, field headlands or tracks.
Impact Assessment Criteria

Consultation and Scope

4.9 The sites have been subject to a Phase 1 (geoenvironmental) desk study and subsequent intrusive investigation reports prepared by Peter Brett Associates LLP. The scope of work for the initial desk study comprised an initial data collection exercise carried out following the guidelines outlined in the Northants Contaminated Land Group publication Contaminated Land – A Guide for Developers and their advisors [Ref. 4.05] (to which Peterborough City Council’s Environmental Services Department are listed members) and BS 10175:2001 Section 6.2 [Ref. 4.06]. As part of the data collection exercise enquiries for public register database information was made to the Environment Agency, Peterborough City Council and the adjacent Huntingdonshire District Council. The Phase 1 desk study is included within Volume 3 of the ES: Appendices.

4.10 The Phase 1 study identified that the sites have essentially only a history of agricultural working and consequently that the potential for site wide contamination was Low. The subsequent intrusive geoenvironmental investigation was designed by Peter Brett Associates LLP to confirm the general geology of the sites and the preliminary conceptual site model developed as part of the Phase 1 desktop study. The intrusive investigation was also scoped to acquire general geotechnical information for the sites. Guidelines for combined geoenvironmental and geotechnical studies were followed.

4.11 The intrusive investigation works carried to determine the baseline conditions have been carried out with reference to best practice guidelines outlined in:

- Association of Geotechnical & Geoenvironmental Specialists (AGS) Guidelines for Combined Geoenvironmental and Geotechnical Investigations [Ref. 4.07];

- British Standards BS1377 [Ref. 4.08] and BS5930 [Ref. 4.09];

- Building Research Establishment (BRE) Digests 318, 348 and 411 Site investigation for low-rise building: direct investigations [Refs. 4.10, 4.11 and 4.12];

- Environment Agency Guidance on Requirements for Land Contamination Reports [Ref. 4.13]; and

- National House Building Council's Technical Standards Chapter 4.1 Managing Ground Conditions [Ref. 4.14];

4.12 The combined investigation had the specific objectives detailed in Table 4.1.
Great Haddon, Peterborough
Environmental Statement

Ground Conditions

Great Haddon Consortium

Table 4.1: Phase 2 (Intrusive) Investigation Objectives
Geoenvironmental

This stage consists of an intrusive site investigation and subsequent
risk assessment. The investigation process seeks to confirm the
potential source-pathway-receptor identified by the Conceptual Site
Model (CSM) developed during the Phase 1 assessment. It confirms
the plausibility of a pollutant linkage and gives an indication of the
sites’ current suitability for proposed use.
The intrusive study involves general site characterisation and
assessment on the basis of exploratory site investigation data. This
stage also takes into account the nature, likely location and
behaviour of contaminants, together with their possible interactions
with defined receptors.

Geotechnical

This stage confirms the anticipated geology of the sites, establishes
the engineering properties of the various strata encountered and
allows identification of potential ground related constraints to
proposed building fabric and services.

4.13

The combined (geoenvironmental and geotechnical) intrusive investigation was
undertaken in accordance with current best practice guidelines and guidance as
detailed above and comprised an initial stage of general site works carried out over
the period late August to early October 2008 and encompassing:
•

The sinking of dynamic sample and window sample boreholes and machine
excavated trial pits to confirm the geology across the application sites;

•

Construction of monitoring wells in selected boreholes to facilitate monitoring of
groundwater levels and check for the presence of soil borne gas (including
methane, carbon dioxide and hydrogen sulphide);

•

Recovery of soil samples for subsequent testing to determine the classification
and general geotechnical properties of the various strata encountered; and

•

Recovery of soil samples for subsequent geochemical laboratory analysis for a
range of common contaminants.

4.14

Following completion of the site work, a monitoring programme has been undertaken
encompassing soil-gas (methane, carbon dioxide, carbon monoxide, oxygen and
hydrogen sulphide) across the site with seven data sets collected over the period 9
September 2008 to 11 May 2009. In each instance, the soil-gas measurements were
made in borehole monitoring wells.

The atmospheric pressure at the time of

monitoring was recorded; also the instruments used were fitted with gas flow pods to
allow soil-gas flow rates to be monitored and recorded.
Compiled by David Lock Associates
November 2009

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4.15 The intrusive works encompassed all parts of the sites with the exception of the areas of woodland and the (30m wide) easement corridor around the former government (oil) pipeline that crosses the southern part of the Core Area.

**Assessment Methodology**

4.16 Environmental impacts on ground conditions have been assessed in accordance with the guidelines and methodology set out in:

- Department for Communities and Local Government Consultation Paper. *Environmental Impact Assessment: a guide to good practice and procedures* [Ref. 4.15].
- CIRIA Report C552 *Contaminated land risk assessment – a guide to good practice* [Ref. 4.16].

4.17 Risk assessment relating to the ground conditions has considered and been undertaken with regard to:

- Humans (Current users, construction workers and end users);
- Water resources (groundwater and surface water);
- Aquatic flora and fauna; and
- Building fabric and services.

4.18 In respect of humans (current, during construction and end users), water resources, and aquatic flora and fauna, the risks are principally geoenvironmental in nature relating to the presence of contaminants in the ground. In respect of building fabric and services, the risks are primarily geotechnical in nature relating to post construction serviceability issues.

**Significance Criteria**

4.19 There are no ‘standard’ significance criteria for assessing the effect of ‘ground conditions’ on the development or of the effect of development on the ground. Evaluation of the ground conditions within the sites are based on the suitability of the geotechnical and geoenvironmental properties of the ground for the intended end use, and the processes (if any) and treatment of the ground that will be required to achieve that end use.
4.20 The significance of the impacts of these processes has been assessed by comparing the likely interactions between these processes and the existing ground conditions. Professional judgment has had to be used in some cases to assess effects. The significance criteria are outlined below:

- **Substantial Adverse**: Environmental hazard to water resources, aquatic fauna and flora, and humans (construction workers and end users) requiring extensive remedial works. Significant structural damage to buildings rendering it unsafe to occupy and requiring major repairs involving partial or complete re-building. Permanent loss of serviceability of site infrastructure requiring complete replacement or major repairs;

- **Moderate Adverse**: Environmental hazard to construction workers and/ or end users requiring monitoring and local remedial work. Minor structural or non-structural damage to buildings requiring services of builder (including possible partial underpinning). Weather-tightness of buildings impaired. Loss of functionality of floor slabs. Local damage to service pipes. Some loss of serviceability of roads/ footways requiring repair/ replacement;

- **Minor Adverse**: Temporary and minor environmental impact on surface water resources or air quality. Minor (non-structural) damage to building fabric (brickwork / building finishes). Some continued maintenance required to all hardstanding areas;

- **Negligible**: No appreciable environmental impact on the ground, water resources, aquatic flora and fauna and humans. Any minor adverse effects are reversible;

- **Minor Beneficial**: Minor reduction in environmental risk to humans or aquatic flora and fauna. Minor improvement in water resources (surface water and groundwater);

- **Moderate Beneficial**: Moderate reduction in environmental risk to humans or aquatic flora and fauna. Moderate improvement in water resources (surface water and groundwater); and

- **Substantial Beneficial**: Substantial reduction in environmental risk to humans or aquatic flora and fauna. Significant improvement in water resources (surface water and groundwater).
Baseline Ground Conditions

Data in the Public Domain

Published Geology

4.21 An extract from the current published geological map for the Peterborough district (Geological Survey of England and Wales – now British Geological Survey - 1:50,000 Series, Sheet 172 – Ramsey, solid and drift edition, published 1973) [Ref. 4.18], is presented as Figure 4.1 in ES Volume 2: Chapter 4.

4.22 The geological map shows the development area to be underlain by bedrock strata of the Jurassic aged Oxford Clay Formation. These bedrock deposits are shown to be overlain across the southern parts of the site by Quaternary (Pleistocene and Holocene) aged “Glaciofluvial Deposits”, “Glaciolacustrine Deposits” and “Glacial Till (formerly termed Boulder Clay)” and across northern parts with isolated areas (or outliers) of “River Terrace Deposits”. A narrow tract of “Alluvium” is shown on the eastern side of the site following the tract associated with the Stanground Lode watercourse.

Historical Land Use

4.23 Details of the previous land use across the development area (from Pre-history to the Modern era) are chronicled in detail in Chapter 7 (Archaeology and Cultural Heritage). Land use in the modern era is detailed in the Phase 1 (Ground Condition) Assessment Report prepared by PBA for the application sites (see ES Volume 3, Chapter 4 - Appendix 4.01).

4.24 Generally, from the late nineteenth century to the modern day, the vast majority of the site has been worked by arable agricultural or has remained covered by woodland. The exception to this is a small parcel of land known as the ‘hostel site’ on the eastern part of the site. The hostel site was used during World War II (WW2) as an army camp and later a prisoner of war camp and after WW2 as a hostel site for migrant workers employed in the local brick making industry. The hostel site had various huts for housing workers and a small sewage works in the north-western corner of the site serving the camp.

4.25 A decommissioned government pipeline has been identified crossing the southern part of the development area lying aligned south west to north east. The date of construction of this pipeline and depth at which this pipeline was laid are unknown. The method of construction is also unknown but assumed to be ‘cut and cover’. Further details of the pipeline are given in Chapter 13 (Energy and Utilities).
Current Land Use

4.26 Current land use is described in the Phase 1 (Ground Condition) Assessment Report prepared by PBA for the development area (see ES Volume 3: Chapter 4 Appendix 4.01). The application sites are presently used for arable agriculture. Two farmsteads (Yaxley Lodge Farm and Spendelow’s Farm) are present in the southern part of the Core Area. There are several areas of mature deciduous woodland north of the Core Area. The development area is crossed by footpaths and bridleways. The government pipeline that crosses the southern part of the development area is decommissioned but understood to remain in situ.

Identified Ground Conditions

General Geology

4.27 The exploratory holes undertaken as part of this investigation have confirmed the presence of the Oxford Clay beneath a complex cover of superficial deposits. Specifically:

- The Glaciofluvial deposit that is present as an outlier in the southern corner of the site is inferred by the two boreholes sunk to be a variably gravelly sandy clay rather than a sand and gravel. This seems to confirm the findings of an earlier historical borehole record (sunk in 1993 in connection with the A1 widening scheme). This previous borehole was sunk within the mapped outlier of Glaciofluvial Deposits (on the western side of the adjacent Napoleonic War Scheduled Monument Site) and proved a sequence of gravelly sandy clays (interpreted as boulder clay) to 18.0m depth over the Oxford Clay;

- Whilst the ‘River Terrace Deposits’ were found in the general locations shown on the geological map, they comprised sandy gravel clay rather than ‘sand and gravel’. This is similar to the lithology of the Third Terrace Deposits in other parts of the wider Peterborough District;

- The lithology of the Glaciolacustrine Deposits is similar to that of the Oxford Clay;

- The Head Deposits on the northern part of the site were found to be present as a more extensive continuous surface sheet rather than isolated outliers. The lithology of the deposit is also similar to that of the weathered Glacial Till;

- The alluvial tract associated with the Stanground Lode watercourse was found to extend the full length of the watercourse;
• The Oxford Clay was present as stiff and very stiff greenish grey fissured clay which progressively weathers to a light brown and grey clay near-surface;

• Made Ground was also noted in the small part of the site associated with the former ‘Hostel site’. Some remnant in-ground structures were also found on this small parcel;

• The predominantly cohesive soils encountered during the investigation were noted to be variably desiccated near surface. This in part due to seasonal desiccation (the exploratory holes were sunk in late summer) and in part as a result of the exploratory holes being sited within field headlands (and thus in close proximity of existing boundary trees and hedgerows) to limit crop damage.

4.28 The exploratory holes indicate the following sequence of strata across the development area: agricultural top soil; overlying Superficial Drift deposits comprising either Alluvium, Head Deposits, River Terrace Deposits, or Glacial Till (Boulder Clay), and Glaciolacustrine Deposits overlying Oxford Clay, as summarised in Table 4.2.

Table 4.2: Summary of Ground Conditions Encountered

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Thickness (m)</th>
<th>OD level (m AOD)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Topsoil</td>
<td>0.2 to 0.45</td>
<td>-</td>
<td>Reworked by ploughing</td>
</tr>
<tr>
<td>Alluvium</td>
<td>0.7 to 1.7</td>
<td>-</td>
<td>Locally present adjacent to the course of the Stanground Lode watercourse</td>
</tr>
<tr>
<td>Head Deposits</td>
<td>0.6 to 1.7</td>
<td>-</td>
<td>Present overlying the Oxford Clay in the absence of other Quaternary and Recent deposits.</td>
</tr>
<tr>
<td>River Terrace Deposits</td>
<td>0.15 to 0.9</td>
<td>-</td>
<td>Locally present in parts of the northern side of the site</td>
</tr>
<tr>
<td>Glacial Till (Boulder Clay)</td>
<td>0.6 to 7.75</td>
<td>-</td>
<td>Present over the southern side of the site occupying the higher ground south of Stanground Lode</td>
</tr>
<tr>
<td>Glaciolacustrine Deposits</td>
<td>Not fully proven</td>
<td>-</td>
<td>Locally over the northern side of the site underlying the Glacial Till (Boulder Clay)</td>
</tr>
<tr>
<td>Oxford Clay</td>
<td>Not fully proven</td>
<td>+30.3 to +10.86</td>
<td>Underlying the whole site</td>
</tr>
</tbody>
</table>
Assessment of Risk from Contamination

General Soil Contaminants

4.29 A total of 38 soil samples taken during the intrusive investigation works from the Superficial Drift and bedrock deposits across the site have been analysed for a range of common contaminants by the specialist independent company ALcontrol Laboratories at their Hawarden (Deeside) laboratory. This laboratory held accreditation under the United Kingdom Accreditation Service (UKAS) (Laboratory Scheme Reference Number 1291). UKAS is the sole national accreditation body recognised by government to assess, against internationally agreed standards, organisations that provide certification, testing and inspection, and calibration services. Accreditation by UKAS demonstrates the competence, impartiality and performance capability of these evaluators. The laboratory also held MCERTS accreditation for most of the analytical tests carried out - MCERTS is the Environment Agency’s Monitoring Certification Scheme and was introduced in 2005 for the chemical testing of soils to ensure high-quality and consistent environmental measurements are used when evaluating and comparing analytical data. MCERTS provides formal accreditation of laboratories in accordance with European standards.

4.30 The results of the analytical testing are presented and discussed in detail in the technical reports which are included in Volume 3 Appendices, Chapter 4 - Appendix 4.02 and Appendix 4.03. In summary, the tests confirm that all the contaminants considered potentially hazardous to human health are below current or former Soil Guideline Values (SGVs) and current Generic Assessment Criteria (GACs).

4.31 The baseline analytical testing on soil samples across the application sites confirms the general Low risk assessment made in the Phase 1 (Ground Conditions) Assessment Report. The intrusive study however has shown that ‘natural’ background levels of arsenic are below the current SGV for residential end use with plant uptake and thus this potential source of contamination identified in the Phase 1 study can be eliminated. The investigation works to-date however have not targeted all of the identified local potential sources of contamination (e.g. the easement around the decommissioned oil pipeline, the existing farmyards and small number of backfilled pond features), primarily because of restrictions imposed on the available exploratory hole positions due to ecological, current land-usage or third party easement restrictions. It is anticipated that where these features lie within individual development parcels that they will be further investigated in advance of the parcel/plot development by the individual developers.
General Surface Water Contaminants

4.32 Samples of surface water were taken from 10 locations on and around the development area on two occasions in July 2008 and October 2008. Figure 4.3 shows the surface water sampling locations. Sample locations included field drains and the main watercourses (the Stanground Lode and the Stanground Lode Tributary) which are on site, and off site locations including the Yards End Dyke near Yaxley and the now flooded former clay pits (Norman Cross Lake and Long Lake).

4.33 The samples were analysed for a range of common contaminants by the independent company ALcontrol Laboratories at their Hawarden (Deeside) laboratory. This facility is an accredited laboratory for water sample analysis under the United Kingdom Accreditation Service (UKAS) (Laboratory Scheme Reference Number 1291). The results of the testing undertaken on 10 samples recovered in summer (July) 2008 are presented in full in the technical reports which form Appendix 4.02 and 4.03. In summary, the results indicate that the surface waters of the Stanground Lode routinely have concentrations of sulfate in excess of the EQS (400mg/l). High sulfate concentrations are present at the entry point of the Stanground Lode to the assessment area and at its exit from the site indicating that the sulfate is generated off site. Surface water quality to the east of the assessment area on and around the Hampton Township area has been monitored and tested regularly by PBA for O&H, the owner of land at Hampton for a number of years as part of the ongoing Hampton environmental monitoring programme. Water sampling has taken place from Beeby’s Lake (east and west), Teardrop Lake, Fletton Lake, Pumphouse Pit, Knothole Lake and the Serpentine Lakes. It is noteworthy that sulfate has generally been recorded at concentrations in excess of the sulfate EQS at all of these lakes during most of the monitoring rounds undertaken. The measured sulfate levels therefore are considered to be simply indicative of ‘natural’ background levels in this area (associated with the underlying Jurassic aged Oxford Clay bedrock).

4.34 The surface water sample taken in July 2008 from sampling point SW5 at the entry point of the Stanground Lode Tributary to the site contains a slightly elevated chloride concentration relative to the EQS. The presence of high chloride in the 2008 summer could be associated with the very wet weather which may have washed salt laden sediment trapped in drains from the A1(M) to the west into the watercourse. In any case the presence of chloride in the surface water entering the site via the Stanground Lode Tributary is not considered a cause for concern.

4.35 Surface water samples were also taken from selected off-site locations as shown on Figure 4.3. The analytical testing show that those off site water sources to the south of the assessment area, between Yaxley village to the east and the A1(M) motorway
to the west, also contain elevated levels of sulfate with respect to the current Environmental Quality Standard (EQS). As outlined above, this is consistent with other surface water bodies in the district. The results also show levels of boron exceeding the Water Supply Regulations (WSR) limit in Norman Cross Lake (Sample reference SW2) in both July and October 2008 and the level of copper exceeding the EQS in July 2008. The so termed ‘Norman Cross Lake’ is a partially backfilled former clay pit which supplied the adjacent Norman Cross Brickworks. Boron and copper are common contaminants associated with brickworks and this is likely to be the source of these exceedances.

4.36 The ‘Off-site’ surface water bodies (i.e. the lake to the south of the A15 London Road and the Yards End Dyke watercourse) cannot have an impact on the surface waters of the assessment site and are therefore not considered any further.

Ground Gas (landfill gases including methane, and radon)

4.37 Monitoring data has been acquired over an eight month period covering autumn/winter 2008 and into late spring 2009. Over these monitoring visits, the range of prevailing atmospheric pressure ranged from 986 hPa to 1021 hPa, and was below 1000 hPa on two occasions (11 November 2008 and 5 March 2009). The results have also shown that:

- Methane has been not detected above the detection limit of the monitoring equipment in any of the installations;
- In borehole BHMA103, a peak level of 2.3% v/v was recorded on one occasion. In the other monitoring wells a peak level of 0.4% volume/volume (v/v) was measured;
- Hydrogen sulphide has not been detected above the detection limit of the monitoring equipment; and
- Gas flow rates recorded were low (maximum recorded in boreholes closest to the historical landfill was 0.4 litres per hour).

4.38 In respect of the historic landfill to the south-west of the application sites, it can be concluded that this historic landfill site poses no significant hazard to the proposed development and that no special protective measures are required to be incorporated in the construction of dwellings or commercial buildings. This is on the basis of:

- the known history from review of available map records and other documents, and information pertaining to this historic landfill provided by the Environment Agency and Huntingdonshire District Council;
the strata sequence proven by the boreholes sunk in this part of the site;

the results of soil-gas monitoring carried out; and

the results of the risk assessment classifying those potentially affected site areas as Characteristic gas situation 1 [Ref. 4.19 and 4.20], which does not require the incorporation of gas protection measures for new buildings.

4.39 In respect of potential radon occurrence, following the assessment procedure outlined in BRE Report BR211 [Ref. 4.21], the proposed development does not lie within an area where there is currently an assessed risk of radon occurrence. As such no radon protective measures for new residential dwellings are currently required.

Geotechnics and Foundations

General Earthworks

4.40 To facilitate development, a series of flood mitigation measures have to be implemented incorporating provision of flood storage areas (or ponds) close to the Stanground Lode and the raising of site levels (using materials from the on-site excavations). Most of the materials from the excavation works will be suitable for re-use, although they are likely to be difficult to handle when wet and may require leaving in stockpiles to dry out before re-use.

Foundations

4.41 The absence of Made Ground over most of the development area should enable the use of conventional high level shallow spread (trench fill or strip) footings for low rise residential or commercial development.

4.42 The site is underlain by clay soils which range from low to high shrinkability depending on the geological formation present. Therefore in accordance with current best accepted practice all foundation design will take into account the potential affects on foundations of existing trees and hedgerows whether they are removed before development or remain, as well as future landscaping and planting schemes incorporated in the development. The National House Building Council (NHBC) document Chapter 4.2: Building Near Trees [Ref. 4.22] gives foundation design guidance when designing foundations to account for the effects of vegetation.

4.43 In areas earmarked for residential housing where fill material is placed to raise site levels there has historically been a general presumption against founding conventional shallow spread (trench fill or strip) footings in Made Ground or even onto engineered fill. Where engineered fill is placed/ present, special foundation schemes
are usually still required which for developments of up to 3 storey height can encompass:

- Deep trench fill foundations taken through the engineered fill and placed within suitable underlying ‘natural’ strata;

- Semi-raft type foundations; or

- Piled foundations.

4.44 Where residential apartment blocks of 3+ storey height are to be built, the use of piled foundations is normally required. Early discussion with the Warranty providers (e.g. NHBC / Zurich Building Guarantee) will be undertaken to identify potential restrictions and/ or specific Construction Quality Assessment (CQA) requirements to verify acceptability.

4.45 For low rise non-domestic development, dependent on the transmitted foundation loadings, conventional spread foundations can be placed within engineered fill. Where bridge structures are proposed (or more onerous settlement tolerances are imposed/ required for building serviceability) then piled foundation schemes will need to be adopted.

**Potential Impacts, Mitigation Measures and Residual Impacts**

**Soil, Water and Contamination Considerations During Demolition/ Site Clearance**

4.46 The demolition/ site clearance stages of the works will involve the removal of the existing farmstead buildings and associated structures and the grubbing out of the former in-ground sewage works structures. The decommissioned government (oil) pipeline that crosses the southern part of the development area will also be removed together with any identified contamination of the surrounding sub-soil. This will give rise to a local Moderate Beneficial impact.

4.47 The potential risks are to soil, groundwater and surface water from contamination are local only and related to the demolition of the small number of structures and the decommissioning and removal of the single above ground fuel tank present at Yaxley Lodge Farm. Small spills or leaks of fuel during decommissioning of the fuel tank have the potential for a local Minor Adverse impact to soils, groundwater and surface waters. These risks can be mitigated by the careful controlled removal of the tank by an experienced and competent contractor, such that the residual impact will be Negligible.
4.48 The release of asbestos fibres from the demolition of buildings has the potential for a local Moderate Adverse impact to soils. These risks can be mitigated by the completion of a hazardous building materials survey on the structures to determine if such materials are present and by the decommissioning and removal of any identified hazardous materials and off-site disposal in an appropriate controlled manner. Removal of this potential source of contamination (e.g. hazardous materials within the building fabric) will give rise to a local Minor Beneficial residual impact.

4.49 With respect to the ‘Hostel’ site, any remnant contamination associated with the former small sewage works and around the former huts/ rest of this parcel will be removed or capped. This will give rise to a local Moderate Beneficial impact.

4.50 The decommissioned pipeline has the potential for a local Substantial Adverse Impact to soils, groundwater and surface waters. Controlled removal of the former pipeline and any identified contamination (as a result of operational leakage or the removal process) will be required with the resultant trench excavation backfilled with ‘clean’ site generated fill materials placed and compacted in accordance with an appropriate engineer's specification. This will mitigate any potential current and future impact that this structure may have on the immediately surrounding subsoil and local groundwater table. These mitigation measures will produce a local Moderate Beneficial residual impact as this potential source of contamination will have been removed from the site. Further considerations of issues with regard to the removal of this pipeline are outlined in Chapter 13.

Soil, Water and Contamination Issues During Redevelopment – Groundworks and Construction

4.51 The potential disturbance and unintentional spread of filter bed materials during removal of the remnant in-ground sewage works structures has the potential for a local Minor Adverse impact upon soils. Controlled removal of any remaining sub-structures, allied with removal of any remnant contamination associated with the sewage works will be required as mitigation measures. These will give rise to a residual local Minor Beneficial impact.

4.52 Uncontrolled import of fill materials to site to raise site levels has the potential for a Substantial Adverse impact upon soils and also to surface water via leaching into watercourses and drainage. Controlled selection and import of all materials used for raising site levels in accordance with an appropriate Engineer’s specification including comprehensive source site (geochemical) testing of any proposed import material will be the required mitigation measures. This will ensure that the residual effect of the import of material to site to raise levels is Negligible.
4.53 The intrusive ground investigation has identified the general presence of a clay-soil site, with evidence that the existing on-site and boundary trees and hedgerows has resulted in desiccation of the ground. Existing ground conditions over a substantial part of the development area have potential for ground related movements to occur as a result of seasonal wetting and drying of the near surface soils. The combination of shrinkable soils and trees, hedgerows or shrubs also represents a hazard to structures that requires special consideration. Trees, hedgerows and shrubs take moisture from the ground and (on clay soil sites) this can cause significant volume changes resulting in ground movement. This has the potential to affect foundations and damage the supported structure. In order to minimise this risk, foundations will be designed to accommodate the movement or be taken to a depth where the likelihood of damaging movement is low. Design of foundations in accordance with best accepted current practice, allied with design of new landscape plantings (i.e. selection of plant species and planting distance from new buildings) will ensure that the resultant residual impact is Negligible.

4.54 Overall, the effect of the development on the ground conditions will on the general scale be Negligible, but on the local scale will have a Minor Beneficial impact.

Soil, Water and Contamination Issues – Operational Phase

4.55 Hydrocarbon spills or leaks from vehicles entering the surface water drainage system have a potential for local Minor Adverse impact upon surface water. Proposed mitigation measures include a surface water management plan, incorporation of silt traps and interceptors at strategic points, including immediately prior to the final discharge point, allied with regular inspection and maintenance. This will ensure that the residual impact is Negligible.

4.56 No other mitigation measures are considered necessary with respect to protection of the ground or surface water environment from the operational phase of the development.

Cumulative and Interactive Effects

4.57 The preliminary Phase 2 intrusive investigation has confirmed the initial (Phase 1) desktop assessment that there is no potential site wide ‘contamination’ as a result of the sites’ natural geology or history of previous land usage, but there are a small number of areas where local ‘contamination’ has been identified or may be present but as yet has not been verified. These local areas occur where either: (a) ‘contamination’ has been identified (e.g. associated with the former small sewage works); (b) there is potential for contamination to be present (e.g. hazardous materials
in the fabric of the existing building structures, associated with the farms, in those parts of the hostel site not investigated or within the easement zone of the disused government (oil) pipeline associated with historic leakage/spills; or (c) there is potential for ‘contamination’ to arise at some future date (e.g. leakage from the decommissioned pipeline will remain if this development site does not proceed and it remains in its current use as agricultural land). Thus, the development of this land will potentially have a ‘Minor or Moderately Beneficial’ local impact. These ‘Beneficial’ effects will not however directly impact adjacent sites.

**Summary of Potential Impacts, Mitigation Measures and Residual Impacts**

4.58 The tables overleaf summarise the potential impacts arising from existing Ground Conditions before mitigation, the proposed mitigation measures as part of the proposed development process, and the residual effects.

**Summary Matrix of all Impacts Before Mitigation**

<table>
<thead>
<tr>
<th>Issue</th>
<th>Description of impact</th>
<th>Geographical significance</th>
<th>Impact</th>
<th>Significance</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground Conditions</td>
<td>During Demolition/ Site Clearance Phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spills or leaks during decommissioning/ removal of isolated farmstead fuel oil tanks affecting existing soils, groundwater and surface waters.</td>
<td>* Adverse</td>
<td>Minor Local</td>
<td>Temporary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Release of asbestos fibres into the air/ ground during clearance of farmstead buildings.</td>
<td>* Adverse</td>
<td>Moderate Local</td>
<td>Temporary and Permanent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Issue</td>
<td>Description of impact</td>
<td>Geographical significance</td>
<td>Impact</td>
<td>Significance</td>
<td>Duration</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------</td>
<td>--------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td></td>
<td>Release of contaminants from the former small scale sewage works in the Hostel site or other contaminants around the former huts / camp buildings</td>
<td></td>
<td>• Adverse</td>
<td>Moderate Local</td>
<td>Temporary and Permanent</td>
</tr>
<tr>
<td></td>
<td>Leaks from decommissioned oil pipeline affecting surrounding soils, groundwater and surface waters</td>
<td></td>
<td>• Adverse</td>
<td>Moderate Local</td>
<td>Temporary</td>
</tr>
<tr>
<td></td>
<td>Importation of ‘contaminated’ subsoil to site to raise general site levels</td>
<td></td>
<td>• Adverse</td>
<td>Substantial Local</td>
<td>Permanent</td>
</tr>
</tbody>
</table>

Geographical Significance Key: I = International; N = National; R = Regional; D = District; L = Local.

During Ground works and Superstructure Construction Phase

- Spread of remnant filter bed materials (in former sewage works area) during removal of existing substructure and affect on soils, groundwater and surface waters
  - Adverse
  - Minor Local
  - Temporary and Permanent

- Importation of ‘contaminated’ subsoil to site to raise general site levels
  - Adverse
  - Substantial Local
  - Permanent
## Ground Conditions

### Ground Movement

- **Description of impact:** Ground movement due to seasonal shrinkage and swelling where clay subsoil occurs and effect of existing trees/ hedgerows and/ or proposed landscape plantings.
- **Geographical significance:** -
- **Impact:** Adverse
- **Significance:** Substantial
- **Duration:** Permanent

### Hydrocarbon Spills

- **Description of impact:** Hydrocarbon spills/ leaks from vehicles entering surface water drainage system
- **Geographical significance:** -
- **Impact:** Adverse
- **Significance:** Minor Local
- **Duration:** Temporary

### Subsidence Damage

- **Description of impact:** Subsidence damage arising from the presence of clay subsoil and effect of existing or proposed landscape plantings
- **Geographical significance:** -
- **Impact:** Adverse
- **Significance:** Substantial
- **Duration:** Permanent

## Summary of Mitigation and Enhancement Measures and Residual Effects

### During Demolition/ Site Clearance

- **Issue:** Ground Conditions
- **Description of impact:** Spills or leaks during decommissioning/ removal of isolated farmstead fuel oil tanks affecting existing soils, groundwater and surface waters.
- **Mitigation/enhancement measures:** Decommissioning works to be carried out by a suitably experienced specialist contractor. Any accidental spills that occur during the works to be remediated.
- **Residual Effects:** Negligible
### Ground Conditions

<table>
<thead>
<tr>
<th>Issue</th>
<th>Description of impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Release of asbestos fibres into the air/ground during clearance of</td>
<td>A hazardous building material assessment to be carried out prior to demolition/site</td>
</tr>
<tr>
<td>farmstead buildings.</td>
<td>clearance. Where asbestos containing materials identified, safe removal prior to</td>
</tr>
<tr>
<td></td>
<td>demolition to be carried out by a suitably experienced specialist contractor.</td>
</tr>
<tr>
<td>Release of contaminants from former small scale sewage works in the</td>
<td>A suitably experienced, competent, specialist contractor will be employed to carry out</td>
</tr>
<tr>
<td>Hostel site or other contaminants around the former huts and camp</td>
<td>the removal works. Contingency plans in place to deal with/remediate affect of any</td>
</tr>
<tr>
<td>buildings</td>
<td>accidental spills.</td>
</tr>
<tr>
<td>Leaks from decommissioned oil pipeline affecting surrounding soils,</td>
<td>A suitably experienced, competent, specialist contractor will be employed to carry out</td>
</tr>
<tr>
<td>groundwater and surface waters</td>
<td>the removal works. Contingency plans in place to deal with/remediate affect of any</td>
</tr>
<tr>
<td></td>
<td>accidental spills.</td>
</tr>
<tr>
<td>Spread of remnant filter bed materials (in former sewage works area)</td>
<td>Removal of the remnant sub-structures to be carried out in a controlled manner to</td>
</tr>
<tr>
<td>during removal of existing sub-structure and affect on soils,</td>
<td>avoid spread of filter bed material.</td>
</tr>
<tr>
<td>groundwater and surface waters</td>
<td></td>
</tr>
</tbody>
</table>

---

**Compiled by David Lock Associates**

**November 2009**
<table>
<thead>
<tr>
<th>Issue</th>
<th>Description of impact</th>
<th>Mitigation/enhancement measures</th>
<th>Residual Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Importation of ‘contaminated’ subsoil to site to raise general site levels</td>
<td>Importation of fill materials to Site to be carried out in accordance with an Engineer’s specification including comprehensive source site (geochemical) testing to confirm acceptability of proposed material for importation to site.</td>
<td>Negligible</td>
</tr>
<tr>
<td></td>
<td>Ground movement due to seasonal shrinkage and swelling where clay subsoil occurs and effect of existing trees/ hedgerows and/or proposed landscape plantings.</td>
<td>Foundations (type and depth) to new build to be constructed in accordance with current best accepted practice to take account of potential future shrink/swell ground movements. Landscape plantings (i.e. species/planting distance from building) to be designed to be compatible with the proposed foundation scheme in accord with current best accepted practice.</td>
<td>Negligible</td>
</tr>
<tr>
<td>During Operational Phase</td>
<td>Hydrocarbon spills/ leaks from vehicles entering surface water drainage system</td>
<td>Surface water management plan Installation of oil interceptors into drainage system during construction. Provision for regular cleaning and maintenance of the interceptors during operational life.</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

**Technical References**


Ref. 4.05 – Northants Contaminated Land Group. Contaminated Land – A Guide for Developers and their advisors. V3. November 2005. [Corby District Council; Daventry District Council; East Northamptonshire Council; Kettering Borough Council; Northampton Borough Council; South Northamptonshire Council; Wellingborough Council; Peterborough City Council].


Ref. 4.07 - Association of Geotechnical and Geoenvironmental Specialists. Guidelines for Combined Geoenvironmental and Geotechnical Investigations. AGS.


Ref. 4.18 - British Geological Survey 1999: Sheet 172 - Ramsey solid and drift, 1: 50,000.


Rationale for the Selection of Generic Assessment Criteria: PBA Briefing

Note

1 Introduction
The aim of this document is to present an explanation for the selection of the generic assessment criteria routinely used by PBA. Any deviation from these criteria and selection of criteria for parameters not covered in this document will be described in the report text. The report will also comment on the appropriateness of the criteria for any specific project objectives or ground conditions.

The document is divided into some introductory text and individual discussions on soils, water and soil gases.

2 Contaminated Land Legislation and Definition
The statutory regime for the identification and remediation of contaminated land came into effect on 1 April 2000 by bringing into force Part 2A of the Environmental Protection Act 1990. Part IIA was inserted into the 1990 Act by Section 57 of the Environment Act 1995. The definition was further revised with respect to pollution of controlled waters on 1st October 2004 by bringing in an amendment under Section 86 of the Water Act 2003.

The Contaminated Land Regime reflects the UK Government's stated objectives of achieving sustainable development through the "suitable for use approach". This consists of three elements:

i) Ensuring that land is suitable for its current use;
ii) Ensuring that land is made suitable for any new use, as planning permission is given for that new use; and
iii) Limiting requirements for remediation to the work necessary to prevent unacceptable risks to human health or the environment in relation to the current use or future use of the land for which planning permission is being sought.

Contaminated Land for the purpose of Part 2A is defined as "any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that (a) Significant harm is being caused or there is a significant possibility of such harm being caused; or (b) Significant pollution of controlled waters is being caused or there is a significant possibility of such pollution being caused".

The planning system uses a slightly different definition for contaminated land which is currently provided within Annex 2 of Planning Policy Statement 23: Planning and Pollution Control (ODPM, 2004). The term "land affected by contamination" is used which covers cases where "the actual or suspected presence of substances in, on or under the land may cause risk to people, properties, human activities or the environment, regardless of whether or not the land meets the statutory definition in Part IIA".

3 Principles of the Tiered Approach to Risk Assessment

The principle of risk assessment underlines the determination of whether the land is contaminated land. The risk assessment includes the development of a conceptual site model that describes the types and locations of contamination source(s), potential receptor(s) and potential migration/transportation pathway(s) that may link the identified source(s) to the identified receptor(s). The methodology is endorsed in relevant technical guidance (e.g. DETR, 2000a, EA, 2002 and EA, 2006a).

A tiered approach to land assessment is outlined as follows:

Tier 1 Preliminary Risk Assessment - a qualitative assessment informed by a Phase 1 study comprising of a desk study and walkover.

Tier 2 Generic Risk Assessment - a quantitative assessment of site-specific data by comparison to generic assessment criteria (GAC) informed by a Phase 2 study comprising intrusive investigation and laboratory testing.

Tier 3 Detailed Risk Assessment (DQRA) - comprising a quantitative risk assessment by comparison to site-specific assessment criteria (SSAC).

The guidance advocates that each tier of assessment should be undertaken in a step-wise approach until the level of risk posed by the site is fully understood and deemed to be acceptable. Thus if a Tier 1 assessment concludes that the risks associated with the site are acceptable, no further assessment is required. Similarly, where unacceptable risks can be ruled out by a Tier 2 assessment, then there is no need for a Tier 3 assessment.
Rationale for the Selection of Generic Assessment Criteria

Under PPS23 it is necessary to determine whether there are likely to be any contamination issues on the site prior to submitting an application for planning consent. Some local authorities are requiring a minimum of a Phase 1 containing a Tier 1 Preliminary Risk Assessment for applications where the development is sensitive or sensitive receptors are present. Where contamination is known or likely it may be necessary to undertake an intrusive investigation to collect site-specific data before an application can be made.

4 Tier 2 Generic Assessment Criteria

The Tier 2 risk assessment involves the use of published generic criteria to "screen" the site-specific contamination testing data and identify potential hazards to specific receptors. Guidance on available generic assessment criteria (GAC) is given in CRL 11 (EA, 2004). The following text identifies the criteria routinely adopted by PBA for screening the risk to specific receptors. Where this general approach is not appropriate for any one site, alternative assessment criteria will be presented in the report text.

4.1 General Notes

It should be noted that in general, GAC have been developed using highly conservative assumptions to screen out sites that definitely would not present a problem. Where sites fail the criteria this may not necessarily mean that the site represents an unacceptable risk for the particular management context in which decisions have been made.

It is stressed that the exceedance of a Tier 2 GAC does not necessarily indicate that a site is statute or contaminated or unsuitable for use (CLAN2-05) and that whilst GAC provide an aid to decision-making, they do not replace the need for professional judgement in risk assessment (EA, 2006b).

It should be noted that any PBA interpretation of contamination test results is based on a scientific and engineering appraisal. The perceptions of, for example, banks, insurers, lay people etc are not taken into account.

Any summary tables included in this Appendix are produced for ease of reference to the criteria, they do not in any way replace the documents of origin (which are fully referenced) and which should be read to ensure appropriate use and interpretation of the data.

4.2 Tier 2 Screening Values for Assessing Soils

Potential Harm to Human Health The criteria which are routinely used by PBA as Tier 2 soil screening values are presented in Table 1.

Cautionary Note The production of authoritative contaminated land guidance in the UK is currently incomplete. DEFRA has yet to produce a comprehensive list of assessment criteria that on its own, would be sufficient to enable the assessment of the potential risks posed by soil contaminants (to human health). A number of industry-driven initiatives have developed in recent months in order to increase the amount of contaminated land guidance available to practitioners. This has led to the publication of a series of non-statutory non-Governmental contaminated land assessment criteria. (It should be noted that the published DEFRA guidance is also non-statutory).

PBA has reviewed these publications and has taken a pragmatic view to the use of various criteria in the assessment of human health risk from contaminated land. Where we consider that non-Governmental criteria are authoritative and robust, we will refer to such criteria in our assessment of soil contamination. Because such criteria are not published by the UK Government, they are not beyond scrutiny and may be subject to challenge by a regulatory body or their representative. If the use of selected generic assessment criteria is challenged, it may be necessary to carry out detailed modelling to generate site-specific assessment criteria.

Former Soil Guideline Values (2002) Technical guidance with respect to the human health element of the assessment of contamination in soils was released by the Environment Agency (EA) in March 2002 via the ‘contaminated land exposure assessment’ (CLEA) regime (EA, 2002).

The CLEA regime provided generic Soil Guideline Values (SGVs) for a limited number of contaminants for a variety of different land use classes. The regime was incomplete in terms of the range of contaminants listed in CLR8 (EA, 2002) and prior to July 2008, SGVs had only been published for 10 substances (arsenic, cadmium, chromium, lead, mercury, nickel, selenium, ethylbenzene, toluene and phenol).

On 22 July 2008 DEFRA announced the withdrawal of the existing SGVs to coincide with the release of a revised and updated version of the CLEA model (the original version of which was used to devise the original SGVs). The Environment Agency (EA) is currently in the process of deriving new SGVs using the updated CLEA model. The first tranche of this work was published in March 2009.

New (2009) SGVs that have been published are generally similar to the withdrawn SGVs (i.e. they still represent conservative threshold numbers below which no significant risk of harm to human health is likely to be present). Consequently, in the absence of replacement SGVs, there is no
reason whatsoever to suggest that the former SGVs should be considered technically unsound and since both practitioners and regulators require a framework to continue working within, the former SGVs will still be used to assist in the interpretation of relevant geoenvironmental testing results until such time that they have been formally replaced by DEFRA.

An exceedence of a 2002 SGV indicates that further assessment via a site specific risk assessment may be needed.

**Soil Guidance Values (2009)** On 31 March 2009, the EA took the first of an intended series of steps towards re-releasing SGVs calculated using the latest version of the CLEA model (CLEA v 1.04). SGVs were published for six substances (benzene, toluene, ethylbenzene and xylene (BTEX compounds) and mercury and selenium) (EA, 2009). The specified land uses were residential with plant uptake, allotments and industrial/commercial. Subsequently SGVs have been published for a further four substances (arsenic, nickel, cadmium and phenol) for residential with plant uptake, allotments and industrial/commercial land use. These SGVs will be used by PBA as Tier 2 assessment criteria.

**CLED Generic Assessment Criteria (GAC)** It is noteworthy that the SGVs generated by the CLEA model for organic compounds are dependent on the amount of organic matter present in the soil (a lower SGV is generated for soils with lower organic matter contents since organic matter acts to immobilise organic contaminants). The SGVs published by the EA for BTEX compounds and phenol assume that the ‘host’ soil has 6% organic matter.

PBA recognises that UK soils often have organic matter concentrations below 6% and that it may therefore not be conservative to use the published SGVs for BTEX compounds when assessing the potential risks from these chemicals. The on-line Contaminated Land Strategies Digest (CLSD) formed a consortium of ten practitioners (including representatives from local authorities), to prepare generic assessment criteria for a number of contaminants at more conservative organic matter contents of 1% and 3% for the same end uses. Ten independent professionals reproduced the same criteria using the EA’s latest CLEA model and latest CLEA guidance and PBA independently verified the results published using the latest CLEA model. These criteria will be used by PBA where appropriate.

In addition the CLSD consortium derived generic assessment criteria (GAC) for selected substances for another end use, that being residential without plant uptake (CLSD, 2009).

**CIEH Generic Assessment Criteria (GAC)** In December 2006, GAC for 31 substances were published by the Chartered Institute of Environmental Health (CIEH) (LOM and CIEH, 2006) using the then current version of the CLEA software, (CLEA UK beta version 1.0 (or CLEA UK) released in November 2005). The work was repeated in 2009 using the latest CLEA model and the results were published in July 2009. These GAC are considered to be conservative, authoritative and scientifically based by PBA and will be used as Tier 2 assessment criteria where we test for these substances in soil. This practice will continue until such time that DEFRA derive and publish formal SGVs to replace these criteria.

**Potential for Harm to the Built Environment** PBA use the following primary guidance to assess the significance of soil chemistry with respect to its potential to harm the built environment.

i) Site Preparation and Resistance to Contaminants and Moisture. Approved Document C (BRE 2004);

ii) Concrete in aggressive ground SD1 (BRE 2005); and

iii) Technical guidance on the assessment of soil chemistry with respect to its potential to corrode plastic service pipes has been published by the Water Regulations Advisory Scheme (WRAS, 2002). PBA use this guidance to assess the significance of various chemical testing results on plastic construction materials where required.

**Potential to Harm Ecosystems, Animals, Crops etc** The criteria which are routinely used by PBA as Tier 2 screening values are given in Table 3. PBA use the following primary guidance to assess the significance of soil chemistry with respect to its potential to harm ecosystems.


ii) Consultation on Soil Screening Values for Assessing Ecological Risk, issued by the Environment Agency, Bristol (EA, 2008);

iii) The Restoration and Aftercare of Metalliferous Mining Sites for Pasture and Grazing (ICRCL 70/90, 1990);

iv) Code of Practice for Agricultural Use of Sewage Sludge (DOE, 1993); and


**Note on Appropriate Use of Assessment Criteria** The assumptions used within the CLEA model for deriving the former SGVs, and those that will be used to derive future SGVs, are both numerous and complex and the appropriateness of these assumptions requires confirmation on a site-specific basis.
Any GACs which have been derived using the current or previous CLEA model are not applicable where soils are provided with a cap. In such instances, the adequacy and effectiveness of the cap needs to be determined using for example the appropriate Building Research Establishment guidance (Tedd et al., 2004).

**Note on Mercury Assessment** Mercury can exist in a number of different forms in the environment including inorganic, elemental and organic. Mercury is most commonly found in its inorganic state and it is very rare to find significant concentrations of elemental and organic mercury unless there is a process related source of one of these other forms relevant to the site in question. PBA undertake routine analytical testing to determine total mercury content. Total mercury includes both inorganic and elemental forms of the metal.

The hazard identification stage of the risk assessment process is used to assess whether further speciation of mercury into its elemental and organic forms is necessary and these additional tests are not routinely specified.

Situations where it is desirable to determine the proportions of different forms of mercury might include sites where potential industrial sources of mercury have been identified, or were initial screening tests have revealed unusually high concentrations of total mercury.

In these cases, concentrations of inorganic, elemental and organic mercury can be assessed against specific Soil Guideline Values published by the Environment Agency.

### 4.3 Tier 2 Screening Values for Assessing Controlled Waters

**Potential Harm to Human Health** The criteria which are routinely used by PBA as Tier 2 water screening values are given in Table 2. PBA use the following primary guidance to assess the significance of water chemistry with respect to its potential to harm human health where appropriate.

1. The Water Supply (Water Quality) Regulations 2000 (DETR, 2000b);
2. Guidelines for drinking-water quality, World Health Organisation (WHO, 1993); and
3. The Surface Water (Abstraction for Drinking Water) (Classification) Regulations (DoE, 1996); and subsequent amendments.

Although not specific to the UK the WHO guidelines for drinking water quality are utilised as they incorporate more organic parameters than listed in the Water Supply (Water Quality) Regulations. The WHO system provides a guideline value for substances that are considered to be carcinogenic based on a concentration in drinking water associated with an excess lifetime cancer risk of $10^{-5}$ (one additional cancer per 100,000 of the population ingesting drinking water containing the substance at or above the guideline value for 70 years).

A number of the prescribed concentrations listed in the Water Supply Regulations have been set for reasons other than their potential to cause harm to human health. The concentrations of some elements are controlled because they may taint potable water with an undesirable taste, odour or colour or may potentially deposit precipitates in water supply pipes.

**Potential to Harm Controlled Waters** Controlled Waters are namely rivers, estuaries, coastal waters, lakes and groundwaters, but not perched waters. There are no official or statutory limits on acceptable concentrations of contaminants in groundwater in the UK.

There are statutory limits on acceptable concentrations of contaminants in surface water in the UK. Limits have been published in the form of Environmental Quality Standards (EQSs) which are available for fresh, estuarine and marine waters. EQSs have been derived under the requirements of the EC Dangerous Substances Directive (EC, 1976) that classifies substances as List I and List II. Standards for List I substances have been defined in ‘daughter’ Directives to the EC Dangerous Substances Directive. The Dangerous Substances Directive requires that standards for List II substances are derived by the member states. The UK has set EQSs for List II substances (derived by WRc plc, Swindon) and these are published on the Environment Agency website (EA, 2004). The Environment Agency has a legal obligation to ensure that statutory EQSs are met.

The criteria which are routinely used by PBA as Tier 2 screening values are given in Table 2. PBA use the following primary guidance to assess the significance of water chemistry with respect to its potential to harm Controlled Waters.

1. The Water Supply (Water Quality) Regulations (DETR, 2000); and
2. Environmental Quality Standards (EQSs).

The results from any eluted liquids will be compared to appropriate assessment criteria depending on the receptor of concern.

### 4.4 Tier 2 Screening Guidance for Assessing Soil Gases

**Risk Assessment Approach** Guidance on the assessment of risks specifically for sites located adjacent to Landfill Sites has been published by the Environment Agency (EA, 2004d). A tiered approach to assessing risk is advocated by the guidance. This allows the level of detail in a risk assessment to be proportionate to the nature and complexity of the risk.
The Tier 1 Risk Screening methodology advocated by the Environment Agency (EA) guidance document (EA, 2004d) should:

i) Identify complete source-pathway-receptor linkages;
ii) Screen out insignificant risks;
iii) Prioritise the risks and receptors; and
iv) Provide an initial assessment of the potential impacts at a receptor.

A Tier 2 assessment comprises the quantitative analysis of risk following the collection and analysis of soil gas monitoring data.

Guidance on suitable methodologies for the collection of gas monitoring data is provided in CIRIA Report C665 (CIRIA, 2007).

Guidance Available

PBA use the following primary guidance to assess the significance of soil gas chemistry with respect to its potential to harm human health.

i) Assessing risks posed by hazardous gases to buildings C665 (CIRIA 2007);
ii) Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present. (NHBC 2007);
iii) Code of practice for the characterization and remediation from ground gas is affected developments (BSI, 2007); and

Waste Management Paper No. 27 (DoE, 1991) defines what constitutes a “significant quantity” of gas. WMP27 advises that a site producing (i) Methane concentrations in excess of 1% by volume and with a flow rate of greater than 15 litres per hour; or (ii) Carbon dioxide in excess of 1.5% by volume in air and with a flow rate of greater than 22 litres per hour would be considered as a significant source of soil gas.

Guidance on quantifying the risks from hazardous soil gases to properties and their occupiers is provided in CIRIA, 2007 (commercial developments), NHBC, 2007 (low rise residential developments) and British Standard BS 8485:2007. These documents provide guidance on gas monitoring methods and strategy, the assessment of risk posed by soil gases and mitigating the risks posed by soil gases during site development.

PBA use gas concentrations and borehole flow data in order to obtain the gas screening value (GSV) for methane and carbon dioxide at the site. The GSV can be used to establish the characteristic situation of the site as detailed in CIRIA C665 and in order to make recommendations for gas protection measures for buildings if required.

Radon In addition to the guidance listed above, PBA use the following primary guidance to assess the significance of the radon content of soil gas.

i) Radon: guidance on protective measures for new dwellings. Report BR211 (BRE, 1999); and

5 References


Rationale for the Selection of Generic Assessment Criteria


WRAS (2002) The selection of materials for water supply pipes to be laid in contaminated land. Water Regulations Advisory Scheme.
Rationale for the Selection of Generic Assessment Criteria

Table 1: Tier 2 Screening Criteria for the Assessment of the Significance of Potential Contaminant Concentrations in Soil – Protection of Human Health

<table>
<thead>
<tr>
<th>Determinand</th>
<th>Allotments</th>
<th>Residential with plant uptake</th>
<th>Residential without plant uptake</th>
<th>Commercial/Industrial</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mg/kg</td>
<td>mg/kg</td>
<td>mg/kg</td>
<td>mg/kg</td>
</tr>
<tr>
<td><strong>Metals/Metalloids</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arsenic</td>
<td>43</td>
<td>32</td>
<td>35</td>
<td>640</td>
</tr>
<tr>
<td>Beryllium</td>
<td>55</td>
<td>51</td>
<td>-</td>
<td>420</td>
</tr>
<tr>
<td>Boron</td>
<td>45</td>
<td>291</td>
<td>-</td>
<td>192,000</td>
</tr>
<tr>
<td>Cadmium</td>
<td>1.8</td>
<td>10</td>
<td>117</td>
<td>230</td>
</tr>
<tr>
<td>Chromium (trivalent)</td>
<td>34,600</td>
<td>3000</td>
<td>-</td>
<td>30,400</td>
</tr>
<tr>
<td>Chromium (hexavalent)</td>
<td>2.1</td>
<td>4.3</td>
<td>-</td>
<td>35</td>
</tr>
<tr>
<td>Copper</td>
<td>524</td>
<td>2330</td>
<td>-</td>
<td>71,700</td>
</tr>
<tr>
<td>Lead</td>
<td>-</td>
<td>450</td>
<td>450b</td>
<td>750</td>
</tr>
<tr>
<td>Mercury (elemental)</td>
<td>1</td>
<td>26</td>
<td>-</td>
<td>26</td>
</tr>
<tr>
<td>Mercury (inorganic)</td>
<td>80</td>
<td>170</td>
<td>235</td>
<td>3600</td>
</tr>
<tr>
<td>Methyl Mercury</td>
<td>8</td>
<td>11</td>
<td>-</td>
<td>410</td>
</tr>
<tr>
<td>Nickel</td>
<td>230</td>
<td>130</td>
<td>130f</td>
<td>1800</td>
</tr>
<tr>
<td>Selenium</td>
<td>120</td>
<td>350</td>
<td>595f</td>
<td>13000</td>
</tr>
<tr>
<td>Vanadium</td>
<td>18</td>
<td>75</td>
<td>-</td>
<td>3160</td>
</tr>
<tr>
<td>Zinc</td>
<td>618</td>
<td>3750</td>
<td>-</td>
<td>665,000</td>
</tr>
<tr>
<td><strong>BTEX Compounds (1%, 3% and 6% SOM)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benzene</td>
<td>0.02 / 0.04 / 0.07^a</td>
<td>0.08 / 0.1 / 0.33^a</td>
<td>0.27 / 0.56 / 1.0^f</td>
<td>28 / 57 / 95^a</td>
</tr>
<tr>
<td>Toluene</td>
<td>22 / 60 / 120^b</td>
<td>120^c / 320 / 610^d</td>
<td>600^e / 1500 / 2700^f</td>
<td>870 / 2200 / 4400^g</td>
</tr>
<tr>
<td>Ethylbenzene</td>
<td>16 / 45 / 90^h</td>
<td>65 / 180 / 350^i</td>
<td>165 / 450 / 840^j</td>
<td>520 / 1400 / 2800^k</td>
</tr>
<tr>
<td>Xylenes (m-xylene)</td>
<td>28 / 80 / 160^l</td>
<td>42 / 120 / 230^m</td>
<td>53 / 145 / 285^n</td>
<td>475 / 1300 / 2600^o</td>
</tr>
<tr>
<td><strong>Polycyclic Aromatic Hydrocarbons (1%, 2.5% and 6% SOM)</strong>^d</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acenaphthene</td>
<td>34 / 85 / 200^p</td>
<td>210 / 480 / 1000^q</td>
<td>-</td>
<td>85000 / 98000 / 100000^r</td>
</tr>
<tr>
<td>Acenaphthylene</td>
<td>28 / 69 / 160^r</td>
<td>170 / 400 / 850^s</td>
<td>-</td>
<td>84000 / 97000 / 100000^t</td>
</tr>
<tr>
<td>Anthracene</td>
<td>380^u / 950 / 2200^v</td>
<td>2300^w / 4900 / 9200^x</td>
<td>-</td>
<td>530000 / 540000 / 540000^y</td>
</tr>
<tr>
<td>Benzo(a)anthracene</td>
<td>2.5 / 5.5 / 10^z</td>
<td>3.1 / 4.7 / 5.9^{aa}</td>
<td>-</td>
<td>90 / 95 / 97^ab</td>
</tr>
<tr>
<td>Benzo(a)pyrene</td>
<td>0.60 / 1.2 / 2.1^bc</td>
<td>0.83 / 0.94 / 1.0^cd</td>
<td>-</td>
<td>14 / 14 / 14^de</td>
</tr>
<tr>
<td>benzo(b)fluoranthene</td>
<td>3.5 / 7.4 / 13^ef</td>
<td>5.6 / 6.5 / 7.0^fg</td>
<td>-</td>
<td>100 / 100 / 100^gh</td>
</tr>
<tr>
<td>benzo(g,h,i)pyrrole</td>
<td>70 / 120 / 160^i</td>
<td>44 / 46 / 47^j</td>
<td>-</td>
<td>650 / 660 / 660^k</td>
</tr>
<tr>
<td>benzo(k)fluoranthene</td>
<td>6.8 / 14 / 23^l</td>
<td>8.5 / 9.6 / 10^m</td>
<td>-</td>
<td>140 / 140 / 140^n</td>
</tr>
<tr>
<td>Chrysene</td>
<td>2.6 / 5.8 / 12^o</td>
<td>6.0 / 8.0 / 9.3^p</td>
<td>-</td>
<td>140 / 140 / 140^q</td>
</tr>
<tr>
<td>Dibenzo(a,h)anthracene</td>
<td>0.76 / 1.5 / 2.3^r</td>
<td>0.76 / 0.86 / 0.90^s</td>
<td>-</td>
<td>13 / 13 / 13^t</td>
</tr>
<tr>
<td>Fluoranthene</td>
<td>52 / 130 / 290^u</td>
<td>260 / 460 / 670^v</td>
<td>-</td>
<td>23000 / 23000 / 23000^w</td>
</tr>
<tr>
<td>Fluorene</td>
<td>27 / 67 / 160^x</td>
<td>160 / 380 / 780^y</td>
<td>-</td>
<td>64000 / 69000 / 71000^z</td>
</tr>
<tr>
<td>Indeno(1,2,3-cd)pyrene</td>
<td>1.8 / 3.8 / 7.1^aa</td>
<td>3.2 / 3.9 / 4.2^ab</td>
<td>-</td>
<td>60 / 61 / 61^ac</td>
</tr>
<tr>
<td>Naphthalene</td>
<td>4.1 / 9.9 / 23^bc</td>
<td>1.5 / 3.7 / 8.7^cd</td>
<td>-</td>
<td>200 / 480 / 1100^de</td>
</tr>
<tr>
<td>Phenanthrene</td>
<td>16 / 38 / 90^ef</td>
<td>92 / 200 / 380^gh</td>
<td>-</td>
<td>22000 / 22000 / 23000^ij</td>
</tr>
<tr>
<td>Pyrene</td>
<td>110 / 270 / 620^ij</td>
<td>560 / 1000 / 1600^kl</td>
<td>-</td>
<td>54000 / 54000 / 54000^lm</td>
</tr>
<tr>
<td><strong>Aliphatic/Aromatic Hydrocarbons (1%, 2.5% and 6% SOM)</strong>^d</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPH Aliphatic &gt;C5-6</td>
<td>740 / 1700 / 3900</td>
<td>30 / 55 / 110^n</td>
<td>-</td>
<td>3400 / 6200 / 13000^o</td>
</tr>
<tr>
<td>TPH Aliphatic &gt;C6-8</td>
<td>2300 / 5600 / 13000</td>
<td>73 / 160 / 370^p</td>
<td>-</td>
<td>8300 / 18000 / 42000^q</td>
</tr>
<tr>
<td>TPH Aliphatic &gt;C8-10</td>
<td>320 / 770 / 1700^r</td>
<td>19 / 46 / 110^s</td>
<td>-</td>
<td>2100 / 5100 / 12000^t</td>
</tr>
<tr>
<td>TPH Aliphatic &gt;C10-12</td>
<td>2200 / 4400 / 7300</td>
<td>93 / 230 / 540^u</td>
<td>-</td>
<td>10000 / 24000 / 49000^v</td>
</tr>
</tbody>
</table>
Rationale for the Selection of Generic Assessment Criteria

<table>
<thead>
<tr>
<th>Determinand</th>
<th>Allotments</th>
<th>Residential with plant uptake</th>
<th>Residential without plant uptake</th>
<th>Commercial/Industrial</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mg/kg</td>
<td>mg/kg</td>
<td>mg/kg</td>
<td>mg/kg</td>
</tr>
<tr>
<td>TPH Aliphatic &gt;C12-16</td>
<td>11000⁰ / 13000⁰ / 13000⁰</td>
<td>740⁰ / 1700⁰ / 3000⁰</td>
<td>-</td>
<td>61000⁰ / 83000⁰ / 91000⁰</td>
</tr>
<tr>
<td>TPH Aliphatic &gt;C16-35</td>
<td>260000⁰ / 270000⁰ / 270000⁰</td>
<td>4500⁰ / 64000⁰ / 7600⁰</td>
<td>-</td>
<td>1600000⁰ / 1800000⁰ / 1800000⁰</td>
</tr>
<tr>
<td>TPH Aliphatic &gt;C35-44</td>
<td>260000⁰ / 270000⁰ / 270000⁰</td>
<td>4500⁰ / 64000⁰ / 7600⁰</td>
<td>-</td>
<td>1600000⁰ / 1800000⁰ / 1800000⁰</td>
</tr>
<tr>
<td>TPH Aromatic &gt;C5-7</td>
<td>13° / 27° / 57°</td>
<td>65° / 130° / 280°</td>
<td>-</td>
<td>28000⁰ / 49000⁰ / 9000⁰</td>
</tr>
<tr>
<td>TPH Aromatic &gt;C7-8</td>
<td>22° / 51° / 120°</td>
<td>120° / 270° / 611°</td>
<td>-</td>
<td>59000⁰ / 110000⁰ / 190000⁰</td>
</tr>
<tr>
<td>TPH Aromatic &gt;C8-10</td>
<td>8.6° / 21° / 51°</td>
<td>27° / 65° / 151°</td>
<td>-</td>
<td>3700 / 8600 / 18000⁰</td>
</tr>
<tr>
<td>TPH Aromatic &gt;C10-12</td>
<td>13° / 31° / 74°</td>
<td>69° / 160° / 346°</td>
<td>-</td>
<td>17000⁰ / 29000⁰ / 34500⁰</td>
</tr>
<tr>
<td>TPH Aromatic &gt;C12-16</td>
<td>23° / 57° / 130°</td>
<td>140° / 310° / 593°</td>
<td>-</td>
<td>36000⁰ / 37000 / 37800⁰</td>
</tr>
<tr>
<td>TPH Aromatic &gt;C16-21</td>
<td>46° / 110° / 260°</td>
<td>250° / 480° / 770°</td>
<td>-</td>
<td>28000⁰ / 28000⁰ / 28000⁰</td>
</tr>
<tr>
<td>TPH Aromatic &gt;C21-35</td>
<td>370° / 820° / 1600°</td>
<td>890° / 1100° / 1230°</td>
<td>-</td>
<td>28000⁰ / 28000⁰ / 28000⁰</td>
</tr>
<tr>
<td>TPH Aromatic &gt;C35-44</td>
<td>370° / 820° / 1600°</td>
<td>890° / 1100° / 1230°</td>
<td>-</td>
<td>28000⁰ / 28000⁰ / 28000⁰</td>
</tr>
<tr>
<td>TPH Aliphatic + Aromatic &gt;C44-70</td>
<td>1200° / 2100° / 3000°</td>
<td>1200° / 1300° / 1300°</td>
<td>-</td>
<td>28000⁰ / 28000⁰ / 28000⁰</td>
</tr>
</tbody>
</table>

Chlorinated Hydrocarbons (1%, 2.5% and 6% SOM)⁴

<table>
<thead>
<tr>
<th>Substance</th>
<th>Residential</th>
<th>Commercial/Industrial</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,2-Dichloroethane</td>
<td>0.0046⁰ / 0.0083⁰ / 0.016⁰</td>
<td>0.0054⁰ / 0.0080⁰ / 0.014⁰</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane (TCA)</td>
<td>48° / 110° / 240°</td>
<td>6.2° / 13° / 28°</td>
</tr>
<tr>
<td>1,1,2-Tetrachloroethane</td>
<td>0.79° / 1.9° / 4.4°</td>
<td>0.90° / 2.1° / 4.8°</td>
</tr>
<tr>
<td>Tetrachloroethene (PCE)</td>
<td>0.41° / 0.85° / 2.0°</td>
<td>1.4° / 2.9° / 6.3°</td>
</tr>
<tr>
<td>Tetrachloromethane (Carbon tetrachloride)</td>
<td>1.6° / 3.7° / 8.7°</td>
<td>0.94° / 2.1° / 4.8°</td>
</tr>
<tr>
<td>Trichloroethylene (TCE)</td>
<td>0.43° / 0.95° / 2.2°</td>
<td>0.11° / 0.22° / 0.49°</td>
</tr>
<tr>
<td>Trichloromethane (chloroform)</td>
<td>0.36° / 0.70° / 1.5°</td>
<td>0.75° / 1.3° / 2.7°</td>
</tr>
<tr>
<td>Vinyl Chloride (Chloroethene)</td>
<td>0.00055° / 0.0010° / 0.0018°</td>
<td>0.00047° / 0.00064° / 0.00099°</td>
</tr>
</tbody>
</table>

Pesticides and Other Organic Compounds (1%, 2.5% and 6% SOM)⁴

<table>
<thead>
<tr>
<th>Substance</th>
<th>Residential</th>
<th>Commercial/Industrial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aldrin</td>
<td>1.3° / 2.6° / 4.0°</td>
<td>1.7° / 2.0° / 2.1°</td>
</tr>
<tr>
<td>Atrazine</td>
<td>0.037° / 0.085° / 0.2°</td>
<td>0.24° / 0.56° / 1.3°</td>
</tr>
<tr>
<td>Dichlorvos</td>
<td>0.044° / 0.091° / 0.20°</td>
<td>0.29° / 0.6° / 1.3°</td>
</tr>
<tr>
<td>Dieldrin</td>
<td>0.13° / 0.32° / 0.73°</td>
<td>0.69° / 1.4° / 2.2°</td>
</tr>
<tr>
<td>Endosulfan</td>
<td>0.47° / 1.2° / 2.7°</td>
<td>2.9° / 7.0° / 16°</td>
</tr>
<tr>
<td>Carbon Disulphide</td>
<td>4.8° / 10° / 23°</td>
<td>0.10° / 0.20° / 0.44°</td>
</tr>
<tr>
<td>Chlorobenzene</td>
<td>5.9° / 14° / 32°</td>
<td>0.33° / 0.73° / 1.7°</td>
</tr>
<tr>
<td>Hexachloro-1,3-butadiene</td>
<td>0.25° / 0.61° / 1.4°</td>
<td>0.21° / 0.51° / 1.2°</td>
</tr>
<tr>
<td>Hexachlorobenzene</td>
<td>0.18° / 0.42° / 0.92°</td>
<td>0.59° / 1.0° / 1.4°</td>
</tr>
<tr>
<td>Pentachlorobenzene</td>
<td>1.2° / 3.1° / 7.1°</td>
<td>5.2° / 10° / 17°</td>
</tr>
<tr>
<td>Benthalchlorohexone</td>
<td>0.084° / 0.21° / 0.49°</td>
<td>0.55° / 1.3° / 2.96°</td>
</tr>
<tr>
<td>Phenol (1, 3, 6 SOM)</td>
<td>66° / 158° / 280°</td>
<td>184° / 316° / 420°</td>
</tr>
</tbody>
</table>

Notes

a Soil Guideline Value (2009)
b Soil Guideline Value (2002)
c Generic Assessment Criteria (LOM & CIEH 2009)
d Where three values are presented, SGV/GAC for soils with SOM of 1%, 2.5% and 6% or 1%, 3% and 6% are given as detailed in the table. SOM denotes Soil Organic Matter.
Rationale for the Selection of Generic Assessment Criteria

Generie Assessment Criteria generated using CLEA v 1.04 by an independent contaminated land working group and independently verified by PBA (CLSD, 2009)
### Rationale for the Selection of Generic Assessment Criteria

Table 2: Tier 2 Screening Criteria for the Assessment of the Significance of Potential Contaminant Concentrations in Groundwater and Surface Water

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Water abstracted for potable use Water Supply (Water Quality Regulations 2000)</th>
<th>Water not abstracted for potable use Environmental Quality Standards (EQSs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic (µg/l)</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>Cadmium (µg/l)</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Chromium (µg/l)</td>
<td>50</td>
<td>5 to 250</td>
</tr>
<tr>
<td>Lead (µg/l)</td>
<td>25 (10 from 25/12/13)</td>
<td>4 to 250</td>
</tr>
<tr>
<td>Mercury (µg/l)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Selenium (µg/l)</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>Nickel (µg/l)</td>
<td>20</td>
<td>50 to 200</td>
</tr>
<tr>
<td>Zinc (µg/l)</td>
<td>-</td>
<td>8 to 500</td>
</tr>
<tr>
<td>Antimony (µg/l)</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>Boron (µg/l)</td>
<td>1000</td>
<td>2000</td>
</tr>
<tr>
<td>Copper (µg/l)</td>
<td>2000</td>
<td>1 to 28</td>
</tr>
<tr>
<td>Iron (µg/l)</td>
<td>200</td>
<td>1000</td>
</tr>
<tr>
<td>Manganese (µg/l)</td>
<td>50</td>
<td>-</td>
</tr>
<tr>
<td>Vanadium (µg/l)</td>
<td>-</td>
<td>20 to 60</td>
</tr>
<tr>
<td>pH (pH units)</td>
<td>6.5 to 10</td>
<td>6.0 to 9.0</td>
</tr>
<tr>
<td>Electrical Conductivity (µS/cm)</td>
<td>2500</td>
<td>-</td>
</tr>
<tr>
<td>Ammoniacal nitrogen (mg/l)</td>
<td>0.5</td>
<td>0.015</td>
</tr>
<tr>
<td>Sulphate (mg/l)</td>
<td>250</td>
<td>400</td>
</tr>
<tr>
<td>Chloride (mg/l)</td>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td>Total Phenol (mg/l)</td>
<td>0.5</td>
<td>30 (300)</td>
</tr>
<tr>
<td>Nitrate (mg/l)</td>
<td>50</td>
<td>-</td>
</tr>
<tr>
<td>Cyanide (mg/l)</td>
<td>50</td>
<td>-</td>
</tr>
<tr>
<td>PAHs (EPA 16) (µg/l)</td>
<td>0.1</td>
<td>-</td>
</tr>
<tr>
<td>Benzo(a)pyrene (µg/l)</td>
<td>0.01</td>
<td>-</td>
</tr>
<tr>
<td><strong>SVOCs:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hexachlorobenzene (µg/l)</td>
<td>-</td>
<td>0.03</td>
</tr>
<tr>
<td>Hexachlorobutadiene (µg/l)</td>
<td>-</td>
<td>0.1</td>
</tr>
<tr>
<td>Phenol (µg/l)</td>
<td>-</td>
<td>30 (300)</td>
</tr>
<tr>
<td><strong>VOCs:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chloroform (µg/l)</td>
<td>-</td>
<td>12</td>
</tr>
<tr>
<td>1,2-Dichloroethane (µg/l)</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane (µg/l)</td>
<td>-</td>
<td>100 (1000)</td>
</tr>
<tr>
<td>Trichloroethene (µg/l)</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>1,1,2-Trichloroethane (µg/l)</td>
<td>-</td>
<td>400 (4000)</td>
</tr>
<tr>
<td>Tetrachloroethene (µg/l)</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Styrene (µg/l)</td>
<td>-</td>
<td>50 (500)</td>
</tr>
<tr>
<td>Benzene (µg/l)</td>
<td>1</td>
<td>30 (300)</td>
</tr>
<tr>
<td>Toluene (µg/l)</td>
<td>-</td>
<td>50 (500)</td>
</tr>
<tr>
<td>Vinyl Chloride (µg/l)</td>
<td>0.5</td>
<td>-</td>
</tr>
<tr>
<td>Xylene (µg/l)</td>
<td>-</td>
<td>30</td>
</tr>
</tbody>
</table>

**Notes**

a Some organic contaminants are given two EQS values. These values relate to an acceptable annual average concentration followed in brackets by a maximum admissible peak concentration.

b Where a range is presented e.g. for vanadium, different EQSs relate to different alkalinity (hardness) values for the water sample being tested.
### Table 3 Tier 2 Screening Criteria for the Assessment of the Significance of Potential Contaminant Concentrations in Soil – Protection of Ecological Systems

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Threshold (^a)</th>
<th>ICRCL 70/90 (^a)</th>
<th>Proposed SSVs (^b)</th>
<th>The Soil Code (^c)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mg/kg</td>
<td>Maximum</td>
<td>mg/kg</td>
<td>mg/kg</td>
</tr>
<tr>
<td></td>
<td>Livestock</td>
<td>Crop Growth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benzo(a)pyrene</td>
<td>0.15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arsenic</td>
<td>50</td>
<td>500</td>
<td>1000</td>
<td>50</td>
</tr>
<tr>
<td>Cadmium</td>
<td>3</td>
<td>30</td>
<td>50</td>
<td>1.15</td>
</tr>
<tr>
<td>Chromium</td>
<td>21.1</td>
<td></td>
<td></td>
<td>400</td>
</tr>
<tr>
<td>Copper</td>
<td>250</td>
<td>500</td>
<td>250</td>
<td>88.4</td>
</tr>
<tr>
<td></td>
<td>80/ 100/ 135/ 200 (^e)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluoride</td>
<td>500</td>
<td>1000</td>
<td></td>
<td>500</td>
</tr>
<tr>
<td>Lead</td>
<td>300</td>
<td>1000</td>
<td>167.9</td>
<td>300</td>
</tr>
<tr>
<td>Mercury</td>
<td>0.06</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nickel</td>
<td>25.1</td>
<td>50/ 60/ 75/ 110 (^e)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pentachlorobenzene</td>
<td>0.029</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pentachlorophenol</td>
<td>0.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selenium</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tetrachloroethene</td>
<td>0.01</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toluene</td>
<td>0.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zinc</td>
<td>1000</td>
<td>3000</td>
<td>1000</td>
<td>90.1</td>
</tr>
<tr>
<td></td>
<td>200/ 200/ 200/ 300 (^e)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

a Interdepartmental Committee on the Redevelopment of Contaminated Land (ICRCL) 70/90 Restoration and Aftercare of Metaliferous Mining Sites for Pasture and Grazing 1st edition 1990.

b Proposed Soil Screening Values (SSVs) – Consultation, Environment Agency 2008. Threshold which if exceeded prompts further assessment.


d Concentrations are for contamination derived from mine spoil. In other situations the speciation may be more available. Factors include total concentration, speciation, particle size, pH, species of plant, type of animal/grazing habit.

e Where four values are presented, concentrations are for soils with pH values 5.0-5.5/ 5.5-6.0/ 6.0-7.0/ >7.0
5.0 FLOOD RISK, WATER AND DRAINAGE

Introduction and Scope of Assessment

5.1 This chapter of the Environmental Statement considers flood risk, surface water management and water resource issues related to the proposed Great Haddon development and has been prepared by Peter Brett Associates LLP (PBA). PBA has also prepared a report entitled Great Haddon – Flood Risk Assessment/Water Management Strategy, February 2009 (FRA), a copy of which is presented within ES Volume 3: Chapter 5. This chapter should be read in conjunction with drawing 15188/400/05 rev B (see ES Volume 2: Figure 5.1), which sets out the proposed surface water management strategy. The FRA considers the following:

- Whether the proposed development is likely to be affected by current or future flooding from any source;
- Whether development will increase flood risk elsewhere;
- The nature of mitigation measures required to deal with the impacts of development.

5.2 With reference to the aforementioned FRA, this chapter presents:

- An overview of the assessment methodology;
- A summary of the baseline site conditions;
- A description of the potential impacts arising as a result of development;
- A description of impact mitigation measures.

Reference Material

5.3 Details of the national, regional and local policy, legislation and guidance relating to surface water drainage and fluvial flood risk is set out in detail in Section 4 of the Great Haddon FRA.
Assessment Methodology

Desk Study Review

5.4 Two principal sources of data are available in respect of flood risk associated with the Stanground Lode:

(i) The Strategic Flood Risk Assessment undertaken by Haskoning UK Ltd on behalf of Peterborough City Council; and

(ii) The Flood Zone maps published by the Environment Agency.

Consultation

5.5 The Stanground Lode is designated as Main River and falls under the jurisdiction of the Environment Agency (EA). The EA was formally consulted towards the latter part of 2005 and again in August 2008 to:

• Identify and collate data in respect of flood risk arising from the Stanground Lode;
• Agree the issues to be addressed by a Flood Risk Assessment (FRA);
• Agree the scope of investigation/technical work required to inform the FRA; and
• Agree design principles that should be applied to ensure compliance with the policy/legislation and guidance summarised above.

5.6 The Environment Agency confirmed that:

• The Stanground Lode does not benefit from flood defences that would control the passage of floodwaters;
• Neither the Flood Zone map data nor the information presented in the SFRA was considered sufficiently robust to inform development planning at a local/site scale.

5.7 The EA advised that the best available information in respect of flood risk on the River Nene and its tributaries was provided by the Nene Catchment Strategic Model and that any assessment of floodplain extents should be based upon this dataset.

Methodology

5.8 The EA provided a copy of the aforementioned River Nene model and the associated study reports. The model includes approximately 8.6km of the Stanground Lode extending upstream from the confluence with the River Nene to the A1(M). To better represent local features and flooding mechanisms (such as floodwater spill into water bodies) the model was supplemented with additional data derived from the Great
Haddon topographic survey as undertaken by Associated Surveying Consultants (ASC), (Survey Drawing number ASC.08.680, dated December 2008. Topographical survey of the A15 and Beeby's Lakes is taken from a survey for the Hampton Leys scheme also undertaken by ASC (Drawing number ASC.07.525, dated August 2007). The topographical survey information is included within the FRA for reference.

Assumptions, Limitations and Technical Difficulties

5.9 The principal considerations in respect of the hydraulic modelling undertaken to assess floodplain extents are as follows:

- It has been assumed that the hydraulic model provided by the Environment Agency and used as the basis for the assessment is “fit for purpose”. The model has been reviewed and verified where possible based upon field observations. However, the extent of this review has been limited by the available data.

- The model is uncalibrated and based upon (i) a number of assumed parameters and (ii) design flood flows estimated using the Flood Estimation Handbook (FEH). As a result, there is a degree of uncertainty associated with the design flood levels. Model sensitivity testing has been undertaken to understand the potential impact upon design flood levels caused by variation of model input parameters.

Impact Assessment/Significance Criteria

5.10 There are no 'standard' significance criteria for the consideration of flood risk and it has therefore been necessary to employ a qualitative approach based upon available knowledge and professional judgement. The significance of the impacts has been assessed through consideration of their magnitude, duration and nature (ie: reversible, irreversible, repairable or non-repairable) and also the geographic context (ie: highly localised or widespread). The significance criteria are outlined below:

- **Substantial Adverse**: Severe detrimental effect on watercourses. Permanent flooding or change to flow characteristics of watercourses. Increase in the potential for flooding upstream, downstream or within the development site. Permanent reduction in the quality of surface water. Permanent adverse impact upon aquatic flora and fauna.

- **Moderate Adverse**: Moderate detrimental effect on watercourses. Severe temporary flooding or change to flow characteristics of watercourses. Severe temporary reduction in the quality of surface water. Severe temporary adverse impact on aquatic flora and fauna.
- **Minor Adverse**: Temporary and minor detrimental effect on watercourses. Moderate local flooding. Moderate local scale reduction in the quality of surface water. Reversible detrimental effects on aquatic flora or fauna.

- **Negligible**: No appreciable impact – any minor adverse effects are reversible.

- **Minor Beneficial**: Minor reduction in risk to receptors. Minor local scale improvement to the quality of surface water or minor reduction in localised flood risk.

- **Moderate Beneficial**: Moderate reduction in risk to receptors. Moderate local scale improvement to the quality of surface water or moderate reduction in localised flood risk.

- **Substantial Beneficial**: Major reduction in risk to receptors. Significant local scale/widespread improvement to the quality of surface water or significant local scale/widespread reduction in flood risk.

**Baseline Conditions**

*Watercourses and Water Bodies*

5.11 The principal watercourse in the vicinity of the sites is the River Nene which at its closest lies approximately 2km to the north of the northern boundary of the development area. The Great Haddon Core Area is bisected by the Stanground Lode, which is classed as a Main River, a tributary of the River Nene. The headwaters of the Stanground Lode comprise two tributaries, one rising in the vicinity of Haddon (the northern tributary), the other rising in the vicinity of Morborne (the southern tributary). The tributaries drain a predominantly rural landscape dominated by arable agriculture. The confluence of the two tributaries is located a short distance to the east of the A1(M), at which point the contributing catchment is approximately 9.37km². The Lode continues to flow to the north-east through an area characterised by arable agriculture and blocks of mature woodland. At the eastern boundary of the Core Area (the A15 London Road), the contributing catchment has increased to 12.92km². Downstream of the A15, the Lode passes through the emerging Hampton Township and the Stanground District before ultimately outfalling to the River Nene, at which point the contributing catchment amounts to 23.79km².

5.12 There are several structures and water bodies of note within the sites and adjacent river system:

- The northern tributary passes beneath the A1(M) via a 2.6m by 1.8m box culvert;
• The southern tributary passes beneath the A1(M) via a 2.6m by 1.8m box culvert;

• A flow gauging station is located at NGR 516900 293000;

• An access crossing that comprises a box section opening of approximately 4m is located immediately downstream of the gauging station;

• The A15 London Road crossing, comprising a 4m wide by 1.5m high box section opening;

• An access road crossing located approximately 100m downstream of the A15 London Road;

• The railway crossing comprising two 3.5m wide by 2.5m high arch openings.

5.13 A number of water bodies lie within or close to the Core Area. Two surface water balancing ponds are located immediately to the east of the A1(M) and adjacent to the northern and southern tributaries of the Stanground Lode. It is understood that these facilities regulate stormwater flows arising from the adjacent highway.

5.14 Immediately to the east of the development area lies the Orton Pit Special Area for Conservation (SAC) (designated for its large populations of Great Crested Newts and charophyte (stonewort) species). The Orton Pit SAC lies adjacent to Haddon Lake, a former clay pit that has since filled to a level of approximately 9.3mAOD extending over an area of approximately 28.6ha. A further disused clay pit, known locally as Long Lake, is located in the northeast corner of the site, aligned parallel with the eastern boundary. Long Lake is fed by a number of field drainage ditches that drain a small catchment to the south. The water level in Long Lake is managed by an overflow weir/overflow channel which discharges to the Stanground Lode. The invert of the weir/channel and thus the maximum retained water level of Long Lake is approximately 10.7mAOD.

5.15 The Beeby’s Lakes complex is located immediately to the east of the A15 London Road and comprises three separate water bodies (Beeby’s Lakes East, West and North) that extend over a combined area of 42.7ha.

Existing Surface Water Drainage

5.16 The sites are currently used as arable farmland and surface water is generally drained by a network of drains/ditchcourses which typically define field boundaries. Ditchcourses within the area to the north of the Stanground Lode discharge to either the Northern Tributary of the Stanground Lode or into Orton Pit SAC. Drainage ditches within the area south of the Stanground Lode generally discharge to the
Stanground Lode or Long Lake. The area to the west of the confluence of the Stanground Lode and its Northern Tributary has no formal drainage system and as such surface water will run-off to the Stanground Lode or its Northern Tributary.

**Ground Conditions**

5.17 Reference should be made to the Ground Conditions chapter of the EIA (Chapter 4), for a detailed discussion of the baseline ground conditions and geology for the application sites and surrounding area.

**Water Quality**

5.18 PBA has been undertaking surface water quality monitoring at Great Haddon and the surrounding area to ascertain baseline conditions for both Water Supply (Water Quality) Regulations 2000 (water extracted for potable use) and Environmental Quality Standards (water not extracted for potable use). Reference should be made to the Ground Conditions chapter of the EIA for a detailed discussion of the baseline water quality conditions and existing surface water sampling regime on and adjacent to the sites.

5.19 In summary, the surface water quality of the existing waterbodies in and surrounding the sites is understood to be high when compared against the requirements for both standards considered; with only high sulphate concentrations recorded, which is not unexpected given the underlying bedrock is the Oxford Clay which is rich in the naturally occurring sulphate bearing minerals selenite and epsomite. Additionally, slightly elevated chloride concentrations have been recorded. However, it is believed that these can be attributed to use of salt (sodium chloride) on the A1(M) in winter as a de-icer, which becomes dissolved in rainwater and enters watercourses, through the existing balancing ponds, which discharge to the Stanground Lode.

**Fluvial Flood Risk**

5.20 The main source of flood risk is overflow from the Stanground Lode. Floodplain extents have been assessed using the hydraulic model for the following flood return periods:

- 1 in 20 year
- 1 in 100 year
- 1 in 100 year including an allowance for climate change
- 1 in 1,000 year and
• 1 in 1,000 year including an allowance for climate change

5.21 The modelling analysis shows that the 1 in 100 year floodplain of the Stanground Lode is generally confined to a very narrow corridor either side of the watercourse. On this basis and within the context of PPS25, Annex D, Table D.1, some limited areas of the river corridor immediately adjacent to the watercourse are shown to lie within Flood Zone 3a – High Probability. However, an assessment of the 1 in 1,000 year floodplain extent shows that the vast majority of the Core Area and all of the Employment Area are classified as Flood Zone 1 – Low Probability.

5.22 The modelling analysis also shows that floodwater may spill from the Stanground Lode and into both the Orton Pit SAC and Haddon Lake as a result of a 1 in 100 year plus climate change event.

Potential Impacts

5.23 The development proposals have the potential to give rise to the following impacts:

• Increase the impermeable area within the catchment of the Stanground Lode, thereby increasing surface water run-off to the watercourse.

• Change catchment flood response characteristics (alter the shape of the flood hydrograph)

• Change the drainage regime of the sites, thereby increasing the frequency of floodwater inundation of the Orton Pit SAC.

• Reduce flood storage through ground raising within the floodplain

• Affect the quality of surface waters

• Increase flood risk downstream.

5.24 Details of measures to be brought forward to mitigate development impacts are set out below.

5.25 In addition, the construction phase may give rise to the following impacts:

• Increased flood risk resulting from channel restriction and associated reduction in flow conveyance during the construction of bridge crossings;

• Contamination of surface water resulting from the flushing of inappropriately stored or accidentally spilled petrochemicals and silts following soil stripping and ground raising operations;
• Increased silt loading within the Stanground Lode associated with (i) construction works within/adjacent to the channel (ie: installation of surface water outfall headwalls) and (ii) the excavation and movement of earthworks materials across the sites undertaken as part of the formation of development plots and attenuation facilities;

• Installation of the surface water drainage infrastructure for each development sub-catchment will increase the rate of surface water run-off relative to “pre-development” levels.

5.26 Construction impacts are considered separately below.

Mitigation Measures

5.27 A Flood Risk Assessment (FRA) has been prepared in support of the proposals (see ES Volume 3: Chapter 5). This assessment responds to both the issues identified following consultation with the Environment Agency and the guidance set out within Planning Policy Statement 25. The report sets out (i) an assessment of the floodplain extents associated with the Stanground Lode and its Northern Tributary and (ii) details of the strategy that will be brought forward to mitigate development impacts. The principal aspects of the impact mitigation strategy are summarised in the sections that follow.

Surface Water Drainage Strategy

5.28 The configuration of the surface water drainage strategy is shown in Drawing Number 15188/400/05 (Volume 3: Technical Appendices, Chapter 5). The combined site area (Core Area and Employment Area) has been divided into 10 surface water drainage sub-catchments. The key aspects of the surface water drainage strategy are as follows:

• The catchment areas discharging to the Stanground Lode upstream of the confluence with the Northern Tributary will outfall at a rate equivalent to the greenfield rate of run-off;

• The catchment areas outfalling to the Northern Tributary will discharge surface water at a rate that exceeds the greenfield rate of run-off;

• Localised channel improvements will be implemented along the lower reach of the Northern Tributary to provide adequate capacity for the conveyance of surface water inflows;
To compensate for elevated rates of surface water outflow from development sub-catchments, floodwater will be diverted into a new conveyance channel located immediately to the south of the Stanground Lode;

A side spill/weir will be constructed on the right bank of the Stanground Lode to facilitate floodwater diversion;

The new conveyance channel will also receive unattenuated surface water flows arising from the development area located to the south;

Flows entering the conveyance channel will be routed east towards Beeby’s Lakes. From here, water will be pumped to the watercourse located south of the Lakes and routed to Crown Lakes, from where it will be discharged into the Stanground Lode;

Culverts will be installed at three locations along the alignment of the conveyance channel;

The northern area of Long Lake will be "filled" to accommodate the conveyance channel and the existing outfall from the pond to the Stanground Lode will be re-located to outfall into the conveyance channel;

The current retained water level in Beeby’s West will be drawn down from 6.0m AOD to 5.5m AOD and a connection provided between Beeby’s East and West.

The hydraulic modelling analysis summarised in the FRA report (Volume 3: Technical Appendices, Chapter 5) shows that peak flood flows in the Stanground Lode downstream of the weir link to the conveyance channel are reduced when compared to the existing/”prior to development” flow regime.

5.29 Catchment Flood Response

The modelling analysis summarised in the FRA report shows that the proposed drainage strategy impacts upon the rising limb of the flood hydrograph (ie: development gives rise to short duration inflows). Although these inflows give rise to locally (ie: along the lower reach of the Northern Tributary) higher peak flows when compared to the prior to development case, this impact will be mitigated through the implementation of channel works. As noted above, the surface water drainage strategy serves to reduce peak flows in the Stanground Lode downstream of the weir link to the conveyance channel when compared to the prior to development scenario.
Floodwater Inundation of Orton Pit SAC

5.31 The surface water drainage strategy outlined above serves to divert floodwater into the new conveyance channel a short distance upstream of the western boundary of Orton Pit SAC. The hydraulic modelling analysis summarised in the FRA report (Volume 3: Technical Appendices, Chapter 5) shows that, following implementation of the scheme, the frequency of floodwater spill to Orton Pit SAC is reduced. Following implementation of the drainage strategy, Orton Pit SAC is safeguarded from floodwater inundation to the 1 in 100 year plus climate change design standard.

Floodplain Storage

5.32 To facilitate and safeguard development in the vicinity of the confluence of the Stanground Lode and the Northern Tributary it will be necessary to raise ground levels above the design flood level. In addition, new river crossings may give rise to additional “footprint” within the floodplain. To mitigate the impacts of ground raising and any new infrastructure “footprint” upon flood storage, floodplain storage compensation works will be provided in accordance with the Environment Agency’s level for level and volume for volume criteria.

Water Quality

5.33 The Great Haddon development will aim to provide an exemplar strategy for managing the quality of surface water run-off arising from the sites. Several measures will be incorporated as part of the surface water management strategy to ensure that water quality is maintained to the highest standards:

- Trapped Gullies are to be provided as standard across the sites;
- Vegetative systems proposed to mitigate against diffuse pollution;
- As development proposals are confirmed in detail and industrial uses are identified for the employment areas, site specific mitigation measures will be set up on a plot by plot basis as required based on the potential for surface water pollution;
- The surface water management strategy will seek to maximise the use of grassed surface water conveyance channels/swales and constructed wetlands to convey surface water runoff. Rivers, Ponds, Reedbeds and grass channels/swales are effective at improving water quality by reducing pollutants associated with diffuse pollution sources and filtering suspended particles;
• Permeable pavements can improve the quality of surface water runoff. These may be incorporated in lightly trafficked/pedestrian hard standing areas. Permeable pavements limit potential pollution sources by reducing the content of heavy metals and suspended fine particles. Biodegradation of hydrocarbons in permeable pavements can also reduce diffuse pollution.

5.34 The surface water quality monitoring regime will be maintained as part of the adoption and maintenance agreement for the Great Haddon development surface water management strategy to ensure the existing high water quality is maintained for the project life cycle.

Construction Impacts

5.35 The construction of bridge crossings will be undertaken in accordance with construction procedures and environmental management controls specified by the Environment Agency. This will ensure that the existing channel section and flow conveyance capacity is maintained at all times such that there is no increase in flood risk.

5.36 The use of environmental management controls and procedures such as bunding fuel tanks and siting of refuelling points away from watercourses/drains as specified in Environment Agency Pollution Prevention Guidance Notes will ensure that any risk of contamination of surface water is appropriately controlled.

5.37 The potential impacts of earthworks operations upon silt loading within the Stanground Lode will be mitigated by phasing the operations and incorporating measures to route surface water run-off from “worked” areas to a sump/silt trap before discharging to the watercourse. In addition, the surface water discharge regime from any sump/silt trap facility would be structured to enable silt to “settle out”.

5.38 Construction operations within/adjacent to the channel of the Stanground Lode will be controlled by best practice and environmental management controls set out by the Environment Agency. Construction of the side spill/weir would be facilitated by excavation of a temporary diversion channel or use of a cofferdam such that the works could be undertaken in the “dry”.

5.39 Prior to the commencement of development works for any given phase of development, surface water drainage and balancing infrastructure will be constructed to ensure the appropriate storage capacity is provided to mitigate flood risk impacts.
Residual Impacts

Surface Water Drainage Strategy

5.40 Following implementation of the surface water drainage strategy, peak flood flows downstream of the Core Area will be reduced when considered within the context of the existing/"prior to development" flow regime. The scheme will therefore contribute to a reduction in downstream flood risk thereby giving rise to a Substantial Beneficial residual impact.

Catchment Flood Response

5.41 Urbanisation of the greenfield catchment gives rise to a quicker flood response and impacts upon the rising limb of the flood hydrograph. Locally, the potential impact of additional surface water inflows is mitigated through the implementation of channel works, such that the residual impact is Negligible.

5.42 The development sites comprise a relatively small part of the total catchment of the Stanground Lode at the confluence with the River Nene. Within this context, the principal driver in respect of downstream flood risk is often considered to be the response of the wider contributing catchment outside the boundary of the development. Although the proposed drainage strategy alters the shape of the flood hydrograph, peak flood flows downstream of the Core Area will be reduced when considered within the context of the existing/"prior to development" flow regime. The scheme will therefore contribute to a reduction in downstream flood risk thereby giving rise to a Substantial Beneficial residual impact.

Floodwater Inundation of Orton Pit SAC

5.43 Following implementation of the surface water drainage strategy, the frequency of floodwater spill to Orton Pit SAC will be reduced and the SAC will be safeguarded from floodwater inundation to the 1 in 100 year plus climate change design standard. The residual impact is therefore Substantial Beneficial.

Floodplain Storage

5.44 To mitigate the impacts of ground raising and any new infrastructure “footprint” upon flood storage, floodplain storage compensation works will be provided in accordance with the Environment Agency’s level for level and volume for volume criteria. The residual impact is therefore Negligible.
Water Quality

5.45 As part of the implementation of the surface water drainage strategy mitigation measures will be incorporated to ensure potential for pollution arising from the development is controlled. The surface water drainage strategy will ensure that no surface water run-off generated by the development will enter the SAC area. Additional measures will be incorporated should they be required as part of any employment use later identified for the site. The residual impact is therefore Negligible.

Construction Impacts

5.46 The construction of bridge crossings in accordance with construction procedures and environmental management controls specified by the Environment Agency will ensure that the residual impact of construction works upon flow conveyance capacity is Negligible.

5.47 The use of environmental management controls and procedures such as bunding fuel tanks and siting of refuelling points away from watercourses/drains as specified in Environment Agency Pollution Prevention Guidance Notes will ensure that the residual risk of contamination of surface water is Negligible.

5.48 The implementation of silt trapping measures will ensure that the residual impacts of earthworks operations upon silt loading within the Stanground Lode are Negligible.

5.49 The use of “best practice” and environmental management controls set out by the Environment Agency, together with channel diversion works to facilitate construction of the side spill/weir, will ensure that the residual impact of construction operations within/adjacent to the channel of the Stanground Lode is Negligible.

5.50 The construction of surface water drainage and balancing infrastructure prior to the commencement of development works will ensure that appropriate storage capacity is provided to mitigate flood risk impacts, such that the residual impact is Negligible.

Cumulative and Interactive Effects

Surface Water Drainage Strategy

5.51 The proposed surface water management strategy based upon floodwater diversion to Beeby’s Lakes has been shown to reduce peak flood flows in the Stanground Lode, along both the reach of the watercourse through the Core Area and extending downstream to the confluence with the River Nene. On this basis, the scheme offers
a strategic benefit to existing and proposed development schemes located downstream.

5.52 Beeby's Lakes are identified as a strategic surface water balancing facility within the *Hampton, Peterborough – Strategic Flood Study* (June 2002) and will receive surface water run-off arising from the Hampton Vale development located between the Lakes and the Stanground Lode. The strategy prepared in support of the Great Haddon proposals makes due allowance for the Hampton Vale development and associated constraints/design criteria.

**Summary of Potential Impacts, Mitigation Measures and Residual Impacts**

5.53 The tables below summarise the potential impacts upon hydrology and drainage before mitigation, the mitigation measures proposed and the residual effects.

**Summary Matrix of all Impacts Before Mitigation**

<table>
<thead>
<tr>
<th>Issue</th>
<th>Description of impact</th>
<th>Geographical significance</th>
<th>Impact</th>
<th>Significance</th>
<th>Duration</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>I N R D L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrology and Drainage</td>
<td>Increased rate and volume of surface water run-off to the Stanground Lode</td>
<td>*</td>
<td>Adverse</td>
<td>Substantial</td>
<td>Permanent</td>
</tr>
<tr>
<td></td>
<td>Change catchment flood response characteristics (alter the shape of the flood hydrograph)</td>
<td>*</td>
<td>Adverse</td>
<td>Substantial</td>
<td>Permanent</td>
</tr>
<tr>
<td></td>
<td>Change the drainage regime of the sites, thereby increasing the frequency of floodwater inundation of the Orton Pit SAC</td>
<td>*</td>
<td>Adverse</td>
<td>Substantial</td>
<td>Permanent</td>
</tr>
<tr>
<td>Issue</td>
<td>Description of impact</td>
<td>Geographical significance</td>
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<td></td>
<td>Reduce flood storage through ground raising within the floodplain</td>
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<tr>
<td></td>
<td>Affect the quality of surface waters</td>
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<tr>
<td></td>
<td>* Adverse Minor Permanent</td>
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<td></td>
<td>During Construction Phase</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Increased flood risk resulting from reduced flow conveyance during bridge construction works</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contamination of surface water by petrochemicals</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increased silt loading within the Stanground Lode resulting from construction works</td>
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</tr>
</tbody>
</table>

**Summary of Mitigation and Enhancement Measures and Residual Effects**

<table>
<thead>
<tr>
<th>Issue</th>
<th>Description of impact</th>
<th>Mitigation/enhancement measures</th>
<th>Residual Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrology and Drainage</td>
<td>Increased rate and volume of surface water run-off to the Stanground Lode</td>
<td>Implementation of surface water drainage strategy based upon floodwater diversion to Beeby’s Lakes</td>
<td>Substantial Beneficial</td>
</tr>
<tr>
<td>Issue</td>
<td>Description of impact</td>
<td>Mitigation/enhancement measures</td>
<td>Residual Effects</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Change catchment flood response characteristics</td>
<td>(alter the shape of the flood hydrograph)</td>
<td>Implementation of channel works to deal with local impacts and surface water</td>
<td>Negligible (local impacts within the site) and Substantial Beneficial at catchment scale</td>
</tr>
<tr>
<td>Change the drainage regime of the sites, thereby increasing</td>
<td>the frequency of floodwater inundation of the Orton Pit SAC</td>
<td>Implementation of surface water drainage strategy based upon floodwater diversion to Beeby’s Lakes</td>
<td>Substantial Beneficial</td>
</tr>
<tr>
<td>Reduce flood storage through ground raising within the floodplain</td>
<td></td>
<td>Implementation of floodplain storage compensation works in accordance with the Environment Agency’s level for level and volume for volume criteria</td>
<td>Negligible</td>
</tr>
<tr>
<td>Affect the quality of surface waters</td>
<td></td>
<td>Inclusion of several measures to mitigate against the potential pollution generated by the development</td>
<td>Negligible (local impacts within the site)</td>
</tr>
</tbody>
</table>

### During Construction Phase

<table>
<thead>
<tr>
<th>Issue</th>
<th>Description of impact</th>
<th>Mitigation/enhancement measures</th>
<th>Residual Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased flood risk resulting from reduced flow conveyance during</td>
<td>bridge construction works</td>
<td>Construction in accordance with procedures and environmental management controls specified by the Environment Agency</td>
<td>Negligible</td>
</tr>
<tr>
<td>Contamination of surface water by petrochemicals</td>
<td></td>
<td>Implementation of environmental management controls and procedures as specified in Environment Agency Pollution Prevention Guidance Notes</td>
<td>Negligible</td>
</tr>
<tr>
<td>Increased silt loading within the Stanground Lode resulting from</td>
<td>construction works</td>
<td>Implementation of silt trapping measures and use of &quot;best practice&quot; and environmental management controls set out by the Environment Agency</td>
<td>Negligible</td>
</tr>
</tbody>
</table>
6.0 ECOLOGY

Introduction and Scope of Assessment

Aims

6.1 This chapter of the Environmental Statement (ES) assesses the likely significant ecological effects of the proposed development and includes a summary of the ecological surveys undertaken, which describe the current baseline conditions. The full details of the survey methodology and results are included in Appendix 6.5.

6.2 The aims of this chapter are to:

- Describe the existing baseline conditions and setting of the application sites in terms of on-site and off-site ecological features of interest;
- Describe the methods used to determine the effects of the development on current baseline conditions;
- Describe and evaluate these ecological features of interest;
- Predict the likely impacts from both the pre-construction / construction phase and the completed development (operational phase) and take into account direct, indirect, secondary, cumulative, short, medium and long-term, beneficial and adverse effects of the proposed development in order to assess the significance of these impacts on ecological features of interest;
- Provide a description of the mitigation and compensation measures proposed to prevent, reduce and offset significant effects to ecological features of interest both on and off-site, detail any other ecological enhancements proposed, outline measures to be implemented to avoid legal infringements and provide an assessment of any residual effects arising from the proposed development at its completion;
- Assess the nature of any cumulative effects arising from the scheme in combination with other proposed schemes within the area.

Brief description of the sites

6.3 The application sites lie to the south-west of Peterborough, to the south of the Hampton development and the Orton Pit Special Area of Conservation (SAC), to the east of the A1 (M) and to the north west of the A15 at Yaxley. The approximate centre of the Great Haddon development area is at Ordnance Survey grid reference TL160927 and the area is approximately 390 ha in size. The development area
comprises mostly agricultural land and woodland, and includes several small ponds, hedgerows and ditches and the Stanground Lode watercourse.

**Ecological Study Area**

6.4 To assess the potential effect of the proposed development on the site, detailed ecological survey work has been undertaken over a number of years and a desk study has been undertaken to collect ecological information from the wider area. The area of search for the desk study extends for 2km from the site boundary. It is important to collect information from such a wide area to place the application sites and their ecological interests in context.

6.5 The study area for field based ecological surveys extends beyond the application sites boundaries to the south of the A15 in order to assess the baseline conditions and potential impacts of development on the County Wildlife Site at Norman Cross. This area of land is a steep escarpment, which has been the subject of mining and clay extraction in the past. This has left three large ponds cut into the escarpment as well as many steep slopes and rubble piles.

**Supporting Information**

6.6 The following figures are referred to in the assessment and are provided in ES Volume 2:

- Figure 6.1A: Phase 1 Habitat Plan
- Figure 6.1B: Phase 1 Habitat Plan
- Figure 6.2: Location of ponds
- Figure 6.3: Statutory & Non-statutory Designated Sites
- Figure 6.4: Trees with High and Medium Bat Potential to be removed
- Figure 6.5: Details of proposed Habitat Creation to western edge of Orton Pit SSSI/SAC
- Figure 6.6A: Shadow Analysis of proposed employment development west of SSSI/SAC
- Figure 6.6B: Shadow Analysis of proposed employment development west of SSSI/SAC
- Figure 6.7: Biodiversity Strategy
- Figure 6.8: Great Crested Newt Connectivity Strategy
• Figure 6.9: Access Management Strategy

6.7 In addition, the Technical Reports listed below which inform and underpin the ecological assessment are included in ES Volume 3.

Appendix 6.1 Ecological Scoping Report
Appendix 6.2 Biodiversity Strategy
Appendix 6.3 Newt Connectivity Strategy
Appendix 6.4 Access Management Strategy
Appendix 6.5 Baseline Ecological Survey Reports (Including Survey Figures)

6.8 The following baseline ecological survey reports are considered to be confidential and have not been included with Appendix 6.5. Copies of these reports can be provided to statutory agencies and the City Council upon request.

• Badger and Brown Hare Survey Report and associated Figure.
• Schedule 1 Bird Survey.

Assessment Method and Reference Material

Desk Study

6.9 The Cambridgeshire and Peterborough Biological Records Centre (CRBRC) was contacted for records of statutory and non-statutory designated sites of nature conservation importance and records of protected species within a 2km radius of the footprint of the proposed Great Haddon development site. The Cambridgeshire Badger and Otter Group were contacted for any records of these two species within 2km of the site. The Peterborough Bird Club was contacted for data on birds using Orton Pit SSSI/SAC/cSAC and adjacent areas, as raised in the scoping response.

Consultation

6.10 Full details of the methodologies employed for the habitat and species surveys can be found in the Baseline Ecological Survey Reports (Appendix 6.5).

6.11 An ecological scoping document (Appendix 6.1) was prepared by LDA Design prior to the start of survey work in 2007. The range of surveys and methods were set out in this document and has been agreed with Peterborough City Council, Cambridgeshire County Council, Environment Agency and Natural England (formerly English Nature). The responses to the scoping report received from Peterborough City Council in July 2008 are also addressed within this document.
6.12 The following range of field survey work was agreed:

- Phase 1 habitat survey
- Botanical survey, including a specific arable flora survey
- Stonewort survey
- Hedgerow survey
- Breeding bird survey – following the initial breeding bird survey a further survey for breeding Schedule 1 bird species was undertaken.
- Badger survey
- Brown hare survey
- Bat survey
- Water vole survey
- Otter survey
- Terrestrial invertebrate survey, including a specific butterfly and moth survey
- Aquatic invertebrate survey
- Great crested newt survey
- Reptile survey

Field surveys

Phase 1 Habitat Survey

6.13 A Phase 1 Habitat Survey was carried out in accordance with the published guidelines (JNCC 1993; 2003¹). The survey was originally undertaken on 4/5 October 2005 by Helen Evriviades MIEEM and Dr. Edward Bodsworth MIEEM. The site was walked, habitats were mapped and target notes were prepared for features of particular ecological interest. In addition, notes were made on the suitability of the habitats to support protected species. This Phase 1 Habitat Survey has been updated as a result of further surveys in 2007 to ensure that the information presented within this document is accurate and up-to-date. The nomenclature of the

A botanical and arable flora survey was undertaken on 24 May 2007 by Corin Simmonds MIEEM and Karen Lunan MIEEM and on 21 June 2007 by Corin Simmonds MIEEM and Anna Gundrey MIEEM. During this survey individual habitat types were mapped and detailed descriptions taken of their botanical assemblages. In addition, specific surveys of the arable fields were undertaken to look for rare arable flora especially those listed in the Natural Environment and Rural Communities (NERC) Act 2006 and UK Biodiversity Action Plan. National Vegetation Classifications (NVC) were not used but detailed species lists were gathered for all the various habitat types within the site. Details of these surveys and their findings can be found in Appendix 6.5.

Stoneworts

A specific survey of the water bodies for stoneworts *Chara sp.* was undertaken during the 2nd week of June 2007 by Dr. Nick Stewart, a national expert on stoneworts. The water bodies were investigated from their edges, wading out where possible to the limit of thigh waders and using a grapnel device to sample the vegetation in deeper water. A bathyscope was used for viewing vegetation in shallow water where water visibility permitted. In each water body, a list of aquatic and wetland species was drawn up and an assessment of their frequency recorded on a DAFOR scale. All the ponds and lakes were surveyed in addition to a number of the wet ditches within the site. Details of these surveys and their findings can be found in Appendix 6.5.

Hedgerows

A hedgerow survey of the site was undertaken on 24 2007 May by Corin Simmonds MIEEM Karen Lunan AIEEM, on 21 June by Corin Simmonds and Anna Gundrey MIEEM and on 28 June by Corin Simmonds. During the survey all of the hedgerows on site were surveyed and assessed against the Hedgerow Regulations 1997, the NERC Act and the UK Biodiversity Action Plan (UKBAP). Details of the survey methodology are included in Appendix 6.5.

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Breeding birds

6.17 The breeding bird survey followed the standard Common Bird Census (CBC) methodology (Gilbert et al. 19983) but was modified from ten to three survey visits through the spring and early summer to ensure that both resident breeding birds and migrant breeding birds (which tend to start breeding later in the season) were recorded. Dr Matthew Denny MIEEM and Dr Guy Anderson undertook the survey on five dates during 2007 such that the whole survey area was surveyed three times spread through the season. The survey recorded birds exhibiting territorial or breeding behaviour: singing or calling; repeated territorial calls; territorial aggression; displaying; adults carrying food, nesting material or faecal sacs; juvenile birds and family groups. Birds not exhibiting such behaviour were recorded separately. Birds flying over and not using the site or surrounding area were noted separately and not incorporated into the survey results. Records were mapped using the British Trust for Ornithology Common Bird Census notation. The numbers of all the key species present (i.e. significant flocks of wildfowl) and their main behaviour were recorded and mapped. Further information on survey methodology is given in Appendix 6.5.

Schedule 1 Birds

6.18 In addition to the general breeding bird survey specific surveys for a number of birds listed on Schedule 1 of the Wildlife and Countryside Act 1981 were undertaken during the summer of 2007. These species had been identified during the breeding bird survey and more information was needed to understand whether these birds were nesting on site. Dr Matthew Denny MIEEM undertook the following surveys under Natural England survey licence no. 20071181.

6.19 The stone curlew Burhinus oedicnemus survey comprised two separate elements: checking for calling birds at night and undertaking two-three hour checks of each of the two potential nesting locations identified to watch for a change-over in incubating adults which occurs approximately every 1.5 hours (R. Winspear pers. com.).

6.20 The marsh harrier Circus aeruginosus survey involved a vantage point survey of the area to determine the location of any nest sites. A vantage point was selected and the surrounding area was scanned continuously by eye or using binoculars for three hours to detect evidence of nesting marsh harriers.

6.21 On 17 April the buildings at Spendelows Farm in the southern section of the survey area were inspected for evidence of breeding barn owls *Tyto alba* such as fresh pellets, droppings, nests, eggs or parent birds. Further information on all the survey methodologies is given in Appendix 6.5.

6.22 In addition a survey of two derelict farm buildings on the western edge of the site near to the road that loops under the A1(M) road was undertaken on 13th March 2008 by Dr. Ted Bodsworth MIEEM. The inspection was required as a result of the need to demolish these buildings for health and safety purposes and following an incidental report of a barn owl flying from the buildings by a member of the public.

**Badgers**

6.23 A survey for evidence of badgers *Meles meles* within the site was conducted on 7, 8 and 9 November 2007 between 8am and 4pm by Corin Simmonds MIEEM and Gillian Catton. Over the course of the three days the site was closely examined for badger setts as well as field signs of badgers such as latrines, footprints and foraging activity. Particular attention was paid to the hedgerows and woodlands, although all the fields were also scanned for evidence of badgers. Further information on all the survey methodologies is given in Appendix 6.5.

**Brown hare**

6.24 A survey for evidence of brown hare *Lepus europaeus* within the site was conducted on 7, 8 and 9 November 2007 at the same time as the badger survey. This survey involved walking transects of the site and observing hares that were flushed from their forms. Further information on all the survey methodologies is given in Appendix 6.5.

**Bat roosts in trees**

6.25 A survey of the mature trees within the site was undertaken by Corin Simmonds MIEEM and Gillian Catton on 7, 8 and 9 November 2007. This survey assessed the trees for their potential to support roosting bats. Trees were assessed as either having high, medium, low or little/no potential to shelter roosting bats according to the criteria shown in Appendix 6.5.

**Bat roosts in buildings**

6.26 A survey of the farm buildings at Spendelows Farm for roosting bats was undertaken in June with subsequent emergence surveys on 7 June and 16 August 2007. The
standard methodology from the Good Practice Guidelines (BCT 2007) for building inspection was followed which involved looking for direct evidence of bats such as droppings, corpses, urine stains, grease marks and cob-web free gaps in brickwork.

6.27 The accessible exterior and interior of the building was examined for signs of bats and potential bat access points although not all rafters and beams could be accessed due to the height of the buildings. Close-focussing binoculars were used where necessary to gain a better view of external features of the building. The subsequent emergence surveys started 15 minutes before sunset and continued for 2 hours after sunset. Further information on all the survey methodologies is given in Appendix 6.5.

Bat activity

6.28 Bat activity surveys were undertaken to determine the pattern and quantity of bat foraging and commuting behaviour in different areas of the site. Survey visits were made on the evenings throughout June, July, August and September. Transects were walked and a Duet bat detector and an Anabat bat detector with call data logger were used to detect calling bats and the location and time of records were mapped during the survey. The transect routes, times of survey and details of station stops are provided in Appendix 6.5.

Water vole

6.29 Water courses within the site were surveyed for water voles Arvicola terrestris by Corin Simmonds MIEEM and Helen Evriviades MIEEM on 26 and 27 September 2007. Observations were made for signs of water voles including burrow holes, feeding stations, trackways at the water’s edge, latrines and characteristic ‘lawn’ areas close to burrows. Further information on the survey methodology is given in Appendix 6.5.

Otter

6.30 A search was made for signs of otter Lutra lutra on the Stanground Lode by Corin Simmonds MIEEM and Helen Evriviades MIEEM on 26 and 27 September 2007 at the same time as the water vole survey. The signs searched for included otter footprints and faeces. Otter faeces, known as spraints, tend to be distinctive in appearance and smell and are often left in prominent positions along waterways.

making them relatively easy to identify. Further information on the survey methodology is given in Appendix 6.5.

**Terrestrial Invertebrates**

6.31 A specialist entomologist undertook invertebrate surveys from May to August 2007 inclusive, within the brown field land in the south of the site (south of the A15 road). The aim was to make a visual assessment of the habitats present and their potential to support invertebrates of conservation importance as well as sampling some habitats to identify the species present. Invertebrates were sampled using the techniques shown in Appendix 6.5. Many invertebrates were reliably identified in the field but certain specimens were taken for further study and identification.

**Butterflies and moths**

6.32 Two butterfly species, the black hairstreak *Satyrium pruni* and the purple hairstreak *Neozephyr quercus*, have been recorded in the vicinity of the site prior to the surveys. These butterfly species were the target of the butterfly surveys conducted on 28 June and 10 July 2007 by Dr Edward Bodsworth MIEEM, details of which can be found in Appendix 6.5. Incidental observations of other butterfly species were also made during these surveys.

6.33 A moth survey using a Robinson moth trap was carried out on the evening of 15 August 2007. This survey was undertaken to provide information on the general assemblage of moth species present within the brown field habitat area, south of the A15 road. Details of the survey and location of the moth trap can be found in Appendix 6.5.

**Aquatic invertebrates**

6.34 A specialist aquatic entomologist undertook initial surveys of all waterbodies within the site during May of 2007. These surveys involved an initial assessment of all of the standing water to look for potential to support protected aquatic invertebrates in particular aquatic beetles of which there are known populations in the various old clay workings around the site. This initial assessment was followed by a further investigation of the water bodies that were assessed as having high or medium potential using the assessment set out in Appendix 6.5.

6.35 The six water bodies assessed as having either high or medium potential for aquatic invertebrates and thought to potentially be affected by the proposed development were surveyed again in November 2007.
Great crested newts

6.36 Surveys of the ponds within the assessment area assessment area for the presence of great crested newts *Triturus cristatus* were carried out from April to June 2007. During this period all ponds were surveyed using bottle trapping, torching and egg searching in order to confirm presence or absence and to gauge population size. The surveys were undertaken in spring 2007 in accordance with standard guidance (English Nature 2006). Two ponds around the Spendelows Farm area had been surveyed for great crested newts in 2006 (Haskoning 2006) and therefore were not resurveyed. The results of all earlier surveys are discussed within this report. Further information on the timing of surveys and the exact survey effort can be found in Appendix 6.5. The great crested newt surveys were undertaken by Froglife due to their local knowledge of the Orton Pit SSSI/SAC/cSAC (Hampton Reserve.)

Reptiles

6.37 Reptile surveys were undertaken during spring 2007. The survey methodology followed that suggested in the Herpetofauna Workers Manual (Gent & Gibson 2003); walking a transect of the site slowly and quietly, observing potential basking sites through binoculars at a distance of at least 10m before approaching such sites more closely and checking under artificial refugia. Further information on the survey methodology and the locations of reptile refugia are included within Appendix 6.5.

Planning Context and Legislation

6.38 There are a number of national, regional and local planning policies that relate to nature conservation and ecology within the planning process. Reference to these provides a summary and indication of the likely requirements and expectations of statutory authorities in relation to planning applications and nature conservation and ecology within a given area.

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National Planning Policy

6.39 PPS9 - Planning Policy Statement 9: Biodiversity and Geological Conservation (PPS9) (ODPM, 2005a) sets out planning policies on the protection of biodiversity and geological conservation through the planning system and replaces Policy Planning Guidance Note 9 (PPG9) on Nature Conservation (Defra, 1994). One of the six Key Principles (Principal (vi)) of PPS9 that regional planning bodies and local planning authorities should adhere to, is to ensure that the potential effects of planning decisions on biodiversity and geological conservation are fully considered, it states:

“The aim of planning decisions should be to prevent harm to biodiversity and geological conservation interests. Where granting planning permission would result in significant harm to those interests, local planning authorities will need to be satisfied that the development cannot reasonably be located on any alternative sites that would result in less or no harm. In the absence of any such alternatives, local planning authorities should ensure that, before planning permission is granted, adequate mitigation measures are put in place. Where a planning decision would result in significant harm to biodiversity and geological interests which cannot be prevented or adequately mitigated against, appropriate compensation measures should be sought. If that significant harm cannot be prevented, adequately mitigated against, or compensated for, then planning permission should be refused”.

6.40 Other paragraphs of particular relevance in PPS9 include paragraphs 13 and 14, which state:

“The re-use of previously development land for new development makes a major contribution to sustainable development by reducing the amount of countryside and undeveloped land that needs to be used. However, where such sites have significant biodiversity of geological interest of recognised local importance, local planning authorities, together with developers, should aim to retain this interest or incorporate it into any development of the site” (paragraph 13).

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“Development proposals provide many opportunities for building-in beneficial biodiversity or geological features as part of good design. When considering proposals, local planning authorities should maximise such opportunities in and around developments, using planning obligations where appropriate” (paragraph 14).

6.41 PPS9 is accompanied by Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and their Effect within the Planning System (Defra Circular 01/2005 and ODPM Circular 06/2005) (ODPM 2005b). This aims to support PPS 9 by ‘providing guidance on the application of the law in relation to planning and nature conservation as it applies in England’. In addition, the Government has also produced further guidance to complement these two documents: Planning for Biodiversity and Geological Conservation: A Guide to Good Practice (ODPM 2006). This document provides guidance, through case studies and examples, to achieve the key principles of PPS9 and comply with the legal requirements set out in the Circular. It does not provide additional national policy or provide legal interpretation, but is intended to be used in conjunction with PPS9 and the Circular to further biodiversity and geological conservation.

6.42 PPS9, the Circular Defra 01/2005 and ODPM 06/2005 aim to ensure that ‘construction development and regeneration should have minimal effects on biodiversity and enhance it where possible’. The guidance proposes to ensure that planning decisions are made based on up-to-date information and ensure the maintenance, enhancement, restoration or addition of biodiversity within scheme design and ensure planning decisions ‘prevent harm to biodiversity and geological conservation interests’ (ODPM 2005a). The government circular makes reference to the UK Biodiversity Action Plan, England Biodiversity Strategy and Local Biodiversity Partnerships. These documents outline strategic action for biodiversity at both the national and local level and are considered further below.


6.43 The East of England Plan is published by the Secretary of State for Communities and Local Government and covers the counties of Norfolk, Suffolk, Cambridgeshire, Essex, Hertfordshire and Bedfordshire. Together with relevant sections of the Milton Keynes South Midlands Sub-Regional Strategy, 2005 it constitutes the Regional Spatial Strategy (RSS) for the East of England and was published in 2008. The policies considered to be relevant to ecology are set out below.

6.44 POLICY ENV1: Green Infrastructure. Areas and networks of green infrastructure should be identified, created, protected, enhanced and managed to ensure an improved and healthy environment is available for present and future communities.
Green infrastructure should be developed so as to maximise its biodiversity value and, as part of a package of measures, contribute to achieving carbon neutral development and flood attenuation.

6.45 POLICY ENV2: Landscape Conservation. In their plans, policies, programmes and proposals planning authorities and other agencies should, in accordance with statutory requirements, afford the highest level of protection to the East of England’s nationally designated landscapes – the Norfolk and Suffolk Broads, the Chilterns, Norfolk Coast, Dedham Vale, and Suffolk Coast and Heaths Areas of Outstanding Natural Beauty (AONBs), and the North Norfolk and Suffolk Heritage Coasts. Within the AONBs priority over other considerations should be given to conserving the natural beauty, wildlife and cultural heritage of each area.

6.46 POLICY ENV3: Biodiversity and Earth Heritage. In their plans, policies, programmes and proposals planning authorities and other agencies should ensure that internationally and nationally designated sites are given the strongest level of protection and that development does not have adverse effects on the integrity of sites of European or international importance for nature conservation. Proper consideration should be given to the potential effects of development on the conservation of habitats and species outside designated sites, and on species protected by law.

6.47 POLICY ENV5: Woodlands. In their plans, policies, programmes and proposals planning authorities and other agencies should seek to achieve an increase in woodland cover by protecting and achieving better management of existing woodland and promoting new planting where consistent with landscape character. Ancient semi-natural woodland and other woodlands of acknowledged national or regional importance should be identified in Local Development Documents with a strong presumption against development that would result in their loss or deterioration. Aged or veteran trees should be conserved. The nature conservation and recreation value of woodland is recognised, and conversion to other land uses should be resisted unless there are overriding public and ecological benefits. Woodland unavoidably lost to development should be replaced with new woodland of at least equivalent area and composition, preferably in the same landscape unit.


6.48 The purpose of the Cambridgeshire and Peterborough Structure plan is to set out the strategic planning policies for Cambridgeshire and the Peterborough area. Following the approval of the East of England Plan by the Secretary of State on 12 May 2008,
only certain policies from the Cambridgeshire and Peterborough Structure Plan 2003 remain in force. None of these relate to issues of biodiversity.

Peterborough Local Plan (First Replacement) adopted 2005

6.49 The policies listed below are the saved policies in the Peterborough Local Plan (First Replacement) 2005 as confirmed by the Direction from the Secretary of State issued in June 2008. In addition, the emerging Policies contained within the Peterborough Core Strategy Preferred Options are included, although these policies are currently in draft form and are subject to the outcome of the latest consultation and also the EiP likely to take place during 2010.

6.50 Policy LNE13 relates to the application sites since there are several ponds and other waterbodies associated with the proposed development.

“LNE13: The City Council will not grant planning permission for development that would unacceptably harm the ecological interest of ponds, wetlands and watercourses”.

6.51 Policy LNE14 relates to the Application Sites as the site is close to a Special Area of Conservation (SAC) and candidate SAC (cSAC).

“LNE14: Proposals for development which may affect a designated or proposed designated European site of nature conservation importance will be subject to the most rigorous examination.

Development proposals not directly connected with or necessary for site management, which would adversely affect the integrity of the site, and where that adverse effect could not be removed by conditions, will not be granted planning permission unless: (a) there is no alternative solution; and (b) there is an imperative reason of overriding public interest for permitting the development.

Where the proposal site concerned hosts a priority habitat type and/or a priority species, development proposals will not be permitted unless necessary for reasons of human health or public safety or for benefits of primary importance for nature conservation”.

6.52 Policy LNE15 relates to the application sites as the site is close to the boundary of a Site of Special Scientific Interest (SSSI).
“LNE15: Proposals for development in or likely to have an adverse effect on a Site of Special Scientific Interest will be subject to special scrutiny. Planning permission will not be granted for development which may have an adverse effect on the special interest of the site unless the reasons for development outweigh the nature conservation value of the site and national policy to safeguard the national network of such sites. Where development is permitted, the City Council will attach conditions and/or seek a planning obligation to ensure the protection and enhancement of nature conservation interests on the site”.

6.53 Policy LNE16 relates to the application sites as it relates to County Wildlife Sites, which are present within the local area.

“LNE16: Planning permission will not be granted for development which would be likely to have an adverse effect on a Local Nature Reserve or a County Wildlife Site unless there are demonstrable reasons for the proposal which outweigh the need to safeguard the nature conservation value of the site. Where development is permitted, damage to nature conservation interests will be expected to be kept to a minimum. Where development is permitted, the City Council will attach conditions and/or seek a planning obligation to ensure the protection and enhancement of nature conservation interests on the site”.

6.54 Policy LNE17 refers to proposals which are likely to have an adverse effect on habitats in general, where not specifically covered by Policies LNE14, LNE15 and LNE16.

“LNE17: Outside areas subject to policies LNE14, LNE15 and LNE16, planning permission will not be granted for development proposals unless adequate provision is made, as far as is reasonably practicable commensurate with the development proposed, to protect wildlife habitats that are likely to be adversely affected. Where development is permitted that is likely to harm a site of identifiable nature conservation interest, the City Council will attach conditions and/or seek a planning obligation to ensure appropriate mitigation and/or compensatory measures. Where appropriate, the City Council will seek to encourage the promotion and enhancement of biodiversity in association with development proposals”.

6.55 Policy LNE19 relates to the application sites as a number of legally protected species have been recorded.
LNE19: The City Council will not grant planning permission for any development proposal that would cause demonstrable harm to a legally protected species. Where planning permission is granted for development that may have an effect on those species, the City Council will attach conditions and/or seek a planning obligation to, where appropriate: (a) facilitate the survival of individual members of the species; And (b) ensure disturbance is kept to a minimum; and (c) provide adequate alternative habitats to sustain at least the current levels of population.

Peterborough Core Strategy Preferred Options (2008)

6.56 Preferred Option CS20 (Biodiversity and Geological Conservation) promotes the conservation and enhancement of biodiversity and geology and refers to the creation of “an effective, functioning “Green Grid” across Peterborough that links to green infrastructure in adjoining local authority areas.” It requires “appropriate mitigation and/or compensatory measures to ensure a net gain for biodiversity.”

6.57 The site boundary borders land and existing housing areas within Huntingdonshire and relevant policies are identified below with reference to the saved polices contained in the Huntingdonshire Local Plan (1995) and the Local Plan Alteration (2002) as set out in the Direction from the Secretary of State issued in September 2007). HDC is well advanced with the preparation of its LDF and in addition to the above, policies should be considered from the HDC and the Huntingdonshire Interim Planning Policy Statement (April 2007) and the Core Strategy (adopted September 2009).

Huntingdonshire Local Plan (1995)

6.58 Policy En22 (Nature and Wildlife Conservation) requires that the determination of applications for planning permission will take appropriate account of the interests of nature and wildlife conservation.

6.59 Policy En23 (Sites of Special Scientific Interest and National Nature Reserves) development within, or which adversely affects, a Site of Special Scientific Interest, National Nature Reserve or Local Nature Reserve, or which has a significant adverse effect on the interests of wildlife in an area of Special Importance for Nature Conservation, will not be normally permitted.

6.60 Policy G4 (protected habitats and species) sets out criteria designed to ensure that sites and species of importance are afforded protection within the planning process appropriate to their significance for biodiversity or geology.

6.61 Policy G7 (Biodiversity) is concerned with protecting and enhancing biodiversity and promotes where possible, the incorporation of biodiversity into development proposals.

Huntingdonshire Submission Core Strategy

6.62 Policy CS 1 (Sustainable Development in Huntingdonshire) relates to sustainable development reflecting environmental, social and economic issues. This includes "protecting, maintaining and enhancing the range and vitality of characteristic habitats and species to create a viable ecological network."

6.63 Policy CS9 (Strategic Green Space Enhancement) identifies areas of strategic green space enhancement with new and enhanced green corridors to form a network linking with areas of population growth. The supporting text to the policy makes reference to the Cambridgeshire Horizons Green Infrastructure Strategy which identifies a number of Green Infrastructure initiatives including a proposed green corridor to link the Great Fen project with the Peterborough urban area and the area of the South Peterborough Green Park as identified in the Peterborough Green Grid.

Biodiversity Checklist for Land Use Planners in Cambridgeshire and Peterborough

6.64 The Biodiversity Checklist for Land Use Planners in Cambridgeshire and Peterborough has been developed by the Biodiversity Partnership for Cambridgeshire and Peterborough in conjunction with the Local Planning Authorities. This guidance note lays down ways to encourage high quality development which will make a positive contribution to the protection and enhancement of the local environment. It includes steps that one can take during the planning application process that will help to achieve gains for biodiversity in the county as well as ensuring that government legislation is not contravened.

Biodiversity Action Plan

6.65 As a direct result of the signing of the Convention on Biological Diversity at the Earth Summit in 1992 the Government has drawn up a national strategy to conserve our
threatened native species and habitats - the UK Biodiversity Action Plan (UK Biodiversity Partnership, 2006\(^{10}\)). In 2007 the UKBAP (UK Biodiversity Partnership 2007\(^{11}\)) was reviewed in order to ensure that the UK BAP remains focussed on the correct priorities for action and takes account of changes in the status of UK biodiversity and new information.

6.66 Priority species within the UK Biodiversity Action Plan which are considered relevant to the site are:

- Skylark *Alauda arvensis*
- Stone Curlew *Burhinus oedicnemus*
- Common Linnet *Carduelis cannabina subsp. autochthona/cannabina*
- Yellowhammer *Emberiza citrinella*
- Reed Bunting *Emberiza schoeniclus*
- Common Grasshopper Warbler *Locustella naevia*
- House Sparrow *Passer domesticus*
- Grey Partridge *Perdix perdix*
- Hedge Accentor/Dunnock *Prunella modularis subsp. occidentalis*
- Bullfinch *Pyrrhula pyrrhula*
- European Turtle Dove *Streptopelia turtur*
- Common Starling *Sturnus vulgaris subsp. Vulgaris*
- Song thrush *Turdus philomelos*
- Northern Lapwing *Vanellus vanellus*
- Water vole *Arvicola terrestris*
- Brown Hare *Lepus europaeus*
- Otter *Lutra lutra*
- Noctule *Nyctalus noctula*

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Great Haddon, Peterborough
Environmental Statement
Great Haddon Consortium

Ecology

- Soprano Pipistrelle *Pipistrellus pygmaeus*
- Brown long-eared bat *Plecotus auritus*
- Barbastelle bat *Barbastella barbastellus*
- Great Crested Newt *Triturus cristatus*
- Grass Snake *Natrix natrix*
- Common Lizard *Zootoca vivipara*
- Shaded broad-bar *Scototeryx chenopodiata*
- Grey dagger *Acronicta psi*
- Bearded Stonewort stonewort *Chara canescens*

6.67 Priority habitats within the UK Biodiversity Action Plan which are considered relevant to the site are:

- Arable field margins
- Hedgerows
- Open Mosaic Habitats on Previously Developed Land
- Ponds

Local Cambridgeshire Biodiversity Action Plan

6.68 The Cambridgeshire Biodiversity Action Plan12 covers a number of local species and habitats. Habitat Action Plans (HAPs) within the Cambridgeshire BAP or subsequently prepared by the Biodiversity Partnership for Cambridgeshire include: Broad habitat action plans for standing open water, broadleaved and mixed woodland, Open Mosaic Habitats on Previously Developed Land and rivers and streams; Priority habitat action plans for cereal field margins, eutrophic standing waters, lowland calcareous grassland and reedbeds; Local habitats include arable, drainage ditches, mineral restoration sites, ponds and scrub. Priority Species listed under the Biodiversity Action Plan for Cambridgeshire which are relevant to the application sites and its surrounding area include great crested newt, skylark, song thrush, black hairstreak butterfly, water vole, brown hare and pipistrelle bat.

Legislation Relating to Protected Sites and Species

6.69 There are several pieces of legislation which also provide varying degrees of protection to species and special sites in the UK, these include; Countryside and Rights of Way (CRoW) Act, 2000, the Wildlife and Countryside Act (1981) (as amended), the Conservation (Natural Habitats &c.) Regulations (1994) (as amended 2007,) referred to hereafter as the Habitats Regulations 1994, the Protection of Badgers Act (1992), the Abandonment of Animals Act (1960) and the Wild Mammals (Protection) Act (1996). The protection afforded to various species is described below, including references to the relevant legislation outlined here.

Natural Environment and Rural Communities (NERC) Act 2006 and Section 41

6.70 Section 41 of the NERC Act 2006 replaces what is in existing subsections (2) and (5) of Section 74 of the CRoW Act 2000. It places a duty on the Secretary of State to publish, review and revise lists of living organisms and types of habitat in England that are of principal importance for the purpose of conserving English biodiversity and to consult Natural England before doing so. It also requires the Secretary of State to take, and promote the taking of, steps to further the conservation of the listed organisms and habitats. A list was published in 2002 under the existing duty placed on the Secretary of State by section 74 (5) of the CRoW Act 2000. Those species found at the site that are listed on Section 74 are identified in the Results section of this chapter.

Hedgerows

6.71 The Hedgerows Regulations (made under Section 97 of the Environment Act 1995) were enacted in England and Wales in 1997. The Regulations prohibit the removal of most countryside hedgerows without first submitting a hedgerow removal notice to the local planning authority. The Regulations set out the criteria that should be used by the local planning authority in determining which hedgerows are important.

6.72 A landowner who wishes to remove a hedgerow must serve a Hedgerow Removal Notice in writing on their Local Planning Authority. The authority then has 42 days to determine whether or not the hedgerow is ‘important’ under the Regulations, and whether or not to issue a Hedgerow Retention Notice.

6.73 If the hedgerow is not ‘important’, the authority cannot refuse a permission to remove it under these regulations. If the hedgerow is “important”, it should be protected. However, the authority does not have to issue a retention notice if they are satisfied that circumstances justify the removal.
6.74 The authority must consult the local parish council in England or community council in Wales and consider their views when making the decision, but they do not have to consult anyone else.

6.75 The removal of any hedgerow to which the Regulations apply is permitted if it is required -

a) for making a new opening in substitution for an existing opening which gives access to land, but the person removing it shall fill the existing opening by planting a hedge within 8 months of the making of the new opening;

b) for obtaining temporary access to any land in order to give assistance in an emergency;

c) for obtaining access to land where another means of access is not available or is available only at disproportionate cost;

d) for the purposes of national defence;

e) for carrying out development for which planning permission has been granted or is deemed to have been granted, except development for which permission is granted by article 3 of the Town and Country Planning General Permitted Development Order 1995 in respect of development of any of the descriptions contained in Schedule 2 to that Order other than Parts 11 (development under local or private Acts or orders) and 30 (toll road facilities);

f) for carrying out, pursuant to, or under, the Land Drainage Act 1991, the Water Resources Act 1991 or the Environment Act 1995[19], work for the purpose of flood defence or land drainage;

g) for preventing the spread of, or ensuring the eradication of -

i. any plant pest, within the meaning of the Plant Health (Great Britain) Order 1993, in respect of which any action is being, or is to be, taken under Article 22 or 23 of that Order, or

ii. any tree pest, within the meaning of the Plant Health (Forestry) (Great Britain) Order 1993, in respect of which any action is being, or is to be, taken under Article 21 or 22 of that Order;

h) for the carrying out by the Secretary of State of his functions in respect of any highway for which he is the highway authority or in relation to which, by virtue of section 4(2) of the Highways Act 1980, he has the same powers under that Act as the local highway authority;

i) for carrying out any felling, lopping or cutting back required or permitted as a consequence of any notice given or order made under paragraph 9 of Schedule 4 to the Electricity Act 1989 (felling, lopping or cutting back to prevent obstruction of or interference with electric lines and plant or to prevent danger); or
6.76 In addition to the Hedgerow Regulations, hedgerows are included on the Government’s lists of habitats considered to be of principal importance; the UK Biodiversity Action Plan (BAP) priority habitats and those habitats listed within Section 74 of the Crow Act 2000.

6.77 The UK Biodiversity Action Plan lists those habitats and species which are considered to be priorities for conservation action in the UK. The list was updated in 2007 and the criteria for hedgerows amended from “ancient/species rich hedgerows” to “hedgerows” which need to have at least one woody species and over 80% or more cover to qualify.

**Breeding birds**

6.78 Breeding birds are protected under the Wildlife and Countryside Act 1981 (as amended), which makes it an offence to intentionally kill, injure or take any wild bird or take, damage or destroy its nest whilst in use or being built, or take or destroy its eggs. In addition to this, for some rarer species (listed on Schedule 1 of the Act), it is an offence to intentionally or recklessly disturb them while they are nest building or at or near a nest with eggs or young, or to disturb the dependent young of such a bird.

**Badgers**

6.79 Badgers are protected under The Protection of Badgers Act 1992. This makes it an offence to wilfully kill, injure, take, possess or cruelly ill-treat a badger, or to attempt to do so; or to intentionally or recklessly interfere with a sett. Sett interference includes disturbing badgers whilst they are occupying a sett, as well as damaging or destroying a sett or obstructing access to it.

6.80 Work up to 30m from any of the setts may require a license, dependent on the type of work required. English Nature’s guidance on the types of activity which is considers should be licensed within certain distances of sett entrances is as follows:

- using very heavy machinery (generally tracked vehicles) within 30 metres of any entrance to an active sett;
- using lighter machinery (generally wheeled vehicles), particularly for any digging operation, within 20 metres;
- light work such as hand digging or scrub clearance within 10 metres.
Brown hare

6.81 The brown hare is listed as a species of principal importance for the conservation of biological diversity, in accordance with Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. It is also a Priority Species within the UK Biodiversity Action Plan and Biodiversity Action Plan for Cambridgeshire.

Bats

6.82 Bats and their roosts are protected under the Wildlife and Countryside Act (WCA) 1981 (as amended by the Crow Act 2000) and under the Conservation (Natural Habitats, &c.) Regulations 1994 – as amended by the Conservation (Natural Habitats, &c.) (Amendment) Regulations 2009. Taken together, these make it an offence to:

1) Deliberately capture or intentionally take a bat.
2) Deliberately or intentionally kill or injure a bat.
3) To be in possession or control of any live or dead wild bat or any part of, or anything derived from a wild bat.
4) Damage or destroy a breeding site or resting place of such an animal or intentionally or recklessly damage, destroy or obstruct access to any place that a wild bat uses for shelter or protection.
5) Intentionally, recklessly or deliberately disturb any wild bat while it is occupying a structure or place that it uses for shelter or protection. The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended 2009) further states that the offence of disturbance includes any activities that will:
   a. impair bats’ ability to:
      i. survive, breed or reproduce, or to rear or nurture their young, or
      ii. to hibernate or migrate.
   b. affect significantly the local distribution or abundance of the species to which they belong.

6.83 Derogations from the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended 2009) are allowed under licence; at present three tests have to be met before a European Protected Species (EPS) licence can be issued by the licensing authority (Natural England):

- The licence is for works that “preserve public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment”.
- “There is no satisfactory alternative”.

Compiled by David Lock Associates
November 2009
The action proposed "will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range".

6.84 Certain bat species are also listed as Priority Species under the UK Biodiversity Action Plan and within Section 41 of the Natural Environment and Rural Communities (NERC) Act (2006).

Water vole

6.85 The water vole is fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended), making it an offence to:

- intentionally kill, injure or take (capture) a water vole;
- possess or control any live or dead water vole or any part of, or anything derived from, a water vole;
- intentionally or recklessly damage, destroy or obstruct access to any place used for shelter or protection by a water vole;
- intentionally or recklessly disturb a water vole while it is occupying a structure or place that it uses for shelter or protection.

6.86 Water voles are also listed as a Priority Species within the UK Biodiversity Action Plan and Biodiversity Action Plan for Cambridgeshire.

Otter

6.87 Otters and their habitats are protected under the Wildlife and Countryside Act 1981 (as amended by the CRoW Act 2000), and by the Conservation Regulations 1994. In summary, these make it an offence to damage or destroy a resting place, intentionally or recklessly obstruct any place used for shelter or protection, deliberately, intentionally or recklessly disturb an otter or intentionally kill, injure or take any otter. It is also a Priority Species within the UK Biodiversity Action Plan.

Moths and butterflies

6.88 The black hairstreak butterfly is listed on Schedule 5 of the Wildlife and Countryside Act 1981 (sale only). This makes it an offence to sell, or offer for sale, any wild specimen or any part of a wild specimen, either alive or dead. The purple hairstreak butterfly receives no legal protection in England. The black hairstreak is also listed as a species of conservation concern in *Biodiversity: The UK Steering Group Report* and is listed as a priority species within the Biodiversity Action plan for Cambridgeshire because of its rarity and the vulnerability of its populations. Several moth species are
listed as priority species within the UK BAP. These include relatively common and widespread species which have recently undergone population declines within the UK.

**Great crested newt**

6.89 Great crested newts are protected under the Wildlife and Countryside Act 1981 (as amended by the Countryside and Rights of Way Act 2000) and under the Conservation (Natural Habitats, &c.) Regulations. 1994, as amended by the Conservation (Natural Habitats, &c.) (Amendment) Regulations 2007. In summary, these make it an offence to damage or destroy a breeding site or resting place, intentionally or recklessly obstruct any place used for shelter or protection, deliberately, intentionally or recklessly disturb a great crested newt or intentionally kill, injure or take any great crested newt. It is also a Priority Species within the UK Biodiversity Action Plan and the Biodiversity Action Plan for Cambridgeshire.

**Reptile**

6.90 The commoner species of reptile; the slow worm *Anguis fragilis*, common lizard *Lacerta vivipara*, adder *Vipera berus* and grass snake *Natrix natrix* are protected by the Wildlife and Countryside Act 1981 (as amended) against intentional killing and injury (but not taking). Once captured all British reptiles become subject to the Protection of Animals Act 1911, which prohibits cruelty and mistreatment. Releasing a reptile in such a way to cause undue suffering may be an offence under the Abandonment of Animals Act 1960. All species of reptiles are Priority Species within the UK Biodiversity Action Plan.

**Assumptions, Limitations and Technical Difficulties**

6.91 It is not considered that there were any major constraints to the desk study or the field survey. Minor variables are discussed in the technical reports (Appendix 6.5). Some of the organisations contacted to provide information did not respond and it is not known if this is because they do not hold any data for the site.

**Impact Assessment Criteria**

**Assessment Methodology**

6.92 The assessment methodology for this chapter follows the *Guidelines for Ecological Impact Assessment* developed by the Institute of Ecology and Environmental
Management (IEEM 2006\textsuperscript{13}). The objective of the Guidelines is to promote a scientifically rigorous and transparent approach to Ecological Impact Assessment (EcIA), as a key component of Environmental Impact Assessment (EIA). The Guidelines comprise advice on best practice in four key areas of EcIA:

- Identifying and evaluating ecological features;
- Characterising and quantifying effects and assessing their significance;
- Minimising adverse effects and maximising benefits through the scheme design process; and
- Identifying legal and policy implications and their consequences for decision-making.

\textbf{Valuing Ecological Features and Resources}

6.93 The IEEM Guidelines recognise that ecological evaluation is a ‘complex and subjective process’ but provides key considerations to apply when ‘applying professional judgement to assign values to ecological features and resources’. These include consideration of: geographic frame of reference; site designations and features; biodiversity value; large populations or important assemblages of species; potential value, secondary or supporting value; social/community value and economic value.

6.94 Focusing on assessments of biodiversity value, there are various characteristics that can be used to identify ecological resources or features that are likely to be important in terms of biodiversity. These include:

- Rare or uncommon species in the local, national or international context;
- Endemic or locally distinct sub-populations of a species;
- Species on the edge of their distribution;
- Notably large populations of animals or concentration of animals considered uncommon or threatened in a wider context;
- Species, rich assemblages of plants or animals;

6.95 In this chapter, all ecological resources or features are assigned to a value relating to their geographic frame of reference, using the following scale:

- International
- UK
- National (England)
- Regional (Southern England)
- County (Cambridgeshire)
- District (Peterborough City)
- Local or parish including the immediate zone of influence of the site (Yaxley).

**Characterising and Quantifying Effects and Assessing their Significance**

6.96 The Guidelines state that ecological effects should be characterised in terms of ecosystem structure and function and reference should be made to: positive or negative effects; extent; magnitude; duration; reversibility; timing and frequency; and cumulative effects. The guidelines provide a list of ‘key aspects of ecosystems to consider when predicting effects’.

6.97 For the purpose of this EcIA, the short-term effects during construction are defined as those effects that come about due to construction and last for six weeks at the most; long-term effects during construction are those that could potentially last throughout the construction period and potentially beyond once the development is complete. However, it should be noted that these terms are considered in the assessment relative to each habitat or species affected and their respective successional processes or life-cycles. For example, 6 weeks for one species may represent a single generation time period, but for another it may be a few weeks in a life lasting several years.

6.98 Following the characterisation of effects, an assessment of the ecological significance of an effect is made. Prior to the publication of the current Guidelines in 2006, ecological significance was defined using a matrix in which ecological value and...
magnitude of effect were combined to determine different grades of significance; usually high, medium or low.

6.99 The guidance now advises that assigning levels of significance in this way obstructs a clear understanding of the EcIA process and can result in an assessment that lacks rigour (IEEM, 2005). The Guidelines promote a more transparent approach in which a beneficial or adverse effect is determined to be significant or not, in ecological terms, in relation to the integrity of the defined site or ecosystem(s) and/or the conservation status of habitats or species within a given geographical area, which relates to the level at which it has been valued. The decision about whether an effect is significant or not, is independent of the value of the ecological feature; the value of any feature that will be significantly affected is then used to determine the implications, in terms of legislation, policy and/or development control. (IEEM, 2005).

6.100 The Guidelines (IEEM, 2006) advise that it is important to consider the likelihood of a predicted impact, along with the degree of confidence in the assessment of the effect on ecological structure and function. The decision on confidence levels is based on professional judgement; the scale of confidence levels used for this chapter of the ES is as follows:

- Certain/near-certain: probability estimated at 95% chance or higher;
- Probable: probability estimated between near-certain and 50:50;
- Unlikely: probability less than 50:50 but above 5%; and
- Extremely unlikely: probability estimated at less than 5%

6.101 The concepts of ‘ecological integrity’ and ‘conservation status’ should also be considered when evaluating a feature of ecological interest. The Guidelines refer to ‘integrity’ as defined in the joint ODPM Circular 06/2005 and Defra Circular 01/2005 to accompany Planning Policy Statement 9 as “the coherence of the ecological structure and function, across a site’s whole area, that enables it to sustain that habitat, complex of habitats and/or the levels of populations of species for which it was classified” (ODPM, 2005b). The term ‘conservation status’ relates to the viability,
rarity and condition of habitats and species. It is defined in the Guidelines to ensure that it can be ‘applied to sites, habitats or species within any defined geographical area. If an effect is found not to be significant at the highest geographical level at which the resource or feature has been valued, it may be significant at a lower geographical level.’

6.102 The Guidelines also state that: “significant effects on features of ecological importance should be mitigated (or compensated for) in accordance with guidance derived from policies applied at the scale relevant to the value of the feature or resource” and that “Any significant effects remaining after mitigation (the residual effects), together with an assessment of the likelihood of success in the mitigation, are the factors to be considered against legislation, policy and development control in determining the application” (IEEM, February 2006).

Baseline Ground Conditions

Desk study results

Statutory and non-statutory sites of nature conservation importance

6.103 The Cambridgeshire and Peterborough Biological Records Centre (CPBRC) holds data on the existence of statutory and non-statutory sites of nature conservation importance as well as records of protected species. Orton Pit Site of Special Scientific Interest (SSSI), Special Area of Conservation (SAC) and candidate Special Area of Conservation (cSAC) lies adjacent to the proposed site (for full details and map see Appendix 6.5.) This site has been the subject of various ecological assessments and management plans over recent years. The following documents regarding Orton Pit SSSI/SAC were used to inform this ecological report:


2) O&H Hampton (2004a) Objection by O&H Hampton Ltd. to notification dated 23 March 2004. O&H Hampton


6.104 The following sites were found within a 2km radius of the study area. Further information on these sites, including habitat descriptions and reasons for their designations, can be found in Appendix 6.5.

**Orton Pit SSSI/SAC/cSAC TL159942**

6.105 Orton Pit SSSI/SAC/cSAC lies immediately adjacent to the site to the north-east. The SSSI and SAC/cSAC cover approximately the same area, although slight differences in the western boundary of the sites means that the SSSI covers 145 and the SAC/cSAC covers approximately 141 hectares of the former brickpits (Figure 6.3 (Volume 2) shows the areas covered by the SSSI, SAC and cSAC).

6.106 The notification under Section 28c of the Wildlife and Countryside Act 1981 states the reasons for the SSSI designation. These reasons include:

- Great crested newts
- Standing water habitats
- Assemblage of rare and scarce charophyte species (stoneworts)
- Geological features

6.107 The identification and classification of Special Areas of Conservation arises under the EC Habitats Directive. Article 3 of the Habitats Directive requires the establishment of a European network of important high-quality conservation sites that will make a significant contribution to conserving the habitat types and species identified in Annexes I and II of the Directive (as amended). The reasons for selection of Orton Pit SAC include the following habitats and species:

- Annex I Habitat – hard oligo-mesotrophic waters with benthic vegetation of *Chara sp.*
- Annex II Species – Great crested newt Triturus cristatus.
6.108 The cSAC area was put forward in tranche 34 to the European Commission on 31 March 2006 as a significant boundary extension to the existing Orton Pit SAC.

6.109 Within this Chapter, the SSSI, SAC and cSAC will be referred to as SSSI/SAC/cSAC wherever the text refers to all three designations. Where the sites are discussed separately, SSSI, SAC or cSAC will be used in isolation. The Orton Pit SSSI/SAC/cSAC includes Jones Covert woodland that is also designated as a County Wildlife Site.

6.110 Orton Pit SSSI/SAC/cSAC covers a large area of former brick clay workings. These form a series of linear spoil heaps and pools creating a varied topography which has encouraged the development of a mosaic of habitats namely open water, emergent and aquatic vegetation, ruderal vegetation, woodland, rough grassland and dense and open scrub.

6.111 Orton Pit SSSI/SAC/cSAC contains the largest known population of great crested newts in the United Kingdom due to the presence of a variety of suitable breeding and hibernation sites. Counts of this species made in the late 1990s suggest that the population numbers up to 30,000 adults. The great crested newt is protected under the Wildlife and Countryside Act 1981, as amended, and under Regulation 39 of the Conservation (Natural Habitats etc.) Regulations 1994. This species is also protected by virtue of the site being designated a candidate Special Area of Conservation under Annex 2 of the Habitats and Species Directive, as transposed into UK law under the Conservation Regulations 1994. Thus, Orton Pit is an important site both nationally and internationally for great crested newts.

6.112 In addition, the particular topography and geology of the site makes the water bodies highly favourable for stoneworts *Chara sp.*; fresh and brackish water algae that tend to require high water quality. Ten species of stonewort have been recorded within the site. Of these ten, five are Nationally Scarce and a sixth, the bearded stonewort *Chara canescens*, is Endangered and protected under the Wildlife and Countryside Act 1981, as amended. Bearded is a priority species within the UK Biodiversity Action Plan, as are the stoneworts as a group and the site qualifies as a SSSI/SAC partly on this basis.

6.113 The woodland, which includes Jones's Covert Woodland and a strip along the south of the Fletton Parkway, is old broad-leaved plantation which is now relatively semi-natural in character. The canopy is dominated by ash *Faxinus excelsior*, with oak *Quercus robur* standards and birch *Betula pendula* present in some areas. The understorey is generally rather scattered with hawthorn *Crataegus monogyna* and
elder *Sambucus nigra*. The ground flora is generally rather sparse within the densely shaded areas.

6.114 The purple hairstreak butterfly *Neozephyrs quercus* and Nationally Scarce black hairstreak *Satyrium pruni* (a Local Biodiversity Action Plan species) butterfly are known to breed within Jones’s Covert woodland. This woodland contains several ponds which are known to support breeding populations of great crested newts and the woodland provides terrestrial habitat for this species.

6.115 Furthermore, the site supports high numbers of smooth newt *Triturus vulgaris* and large populations of toad *Bufo bufo*, common frog *Rana temporaria*, common lizard *Zootoca vivipara* and grass snake *Natrix natrix*. The SSSI/SAC also supports badgers *Meles meles*, water voles *Arvicola terrestris* and foraging bats. Fifteen dragonfly and damselfly species have been recorded within the site and two Nationally Scarce vascular plants occur, fen pondweed *Potamogeton coloratus* and golden dock *Rumex maritimus*.

6.116 Orton Pit SSSI/SAC can be described as being of ecological value in an International context due to its international designation.

*Nene Washes SSSI/SAC TL200977 to TF395029*

6.117 The Nene Washes SSSI/SAC lies approximately 5km to the north-east of the assessment area. Although there is no boundary between the assessment area and the Nene Washes SAC, the Stanground Lode (a stream) runs through the assessment area and empties into the River Nene as it flows into the SSSI/SAC. Therefore, changes in water supply and quality could have an effect on this designated site. The Nene Washes supports nationally and internationally important populations of wildfowl and wading birds. The site is also notable for the diversity of plant and associated animal life within its network of waterways.

6.118 The Nene Washes SSSI/SAC can be described as being of ecological value in an International context due to its international designation.

Non-statutory designated sites

*Jones’s Covert Woodlands PCCWS TL1593*

6.119 Jones’s Covert Woodland complex is a County Wildlife Site within the Peterborough Unitary Authority Area (PCCWS) and comprises several areas of woodland in close proximity. Jones’s Covert woodland itself is to the north of the Core Area application site but also forms part of the Orton Pit SAC and is therefore not covered any further within this section.
6.120 The rest of the Jones’s Covert CWS Complex includes The Belt, Two Pond Coppice and Chambers Dole woodlands. The Belt and Two Pond Coppice woodlands are old plantation woodlands and the canopy here is dominated by oak. The understorey contains ash, elder, alder *Alnus* sp. and hazel *Corylus avellana*. Ground flora species include nettle *Urtica dioica*, tufted hair grass *Deschampsia cespitosa*, false wood brome *Brachypodium sylvaticum*, bramble *Rubus fruticosus*, and hedge woundwort *Stachys sylvatica*. Chambers’s Dole is largely mature poplar *Populus* sp. plantation with a ground flora of bramble. Purple hairstreak butterfly and the Nationally Scarce black hairstreak breed at this site. Much of the site is used for game bird rearing.

6.121 Jones’s Covert Woodlands CWS complex can be described as being of ecological value in a County context due to its designation as a County Wildlife Site.

*Debdale Pond PCCWS TL153958*

6.122 Debdale Pond is designated as a County Wildlife Site within the Peterborough Unitary Authority Area and is situated approximately 1km north of the A1139. It is a small pond, permanent in most years but drying out in dry summers. The pond has a narrow fringe of emergent species and some submerged aquatic vegetation. The pond is set in an area of close-mown semi-improved grassland surrounded by a belt of shrubs and trees. The pond is known to support a breeding population of great crested newts, although the size of this population is not known.

6.123 Debdale Pond CWS can be described as being of ecological value in a County context due to its designation as a County Wildlife Site.

*Nene Park PCCWS TL1597 *

6.124 Nene Park County Wildlife Site within the Peterborough Unitary Authority Area is an extremely large site (248.6 ha) which contains a mix of old and recently created habitats including parkland, poplar plantations, osier beds, willow carr, scrub, hedgerows, wet and dry grassland, swamp and open water. The largest areas of water are the result of recent gravel workings and are of value to wintering birds.

6.125 Nene Park CWS can be described as being of ecological value in a County context due to its designation as a County Wildlife Site.

*Norman Cross Brickpits CWS TL1690*

6.126 Norman Cross Brickpits County Wildlife Site (CWS) lies to the south of the A15 London Road and east of the A1(M). The site is dominated by open water habitats and tall swamp vegetation which has developed after the cessation of clay extraction in 1982. The site contains three large ponds which have frequent marginal vegetation
and steep grassy banks. The grassland surrounding the ponds has developed on bare clay and has a strong calcareous influence.

6.127 Norman Cross Brickpits CWS can be described as being of **ecological value in a County context** due to its designation as a County Wildlife Site.

**Crown Pit No. 1 PCCWS TL195943**

6.128 Crown Pit PCCWS lies between the town of Yaxley and the village of Farcet approximately 2km north-east of the study area. This site is also a flooded disused brick pit which has steeply sloping margins. There is dense marginal vegetation and grassland and scrub have developed on the bare clay soil.

6.129 Crown Pit CWS can be described as being of **ecological value in a County context** due to its designation as a County Wildlife Site.

**Denton Common Pit CWS TL176883**

6.130 Denton Common Pit lies approximately 1.5km south of the assessment area. The pit was dug for clay in the 1930/40s and contains three areas of deep open water surrounded by shallower areas of swamp vegetation.

6.131 Denton Common Pit CWS can be described as being of **ecological value in a County context** due to its designation as a County Wildlife Site.

**The Roughs, Caldecote Fen CWS TL190893**

6.132 Caldecote Fen lies some 2km south of southern boundary of the assessment area. The site was dug for peat and now comprises an area of open water with two wooded islands. The pond supports fringing swamp vegetation.

6.133 Caldecote Fen CWS can be described as being of **ecological value in a County context** due to its designation as a County Wildlife Site.

**Records of protected and important species**

6.134 A number of protected species have been identified from within 2km of the site. There are also records of protected species from within the site itself including great crested newts and water vole. In addition there are a number of notable species such as those listed on the UKBAP within 2km of the site.

**Great crested newts**

6.135 There is a large amount of information on great crested newts from the area, and from Orton Pit SSSI/SAC in particular. The large population of this species is one of the
main reasons why Orton Pit has been designated a SSSI and SAC and there are several records of this species within ponds in and around the site (see Table 6.1 below).

6.136 The particular combination and distribution of aquatic and terrestrial habitats within the former brick pit sites provide exceptional breeding, foraging and hibernation conditions for great crested newts. The average density of newts trapped within a former brick pit to the east of the current boundary of Orton Pit SSSI/SAC during the five years of the translocation exercise was 263 per hectare (translocation capture data), giving a total population estimate in the tens of thousands of individuals, assuming that densities are similar for the whole of the SSSI/SAC (English Nature 2004\[16\]).

### Table 6.1: Records of great crested newts from the CPBRC.

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<th>Species</th>
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<td>Yaxley</td>
<td>10/02</td>
</tr>
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<td>Basil Green Pond,</td>
<td>01/08/1998</td>
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<td></td>
<td></td>
<td>Orton</td>
<td></td>
</tr>
<tr>
<td>Great crested newt</td>
<td>TL154958</td>
<td>Debdale Pond</td>
<td>01/07/1998</td>
</tr>
</tbody>
</table>

Water vole

6.137 The network of ponds within Orton Pit SSSI/SAC is known to support water voles Arvicola terrestris (O&H Hampton 2004b17). There are several records of water voles from watercourses around the town of Yaxley, particularly along the Yards End Dyke, which runs close to the southern boundary of the study area.

<table>
<thead>
<tr>
<th>Species</th>
<th>Location</th>
<th>Grid reference</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water vole</td>
<td>Yards End Dyke</td>
<td>TL181915</td>
<td>17/09/2001</td>
</tr>
<tr>
<td>Water vole</td>
<td>Yards End Dyke</td>
<td>TL181916</td>
<td>12/03/2002</td>
</tr>
<tr>
<td>Water vole</td>
<td>Yards End Dyke</td>
<td>TL183918</td>
<td>2000</td>
</tr>
<tr>
<td>Water vole</td>
<td>Yaxley Lode</td>
<td>TL189921</td>
<td>2000</td>
</tr>
<tr>
<td>Water vole</td>
<td>Yaxley Lode</td>
<td>TL188920-TL192917</td>
<td>17/09/2001</td>
</tr>
<tr>
<td>Water vole</td>
<td>Yaxley Lode</td>
<td>TL195914-TL199912</td>
<td>17/09/2001</td>
</tr>
<tr>
<td>Water vole</td>
<td>Old course of the River Nene, Farcet to Yaxley</td>
<td>TL208945-TL195927</td>
<td>19/10/1999</td>
</tr>
<tr>
<td>Water vole</td>
<td>Beeby’s Pit</td>
<td>TL185935</td>
<td>1995</td>
</tr>
<tr>
<td>Water vole</td>
<td>Crown Lakes</td>
<td>TL195942</td>
<td>1995</td>
</tr>
</tbody>
</table>

Badgers

6.138 The Cambridgeshire Badger and Otter Group hold the following records of badger road casualties for the study area, but no records of setts were provided.

Table 6.3: Badger road casualty records for the assessment area.

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Road</th>
<th>Grid reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>21/03/05</td>
<td>Yaxley</td>
<td>A15</td>
<td>TL175935</td>
</tr>
<tr>
<td>22/07/03</td>
<td>Orton Southgate</td>
<td>A606</td>
<td>TL137938</td>
</tr>
<tr>
<td>22/02/05</td>
<td>Yaxley</td>
<td>A15</td>
<td>TL167913</td>
</tr>
<tr>
<td>04/03/05</td>
<td>Yaxley</td>
<td>A15</td>
<td>TL168915</td>
</tr>
<tr>
<td>11/03/05</td>
<td>Yaxley</td>
<td>A15</td>
<td>TL166913</td>
</tr>
<tr>
<td>20/03/05</td>
<td>Yaxley</td>
<td>A15</td>
<td>TL168914</td>
</tr>
<tr>
<td>13/03/05</td>
<td>Yaxley</td>
<td>A15</td>
<td>TL172918</td>
</tr>
</tbody>
</table>

Reptiles

6.139 Orton Pit SSSI/SAC is known to support common lizard, grass snake, slow worm *Anguis fragilis* and adder *Vipera berus* (English Nature 2004a & 2004b). There are no specific records of reptile species from the application sites.

Terrestrial invertebrates

6.140 Twenty eight species of butterfly have been recorded from the 2 km desk study search area. This includes the black hairstreak butterfly, a Priority Species within the Cambridgeshire Biodiversity Action Plan. The butterfly requires mature blackthorn growing in un-shaded situations. Larger populations of the black hairstreak are usually found on the edges of wide rides and glades and on sheltered woodland edges.

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6.141 Although the majority of the butterfly species recorded from the desk study search area are common and widespread within the British Isles, there are several species that are uncommon in a local or national context and many of these species have undergone recent reductions in their range. These include the grizzled skipper *Pyrgus malvae*, white letter hairstreak *Satyrium w-album*, green hairstreak *Callophrys rubi* and the wall brown *Lasiommata megera*. Several of the species recorded, such as the common blue *Polyommatus icarus*, grizzled skipper and brown argus *Plebeius agestis*, are dependent on the open, flower-rich and sparsely vegetated conditions typified by the former brick pits.

Table 6.4: Invertebrate records from the CPBRC

<table>
<thead>
<tr>
<th>Species</th>
<th>Location</th>
<th>Grid reference</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Hairstreak</td>
<td>Jones Covert woods</td>
<td>TL1593</td>
<td>1997</td>
</tr>
</tbody>
</table>

**Stoneworts**

6.142 A range of ponds of varying ages have developed at Orton Pit SSSI/SAC from past clay extraction. These support an assemblage of rare and scarce stoneworts (charophytes) with one nationally rare and five nationally scarce species recorded (O&H Hampton 2002).

6.143 The most significant species is the bearded stonewort, which is most associated with early successional ponds. This species is listed as Endangered in the Red Data Book for Great Britain, protected under the Wildlife and Countryside Act 1981 (as amended) and is a Priority Species within the UK Biodiversity Action Plan (BAP). Another nine species of stonewort occur on the site, five of which are listed as Nationally Scarce. In addition, stoneworts as a group have their own Biodiversity Action Plan because they are associated with good water quality and because so many of them are regarded as scarce or vulnerable (O&H Hampton 2002; Froglife 2004).

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### Table 6.5: Species of stonewort present at Orton Pits SSSI/SAC and their status

<table>
<thead>
<tr>
<th>Species</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bearded stonewort (Chara canescens)</td>
<td>Endangered; Schedule 8 WCA; BAP Priority Species</td>
</tr>
<tr>
<td>Lesser bearded stonewort (Chara curta)</td>
<td>Nationally scarce;</td>
</tr>
<tr>
<td>Hedgehog stonewort (Chara aculeolata)</td>
<td>Nationally scarce</td>
</tr>
<tr>
<td>Smooth stonewort (Nitella flexilis)</td>
<td>Nationally scarce</td>
</tr>
<tr>
<td>Clustered stonewort (Tolypella glomerata)</td>
<td>Nationally scarce</td>
</tr>
<tr>
<td>Rough stonewort (Chara aspera)</td>
<td>Nationally scarce</td>
</tr>
<tr>
<td>Opposite stonewort (Chara contraria)</td>
<td>-</td>
</tr>
<tr>
<td>Bristly stonewort (Chara hispida)</td>
<td>-</td>
</tr>
<tr>
<td>Delicate stonewort (Chara virgata)</td>
<td>-</td>
</tr>
<tr>
<td>Common stonewort (Chara vulgaris)</td>
<td>-</td>
</tr>
</tbody>
</table>

6.144 One other Nationally Scarce plant occurs within Orton Pit SSSI/SAC, namely fen pondweed, which occurs in many of the ponds.

**Field survey results and Evaluation**

**Habitats**

6.145 The majority of the sites comprise intensively managed arable farmland, separated by species-poor hedgerows and ditches, the majority of which were dry at the time of survey. Within this mostly agricultural landscape there are patches of woodland and several small ponds. Small streams also occur within the site, most notably the Stanground Lode within the northern area and a tributary of the Yards End Dyke within the southern part of the study area but outside of the application sites.

6.146 Where there has been clay extraction in the past, a mosaic of habitats have developed on the former brick pits, including open water, reedbed, swamp, dense and
scattered scrub and unimproved grassland. These habitat mosaics exist south west of the site boundary within the Norman Cross County Wildlife Site.

6.147 The broad habitat types that occur within the sites and wider study area are described below. A map of the habitat types is illustrated in Figures 6.1A – 6.1C. A more detailed description of the habitats and particular features of ecological notes can be found in the target notes in Appendix 6.5.

Grassland

6.148 There is only one area of agriculturally improved grassland within the assessment area. Where grassland remains, it tends to be agriculturally semi-improved or unimproved and is associated either with former brick pit sites or with balancing ponds. The main tract of unimproved grassland occurs around the three lakes at the former Norman Cross brickpits which lies outside the Great Haddon Core Area application site boundary south of the A15.

6.149 In this area, grassland has developed on the bare clay substrate and rubble left after the clay extraction. The grassland in the area is considered to show some calcareous influence, with certain species indicative of alkaline conditions (see Appendix 6.5). This grassland forms a mosaic habitat with areas of hard standing and rubble piles that have been created through the demolition of the hard standing as well as patches of scrub that have developed in the cracks and on the edges.

6.150 Therefore this area of grassland can be described as being part of the Open Mosaic Habitats on Previously Developed Land habitat type described within the new UK BAP criteria and can therefore be described as a priority habitat within the UK BAP. This habitat type is assessed fully in the brownfield land section.

Woodland

6.151 The improved grassland within the application sites is considered to have negligible value.

6.152 The un-improved grassland areas around the balancing ponds and adjacent to Jones Covert Woodland that fall outside the boundary of the application sites are considered to be of ecological value in a District context. This assessment has been made due to the declining nature of this kind of habitat on a national scale but the relatively small and isolated nature of these grassland areas. The areas of improved grassland are considered to be of negligible value.
been unmanaged for some considerable time so that the woodland now has many features associated with semi-natural broadleaved woodland. The dominant trees are mature ash *Fraxinus excelsior* and oak *Quercus robur* with elm *Ulmus sp.* This woodland supports both the black hairstreak and purple hairstreak butterflies.

6.154 Chambers Dole, The Belt and Two Pond Coppice Woods (part of the Jones’s Covert CWS complex) lie just outside of the site boundary adjacent to Jones’s Covert woodland. They comprise mature hybrid black poplar *Populus x canadensis* plantations that have undergone some naturalisation with species such as oak and sycamore colonising and have a dense understorey of hawthorn and elder. The plantations appear to be unmanaged and to have developed characteristics of semi-natural woodland. The ground flora tends to be sparse due to the dense shading from the trees.

6.155 Madam Whites Covert woodland is located within the Core Area application site, adjacent to the Stanground Lode and contains species such as hawthorn, elm, blackthorn *Prunus spinosa* and field maple with mature oak standards.

6.156 To the west of Yaxley lies a semi-natural broadleaved woodland that is fairly young in age and dominated by tall ash and sycamore with hawthorn, field maple and silver birch. The ground flora is sparse and dominated by grasses with nettle. The western end of the wood shows evidence of frequent use by humans with tarmac pathways and signs of grazing rabbit and deer.

6.157 Treebelts also occur along stretches of the Stanground Lode and along the northern and southern sides of the A15. The roadside belts tend to be made up of a scrubby understorey beneath mature hybrid black poplar trees.

6.158 Jones’s Covert Woodland can be described as being of ecological value in the County context as although it forms part of the SSSI/SAC in recognition of the fact that it supports a proportion of the great crested newt population for which the SSSI/SAC/cSAC is designated. However as a woodland habitat it is designated as a County Wildlife Site and is therefore of value in a County context.

6.159 The other woodlands within the Great Haddon Core Area application site can be described as being of ecological value in the Local context. Those immediately outside of the site boundary can be described as being of ecological value in the County context as they are also designated as CWS woodlands.
Hedgerows

6.160 The hedgerows within the site tend to be well-trimmed and species-poor and typically include hawthorn, blackthorn, elder, ash and dog rose. They are usually associated with mature standard trees, typically ash and oak, and ditches. Most ditches tend to be dry but many are deep and contain tall ruderal vegetation.

6.161 A total of 5 out of the 42 hedges surveyed met criterion 7 or 8 of the Hedgerow Regulations 1997 and are therefore considered to be ‘important’ for ecological reasons. Within the site there are no known records of any of the species described in criterion 6, so this aspect of the assessment has not been considered further here. (See Appendix 6.5 for details of this assessment).

6.162 Four of the 42 hedgerows surveyed do not fall within the “important” category but can be described as “species rich” (having 5 or more woody species within a 30m section.) A further 30 hedges are considered not to qualify as either “important” or “species rich”, but could be considered to fall under the definition of priority habitat under the UK BAP 2007. The remaining 3 hedges are less than 80% continuous and are therefore not covered by the UKBAP criteria.

6.163 All of the hedgerows that meet the priority species criteria for the UK BAP could be assessed as being of National value due to their inclusion in the UKBAP. However the expanded scope of the hedgerow priority habitat from the Ancient and/or Species Rich hedgerows means that nearly all hedgerows in the UK fall within this designation and therefore a further level of assessment must be used. Hedgerows are not considered rare and are included in the UKBAP partly for their role in connectivity. Therefore those hedgerows that do not form significant connectivity within the site are not assessed at this level. The hedgerows that have been assessed as being “important” through the Hedgerow Regulations are considered to be of ecological value in a County context, those described as “species rich” could be assessed as of ecological value in a District context as hedgerows are not listed as a priority species within the Cambridgeshire BAP so are not considered to be a priority for the County. Finally the other hedgerows, which form the majority of the site, are considered to be widespread and not to be ecologically significant even though they are covered by the new BAP priority habitats and therefore can be described as being of ecological value in a Local context.

6.164 It is therefore considered that the overall assessment of the hedgerows within the site is of ecological value in a Local context but each hedgerow should be assessed on its own merits looking at its species-richness and connectivity.
Bare ground

6.165 There are extensive areas of bare ground where arable fields have been recently ploughed. Overall the arable fields had a low number of arable flora species present within the crops and most of the plants identified were commonly occurring species, such as field poppy *Papaver rhoeas* and field pansy *Viola arvensis*. However, three species of note were identified (listed below). Although these species are regarded as being common and widespread, they are considered to be of note due to documented declines in their abundance and distribution (Wilson & King 2003). None of the species identified on site have any legal protection or designations but they are considered to be useful indicator species that can be used to highlight the suitability of these fields to support rarer arable flora (although no such species were found during the surveys).

- Cut-leaved dead-nettle *Lamium hybridum*
- Dwarf Spurge *Euphorbia exigua*
- Round-leaved fluelien *Kickxia spuria*

6.166 The bare ground that is a consequence of arable production can be described as being of *ecological value in a Local context* due to the occurrence of these species throughout the local area.

Brownfield land

6.167 On the south side of the A15 just outside the application sites boundaries is an area of former brick pits which has developed an open mosaic habitat including scrub, grassland and bare ground resulting from the clay extraction that has left areas of bare substrate which have yet to be fully colonised by vegetation. Bare ground habitats, particularly on south facing slopes with flower-rich grassland nearby, can be very important for certain species of invertebrate including rare bee, wasps and ground beetles.

6.168 The brownfield land within the former brick pits (Norman Cross) can be described as being part of the Open Mosaic Habitats on Previously Developed Land UK BAP priority habitat. This habitat is fairly common and widespread within the District due to the various brick and clay workings throughout the area and is therefore assessed as having an *ecological value in a County context*.

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Scrub

6.169 Scattered scrub is present over much of the former brick pit sites, forming dense thickets in places. However the majority of this habitat falls outside the application sites boundaries. The dominant scrub species are hawthorn and dog rose.

6.170 Elsewhere, there is planted scrub within the compounds of the balancing ponds to the east of the A1(M). These areas of scrub tend to be relatively species rich with field maple, hawthorn, guelder rose *Viburnum lantana*, hazel, dog rose, oak and elder present. The area of scrub on the north western edge of the woodland opposite Yaxley is dominated by bramble.

6.171 The areas of scrub on the site are small, scattered and dominated by common species such as hawthorn, bramble and elder. The scrub habitat has therefore been assessed as having an ecological value in a Local context.

Standing water

6.172 There are many ponds within the ecological assessment area of a variety of size, shape and origin. They range from the large lakes of Normans Cross brickpit to small, neglected ponds within the corners of the arable fields. Ponds are listed as a priority habitat in the UK BAP.

6.173 The lakes of the Norman Cross brick pits contain large areas of open standing water and dense aquatic vegetation. These ponds have wide areas of fringing reedbed and are likely to be important to breeding and over-wintering waterfowl and other reedbed birds such as reed warbler *Acrocephalus scirpaceus* and reed bunting *Emberiza schoeniclus*. In addition these ponds support a range of stonewort species including the nationally threatened Bearded Stonewort which is specially protected under the CROW Act. Also strong populations of the nationally scarce Hedgehog Stonewort *Chara aculeolata* are present.

6.174 The invasive species swamp stonecrop *Crassula helmsii* has been observed within Long Lake in the south east of the site. The plant is currently in one location close to the nearest place to the access point and it is quite likely that it has been introduced when tadpoles were returned to the wild. At present the patch is about 2 metres in diameter and within the fringing swamp and can be eradicated.

6.175 Ponds that occur at the edges of the arable fields are of varying habitat quality. Some appear to have deep, clear water and abundant fringing and aquatic vegetation and support populations of great crested newts (GCN). Several small ponds have dried
out and are over shaded by surrounding trees and shrubs. It is likely that these ponds are less valuable habitats for amphibians and aquatic invertebrates.

6.176 The standing water within the site varies greatly in ecological value. In order to assess the Ecological Value of the ponds a decision tree was used to assess priority ponds (Fairclough & Nicolet 2008) using criteria set out in the Pond Habitat Action Plan in addition to the habitat descriptions in the ponds UK BAP priority habitat classification.

6.177 Table 6.6 below shows the results of this assessment and is cross referenced to Figure 6.2 which shows the location of all the ponds within the site using the same numbering system as used in the GCN surveys and assessment. Ponds that contain populations of great crested newts are assessed as being UK BAP priority ponds. These ponds are associated with the great crested newt metapopulation of the SSSI/SAC but are considered to be sink populations to the SSSI/SAC source population. These ponds tend to have small to medium populations of newts which on their own would merit an evaluation of county value but as they are associated with the SSSI/SAC metapopulation which is of International importance this evaluation has been increased to Regional level.

6.178 Ponds with 5 or more stoneworts can be evaluated as of National importance due to a nationally important stonewort assemblage. Those with less than 5 stoneworts are evaluated as of Regional importance.

Table 6.6: Assessment of ecological value of ponds (See ES Volume 2: Figure 6.2)

<table>
<thead>
<tr>
<th>Pond</th>
<th>Features and assessment criteria</th>
<th>Ecological value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7 wetland plant species</td>
<td>Local</td>
</tr>
<tr>
<td></td>
<td>6 Macroinvertebrate N-taxis</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>BAP priority pond</td>
<td>Regional</td>
</tr>
<tr>
<td></td>
<td>Criteria 2 – GCN present</td>
<td></td>
</tr>
<tr>
<td>3 (both 3a and 3b)</td>
<td>N/A – pond dry N/A</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>N/A – pond dry</td>
<td>N/A</td>
</tr>
<tr>
<td>5</td>
<td>8 wetland plant species</td>
<td>Local</td>
</tr>
<tr>
<td></td>
<td>5 Macroinvertebrate N-taxis</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>BAP priority pond</td>
<td>Regional</td>
</tr>
<tr>
<td></td>
<td>Criteria 2 – GCN present</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>BAP priority pond</td>
<td>Regional</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Criteria 1 – Annex 1 type pond (Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.)</th>
<th>Criteria 2 – GCN present</th>
<th>GCN present</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 BAP priority pond</td>
<td>Regional</td>
<td></td>
</tr>
<tr>
<td>9 2 wetland plant species 9 Macroinvertebrate N-taxa including 1 Nationally Notable List B species</td>
<td>District</td>
<td></td>
</tr>
<tr>
<td>10 4 wetland plant species 6 Macroinvertebrate N-taxa</td>
<td>Local</td>
<td></td>
</tr>
<tr>
<td>11 – 14 outside of survey boundary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 BAP priority pond Criteria 2 – GCN present</td>
<td>Regional</td>
<td></td>
</tr>
<tr>
<td>16 BAP priority pond Criteria 2 – GCN present</td>
<td>Regional</td>
<td></td>
</tr>
<tr>
<td>17 BAP priority pond Criteria 2 – GCN present</td>
<td>Regional</td>
<td></td>
</tr>
<tr>
<td>18 N/A – pond dry</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>19 BAP priority pond Criteria 1 – Annex 1 type pond (Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.)</td>
<td>National (stonewort assemblage)</td>
<td></td>
</tr>
<tr>
<td>20 (both 20a and 20) BAP priority pond Criteria 1 – Annex 1 type pond (Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.)</td>
<td>National (stonewort assemblage)</td>
<td></td>
</tr>
<tr>
<td>21 BAP priority pond Criteria 1 – Annex 1 type pond (Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.)</td>
<td>National (stonewort assemblage)</td>
<td></td>
</tr>
</tbody>
</table>

6.179 In summary the ponds within the site vary in their assessment as having an ecological value ranging from Local to National context.

Running water

6.180 The Stanground Lode runs through the centre of the application sites. The stream flows in a narrow and fairly deep channel and is shadowed by a mature hedgerow and trees for much of its length. Channel vegetation is generally suppressed by the shading from the hedgerow, but some commoner marginal and aquatic species do occur on occasion. The Stanground Lode has been assessed for ecological quality
by the Environment Agency (Environment Agency 1999\textsuperscript{22}) using invertebrate species data. The results of this assessment show a good range of species but no rare or threatened species and therefore a moderate Average Species Per Taxa score (ASPT = 4.25) and Biodiversity Monitoring Working Party Score (BMWP = 68).

6.181 Some of the ditches south of Jones’s Covert have been recently cleaned out and have very sparse vegetation but include some Small Pondweed *Potamogeton berchtoldii* and Horned Pondweed *Zannichellia palustris*.

6.182 Most of the other ditches containing water show indications of enrichment, either by the presence of filamentous algae or a greyish turbidity. The presence of Common Stonewort *Chara vulgaris* in the ditch on the north side of the A15 suggests that this ditch is probably less enriched.

6.183 The Stanground Lode supports a population of water voles (UKBAP priority species) which is a qualifying criterion for Rivers within the UKBAP priority habitat. Rivers and streams are also listed as broad habitat types within the Local BAP however these habitat are fairly common and widespread within the region and nationally and therefore the running water within the site has been assessed as having an ecological value in a District context.

**Species**

**Great crested newts**

6.184 Six out of 15 ponds surveyed by Froglife in 2007 supported great crested newts *Triturus cristatus*; however, the suitability of occupied ponds to sustain a stable breeding population varied considerably. In addition to this survey information, past survey results have been used to analyse the great crested newt populations throughout the site and surrounding area.

Table 6.7 showing details and result of great crested newt surveys at the Great Haddon site.

<table>
<thead>
<tr>
<th>Pond</th>
<th>Surveyor</th>
<th>Date</th>
<th>Presence/absence</th>
<th>Return date</th>
<th>Surveyor</th>
<th>Presence/absence</th>
<th>Return date</th>
<th>Surveyor</th>
<th>Presence/absence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HCI</td>
<td>1991</td>
<td>Absent</td>
<td>2007</td>
<td>Froglife</td>
<td>Absent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>HCI</td>
<td>1991</td>
<td>Absent</td>
<td>2007</td>
<td>Froglife</td>
<td>Present</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3a</td>
<td>Froglife</td>
<td>2007</td>
<td>Absent</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{22} Environment Agency (1999). BIOSYS Assessment. Environment Agency
<table>
<thead>
<tr>
<th>Pond</th>
<th>Surveyor</th>
<th>Date</th>
<th>Presence/absence</th>
<th>Return date</th>
<th>Surveyor</th>
<th>Presence/absence</th>
<th>Return date</th>
<th>Surveyor</th>
<th>Presence/absence</th>
</tr>
</thead>
<tbody>
<tr>
<td>3b</td>
<td>Froglife</td>
<td>2007</td>
<td>Absent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(ponds dry)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>HCI</td>
<td>1991</td>
<td>Absent</td>
<td>2007</td>
<td>Froglife</td>
<td>Absent</td>
<td></td>
<td></td>
<td>(pond filled)</td>
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6.185 In total 8 ponds (shown in bold in Table 6.7) on site support populations of great crested newts. Figure 6.2 shows the numbering of ponds referred to within this document. Two of these ponds were assessed as having medium populations and 4 with small populations. Immediately adjacent to the site is the Orton Pits SSSI/SAC/cSAC (Hampton Reserve) which contains a large population of great crested newts and it is most likely that individuals from ponds within the site also use the ponds of the reserve and therefore should be regarded as part of the reserve’s metapopulation. Because of the close vicinity of the Orton Pit reserve it is impossible to rule out the absence of great crested newts in ponds located close to the reserve, even if they are not suitable for breeding due to presence of fish and/or shading.

6.186 Considering the influence of the Orton Pit SSSI/SAC/cSAC, which contains the largest known population of great crested newts in the United Kingdom, immediately adjacent to the site and the presence of a number of breeding great crested newts ponds the site can be described as of **ecological value in a Regional context**. This conclusion has been reached due to the fact that the great crested newt is a UK and a Local BAP priority species, legally protected under UK and European legislation. In isolation these ponds with small to medium great crested newt populations would be evaluated as of County importance but as the ponds within the site form part of the Orton Pit SSSI/SAC/cSAC metapopulation which is considered to be of international importance this evaluation has been increased to Regional importance.

**Stoneworts**

6.187 The three lakes within Norman Cross brick pits are considered to be of high importance because of the good water quality and the presence of seven species of stonewort (five species is enough to qualify as a nationally important stonewort site), including the nationally threatened Bearded Stonewort Chara canescens (Endangered; Schedule 8 WCA; BAP Priority Species). There are also strong populations of the nationally scarce Hedgehog Stonewort Chara aculeolata.

6.188 Other areas of standing water adjacent to the site boundary include ponds of varying size within Jones’ Covert woodland. Five species of stonewort were identified within the ponds in this woodland complex including the nationally scarce Hedgehog Stonewort. A sixth species, Lesser Bearded Stonewort Chara curta, which is nationally scarce, has been recorded in ponds within Jones’s Covert Woodland within the last two years and may be still present. It is similar to Rough Stonewort Chara aspera and can be difficult to spot among this more common species.

6.189 Although of lesser interest than the preceding, the Long Lake in the eastern corner of the Core Area application site still contains a diverse flora, including small populations
of two stoneworts, as well as extensive areas of swamp communities. Also of note was a population of Greater Spearwort *Ranunculus lingua* which is uncommon in the Peterborough brick pit area.

6.190 In light of this information, the stonewort community within the application sites can be described as having an ecological value in a National context.

**Breeding birds**

6.191 The breeding bird survey identified 61 species breeding within the site and a total of 75 species using the site. This included three species which were considered to be passage migrant species. Therefore, a total of 72 species were recorded breeding within the survey area or using the site regularly during the breeding season.

6.192 Of the 61 species that were suspected of breeding within the survey area three are listed on Schedule 1 of the WCA, ten red-listed Birds of Conservation Concern (BoCC) and twelve amber-listed BoCC (Gregory et al. 2002\(^{23}\)) species, and 13 UK BAP species of which two are also local BAP species. All BoCC red-listed species recorded have this status and are BAP species because of their rapid decline over the last 25 years.

6.193 The cuckoo *Cuculus canorus* and lapwing *Vanellus vanellus* are amber-listed species and BAP species on account of their rapid decline over the last 25 years, despite undergoing only moderate declines before 2002 when the BoCC list was created. Another amber-listed species, Dunnock *Prunella modularis*, is a BAP species on account of it undergoing a moderate decline over the last 25 years and being a subspecies endemic to Britain.

6.194 The ten species using the site regularly and suspected/proved to be breeding nearby but not within the survey area are still significant as the site may form an important foraging or resting area for these species. Of these 10 species, five are amber-listed and three are listed on Schedule 1 of the WCA. Records of three species are considered to relate to passage migrant individuals. These species are wheatear *Oenanthe oenanthe*, fieldfare *Turdus pilaris* which is amber-listed, and stone curlew *Burhinus oedicnemus* which is red-listed. The latter is also on the UK and local BAP list, and on Schedule 1 of the WCA.

6.195 Seven species listed on Schedule 1 of the WCA were recorded during the survey. Four of these species are also nationally rare in the UK and three are nationally scarce. Of these, three were suspected or proven to breed within the survey area: hobby *Falco subbuteo*, barn owl *Tyto alba* and Cetti’s warbler *Cettia cetti*. Marsh harrier *Circus aeruginosus* nested, and kingfisher *Alcedo atthis* possibly nested just outside the survey area, whilst red kite *Milvus milvus* was recorded foraging within the survey area on two occasions but was not thought to be breeding close to the survey area. A stone curlew *Burhinus magnirostris* was recorded on the site on 17 April 2007, but not subsequently and is considered to relate to a passage migrant individual. For further information on the survey records of these seven species can be provided to statutory agencies and the city council upon request.

6.196 The most abundant breeding bird species recorded was chaffinch *Fringilla coelebs* with 79 territories. Other species for which the area supported 20 territories or over, were blackcap *Sylvia atricapilla*, skylark *Alauda arvensis*, willow warbler *Phylloscopus trochilus*, wren *Trogodytes troglodytes*, blackbird *Turdus merula*, dunnock, great tit *Parus major*, blue tit *Parus caeruleus*, robin *Erithacus rubecula*, whitethroat *Sylvia communis* and wood pigeon *Columba palumbus*.

6.197 Of these, only skylark is a red-listed species and dunnock a BAP species, although there were also good numbers of territories of other Red List and BAP species, notably cuckoo, lapwing, reed bunting *Emberiza schoeniclus*, turtle dove *Streptopelia turtur*, bullfinch *Pyrrhula pyrrhula*, grasshopper warbler *Lucostella naevia* and yellowhammer *Emberiza citronella*.

6.198 Several species of waterbirds were recorded breeding and they were concentrated in the areas of open water and swamp, particularly Long Lake and the lake to the south of the A15 in the south west corner of the survey area. The fringing swamp vegetation of these two lagoons supported most of the typical reed bed and swamp species such as reed warbler *Acrocephalus scirpaceus*, sedge warbler *Acrocephalus schoenobaenus* and reed bunting. Scrub species like grasshopper warbler, bullfinch, willow warbler and turtle dove were found in scattered scrub across the site but the greatest concentrations were in the large blocks of scrub.

6.199 Fuller (1980\textsuperscript{24}) provided the following criteria for breeding birds where the number of species found breeding or regularly using the area can be given a value as shown:

\textsuperscript{24} Fuller, R.J. (1980). A method for assessing the ornithological interest of sites for conservation. Biological Conservation 17: 229-239
National = 85+, Regional = 84-70, County = 69-50, Local = 49-25. According to this assessment the site is therefore considered to be of ecological value in a Regional context.

6.200 The Schedule 1 species identified within or adjacent to the site have been considered separately.

**Marsh harrier**

6.201 One pair of marsh harriers is considered to be using the site and nesting in land adjacent to the site. Nationally there are thought to be 360 pairs of Marsh Harrier (RSPB\(^{25}\)) meaning that Marsh Harrier can be described as a rare breeder and this population forms approximately 0.3% of the national breeding population. A rare breeder is considered to be any species with a British breeding population of between 1 and 1,000 pairs (Fuller 1980). The East of England region holds the majority of breeding marsh harriers in the UK. The species is increasing its breeding population and range. In Cambridgeshire 28 breeding females were recorded at 13 sites. It is described as a scarce breeding migrant in the district with the main breeding site being the Nene Washes where up to nine females bred in 2002. In the region they have also been recorded breeding at Woodwalton and Baston Fens and at an undisclosed site since 1998. The presence of a breeding pair of this nationally rare breeding species immediately adjacent to the development site is considered to be of ecological value in a County context.

**Cetti’s warbler**

6.202 It is considered there may be one breeding pair of Cetti’s warblers in or immediately adjacent to the site. The national breeding population is listed as 654 pairs and therefore this population is assumed to be about 0.15% of the national population. Cetti’s warblers are considered to be rare breeders within the UK (Fuller 1980) and rare passage migrants in Peterborough (Peterborough bird club online\(^{26}\)) However, this species is increasing and expanding its range in the UK and with a UK population of 1,137 singing males in 2004 can now be classed as a scarce rather than rare breeding bird. It is common in suitable habitat elsewhere in the region. However, the majority of the population remains in the south of England, particularly the south-west, and Cambridgeshire is on the edge of its expanding range. It is a scarce breeding

\(^{25}\)http://www.rspb.org.uk/wildlife/birdguide

\(^{26}\)http://pbc.codehog.co.uk/report/warbler_cettis.html#2003
bird in the county with 4-5 singing males recorded in 2005, and none recorded in the
district in 2003. It is likely that the species will expand in the county, but it is a
specialist of wet scrub areas which is a generally uncommon habitat and it is likely
that this site will remain one of only a few locations that this species can colonise. It
is therefore considered that this species is of ecological value in a County context.

Kingfisher

6.203 Kingfishers are fairly common and widespread within the UK but are protected under
Schedule 1 (Wildlife and Countryside Act 1981) due to their unfavourable
conservation status in Europe. It is estimated that between 4,800-8,000 pairs of
kingfisher breed in the UK (Baker et al. 2006\textsuperscript{27}). In the county it is described as a
fairly common but local resident breeder with 18 pairs recorded in 2005, but the 43
pairs recorded in 2003 probably is probably closer to the true county population. In
the district, up to three pairs are regularly reported nesting including a pair at Orton
Brick Pits which probably refers to the birds recorded during this survey. The true
population is probably significantly larger than this, but the presence of a breeding
pair on Orton Brick Pits and/or Haddon Lake immediately adjacent to the site is
considered to be of ecological value in the District context.

Hobby

6.204 Hobbies are defined as scarce migrant breeders in the Peterborough area, although
there are 5 sites known to support breeding pairs and the national population is
approximately 2,200. The site is thought to support one or two breeding pairs which
relates to 0.09% of the national population. In 2005, 10-21 pairs were recorded
breeding in the county, and in 2002 summering birds were recorded from 13 sites in
the district. However, it is difficult to find evidence of breeding for the species and the
breeding population is known to generally be under-recorded (Clements 2001\textsuperscript{28}).
Therefore, the true breeding status in the county is likely to be much larger than 21
pairs, and the regular records from 13 sites are likely to be a reflection of the breeding
status within the district. It is therefore considered that the presence of this species
within the site is of ecological value in a District context.


Barn owl

6.205 Breeding barn owl has been identified within the barns of Spendelows Farm during the surveys. Barn owls are listed on the UKBAP and are Schedule 1 (Wildlife and Countryside Act 1981) species but they are fairly common and widespread in the UK. This level of protection relates to a historical decline in population and the potential conflicts with development due to their use of manmade structures. There are 3,000 to 5,000 pairs thought to be breeding within the UK and therefore the presence of one breeding pair within the site is considered to be of ecological value in a District context.

Wintering birds

6.206 The southern Orton Brick Pits, Haddon Lake and adjacent woodlands are regularly surveyed by the Peterborough Bird Club from the public footpath. Notable winter bird records include large numbers of golden plover (highest count of 3000), starling (highest count 5000), lapwing (highest count 1000), and pochard (50). In addition, records for wintering birds from the Hampton reserve have been provided by Froglife. Notable records include breeding short-eared owl, wintering lapwing (maximum count 50), common snipe (maximum count 5), redshank and golden plover (maximum count 3000). It is not clear how these records relate to the assessment area itself but it is considered likely that some of these species will use the assessment area for occasional feeding during the winter months. The presence of these wintering birds is considered to be of ecological value in the District context as the site is thought to be part of a wider habitat used for winter foraging and therefore the loss of this habitat may not have a significant effect on the population of wintering birds.

Badgers

6.207 The detailed information relating to the location of badger setts is not presented in this chapter as such information is considered to be highly sensitive; this species continues to be subject to cruel persecution. Information relating to the status of this species on the site has been submitted to the Planning Authority and has also been submitted to statutory and non-statutory nature conservation consultees. The survey report can be requested from Peterborough City Council who will ensure that appropriate checks are undertaken so that this information does not fall into the hands of potential badger persecutors.

6.208 Although badgers are protected under UK legislation they are considered to be widespread and common. As a consequence, badger use of the site is therefore considered to be of ecological value in a Local context.
Brown hare

6.209 In total, six observations of brown hare were made during the survey. Within the main section of the assessment area, three animals were seen in separate woodlands and the other three observations were made within the rough grassland on the area outside the Core Area application site to the south of the A15. Two of these observations may have been of the same animal as they were flushed within minutes of each other in close proximity. The total area of the site is approximately 400 ha which gives an average population size of approximately one animal per 100 ha which can be considered to be low compared to average home ranges of approximately 30ha (Peter, Van der Wal, Wieren 20129). The brown hare is listed as a priority species on the UK BAP and on the local BAP but the site has relatively low quality habitat and animals were only observed in low numbers so the site is not considered to be of ecological importance for brown hare compared to other areas of more suitable habitat in the local area. Therefore the site is considered to be of ecological value in a Local context, for brown hare. This information is provided in Appendix 6.5 which includes data on badgers and is therefore considered confidential and not included as part of this report. This report can be requested from Peterborough City Council.

Bats in trees

6.210 A total of 98 individual trees (and 8 groups of trees, both woodland blocks and tree belts) were assessed for their potential for roosting bats. Thirty-three of the trees surveyed had high potential for roosting bats, 32 had medium potential and 33 had low potential. In some cases trees were grouped together and assessed as a group. In total 4 tree belts and 4 woodland blocks were assessed. Two of the tree belts were identified as having trees all with a low bat roost potential and a further two were assessed as having a range of trees from low to high potential for roosting bats. There are four significant woodland blocks within the ecological area study all of which are mixed age woods of ash and oak. The woodlands contain trees of various ages some of which have features suitable for roosting bats such as dead wood, cracks and woodpecker holes. Therefore all the woodlands are assessed as having high potential for roosting bats.

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6.211 Considering that two thirds of all the trees on site are assessed as having a medium or high potential for roosting bats then the site can be assessed as to be of ecological value in a District context for bat roosts.

Bats in buildings

6.212 The majority of the buildings at Spendelows Farm are traditional brick buildings with replacement corrugated fabric roofs. In general the buildings can be described as having a high potential for roosting bats as they are constructed of timber frames and brick walls with many cracks and crevices throughout. The internal and external inspection of these buildings did not reveal any evidence of bats although suitable features were identified. One possible dropping was identified within a small hole within the brickwork of a barn but it could not be retrieved from the hole and therefore identification of the dropping was not possible. Small holes within brick walls were identified and noted so that they could be closely observed during the subsequent emergence / re-entry surveys.

6.213 The results of the emergence surveys of the buildings at Spendelows Farm did not identify any emergence of bats from any of the building features identified during the inspections. A single common pipistrelle *Pipistrellus pipistrellus* and was observed foraging within the grass courtyard of the farm buildings during both of the emergence surveys and a Noctule *Nyctalus noctula* passed over head during the first emergence survey. However, no bats were seen emerging from the buildings and no bats were seen returning to roosts during the dawn re-entry survey. It is considered unlikely that the pipistrelle bat observed is roosting in the building as it was not seen emerging from the buildings and there are many suitable trees for roosting around the perimeter of the buildings. However, this does not rule out the possibility of bats roosting within these farm buildings.

6.214 Although no evidence of roosting bats has been found within the Spendelows Farm buildings, it is considered that the potential presence of an unseen, non-breeding bat roost is of ecological value in a Local context.

Bat activity

6.215 A total of 8 species of bat were recorded on site during the course of the surveys. Most of the bats were identified down to species level apart from some bats in the *Myotis* genus which can be hard to separate into species from bat call data alone. In cases where a positive identification could not be made then the family group *Myotis* sp. was used instead. It is considered most likely that the *Myotis* bats that could not be identified down to species level are both Daubenton’s *Myotis daubentonii* and
Natterer's *Myotis nattereri* bats as these have been positively identified on site and there is suitable habitat available for both these species.

6.216 The bats most commonly found on site are the common pipistrelle followed by the soprano pipistrelle. Both of these species were found along all four transects and can therefore be assumed to be ubiquitous throughout the site. Transect D (for which only one survey was undertaken) shows a larger number of soprano pipistrelle *Pipistrellus pygmaeus* than common pipistrelle.

6.217 Noctule bats were observed in small numbers along transect A and B (Appendix 6.5) but in large numbers along transect C. The majority of these bats were observed foraging over the northern part of the Orton Pits SAC and surrounding arable land. This area has extensive woodland to the east and it is considered likely that the bats are roosting within this woodland and feeding within this area.

6.218 Serotine bats *Eptesicus serotinus* were identified on all three of the surveys along transect B only. They were mainly encountered along the edges of the Jones’s Covert woodland complex.

6.219 Daubenton's bats were found adjacent to Long Lake and on the edge of Jones’s Covert woodland complex. Daubenton's bats tend to prefer wooded areas with access to water which is reflected in the locations of these bats identified within the site.

6.220 One call from a barbastelle bat *Barbastella barbastellus* was identified during the first survey of transect B between the edge of Jones’s Covert woodland and Chambers Dole woodland. This call was short and brief which is fairly typical of barbastelle bats and is considered to be from a passing bat some distance from its roosts site. The nearest know barbastelle roost is some 10 kilometres away to the west but this does not rule out the potential for an unknown barbastelle roost closer to the site. However it is considered unlikely that barbastelle bats are roosting within the site as only one call was recorded during all of the surveys and it known that barbastelles can travel long distances (up to 20km) from their roosts (Greenaway 2004\(^30\))

6.221 Only one brown long eared bat call was identified during the third survey of transect B. This was identified from the edge of Haddon Lake. A single Natterer's bat call was

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\(^{30}\) Greenaway, F. 2004 Advice for the management of flightlines and foraging habitats of the barbastelle bat Barbastella barbastellus English Nature Research Reports Number 657
also identified during the third survey of transect A, along the edge of the Stanground Lode.

6.222 Generally the main areas of bat activity identified are as follows:

- the eastern corner adjacent to Long Lake and the woodland opposite Yaxley,
- the Stanground Lode corridor,
- Jones’s Covert woodland complex,
- the edge of the Orton Pits SAC and
- the bridleway that runs north-south in the northern part of the site (Peterborough Green Wheel)

6.223 All these areas are dominated by woodland and both standing and moving water which make them suitable foraging habitat for bats. It is considered likely that the tracks and the Stanground Lode are used as commuting routes from roosts to these areas of suitable foraging.

6.224 Taking into account the range of species and the numbers identified then the site can be assessed as being of ecological value in a County context for bat activity.

**Water voles**

6.225 The water vole survey identified a number of signs of this species throughout the site. Evidence of water vole including burrows, latrines and feeding remains were found along the length of the Stanground Lode, Long Lake in the eastern corner of the site and in the ditches adjacent to the Orton Pits SSSI/SAC/cSAC. The areas with the highest concentration of water vole evidence were the ditches adjacent to the SSSI/SAC/cSAC. There are also numerous records of water vole from the SSSI/SAC/cSAC itself (CPBRC). Water voles are a priority species within the County and UK Biodiversity Action Plan there is suitable habitat throughout the site and the population size is considered to be medium to high. It is therefore considered that the presence of water voles within this site is of ecological value in a County context.

**Otters**

6.226 It is considered that there is suitable aquatic and terrestrial habitat for otters along the Stanground Lode and therefore there is the potential for otters to be using this stretch of the stream for feeding and resting. The otter survey detected no definitive signs of the species within any of the suitable habitats within the site. Although no evidence of otters was found during the survey there are records of otters from the Stanground
Lode and therefore the potential for otters to be using this watercourse can be assessed as of ecological value in a Local context.

**Reptiles**

6.227 Approximately 47 hours was spent in the field searching for reptiles during 22 survey days. In total, 66 observations of reptiles were recorded 29 of common lizards and 37 of grass snakes. No slow worms were recorded. Eighteen out of 25 (69%) transect/sample plots within the survey area were occupied by reptile species (Appendix 6.5). A maximum daily count, throughout the entire site, of 8 grass snakes and 3 common lizards were observed from the survey which is considered to be a Good population size for grass snakes and a Low population size for common lizards.

6.228 The reptile ‘hotspots’ have been selected by identifying the areas where both species were recorded and where important habitat features such as water course, grassland and woodland corridors and brownfield sites are present. The Stanground Lode and associated grassland, scattered trees and scrub appears to be particularly important for grass snakes. The north-east corner of the Employment Area site comprises tall ruderal vegetation with scrub and solitary trees and also offers suitable habitat for reptiles.

6.229 Low numbers of reptiles were recorded within the central part of the Core Area site, along the edge of woodland, the Stanground Lode and around Long Lake. The areas where reptiles were observed are linked to more suitable habitat within the adjacent SSSI/SAC and it is considered likely that species are moving between these areas. No observations of reptiles were recorded for the northern part of the site which is under arable production and it is reasonable therefore assume a similar lack of reptiles in the southern arable part of the site. The main southern compartment is in arable production with large fields and very few field margins. Therefore the reptile population throughout the site can be assessed as of low value. Common lizard and grass snake are common species within suitable habitat in Cambridgeshire, the size of the reptile population is not considered to meet the criteria for a Key Reptile Site under guidance from Froglife (1999\(^3\)). As such, the reptile assemblage at the site is considered to be of ecological value in a Local context.

Aquatic invertebrates

6.230 The initial scoping survey of all the ponds within the site involved assessing each pond for its aquatic invertebrate status. For each waterbody, a number of indices were calculated from the macroinvertebrate families present (Appendix 6.5). These were the total number of families present (N-taxa), the number of dragonfly Odonata and alderfly Megaloptera families present (N-OM) and the number of beetle Coleoptera families present (N-COL). In addition, the Average Score Per Taxon (ASPT) was calculated to give an indication of the value of the assemblage in relation to water quality. These scores were used to identify the site with macroinvertebrate assemblages likely to be of highest nature conservation value.

6.231 Using the biological indices outlined above, the waterbodies surveyed have been divided into high, medium and low groups, indicating the priority for further detailed survey of their aquatic macroinvertebrate fauna. The initial scoping survey of all the ponds within the site identified 6 ponds for further survey.

6.232 A total of 24 water beetle taxa were recorded in these six ponds. The following three water beetles identified from ponds within the site have some higher level status (Na, Nb, LRnsA, LRnsB), indicating their nature conservation value at a national level. These are:

- **Gyrinus paykulli** (Nationally Notable List A /Lower Risk – Nationally Scarce – List A) – Can be abundant in base-rich waters, usually hiding amongst marginal emergent vegetation. It occurs in open swamps and sheltered bays on mesotrophic lakes, often in deep, still water amongst common reed.

- **Helochares lividus** (Nb - Nationally Notable List B) – Widely distributed in southern England and Wales, it occurs in ponds inland as well as coastal dykes.

- **Rhantus frontalis** (Nationally Notable List B / Lower Risk – Nationally Scarce – List A) – Largely confined to coastal waters in the south-east of England as well as fluctuating meres in Breckland.

6.233 Colin Plant Associates (UK) Consultant Entomologists has produced a set of criteria for determining the value of a site on the basis of its invertebrate assemblage\(^\text{32}\). The set of six ponds at Great Haddon would be evaluated as being of ecological value in a District context for having between 1 and 4 Nationally Notable species present. This level of value would also apply individually to two of the ponds surveyed (TN47

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Terrestrial invertebrates

6.234 A total of 504 species of terrestrial invertebrates were recorded on the land south of the A15 outside the Core Area application site during the survey; this is a high total when the survey constraints are taken into account. Overall, a respectable total of noteworthy species was recorded from this part of the site, which was considered to be the only area necessary for survey for terrestrial invertebrates, with four included in the Red Data Book listings and a further 15 regarded as Nationally Scarce.

6.235 None of the species recorded during the present survey are UK Biodiversity Action Plan species (UK Biodiversity Group, 199933).

6.236 Four species listed in the British Red Data Books (Shirt, 198734; Bratton, 199135) or which has been elevated to the status of Nationally Endangered, Nationally Vulnerable or Nationally Rare by subsequent formal reviews, were recorded in the survey. (See Appendix 6.5 for status details)

- The ground bug *Stictopleurus abutilon*
- The ground bug *Stictopleurus punctatonervosus*
- The bee *Sphecodes niger*
- The tumbling flower-beetle *Mordellistena neuwaldegiana*
- Three species that are formally placed in Nationally Notable category Na are recorded.
  - The flea beetle *Longitarsus parvulus*
  - The cuckoo bee *Nomada fucata*
  - The hoverfly *Volucella inflate*

6.237 Of the species mentioned above both the ground bugs and the bee have been expanding their range in recent years, possibly due to global warming, and the tumbling flower bee is also now considered quite widespread. All these species

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35 Bratton, J. H.1991 British Red Data Books: 3. Invertebrates other than insects. NCC
utilise sporadically disturbed habitats which are considered to be abundant within the local vicinity due to various clay workings. In addition both the cuckoo bee and the flea beetle have become fairly widespread and common and therefore may no longer deserve their Notable status. The hoverfly requires mature trees to compete its lifecycle but again has been observed in a larger range of habitats than previously noted. Overall, due to the expanding ranges of all Notable and Rare species recorded during the surveys the land south of the A15 can be assessed as of ecological value in a Local context for terrestrial invertebrates.

Moths and butterflies (Lepidoptera)

6.238 One adult black hairstreak butterfly was observed on the south edge of Two Pond Coppice Wood at approximate Ordnance Survey grid reference TL156929. It was observed perching on and flying above a tall, dense stand of blackthorn which forms the south edge of the woodland (see Appendix 6.5).

6.239 Only small patches of suitable habitat for the black hairstreak are considered to occur within the site. All of these areas occur on woodland edges associated mainly with Jones's Covert Woodland and Two Pond Coppice Wood. Other small patches of potentially suitable habitat occur associated with Alwalton Wood (outside of site boundary) and Madam White's Covert. Suitable habitat within the woodlands was considered to be extremely limited due to the lack of any wide rides or clearings and the very sparse distribution of blackthorn within the woodlands. Although populations of black hairstreak butterflies can be associated with hedgerows (Thomas 1974\textsuperscript{36}), it is considered that the majority of hedgerows within the study area are unsuitable habitat for the black hairstreak due to the intensive management they receive and the general lack of blackthorn within the species mix. However the hedgerow (woodland strip) which runs along the Stanground Lode is considered to have some small patches of potentially suitable habitat.

6.240 Eight adult purple hairstreak butterflies were observed during the transects. These observations were on the south edge of Jones' Covert, Two Pond Coppice Wood and the small strip of woodland which connects the two. In addition, purple hairstreak butterflies were observed on the eastern edge of Allwalton Wood, which forms the western boundary of the study area (see Figure 20).

\textsuperscript{36} Thomas 1974 Factors influencing the numbers and distribution of the brown hairstreak \textit{Thecla betulae} and black hairstreak \textit{Strymonidia pruni}. Unpublished PhD thesis.
6.241 All of these butterflies were observed perching on the leaves of mature oak trees on the woodland edge.

6.242 In addition to both the black hairstreak and the purple hairstreak, fourteen species of butterfly were recorded during the survey. The commonest species observed during the surveys were ringlet *Aphantopus hyperantus*, meadow brown *Maniola jurtina* and the small skipper species *Thymelicus spp*. Only one common blue butterfly *Polyommatus icarus* was observed and this was within an area of unimproved grassland immediately to the west of Jones's Covert.

6.243 Most species were observed within grassy habitat at arable field edges, along woodland edges and along grassy tracks. Some species were also associated with hedgerows and woodland.

6.244 Twenty-four species of moth were recorded during the survey. All of these were common and widespread species and are considered to form a typical assemblage of unimproved and semi-improved grassland and scrub habitats. A few of the species present indicate that the site supports grassland with a calcareous influence (for example, the dusky sallow *Eremobia ochroleuca*) and certain species are more typical of wet and marshy grassland (for example, the straw dot *Rivula sericealis*). The full list of species is given in Appendix 6.5.

6.245 Three species are currently listed as priority species within the UK Biodiversity Action Plan. Although still common and widespread, these species have undergone considerable declines in abundance over the last few decades (Fox et al. 200637) and it is therefore considered that they warrant conservation and research in order to prevent further dramatic declines.

6.246 Considering the status of the black hairstreak butterfly on the Local (Cambridgeshire) Biodiversity Action Plan and on Schedule 5 of the Wildlife and Countryside Act the presence of this species on the site gives rise to the evaluation of the site as being of ecological value in a County context for butterflies and in a Local context for moths.

Table 6.8: Summary Evaluation of Designated sites, Habitats and Species relevant to the application sites.

<table>
<thead>
<tr>
<th>Ecological Resource</th>
<th>Ecological Value (Geographic frame of reference)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Designated sites (outside of site boundary)</strong></td>
<td></td>
</tr>
<tr>
<td>Orton Pit SSSI/SAC TL159942</td>
<td>International</td>
</tr>
<tr>
<td>Nene Washes SSSI/SAC TL200977 to TF395029</td>
<td>International</td>
</tr>
<tr>
<td>Jones’s Covert Woodlands PCCWS TL1593</td>
<td>County</td>
</tr>
<tr>
<td>Debdale Pond PCCWS TL153958</td>
<td>County</td>
</tr>
<tr>
<td>Nene Park PCCWS TL1597</td>
<td>County</td>
</tr>
<tr>
<td>Crown Pit No. 1 PCCWS TL195943</td>
<td>County</td>
</tr>
<tr>
<td>Denton Common Pit CWS TL176883</td>
<td>County</td>
</tr>
<tr>
<td>The Roughs, Caldecote Fen CWS TL190893</td>
<td>County</td>
</tr>
<tr>
<td>Norman Cross Brickpits CWS TL1690</td>
<td>County</td>
</tr>
<tr>
<td><strong>Habitats</strong></td>
<td></td>
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<tr>
<td>Grassland</td>
<td>Improved</td>
</tr>
<tr>
<td>Grassland</td>
<td>Un-improved grassland</td>
</tr>
<tr>
<td>Woodland (Jones Covert)</td>
<td>County</td>
</tr>
<tr>
<td>Woodland (all other woodlands)</td>
<td>Local</td>
</tr>
<tr>
<td>Hedgerows</td>
<td>Local – County</td>
</tr>
<tr>
<td>Bare ground</td>
<td>Local</td>
</tr>
<tr>
<td>Brownfield land</td>
<td>County</td>
</tr>
<tr>
<td>Scrub</td>
<td>Local</td>
</tr>
<tr>
<td>Standing water</td>
<td>Local – National</td>
</tr>
<tr>
<td>Running water</td>
<td>District</td>
</tr>
<tr>
<td><strong>Species</strong></td>
<td></td>
</tr>
<tr>
<td>Great crested newts</td>
<td>International</td>
</tr>
<tr>
<td>Stoneworts</td>
<td>National</td>
</tr>
<tr>
<td>Ecological Resource</td>
<td>Ecological Value (Geographic frame of reference)</td>
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<td>-------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Breeding bird assemblage</td>
<td>Regional</td>
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<tr>
<td>Marsh harrier</td>
<td>County</td>
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<tr>
<td>Cetti’s warbler</td>
<td>County</td>
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<tr>
<td>Kingfisher</td>
<td>District</td>
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<tr>
<td>Hobby</td>
<td>District</td>
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<tr>
<td>Barn owl</td>
<td>District</td>
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<tr>
<td>Wintering bird assemblage</td>
<td>District</td>
</tr>
<tr>
<td>Badger</td>
<td>Local</td>
</tr>
<tr>
<td>Brown hare</td>
<td>Local</td>
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<tr>
<td>Bat roost (trees)</td>
<td>District</td>
</tr>
<tr>
<td>Bat roost (buildings)</td>
<td>Local</td>
</tr>
<tr>
<td>Bat activity</td>
<td>County</td>
</tr>
<tr>
<td>Water Vole</td>
<td>County</td>
</tr>
<tr>
<td>Otter</td>
<td>Local</td>
</tr>
<tr>
<td>Reptiles</td>
<td>Local</td>
</tr>
<tr>
<td>Aquatic invertebrates</td>
<td>District</td>
</tr>
<tr>
<td>Terrestrial invertebrates</td>
<td>Local</td>
</tr>
<tr>
<td>Butterflies</td>
<td>County</td>
</tr>
<tr>
<td>Moths</td>
<td>Local</td>
</tr>
</tbody>
</table>

**Assessing Ecological Effects**

6.247 It is important to re-iterate at this juncture the methodology used for consideration of the ecological effects of the development proposals. The methodology is in accordance with best practice guidance (IEEM 2006) and it is important to note that this methodology is different to that used by other disciplines in this ES, as described earlier.
Consideration of alternatives

6.248 The principle of development at Great Haddon has been considered through the emerging Peterborough Core Strategy (and its Strategic Environmental Assessment) and Development Allocations DPD against alternative development sites considered in this context (see Great Haddon Planning Statement for details). As such, no alternative sites have been considered by this assessment.

Do nothing option

6.249 Were the proposed development not to go ahead then the application sites would remain as farmland, predominantly in arable production. It is considered that the current intensive management and farming practices will continue and land use will remain generally unaltered into the future. It is considered that this is likely to have a neutral impact on the farmland bird and brown hare populations as their habitats would not be altered from their current state.

6.250 It is considered that the ‘do nothing’ option could result in neutral or adverse impacts on the habitats and species for which habitat improvements are proposed, and where significant beneficial effects are predicted as a result of the development. Without the proposed development it is considered that the habitat availability for reptiles and terrestrial invertebrates will remain as it is currently, or will be reduced through further use of intensive farming practices. Under the current proposals it is considered that reptile and terrestrial invertebrate will benefit through the creation of new habitats; existing valued habitats will be protected from degradation through the establishment of appropriate buffer zones; the Stanground Lode will be buffered through the use of a wide grass margin where currently only margins of 6m are in place and the green infrastructure has been designed in a way that will allow maximum connectivity between habitats and features within the site.

6.251 Given the current knowledge of the ecology and land use of the application sites, it is considered that the ‘do nothing’ option will allow the persistence of the current great crested newt population or potentially cause the loss of some of the more isolated or late-successional ponds, resulting in a neutral or potentially negative impacts. In contrast to this, the proposals for the sites are considered to result in a beneficial impact on great crested newts through the provision of new breeding ponds, the enhancement of habitat connectivity and the creation of additional terrestrial habitat. All these features will be created in way that will allow maximum movement of newts between the ponds within the SSSI/SAC/cSAC and those within the site in order to encourage the newt population within the SSSI/SAC/cSAC to expand.
Mitigation and compensation

6.252 Both mitigation and compensation measures are considered within the document and it is necessary to make a distinction between these terms at this stage.

6.253 Mitigation is considered to be the process of preventing, avoiding or minimising adverse impacts by; refraining from a particular action; limiting the degree of action; repairing, rehabilitating or restoring the affected environment; and/or providing substitute resources.

6.254 Compensation is considered to be measures to off-set or make up for losses caused as a result of development or other change, including residual adverse effects which cannot or may not be entirely mitigated. (ODPM, 2006).

Development proposals

6.255 The development proposals are described in detail in Chapter 3 of this Environmental Statement and the Parameter Plans included in ES Volume 2. The proposals have been developed with the existing ecological resources of the study area in mind, balancing impacts on particular species or habitats through an iterative process, taking into account all relevant issues relating to requirements, for example, for remediation and construction. The ecology baseline has provided guiding constraints to these other requirements that have been fine-tuned as further ecological survey data emerged to inform the masterplan.

6.256 The impacts of both the construction and operational phases are considered where appropriate. The potential impacts are characterised according to IEEM guidelines.

6.257 The ecological mitigation, and where necessary compensation, measures form therefore, an integral part of the development proposals and have been designed specifically to reduce or avoid ecological effects; they are addressed specifically in this chapter for each identified ecological resource.

6.258 The aims of the strategy for ecology is also to, where possible, provide a beneficial contribution for ecological enhancement; this includes on-site mitigation, compensation and enhancement measures in line with recent guidance from PPS9.

6.259 The outline biodiversity strategy for the site is included in Appendix 6.2 and is supported by detailed strategies to cover the key issues that have been raised at the EIA scoping stage and in pre-application discussions. These additional strategies can be found in Appendices 6.3 and 6.4 and include a Newt Connectivity Strategy and an Access Management Strategy.
6.260 The key principles which are covered within these strategies are:

- To protect the Orton Pit SSSI/SAC/cSAC;
- To provide suitable receptor habitats for species that will require translocation from areas proposed for development;
- To provide new habitat and biodiversity opportunities throughout the site;
- To encourage connectivity of newt habitat from the habitats on site to the SSSI/SAC/cSAC;
- To create green corridors through the site and into the wider countryside;
- To provide public access to parts of the site and limit access to more sensitive habitats in particular the SSSI/SAC/cSAC.

6.261 Further details of the ecological strategy, mitigation and compensation proposals will be progressed in consultation with Peterborough City Council and relevant statutory agencies through future development briefs and/or reserved matters applications and in response to planning conditions associated with any outline consents. All details will be subject to formal submission and approval and suitably worded planning conditions will be agreed in respect of the following:

- **Ecological Management Plan** - including details of habitat creation and biodiversity enhancements, species receptor site location, capacity, measures to protect habitats and species during construction operations, phasing of works and arrangements for monitoring and long term management.

- **Public Access Strategy** – details of the measures (physical, interpretive, management) to be put in place to control public access to the Orton Pit SAC and other sensitive habitats within the site.

### Potential Impacts

#### Assessment of Effects on Habitats

**Grassland**

Valuation

6.262 There are some areas of un-improved species-rich grassland within the site, and some improved grassland dominated by commoner grasses and herbs that has negligible ecological value. The unimproved grassland within the site is considered to be of **District value** (see Section 6.4.3.1).
Significance of Ecological Effects during Construction and Operation

6.263 There will be loss of one improved grass field in the centre of the Core Area application site near to Spendelows Farm. It is considered that this area of improved grassland has negligible ecological value and therefore the loss will not result in any significant adverse impacts in the local context. There will also be some loss of grass margins around the edges of fields, which are generally considered to be fairly species poor and therefore of negligible ecological value.

Mitigation

6.264 The majority of the grassland will be retained through the development proposals. This includes the un-improved grassland strip adjacent to Jones’s Covert and the un-improved grassland around the balancing ponds beyond the western boundary of the application sites.

6.265 It is therefore considered that there will be no significant adverse effect in the District context.

Enhancement

6.266 New grassland areas will be created throughout the application sites in order to accommodate translocated species and to create wildlife corridors and areas of green space. Creation of grassland will be strategically placed in order to provide connectivity to other key habitats both on and off site and will be managed to encourage wildlife. The newly created grassland will form part of a mosaic of habitats including reedbed and woodland.

Residual impacts and Confidence in Predictions

6.267 With the retention of the main areas of grassland within the site it is considered with certain to near certain confidence that there will be significant beneficial effects on the grassland habitat in the District context.

Development control implications

6.268 Since it is considered that there will be no significant adverse effect on grassland given the proposed habitat retention proposals, this is not considered to be a significant issue in respect of the planning applications associated with this ES.
Woodland

Valuation

6.269 Jones’s Covert Woodland complex is considered to be of ecological value in a County context as it is designated as a County Wildlife Site as a woodland habitat, whereas the other woodland areas (Madam Whites and woodland west of Yaxley) within the site have no designation and are therefore considered to be of Local value (see Section 6.4.3.1).

Significance of Ecological Effects during Construction and Operation

6.270 There is the potential for disturbance during both the construction and operational phases of the development to species that use the woodland habitats such as breeding birds, great crested newts and badgers, amongst others. The impacts on these species are discussed within the individual species sections of this Chapter.

Mitigation

6.271 All of the woodland will be retained within the development proposals. This includes the areas of woodland designated as a County Wildlife Site which are outside the application sites and those that have no designation. No construction will occur within woodland and built development will not come within 20m of existing woodland. Cat proof fencing will be erected along the edge of Jones’s Covert woodland but the construction of fencing is not considered to have any significant impact on the woodland habitat. Therefore, no direct impacts are anticipated on woodland during the construction phase.

6.272 Potential disturbance to species using retained areas of woodland during the operational phase will be mitigated for by the establishment and maintenance of a 20m buffer zone between the woodland edge and adjacent built development and highway infrastructure. In most cases this buffer zone will be significantly larger. The effect of road noise on birds within these woodlands is covered in more detail in the breeding bird section.

6.273 Acoustic fencing will be used to mitigate the impacts of traffic noise on breeding birds within Jones’s Covert Woodland (already agreed as part of the planning consent for the Hampton Western Peripheral Road).

6.274 Madam Whites Covert and the associated ponds will be retained within the development proposals. This woodland will be open to the public and will form part of the Stanground Lode corridor open space. Additional linkages will be formed from this woodland up alongside the Western Peripheral Road (WPR) through creation of
woodland strips and hedgerows in order to allow movement of animals along the Lode and through to the SSSI/SAC/cSAC.

6.275 The woodland on the eastern side of the Core Area application site adjacent to the A15 will be retained and enhanced. The realigned A15 Yaxley bypass will result in the loss of a small area of bramble scrub on the north east corner of the wood and will come within approximately 20m of the woodland. This woodland will be open to the public and is considered to form a strategic area of open space along with formal playing fields and other green space creation. In order to preserve the value of this woodland, features such as timber fencing and kissing gates will be included that will restrict access by motorbikes and other un-wanted vehicles.

6.276 With this mitigation in place it is considered that there will be no significant adverse impacts in the County or Local context.

Enhancement

6.277 Areas of new woodland are to be created within the northern part of the Core Area application site. On the western edge of the site next to the CWS woodland, 6ha of new public accessible woodland will be created that will also act as additional habitat for newts and reptiles. The woodland edge will be planted with blackthorn in order to create habitat for the black hairstreak butterfly. A strip of woodland alongside the Western Peripheral Road (WPR) and an area north and west of the proposed playing fields west of the WPR will also be planted to aid connectivity through the site.

6.278 During the operational phase the new woodland will form a key area of green space within the development and will be enhanced through additional woodland plantings and other habitat creation as illustrated in Figure 6.7. This will enable a movement of species from the SSSI/SAC/cSAC west to the countryside beyond, east along the Stanground Lode corridor and along the edge of the A1(M) to the south. Two Pond Coppice Wood, Chambers Dole and The Belt woodlands do not fall within the boundaries of the application sites and therefore management of these areas cannot be controlled. However it is considered likely that public access will be excluded from these areas through post and rail fencing which will allow the movement of wildlife. As currently, Jones’s Covert woodland will have no public access in order to limit disturbance to species such as breeding birds using the wood and to restrict access by the public into the SAC. In addition, Jones’s Covert will be managed in order to increase its value for wildlife including creating glades that will be suitable for the black hairstreak butterfly (details of which will be agreed with Natural England).
6.279 Existing woodland will be enhanced where necessary, by thinning to create more open areas within the canopy and through the creation of rides and glades. Enhancement works will help encourage wildlife and provide an aesthetic environment for the public.

6.280 Considering that there will be no net loss of woodland habitat, an increase in woodland cover on site, and improved management of retained woodland it is considered that there will be significant beneficial impact on woodland habitats in the County and Local context.

Confidence in Predictions

6.281 It is considered with certain to near certain confidence that with the proposed mitigation and enhancement there will be a significant beneficial impact on the woodland habitat in the County and Local context.

Development control implications

6.282 Since it is considered that there will be no significant adverse effect on woodland given the proposed habitat retention proposals, this is not considered to be a significant issue in respect of the planning applications associated with this ES.

Hedgerows

Valuation

6.283 The mature hedgerows within the site are considered to range in ecological value from County to Local context (see Section 6.4.3.1) for the nesting and foraging habitat they provides for bird species and the potential flight path and foraging habitat they provide for bat species, as well as their intrinsic species richness and habitat connections for other woodland animals and plants.

Significance of Ecological Effects during Construction and Operation

6.284 Approximately 4000 linear metres (30%) of existing hedgerows are proposed for removal throughout the site. The loss of these hedgerow throughout the operational phase of the development represent an adverse effect in the County and Local context, both in terms of the loss of the habitat itself and the severance of potential habitat connections within the site and between the site and the wider countryside.

6.285 In total in the order of 650 linear metres of “Important” hedgerow will be lost, through the severance of two hedgerows and removal of one. Hedge number 6 in the southern part of the Core Area will lose approximately 150m from its western end in order to facilitate the realigned A15 (Yaxley Bypass) and about 70m will also be lost.
from hedgerow 8 in the eastern part of the Core Area to accommodate the proposed primary school. In addition, hedgerow 17 in the Employment Area site will be removed in order to accommodate the new access road to the industrial units and the diverted Green Wheel bridleway. The remaining hedgerows to be removed are neither “important” nor “species-rich.”

6.286 There are three areas of potential hedgerow loss. Five hedgerows will be removed in the eastern area of the Core Area near to Yaxley to allow residential development and the creation of open space with formal recreation provision. These hedgerows are not considered to be “important” or “species rich.” A further 4 hedgerows are to be lost in the area around Spendelows Farm in order to make way for residential properties and access roads. Again none of these hedgerows are considered to be “important” or “species rich.” Finally, three hedgerows will be removed in the northern section of the site where employment development is to be located. These hedgerows are neither “important” nor “species rich” but all hedgerows are listed in the new UKBAP. However it is considered that some of these hedgerows are species poor and heavily managed and therefore the loss of these hedgerows will not significantly affect the biodiversity within the site.

Mitigation

6.287 The majority of the hedgerow habitat (in the order of 9,000 linear metres, equivalent to 70%) is to be retained within the development proposals. These hedgerows tend to be the better quality hedgerows and they will be retained and incorporated into areas of public open space and green corridors through the development. Isolated hedgerows will be connected to a wider network where possible, through new native hedgerow planting. Figure 8.12 in ES Volume 2: Plans, shows the proposed hedgerow removal and retention for the sites.

6.288 Where the loss of key hedgerows cannot be avoided, hedgerows will be removed outside of the bird breeding season (March – August inclusive) and active period for bats in order to limit impacts on these species.

6.289 The severance of 150 linear metres of Hedge 6 will be mitigated by the retention of 350 linear metres of this hedge as the boundary of the proposed cemetery site and the hedge will be replanted along the new road once constructed. Therefore the impacts on this hedgerow are short term only and therefore not considered to be significant. The majority (250m) of hedgerow 8 will be retained within the public open space. Hedgerow 17 will be replaced in full once construction of the road is complete. A species rich hedgerow will be planted along both sides of the Green Wheel bridleway.
6.290 In addition some of the hedgerows are fairly isolated and do not connect with other areas or features of biological significance. With mitigation in place the loss of these hedgerows is considered to be a significant adverse short term impact in the County to Local context.

Development control implications

6.291 Planning Policy Statement 9 states that Local Authorities should take steps to conserve, enhance and restore biodiversity wherever possible. It is considered that in both the short and longer term the current proposals have a significant adverse effect on the hedgerow habitats which is in conflict with this policy. In the longer term, the hedgerow habitat will be reinstated elsewhere within the sites.

6.292 Local Plan Policy LN17 relating to natural resources in general (including habitats) is of relevance when considering the effects on the hedgerow habitat.

Compensation

6.293 In order to compensate for the loss of areas of hedgerow habitat, approximately 6000 linear metres of native hedgerow planting will be undertaken. The hedgerows that will be planted as compensation will exceed the length lost through the development and will comprise a diverse mix of species and located so they provide greater connectivity through the site. New hedgerow planting will be undertaken in various places that will provide connectivity throughout the sites such as along the Green Wheel Bridleway. This planting will help create a pleasant walking route and will provide greater connectivity from the woodland in the centre of the area to the Haddon Lake area. Some new hedgerow planting will be undertaken along the eastern end of the Stanground Lode corridor and within the eastern corner of the Core Area near to Long Lake in order to create better connections throughout this part of the site. Other areas of new planting include around the industrial units to the north and between Spendelows Farm and the proposed cemetery, as shown in Figure 8.12. Native species of local provenance will be used where possible.

Residual Effect including Mitigation and Compensation

6.294 It is considered that the short-term adverse effect of the loss of small sections of hedgerow will be compensated for by the proposed re-enforcement planting, new hedgerow planting and connectivity planting so that overall (and in the long-term) there will be a moderate beneficial effect to hedgerows in the County to Local context.
Confidence in Predictions

6.295 It is considered with certain to near certain confidence that the adverse effects of the removal of small sections of hedgerow are mitigated by the proposed re-enforcement and replacement planting so that overall there will be a significant beneficial effect to the hedgerows in the County to Local context.

Bare Ground

Valuation

6.296 The bare ground within the majority of the site is land in arable production and is considered to be of ecological value in the Local context.

Significance of Ecological Effects during Construction and Operation

6.297 Large areas of bare ground will be lost through the development but this arable ground habitat is considered to have a limited ecological value. The habitat is considered to be of Local value due to the potential for rare arable plants to be present at the field margins. However, only common and widespread arable plant species found within the site during the survey and these are likely to be present in surrounding arable farmland and will be unaffected by the development in the wider context. The creation of new grassland habitats with open mosaics and margins is likely to result in the persistence of flora associated with arable land within the development area. Therefore the potential impacts on arable bare ground and the flora it supports is not considered to be significant. It is therefore considered that there will be no significant effects in the Local context.

6.298 It is considered that there may be potential impacts on protected and notable species that use arable land as a habitat. This issue is covered within the individual species sections where considered appropriate.

Development control implications

6.299 Since it is considered that there will be no significant adverse effect on bare ground given the, this is not considered to be a significant issue in respect of the planning application associated with this ES.

Confidence in Predictions

6.300 It is considered with certain to near certain confidence that the adverse effects of the removal of bare ground will not result in the loss of a habitat of ecological value.
and there will be no significant effect of the loss of bare ground in the Local context.

*Brownfield land*

Valuation

6.301 The brownfield land within the Norman Cross brick pits is considered to be of value in the County context.

Significance of Ecological Effects during Construction and Operation

6.302 No significant impacts on the brownfield land habitat are expected through the current proposals as the land is outside the application sites.

6.303 It is therefore considered that there will be no significant adverse impacts on brownfield habitats in the County context.

Development control implications

6.304 Since it is considered that there will be no significant adverse effect on brownfield land this is not considered to be a significant issue in respect of the planning applications associated with this ES.

Confidence in Predictions

6.305 It is considered with certain to near certain confidence that there will be no significant adverse impacts on brownfield habitats in the County context.

*Scrub*

Valuation

6.306 The scrub habitat on site is considered to be of ecological value in a Local context (see Section 6.4.3.1)

Significance of Ecological Effects during Construction and Operation

6.307 A small area (0.5ha) of scrub on the corner of the wood opposite Yaxley will be lost through the construction of the realigned A15 road. The scrub habitat on the edge of the woodland comprises mainly bramble and is considered to be common and widespread. Some other small areas of scattered scrub may be lost through the development proposals mainly around the Spendelows Farm pond. Therefore the loss of this habitat is not considered to be ecologically significant.
Mitigation

6.308 Mitigation for species that may be using this habitat will be covered in the appropriate sections but will include retaining as much of the scrub as possible during the construction phase and the removal of scrub outside of the breeding bird season.

6.309 With this mitigation in place it is considered that the loss of scrub habitat will result in a significant adverse impact in the Local context.

Development control implication

6.310 Local Plan Policy LN17 relating to natural resources in general (including habitats) is of relevance when considering the effects on the scrub habitat.

Compensation

6.311 The loss of a small area (<1ha) of scrub habitat will be compensated for by the creation of scrub habitat elsewhere on site, namely alongside the old A1(M) road along the western boundary of the sites and around the woodlands in the centre of the area. The areas of scrub to be created will be in excess of 1ha and therefore considerably larger than the area lost through the development. These areas of scrub will include blackthorn, which is the food plant of the resident black hairstreak butterfly and will be managed to encourage a range of species including butterflies, reptiles and breeding birds.

Residual Effect including Mitigation and Compensation.

6.312 Taking into account the above compensation it is considered with certain to near certain confidence that there will be a significant beneficial impact in the Local context through the creation of additional scrub habitats within the sites.

Confidence in Predictions

6.313 It is considered with certain to near certain confidence that the removal of small areas of scrub and subsequent planting of new, larger areas of scrub will result in a significant beneficial impact in the Local context.

Running water

Valuation

6.314 The running water habitat within the site is considered to be of District value.
Significance of Ecological Effects during Construction and Operation

6.315 There is the potential for the construction phase to cause adverse impacts on the water quality of the Stanground Lode through sedimentation and run-off. Disturbance of species such as water vole, using the water course is also a potential issue during the construction phase.

6.316 No residential development will be undertaken immediately adjacent to the watercourse which will limit potential effects of construction. However, the construction of roads passing over the Stanground Lode could damage the bank structure and cause adverse impacts for the species utilising the stream habitat. There will be some improvement works to the Stanground Lode channel in order to facilitate movement of water and to improve capacity. These works will be concentrated on a short section of the watercourse from the confluence of the tributary to the line of the new WPR crossing. These improvements will have impacts on the southern bank in the short term. In the longer term there is the potential for ecological benefits through the creation of a natural stream profile creating opportunity for more marginal vegetation.

6.317 Surface water attenuation features will be created adjacent to the Stanground Lode which will cause short term disturbance but it is considered that the creation of these features will not cause any long term adverse affects upon the water course and will in the long term provide additional habitat and biodiversity benefit.

6.318 The Stanground Lode will be crossed by the Western Peripheral Road at a point east of Madam Whites covert and a smaller road to the west. Along the stream at these points there will be a significant short-term adverse effect within the immediate zone of influence during construction due to disturbance while the new crossing points are installed. The other road will be much smaller in comparison but will involve disturbance to the banks of the water course during the construction phase and a small loss of bank habitat in the long term.

6.319 It is anticipated that there will be no adverse impacts during the operational phase resulting from changes to water quality through surface run-off from the development and aerial deposition from vehicle movements within the development. Surface water run-off will be controlled using sustainable urban drainage techniques and surface water attenuation and water quality will be monitored to ensure the development does not result in any decrease in water quality from the current baseline conditions.
Mitigation

6.320 The Stanground Lode is to be retained within the development proposals. Construction of residential areas and associated infrastructure will in most cases not come within 50m of the water course. The retention and enhancement of a habitat corridor along the length of the water course will limit disturbance of species using the Stanground Lode corridor. The only construction to be undertaken within this 50m zone is the creation of surface water attenuation ponds and the excavating works needed to create these features will be undertaken in a way that will not affect the banks of the Lode. In the long term it is considered that these features will add benefit to the retained habitats along the Lode corridor.

6.321 In order to mitigate for the impacts of construction of the two road crossings of the Stanground Lode, a detailed method statement will be produced prior to construction in order to minimise the potential effects of this operation on the watercourse. The WPR crossing is to be constructed from a single span bridge and the installation of the bridge may require some de-watering operations, depending on the time of year. A temporary crossing (bailey bridge) will be required to provide access during construction. The abutments and foundations for the bridge will be constructed away from the Lode and will therefore not directly affect the banks. Pollution control management measures will be adopted during construction in order to limit sediment and/or pollutants entering the water course with the details to be approved by submission of a Construction Management Plan.

6.322 The other crossing of the Stanground Lode for the smaller residential road will be a smaller bridge or culvert structure that will allow the passage of wildlife beneath it. During the construction phase the part of the stream that will be affected by the construction will be strimmed in order to remove all vegetation; this will have a short term adverse impact on the stream habitat.

6.323 The crossing of the Stanground Lode has been designed in a way that will minimise adverse affects on wildlife through potential severance of the habitat corridor created by the Lode, during the operational phase. A minimum 9m width will be allowed between the bridge abutments and the top of the banks to the Lode. The 5m nearest to the stream will be protected and allowed to develop as habitat for water vole, the outer 4m will be constructed as a more permanent access track, subject to detailed design. In addition the bridge structure will be at least 1.5m above the mean water level in order to provide sufficient space for commuting bats. The size of this corridor may be reduced somewhat during flood conditions when the channel will need to accommodate increased flows. Studies of bat use of tunnel crossing in Europe (Bach
et al 2004\(^{38}\)) have shown that bats including Daubenton’s bat, brown long-eared bat, Natterer’s bat and pipistrelle bat will use tunnels with a minimum height of 1.5 metres, width of 2 metres and over 30 metres in length.

6.324 During the operational phase surface water from the main body of the site will outfall into newly constructed surface water storage lakes south of the Stanground Lode. These lakes will discharge directly off-line from the Lode, into the top section of Long Lake and then via a culvert beneath the A15 road into Beebys Pits. The top section of Long Lake will be bunded to separate it from the lower section and will form part of the conveyance route for surface water. The water from the employment area in the north of the site will discharge into a tributary of the Stanground Lode via a drainage network consisting of a mixture of sustainable and positive drainage. The creation of new storage ponds with reedbeds will enable impurities within the water to be filtered out before outfall. In addition there will be pollution control measures such as sediment traps within the drainage network, prior to outfall into the Lode.

6.325 The development area in the north-western section of the site will discharge into a storage pond and then directly into the Stanground Lode. Again for this part of the site the outfall will have pollution control measures employed. For more details please refer to the indicative surface water strategy in Chapter 5.0.

6.326 Public access along the Stanground Lode will be encouraged and grassland and scrub habitats will be retained and/or created along its length. The provision of access in this area is in line with the proposals set out in the Natural Networks Green Grid Strategy.

Development control implications

6.327 Since there will be no long-term adverse effect on running water habitat, this is not considered to be a significant issue in respect of the planning applications associated with this ES.

Confidence in Predictions

6.328 While there may be a short-term adverse effect on small areas of running water habitat due to disturbance in the immediate zone of influence during construction, it is considered, with certain to near certain confidence, that there will be no

significant adverse effect on this habitat due to the avoidance of indirect adverse impacts through the mitigation described above.

Standing water

Valuation

6.329 There are a number of ponds within the site of varying habitat quality. Some of the ponds support a low diversity of aquatic species and show poor water quality associated with agricultural run-off whereas others are more diverse with good water quality. The value of many of these ponds lies in their use by great crested newts and aquatic invertebrates which are dealt with in the appropriate sections. The ponds vary from being of National importance for those supporting a nationally important assemblage of stoneworts to Local value for those with lower habitat quality and no evidence of protected species (see Section 6.4.3.1).

Significance of Ecological Effects during Construction and Operation

6.330 Three ponds are to be lost through the development (ponds 2, 10 and 17 on Figure 6.2). Two of these ponds are assessed as being of Regional importance and one as of Local importance. Therefore the loss of these ponds will potentially result in significant adverse affects at the Regional to Local level.

6.331 There is the potential for run-off from both the construction and operational phases of the development to have an adverse impact on the water quality of the ponds, which in turn may affect the species using these ponds.

6.332 Water from the development will be channelled through a series of surface water attenuation ponds into the top section of Long Lake which will be separated from the lower section and will finally be discharged into Beeby’s West Lake. No recent surveys of Beeby’s Lake have been undertaken as re-contouring works are still underway. However, the site has been surveyed on a number of occasions including in 1998 and 2001 by Pankhurst and Stewart and in 2006 a site visit was undertaken by Dr Shepherd and Nick Stewart to inform the Method Statement for the Conservation of Stoneworts and Fen Pondweed during earth moving works.

6.333 The surveys identified five species of stonewort within Beeby’s West Lake in addition to spiked milfoil, horned pondweed and other aquatic species. The conclusions of the method statement to deal with stoneworts during the re-contouring of Beeby’s West (which were approved by PCC) were that as long as the appropriate conditions can be provided by the earth moving works then natural colonisation of stonewort and other aquatic species will take place. The report concluded that once the construction
works are complete the new lakes will support a good assemblage of aquatic plants throughout and after the re-profiling which will be similar or identical to the baseline surveyed in 2001.

6.334 Given this previous assessment and the fact that works to Beeby’s West Lake are still on-going and final water levels have not yet been attained, the assessment of the aquatic plant assemblage of Beeby’s West Lake and the effect of any potential impacts has been based on this agreed future baseline for the pit which will be the same as that reported from surveys in 2001. This was considered to be more appropriate than a survey at the current time that will record a fluctuating and changing aquatic flora given the recent re-contouring works.

6.335 In terms of potential impacts to the aquatic flora of Beeby’s West Lake the key is water quality. As long as the water quality of the lake is not significantly affected by the additional discharge there should be no impacts on the aquatic vegetation within the lake. Monitoring of water quality will be undertaken to ensure there are no changes to the water quality of the pits. Baseline water quality monitoring of the Stanground Lode and Beebys West Lake are underway and subsequent post development monitoring will continue to ensure that there are no adverse effects on the quality of water entering Beeby’s Lakes.

6.336 Long Lake will be divided into two sections, one being approximately a quarter of its original size. This area will be used as part of the surface water conveyance route. The water from this pond will then pass through a culvert beneath the A15 road into Beeby’s West Lake. The construction of the bund and dividing of the pond will cause short term adverse impacts. Currently water collects in Long Lake from a small catchment area to the south via a series of existing field drainage ditches. Dividing this pond will mean that only one part of it continues to be used to collect and store water. There is the potential for the swamp stonecrop currently present in the long pond to be transferred into other water bodies through the discharge of water.

Mitigation

6.337 Adverse impacts on the retained ponds during the construction phase will be avoided through the establishment of a buffer zone (at least 5m) around the retained ponds in order to minimise potential disturbance to the habitat. For those ponds with populations of great crested newts, exclusion fencing will be used in order to restrict movement of newts into the development area. Hand searches of terrestrial habitat around the ponds to remove newts will be undertaken and appropriate protection and mitigation for these species put in place (as discussed in the relevant sections below).
All three ponds that will be affected by the development will be checked for great crested newts and appropriate licensing/mitigation undertaken where necessary.

6.338 During the operational phase the impact on the ponds will be mitigated for by the establishment of permanent buffer zones of suitable terrestrial habitat around the ponds. The retained ponds will also undergo habitat enhancements where necessary. This will include the clearance of shading scrub, particularly on the south side of the pond, the pollarding/coppicing of shading trees. Vegetation clearance will be undertaken outside the breeding bird season and newt breeding season (avoiding March to September inclusive) in order to avoid damage or destruction of these species. These habitat enhancements will aim to open the ponds to allow more light into the water and thus promote a higher diversity and abundance of aquatic and marginal vegetation. This, in turn, will promote a greater abundance of invertebrate species and of other species higher up the food chain. No run-off from hard surfaces or roofs of buildings will be discharged into the ponds and no run-off from the construction area will be allowed to enter the waterbodies.

6.339 In order to mitigate for the potential effects of the construction of the bund within Long Lake the work will be undertaken during the winter months when species utilising the pond habitat, such as the charophytes and other aquatic plant species, are dormant. Only a small area of bank will be affected by the developments although the pond will have to be de-watered in order to undertake the construction. However, charophytes re-colonise suitable habitat very quickly and the majority of the existing resource will be retained. Therefore it is likely that the disturbed area will very quickly return to its current baseline condition.

6.340 In order to stop the movement of swamp stonecrop from Long Lake into other waterbodies this species will be eradicated and a monitoring programme set up to ensure that it is no longer present.

6.341 During the operation phase the ponds will mainly be protected by buffer zones as they are incorporated into the areas of green space within the development.

6.342 It is considered that with this mitigation in place, there will still be some residual significant adverse impacts in the National to Local context through the loss of ponds that support populations of protected species and Red Data Book species.

Development control implications

6.343 Policy LNE13 of the Cambridgeshire and Peterborough Structural Plan is of relevance when considering the effects upon ponds and wetland features.
Compensation

6.344 In order to compensate for the loss of three ponds within the site, nine new ponds will be created in other locations within the sites (see Figure 6.7 and Appendix 6.2 for details of pond creation). These ponds will be designed to maximise their potential to support wildlife, in particular great crested newts and aquatic invertebrates. These ponds are located in areas that will allow movement of newts between the ponds in the sites into the Orton Pit SSSI/SAC/cSAC.

Residual Effect including Mitigation and Compensation

6.345 Taking into account the proposed compensation, it is considered that in the long-term it is likely that there will be a significant beneficial impact on the standing water habitats in the Local to National context through the creation of suitably connected ponds elsewhere on-site.

Confidence in Predictions

6.346 With the creation of new connected ponds to replace those to be lost through the development it is considered with probable confidence that there will be a significant beneficial impact in the Local to National context. A probable level of confidence is given as the receptor areas are currently arable fields and have not yet undergone any habitat creation work and so the nature and quality of the resultant ponds is as yet uncertain.

Assessment of Effects on Species

Stoneworts

Evaluation

6.353 The presence of both UK BAP and Nationally Threatened stonewort species means that the stonewort population within the site is of ecological value at the National level.

Significance of Ecological Effects during Construction and Operation

6.354 Potential impacts on stoneworts relate to direct loss of habitat and in-direct effects of surface and aerial pollution. No ponds containing stoneworts will be lost through the development, but one ditch supporting common stonewort will be lost. Potential in-direct impacts upon the stonewort include changes in water quality through run-off during both construction and operational phases and aerial deposition of pollutants, in particular nitrogen from the roads associated with the development. Run-off and
aerial spray/gases may contain pollutants or nutrients which could alter the water chemistry and cause changes to the suitability of the habitat for stoneworts. Stoneworts require waters which are low in nutrients and they are sensitive to nutrient enrichment from nitrates and phosphates, in particular.

6.355 The area of greatest concern is the potential impacts of aerial nitrogen deposition arising from increased traffic within the Orton Pit SSSI/SCA/cSAC and on the lakes of Norman Cross CWS.

6.356 Nitrogen is measured in terms of the gaseous concentration in the air, which is termed the Level and expressed as μg/m³ and the amount of nitrogen falling onto the ground and surface waters from dry and wet deposition which is termed the Load, which is expressed as Kg/N/ha/yr.

6.357 The Design Manual for Roads and Bridges Interim Advice Note 61/05 gives advice on the potential effects of air pollution upon ecosystems. Road transport emits a number of air pollutants including oxides of nitrogen (NOx), volatile organic compounds, ammonia, heavy metals and particulates. The pollution of most concern for sensitive vegetation near roads is NOx.

6.358 In terms of gaseous concentrations of pollutants in the air, Natural England’s guidelines for internationally designated sites and SSSIs state that NOx emissions of an annual mean level of 30 μg/m³ or above is likely to result in adverse impacts on vegetation.

6.359 As gaseous emissions from vehicles settle out of the air nitrogen is deposited onto the ground, vegetation and into aquatic systems. This occurs through dry deposition and through wet deposition (spray drift). This loading of nitrogen if very high can materially affect the vegetation adjacent to roads as it effectively adds a key plant growth nutrient to the environment, which in nutrient-poor environments can be a limiting factor to plant growth often along with phosphorous. For different habitats a series of critical loads have been identified. These loads represent the exposure below which there should be no significant harmful effects on sensitive elements of the ecosystem.

6.360 There is no critical load given for nitrogen for mesotrophic standing waters as found within Orton Pit SSSI/SCA/cSAC. This is because quantitative relationships between the loading of nitrogen and biological processes in mesotrophic water are poorly understood. Phosphorous has generally been considered more important in determining growth and the trophic status of water bodies than nitrogen, although it is recognised that nitrogen limitation or co-limitation with phosphorous is more widespread than first thought.
6.361 Although there is no established critical load for mestrophic standing waters, a critical load has been identified for alkaline fens and reedbeds, which are also present within the ponds at Orton Pit, and it is the growth of emergent plants that can compete with stonewart growth. The critical load for rich fens is given as between 15 and 35 kg N/ha/year.

6.362 The potential operational impacts on vegetation and ecosystems was assessed by modelling NOx concentrations and N deposition at the following locations: Orton Pit SAC boundary (SAC1), 5m from Orton Pit SAC boundary (SAC2), Jones Covert (SAC3) and Haddon Lake (SAC4). The receptor locations are shown on Figure 11.3.

Loss of stonewart locations

6.363 All of the ponds that support stonewart species (ponds within Jones’s Covert Woodland, Long Lake to the east of the Core Area site and the lakes within Norman Cross CWS) are to be retained within the development proposals. They will also be buffered by at least 50m in order to prevent indirect impacts during construction. All of the ponds and lakes that support stoneworts are to be incorporated into areas of green space which will help to maintain their integrity to support stoneworts and other aquatic plant species. However there is one ditch which will potentially be lost within the southern part of the site that supports one species of stonewart, namely common stonewart Chara vulgaris. As its name suggests this is the most common of the Chara species and is not a priority or protected species. Therefore it is considered that the infilling of this ditch will not result in a significant adverse effect on the stonewart species within the site.

6.364 In mitigation nine new ponds are proposed within the green space design for the sites. These ponds will increase the available habitat for stoneworts providing a significant positive effect on stonewart habitat within the sites. Given the extent and quality of stonewart in the area south of Peterborough this is assessed as being a significant positive effect at a District Level.

Surface–water run-off

6.365 Mitigation for potential run-off will include all surface water being directed away from existing standing open water habitats within the SSSI/SAC/cSAC and other waterbodies where stoneworts are present into sustainable drainage systems. No run-off will be allowed to directly enter the standing water habitats. Run-off from the road embankment will be collected in drains at the toe of the banks and piped away from the SSSI/SAC/cSAC. Given that all surface water from polluted surfaces will be
directed away from standing waters and the SSSI/SAC/cSAC it is considered that no adverse impacts will occur.

Aerial deposition of nitrogen

6.366 As discussed in detail in Chapter 11 of this ES, annual mean background gaseous NO2 concentrations in Peterborough ranged from 15-29µg/m3 between 2001 and 2008, below the mean annual critical Level of 30µg/m3 identified by Natural England. Analysis of the long term trend in annual mean background concentrations indicates that there will be an overall decrease of concentrations of approximately 0.7-0.9µg/m3 per year. As such it is predicted that there is likely to be a decrease in measured levels of gaseous nitrogen, which will be below the critical Level.

6.367 The estimated current load of nitrogen deposition in 2008 for the area around Orton Pit has been calculated in Chapter 11 as 17.9 Kg N/ha/year. This is predicted to fall in line with nitrogen deposition trends to 16.8 Kg N/ha/year in 2011 and 10.9 Kg N/ha/year in 2026 (see Chapter 11, Table 11.14 and paragraph 11.113). These values have been derived from the Air Pollution Information System website. The figure is derived from a combination of measurements and models and is given at a 5 kilometre grid resolution.

6.368 Chapter 11 estimates the future critical loads for the site with and without the proposed development. Without the development roads are anticipated to contribute to the nitrogen load at the site between 0.6 and 1.2 kg/N/ha/yr and with the development 0.4 to 0.8 kg/N/ha/yr in 2011. The difference in contributions with and without development relate to differences in Heavy Goods Vehicle movement on the road network within and outside the development. A more detailed explanation for the difference between load contributions with and without the development is provided in Chapter 11 (Table 11.8 paragraph 11.146. In 2026 contributions to the nitrogen load for the site without the development are expected to be 0.5 – 0.9 kgN/ha/yr and with the development 0.3 – 0.6 kgN/ha/yr (see Table 11.19 paragraph 11.148). As a result there is predicted to be a lower contribution to nitrogen loads with the development compared to the situation without the proposed development.

6.369 In terms of the potential exceedance of critical nitrogen loads Chapter 11 concludes that the minimum critical load for N deposition for species-rich alkaline fens is exceeded in 2011 both without and with the proposed development. However, by 2026 with or without the development nitrogen loads within the site are predicted to be 12 Kg/N/ha/yr, which is below the minimum critical load for species-rich alkaline fens. As such by 2026 the nitrogen loading is predicted to have fallen below the
minimum critical load and as such it is considered that there will not be an adverse impact on this habitat type.

6.370 Although fen habitats are unlikely to be affected by nitrogen deposition, as stated above there is no established critical load for nitrogen for open standing waters. However, under the current situation of a background deposition rate of 17 Kg/N/ha/yr the Orton Pit reserve has recently been assessed as being in favourable condition for stoneworts. In addition the favourable condition table for the reserve makes no mention of nitrogen deposition as a problem for the conservation of stoneworts. Specific mention is made of phosphorous deposition, but no additional phosphorous will arise from the development. In addition under existing nitrogen loadings stonewort communities have developed and survived within some of the ponds outside of the Orton Pit reserve.

6.371 Natural succession within the ponds of the Orton Pit reserves has been identified as the primary risk to the maintenance of stonewort communities. As such, the management plan proposes a programme of regular pond clearance in order to set back natural succession to enable the stonewort community to survive.

6.372 Although nitrogen accumulation and availability will be one factor contributing to natural succession, in terms of the integrity of the SSSI/cSAC/SAC the key consideration in relation to the impact of the proposed development is whether the additional nitrogen loading will materially affect the need for management of the ponds within the SSSI/cSAC/SAC and elsewhere where stoneworts are present, the frequency of such management or the ability to undertake the required management.

6.373 With or without the development the special interest of the stonewort community within Orton Pit reserve will be maintained through active management detailed in the site management plan. In contrast without the Great Haddon development stonewort communities outside the Orton Pit reserve are likely to decline as natural succession progresses and no interventive management is undertaken.

6.374 With the development nine new ponds will be created providing early colonisation opportunities for stoneworts. In addition these ponds and the retained ponds with stonewort communities will be brought into a programme of regular interventive management similar to that proposed for the Orton Pit reserve. This will not only provide a greater range of stonewort habitat through an increase in the number of ponds, but will also ensure suitable conditions for stoneworts are maintained throughout all ponds within the site.

6.375 The predicted future environment without the development would not alter the requirement for the reserve and other stonewort ponds/lakes to be actively managed.
to maintain the special interested associated with the stonewort communities. The regularity of management may be slightly affected i.e. management may be required less frequently, but management would still be required. As such even against a falling nitrogen loading management of the SSSI/cSAC/SAC and of other ponds within the site boundary will be undertaken in order to conserve the stonewort communities.

6.376 In the short term the new ponds being created within the site will provide suitable conditions for stoneworts.

6.377 Given the prediction of decreasing nitrogen loadings over the next 15 years and the proposed management it is considered with a high degree of certainty that there will be no significant adverse impacts at the National level on the stonewort communities within the site. Potentially there could be a significant positive impact at the County level.

Development control implications

6.378 Since there will be no long-term adverse effect on stoneworts this is not considered to be a significant issue in respect of the planning applications associated with this ES.

Confidence in Predictions

6.379 With suitable protection of the water bodies, it is considered with certain to near certain confidence that there will be no significant long-term adverse effect in the National context on the stonewort assemblage.

Great Crested Newts

Evaluation

6.380 The presence of great crested newts within the ponds on site and the proximity to the Orton Pit SSSI/SAC/cSAC which is designated in part for its great crested newt population is considered to be of ecological value in an International Context.

Significance of Ecological Effects during Construction and Operation

6.381 Two great crested newt ponds (2 and 17) will be lost through the proposed development. Pond 2 has been assessed as having small populations of great crested newts and pond 17 has a medium population. Therefore it is considered that without mitigation there will be significant adverse effects in a National context on great crested newts within the site.
6.382 Pond 15 will be retained but areas of terrestrial habitat will be reduced through the construction of industrial units. This may have an adverse impact on the newt population within this pond.

6.383 Ponds 6 and 7 are on the edge of Madam Whites Covert woodland and will be retained within the development proposals. However a residential road will be constructed close to these ponds. This will have an affect on the terrestrial habitat availability for the newts using these ponds. However as the land to the north is currently in arable production it is considered unlikely that newts are using this part of the site to any great extent and are considered more likely to use the adjacent woodland and Stanground Lode corridor. Therefore the loss of this arable ground and building of the road is not considered to be a significant issue in the long term.

Mitigation

6.384 The majority of great crested newt ponds will be retained within the development proposals. In order to mitigate for the loss of two great crested newt breeding ponds and the potential loss of viability of a third, a European Protected Species License will be obtained prior to any construction work in close proximity to these ponds. This license will outline the method statement that will be used in order to protect the great crested newt population.

6.385 A mitigation strategy will form the key element of the method statement. This mitigation strategy will ensure that there are no impacts on great crested newts through potential killing, injury or disturbance and that compensation measures are adopted for the loss of breeding and terrestrial habitat. This will be achieved through the appropriate timing of works, trapping and translocation of great crested newts to suitable receptor sites and ponds. These measures will ensure that the conservation status of great crested newts is maintained within the local area, in particular the metapopulation associated with the main site within Orton Pit SSSI/SAC/cSAC.

6.386 The current terrestrial habitat around pond 15 is arable land and the terrestrial habitat along the road embankment and adjacent habitat surrounding the adjacent surface water attenuation feature is considered to be suitable. Mitigation for this pond will include the creation of further ponds within 250m of this pond so that the newt population has the opportunity to move and expand from this location. The creation of new ponds near to the source populations with good habitat connectivity between them will help to establish more permanent and functional breeding populations. For full details on the mitigation and compensation for great crested newts see Appendix 6.3 Newt Connectivity Strategy.
6.387 Mitigation for the loss of terrestrial habitat around ponds 6 and 7 will include the enhancement of Madam Whites Covert woodland and the creation of connecting habitat to other newt ponds. In order to facilitate movement of newts throughout the site newt connectivity features will be provided at road crossings. For full details on newt connectivity see Appendix 6.3. It is anticipated that there will be some adverse impacts to the newts in these ponds during the construction phase and it is therefore necessary to undertake mitigation measures in order to prevent harm to newts within these ponds. Mitigation measures will include timing of works, using exclusion fencing around the construction area and destructive searches of the terrestrial habitat prior to construction.

6.388 The potential impacts of predation of newts within the Jones’s Covert woodland (part of the SSSI/SAC/cSAC) by domestic animals will be mitigated for by the use of cat proof fencing and a swale along the edge of the woodland. The fencing will include an area of land to the south of the woodland where two new great crested newt ponds are to be located. Other great crested newt ponds within the site will not be protected from domestic animals to this extent as they do not fall within the SSSI/SAC/cSAC boundary but they will be located away from the main areas of development so that impacts from domestic animals are reduced. Further details are provided in Appendix 6.3.

6.389 With this mitigation in place there are still significant adverse impacts on great crested newts in the International context.

Development control implications

6.390 Policy LNE19 of the Cambridgeshire and Peterborough Structural Plan is of relevance when considering the effects upon protected species.

Compensation

6.391 Suitable receptor sites have already been identified within the application sites where new ponds and great crested newt terrestrial habitat will be created. Once the ponds have been established the newts will be trapped out and translocated to the new ponds following the guidelines set out in the Great Crested Newt Mitigation Guidelines 200139. Three great crested newt ponds will be lost through the development and nine new great crested newt ponds will be created through the scheme in order to provide additional benefits to the population as a whole.

6.392 The new ponds will all be within 500m of a new or existing pond and most will be within 250m to provide connectivity and dispersal routes for great crested newts. Receptor sites are located within the central area of the site near to the hub of the existing great crested newt populations and in strategic locations linking this area with other known populations outside of the site. In addition these new ponds will be designed in order to support other aquatic species such as invertebrates and flora species (see Appendix 6.3 Great Crested Newt Strategy for more details).

6.393 It is considered that the population at Spendelows Farm (pond 17) is likely to be a small transient population that is colonised via the surface water attenuation pond adjacent to the A1(M) and is therefore not significant in terms of the Orton Pit great crested newt metapopulation. Therefore the removal of this pond is not considered to have significant adverse impacts on this population. The creation of new great crested newt ponds in the area around Jones’s Covert woodland will provide more opportunity for the expansion of the newt population through the sites and beyond. The creation of new ponds near to Long Lake and along the western boundary of the site will also provide a strategic link for great crested newts to move out from the site and to adjoining habitat. For more details see Appendix 6.3 Newt Connectivity Strategy.

6.394 The improved connectivity between ponds and the improved terrestrial habitat around ponds is considered to provide significant benefits to the Orton Pits SSSI/SAC/cSAC great crested newt metapopulation.

Residual Effect including Mitigation and Compensation

6.395 Taking into account the proposed compensation, it is considered that in the long-term it is likely that there will be a significant beneficial effect on the great crested newt population in the International context.

Confidence in Predictions

6.396 At the current time, it is considered with certain to near certain confidence that with the proposed mitigation and compensation in place there will be a significant beneficial effect on great crested newts within an International context through the loss of two breeding ponds.

Breeding birds

Valuation

6.397 The breeding bird assemblage has been valued as of ecological value in a Regional context.
Significance of Ecological Effects during Construction and Operation

6.398 There is the potential for breeding birds to be adversely affected as a result of the long term loss of areas of farmland habitat, mature trees and scrub, resulting in the loss of potential nesting sites, foraging resource and through increase disturbance. These effects are considered to be adverse and significant in the short and long term.

6.399 The construction phase will also result in significant disturbance to a range of species using adjacent land including some of the Schedule 1 birds (Cetti’s warbler and marsh harrier.) Of particular concern are the birds that are listed within Schedule 1 of the Wildlife and Countryside Act that have been identified within and adjacent to the site. Species such as Cetti’s warbler, hobby, marsh harrier and barn owl are all known to be associated with the site and adjacent SSSI/SAC/cSAC. These species have been identified within the woodland and wetland habitat immediately adjacent to the site. These habitats will not be directly affected but have the potential to be affected by human disturbance and noise.

6.400 There will be long term impacts through the loss of farmland habitat that will result in the loss of significant populations of farmland birds in particular skylarks and grey partridge.

6.401 Long term impacts from disturbance to breeding bird habitats by the general public using the site and increased traffic use during the operational phase is also considered to be a significant ecological effect. The key breeding bird habitats within the site have been identified as the woodland, scrub, reed bed and hedgerows.

6.402 Some householders may bring domestic cats with them to the new development. The effect of these cats on the wild bird population is difficult to quantify; research has been carried out in both the UK and US that demonstrates that cats do take wild birds (Woods et al. 2003; Lepczyk et al. 2003) but there is discussion in the literature as to the actual impact this has on populations of wild animals and birds (Kays and DeWan, 2004 and Baker et al. 2005) and no studies have been undertaken in the

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UK to enable quantification of this potential effect. What can be said from the research undertaken in the UK is that those wild species that are most common and those that are often closely associated with human habitation (e.g. house sparrow) are those most frequently caught by cats (Woods et al. 2005) and it is often the juveniles that are taken by cats (Baker et al., 2005).

6.403 It is difficult to assess the potential effect of domestic cats in the completed development because of lack of research in this area. Much depends on the number of cats brought into the new development and their individual abilities to catch prey, but it is important to raise this as a potential effect of the completed scheme even though the effect cannot be quantified. The area of most concern is the SSSI/SAC/cSAC, due to the number of nesting and wintering birds using the habitats (including the woodland, reedbeds, lake and the pits themselves) within the SSSI/SAC/cSAC, including several Schedule 1 species. Other woodlands where public access is to be encouraged, such as the woodland opposite Yaxley, will not be protected from domestic animals but it is considered that this woodland is not so significant in terms of its breeding bird population.

Mitigation

6.404 In order to mitigate against the short-term affects the vegetation clearance works will be scheduled so that they do not occur during the bird breeding season (i.e. outside the period March-August inclusive). Hedgerows will be replanted after the construction phase and therefore impacts on these species will be short term only. New woodland areas and standard trees will be planted that will replace individual trees lost during the construction phase and therefore these impacts are considered to be medium term only.

6.405 In order to minimise disturbance to the species using the Haddon Lake and Orton Pits area built development will come within 30m of the boundary of the Orton Pit SSSI/SAC/cSAC. Disturbance to birds using the woodland will also be minimised through the implementation of a 30m (minimum) buffer zone.

6.406 In order to minimise the impacts on breeding bird habitat all woodland and reedbed habitat is to be retained as part of the masterplan design and therefore long-term adverse effects on these species is not considered to be significant. The loss of farmland habitat will have an effect on species such as skylark, yellow hammer and

grey partridge and may have an adverse effect on foraging barn owl and kestrel. The breeding habitat for kestrel will be retained but forage areas will be greatly reduced in the short term. However areas of forage will be created through the centre of the site near to the breeding site that will be of higher quality then the existing grass margins and arable fields.

6.407 Hedgerows and mature trees will be retained wherever possible and where they can not be retained then habitat loss will be compensated for by the creation of new features elsewhere on site. Impacts on species such as chaffinches, blue tits and robins are not considered to be significant as these species will utilise the garden habitats that will be created in place of the farmland that will be lost.

6.408 Trees and scrub will be planted along the edge of the industrial units in the northern area of the site, adjacent to the SSSI/SAC/cSAC to provide visual screening. In order to minimise the impacts of increased predation on wintering birds using the SSSI/SAC/cSAC by predators such as corvids perching in these trees, the trees will be limited to the height of the buildings. Employment buildings will be set back a 35m from the SSSI boundary and by between 61m and 91m from the SAC boundary as the two are different at this point. Therefore, the opportunities for predators will be limited by the height and distance (see Appendix 6.4 Access Management Plan for more details).

6.409 In order to minimise potential adverse impacts of disturbance by people on the sensitive areas immediately adjacent to the site such as Jones’s Covert Woodland and the edge of Haddon Lake, the development has been designed to prevent or limit access by people to these sensitive areas. This has been achieved by using a range of techniques including fencing, natural barriers and through creating access space elsewhere within the site in order to provide alternatives for the general public to use (see Appendix 6.4 Access Management Plan for more details).

6.410 The additional access and connections to and from the Green Wheel will help enhance and deliver on Peterborough’s Green Grid Strategy by creating further links and connectivity from urban environments to accessible green space.

6.411 The realigned A15 road will form a natural barrier from the majority of the housing and the large areas of green space around the housing on the southern side of the road is likely to reduce the number of domestic animals reaching the woodland opposite Yaxley. Diversion of the Peterborough Green Wheel bridleway away from the sensitive edge of the SSSI/SAC to the south of the Stanground Lode will be undertaken in order to minimise the potential ecological impacts on the SSSI/SAC through increased access and disturbance. In addition the surface water attenuation
features will be designed as a linear feature alongside the ditch but on the southern side of the Green Wheel bridleway. These two water features are likely to provide a sufficient barrier to the movement of cats from domestic properties to the SSSI/SAC and will therefore reduce the potential impacts of predation of cats on birds inhabiting the SSSI/SAC, so that they are not considered to be a significant impact within this assessment (see details in Appendix 6.4 and Figure 6.7).

6.412 The effect of traffic noise on Jones’s Covert Woodland will be mitigated for by the use of acoustic fencing as set out in the planning conditions for the Western Peripheral Road. Other areas where noise may be a significant issue are within the woodland opposite Yaxley and Madam Whites Covert.

6.413 The noise contour maps for the site show that the noise levels will be between above 55 dB(A) on the very northern edge of the wood opposite Yaxley) dropping to 46-49 dB(A) and then 40-43 dB(A) moving south into the central part of the woodland. Levels in Madam Whites Covert are expected to be between 46 dB(A) and 49 dB(A) and levels in the woodlands adjacent to the site are expected to be between 49 and 52 dB(A) on the western edge and between 46 and 49 dB(A) in the centre. The upper threshold limit for birds using woodland habitat as identified by Reijen et al\textsuperscript{44} is 58 dB(A). Therefore the majority of the woodlands fall outside this threshold and there should not be any significant effects from noise on the bird populations within the woodlands. The northern edge of the woodland opposite Yaxley will experience some high noise levels. However, this level will reach only to the northern edge of this woodland and therefore significant adverse impacts will be limited to this edge as noise levels will reduce dramatically into the wood.

6.414 The noise levels along the edge of Haddon Lake where species such as marsh harrier are nesting are expected to be low (mostly under 40 dB(A)) apart from on the western edge of the lake nearest to Western Peripheral Road where levels may rise to 46-49 dB(A). The mitigation for the potential effects of noise on the SAC by the Western Peripheral Road were assessed in the planning application for the road which was approved by PCC in August 2008.

6.415 With this mitigation in place it is considered that there will be significant long term adverse impacts in the Regional context.

Development control implications

6.416 Policy LNE19 of the Cambridgeshire and Peterborough Structural Plan is of relevance when considering the effects upon protected species.

Compensation

6.417 New woodland areas, scrub and meadows will be created within the northern part of the Core Area and in the eastern part of the Core Area near to Long Lake and the existing woodland. In order to comply with guidelines set out in PPS9 additional habitat will be created in order to enhance biodiversity within the site. The woodland and scrub habitats will provide nesting habitat and the meadows and grassland will provide forage habitat. The grassland areas that are being created to support invertebrates and translocated reptiles will also provide some suitable nesting and foraging opportunities for a range of farmland birds including skylark. The nectar rich plants and invertebrates will provide a food source for birds within the site.

Residual Effect including Mitigation and Compensation

6.418 Taking into account the proposed compensation and mitigation, it is considered that there will be significant adverse effects on the breeding birds in the Local context in the worst case. This is due to the presence of residual effects after the proposed compensation and mitigation measures have been put in place. These residual effects are considered to be the disturbance of breeding birds within two of the woodlands within the Core Area during the construction phase and the loss of arable habitats for farmland bird species. The bird assemblage affected does not contain any specially protected (Schedule 1) bird species, but UK BAP species are considered to be affected by disturbance and habitat loss. If all species that are considered to rely on farmland habitat are assumed to be lost (skylark, grey partridge, yellow hammer, linnet, lapwing, meadow pipit, red leg partridge, pheasant and reed bunting) this will result in a potential loss of breeding populations of 9 farmland bird species, including 6 UK BAP species. It is considered that the loss of this habitat could result in the loss of these species from the sites altogether. If this ends up being the case, the resultant bird assemblage that would be lost is considered to be of value in the Parish context. This assemblage coupled with the disturbance to breeding birds within the woodland adjacent to Yaxley is considered to result in significant adverse effects on the breeding birds in the Local context at most.

Confidence in Predictions

6.419 It is considered with probable confidence that with mitigation in place there will be significant adverse effects on the breeding birds in the Local context at most.
This impact is considered to be for particular species where habitat loss will result in the reduction of nesting and foraging opportunities and through increased disturbance by the public and increased traffic noise. A probable level of confidence is given as the adaptability to traffic noise and human disturbance of the species using these woodlands is not known and may limit the adverse effects to a negligible level.

*Barn Owl*

Valuation

6.420 The presence of breeding barn owl on site has been valued as of ecological value in a District context.

Significance of Ecological Effects during Construction and Operation

6.421 Barn owls are nesting within the site but the nesting site is to be retained as part of the development proposals. However, there is the potential for disturbance to the birds (particularly during the nesting period) during the construction phase which could result in a significant adverse impact in the short term. In addition there is the potential for adverse impacts during the operational phase through loss of foraging habitat immediately around the nest site and the proximity of the nest to residential properties, roads and the associated sources of lighting all of which may reduce the suitability of the current nest site.

Mitigation

6.422 During the construction and operational phase there will not be any significant direct impacts on the barn owl nesting site. The access point and nesting features within the barn will be retained.

6.423 In order to mitigate the impacts of disturbance during construction the development immediately surrounding the barn will be undertaken outside of the main breeding period (March – August) with all work completed by January as far as possible in order to give sufficient time for the adults to move in and settle prior to egg-laying. It is common that barn owls can be very tolerant of small scale development nearby (Barn Owl Trust 2002\(^45\)). Therefore it is considered that there is there potential for the barn owl to remain within the current nest site through the development stage. However, the construction of new roads and properties within the wider area may

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cause disturbance to the owls, reduce the forage availability and result in the abandonment of the current nest site.

6.424 During the operational phase, mitigation for habitats loss will be in the form of newly created grassland and scrub habitats along the western edge of the site, around Jones's Covert woodland and retained and enhanced habitats along the Stanground Lode with connections to these areas from the nest site in the form of more formal amenity grassland. However, the retained nest site will be largely surrounded by built development, in addition to a main road to the east and north. Within the design no mitigation/compensation is possible beyond that already discussed. Therefore, there is a possibility that the nest site will be abandoned and the birds may suffer increased likelihood of mortality. To compensate for the potential abandonment of the current nest site nest boxes are proposed (see below). Suitable nesting provision will be provided elsewhere on the site in order to provide suitable nesting habitat away from the construction site and the resultant built development.

6.425 There is the potential that even with this mitigation in place barn owl will not nest during this construction and/or operation phase and that in the longer-term the current nest site will be abandoned in favour of one that experiences less disturbance and that is within closer connection with suitable foraging habitat. Therefore, it is considered that this will result in a significant adverse affect on barn owls in the Local context.

6.426 The conclusion that the impact will be on a Local level is reached because the proposed mitigation does provide retention of current nest, potential new foraging habitat and potential new nest site albeit of sub-optimal quality and quantity.

Development control implications

6.427 Policy LNE19 of the Cambridgeshire and Peterborough Structural Plan is of relevance when considering the effects upon protected species.

Compensation

6.428 Nest boxes for barn owls will be provided within areas of suitable foraging habitat as close to the existing nest site as possible. The most ideal location is the edge of Jones's Covert woodland where disturbance is limited and the surrounding habitat provides good foraging. Additional boxes could be provided within Madam Whites Covert and within the new woodland adjacent to Chambers Dole woodland. With the proposed new nest boxes erected in areas of suitable forage habitat it is considered that there will be no significant adverse impacts on barn owl.
Confidence in Predictions

6.429 It is considered with probable confidence that there will be no significant effect on breeding barn owl in the Local context. A probable level is given because it is not known whether the level of disturbance during the construction/operation phase will affect the availability of foraging habitat and the ability for the barn owls to breed and whether the new nest boxes will be utilised in the event that the current nest site is abandoned.

Marsh Harrier

Valuation

6.430 The presence of breeding marsh harrier adjacent to the site has been valued as of ecological value in a County context.

Significance of Ecological Effects during Construction and Operation

6.431 A pair of marsh harrier is considered to be nesting in habitat immediately off site within the fringing vegetation of Haddon Lake. Therefore there are no direct impacts on this species but the increased disturbance through the both the construction and operational phases of the development could have an adverse impact on this species. Increase noise levels during the construction phase may result in the abandonment of the nest site for the duration of the construction. This is considered to be a short term impact during the construction phase only as the development footprint does not come within at least 50m of the nesting site and therefore general disturbance through the operational phase will be minimised. Increased visitor pressure through the use of the existing route of the Green Wheel has the potential to cause increased disturbance and as a result the potential abandonment of existing nest sites. This would represent a significant adverse effect at the County level. This potential effect has been mitigated for as discussed below.

Mitigation

6.432 The scheme has been designed in order to limit the potential disturbance to birds through human activity and cat predation as discussed in detail in Appendix 6.4 Access Management Strategy. This strategy details the mitigation which includes a realignment of the Green Wheel bridleway that will provide an alternative route for dog walkers to the south of the Stanground Lode and will therefore remove visitor pressure from the northern side of the lode and southern edge of the SSSI/SAC adjacent to the location of the marsh harrier nest. This will reduce the disturbance created by large numbers of people and dogs using the existing bridleway route on
the marsh harrier nesting site. With this mitigation in place it is considered that there will no long term adverse effects on the breeding marsh harrier.

Development control implications

6.433 Since there will be no overall effect on breeding marsh harrier, this is not considered to be a significant issue in respect of the planning applications associated with this ES.

Confidence in Predictions

6.434 It is considered with probable confidence that there will be no significant affect on marsh harrier in the County context. A probable level of confidence is given as it is currently unknown how many people will use the diverted bridleway compared to the original route.

_Cetti’s warbler_

Valuation

6.435 The presence of breeding Cetti’s warbler adjacent to the site has been valued as of ecological value in a County context.

Significance of Ecological Effects during Construction and Operation

6.436 Cetti’s warblers have been recorded on the edge of Haddon Lake and have also been observed within Long Lake in the eastern corner of the site. There is the potential for increased disturbance from increased visitor pressure to significantly affect this species during the operational phase of the development. The construction phase may result in a disturbance through increased noise levels which may result in abandonment of this nest site. The impacts during the construction phase will be short term only and it is considered that if breeding pairs do abandon the south edge of Haddon Lake it will be for one breeding season only.

6.437 The operational phase has the potential to cause adverse impacts through the increased use of the adjacent land by new residents and the potential for predation by cats leading to the potential abandonment of the existing nest site. This would represent a significant adverse effect in the county context.

Mitigation

6.438 The mitigation described above for marsh harrier will also limit disturbance to the Cetti’s warbler considered to be breeding adjacent to the site. Disturbance will be limited as the development has been designed to provide a buffer between Haddon
Lake and the residential areas. The Access Management Strategy (see Appendix 6.4) details the mitigation proposals that will be implemented in order to limit movement of both people and domestic animals into Haddon Lake. The additional reed bed habitat that is to be created on the western edge of Haddon Lake will provide alternative nesting opportunities for Cetti’s warblers. It is therefore considered that with this mitigation in place there will no long term adverse impacts on Cetti’s warbler.

Development control implications

6.439 Since there will be no overall effect on breeding Cetti’s warbler, this is not considered to be a significant issue in respect of the planning applications associated with this ES.

Confidence in Predictions

6.440 It is considered with certain to near certain confidence that there will be no significant affect on Cetti’s warbler in the County context.

Kingfisher

Valuation

6.441 The presence of breeding kingfisher adjacent to the site has been valued as of ecological value in a Local context.

Significance of Ecological Effects during Construction and Operation

6.442 No suitable banks for breeding kingfisher are available within the site but it is considered that suitable banks are present within Haddon Lake and therefore kingfishers may be breeding adjacent to the site. There is the potential for increased disturbance from the development to significantly affect the breeding success of this species. As with other bird species using the Haddon Lake area adjacent to the site boundary there will no direct impacts on the this habitat but there is the potential for disturbance through increased noise during the construction phase and disturbance through population pressure inflicted by the scale of the development.

Mitigation

6.443 The mitigation described above for other species breeding within Haddon Lake (marsh harrier and Cetti’s warbler) will limit disturbance to kingfisher. Therefore the proposed mitigation detailed in the Appendix 6.4 will reduce the potential long term impacts of the operational phase through human movement and cat predation to
insignificance. It is therefore considered that although there may be some short term impacts on breeding kingfisher during the construction phase there will be no long term adverse impacts on the Kingfisher population using the banks of Haddon Lake.

Development control implications

6.444 Since there will be no overall effect on breeding kingfisher, this is not considered to be a significant issue in respect of the planning applications associated with this ES.

Confidence in Predictions

6.445 It is considered with certain to near certain confidence that there will be no significant affect on kingfisher in the Local context.

Hobby

Valuation

6.446 The presence of breeding hobby within the sites has been valued as of ecological value in a District context.

Significance of Ecological Effects during Construction and Operation

6.447 It is considered likely that the hobby is breeding within Jones’s Covert Woodland. There is the potential for the proposed development to have impacts on the breeding success of hobbies during the construction and operational phases through increased noise and disturbance from increased visitor pressure in Jones’s Covert. This increased disturbance may result in the potential abandonment of the nest sites which would represent a significant adverse effect in the District context.

Mitigation

6.448 The impacts from the operational phase have been limited by the development design. The majority of the development is to be constructed at least 400m from the woodland. In order to mitigate for the effects of disturbance through increased use of the site during the operational phase Jones’s Covert woodland is to be protected from both people and domestic animals through the techniques described in the Access Management Plan (see Appendix 6.4).

6.449 The impacts of the operational phase of the Western Peripheral Road have been addressed within the Environmental Statement for the road for which planning permission has been granted. It is considered that by adopting these methods, the identified impacts can be minimised to such a level that significant disturbance
impacts are unlikely to occur and the breeding success of the hobby will not be adversely affected.

Development control implications

6.450 Since there will be no overall effect on breeding hobby, this is not considered to be a significant issue in respect of the planning application associated with this ES.

Confidence in Predictions

6.451 It is considered with certain to near certain confidence that there will be no significant affect on hobby in the District context.

Wintering birds

Valuation

6.452 The presence of wintering birds within and immediately adjacent to the site has been valued as of ecological value in a District context.

Significance of Ecological Effects during Construction and Operation

6.453 Significant numbers of wintering birds use the Orton Pit SSSI/SAC/cSAC and are likely to occasionally use the arable fields within the sites to feed. There is the potential for the proposed development to result in loss of forage habitat through the reduction in arable land that is occasionally used as winter forage. There is also the potential for disturbance through increased noise during the construction phase and movement of people and vehicles during the operational phase of the industrial units to wintering birds within Orton Pit. The disturbance during the construction phase will be short term only and meaning birds may be displaced for a short time but will return to the pits once construction is complete. With regards to foraging habitat, it is considered that areas of suitable forage can be found in significant quantities around the site and therefore the loss of arable habitat will not be a significant issue.

Mitigation

6.454 In order to mitigate for the effect of increased disturbance to wintering birds within the Orton Pit, the SSSI/SAC/cSAC will be protected through the techniques described within Appendix 6.4. The industrial units will be screened using tree planting and a 30m strip of vegetation will be created to provide a buffer and extended the habitats within Orton Pits. Disturbance from the operational phase of the use of the industrial units will be limited through the use of these screening habitats between the units and
Orton Pits. Therefore it is considered that with this mitigation in place there will no long term adverse impacts on wintering birds.

Development control implications

6.455 Since there will be no overall effect on wintering birds, this is not considered to be a significant issue in respect of the planning applications associated with this ES.

Confidence in Predictions

6.456 It is considered with certain to near certain confidence that there will be no significant affect on wintering birds in the District context.

Badgers

Valuation

6.457 Although badgers are protected under UK legislation (see previous section in this chapter) they are considered to be widespread and common. Badger use of the sites is therefore considered to be of ecological value in a Local Context.

Significance of Ecological Effects during Construction and Operation

6.458 Badgers are known to be present within the woodlands just outside of the sites but it is considered that there will be no direct impacts on the main badger sett or any outlying setts in their current location from the proposed development. However there is the potential for adverse impacts on the badger population through disturbance and loss of foraging habitat.

Mitigation

6.459 During construction, night working will be avoided and holes and trenches covered at night or to include a ramp, to prevent pitfall hazard to badgers.

6.460 The level of badger activity within the site will be re-checked 3-6 months prior to the start of construction in any phase, in order to check the status and extent of badger activity and location of main setts. If the current pattern of sett use continues, disturbance to setts is unlikely since the nearest development area is over 30m away from any known or observed sett or any known active setts. Therefore, there are considered to be no significant effects on badgers in terms of disturbance.

6.461 No development will come within more than 30m of any known sett and therefore no impacts are considered likely. Large areas of foraging habitat will be retained and created around the area of badger activity, including grassland, woodlands and
hedgerows. Habitat connections within the site, through new and existing hedgerows, woodlands and grassland will be created as will habitat connections to the wider countryside. A strong habitat corridor will be retained between the woodland in the centre of the site to the countryside to the west and down through the edge of the old A1(M) road to the Norman Cross land. This will be created using existing woodland features and new woodlands and grasslands. Badgers are adaptable in their exploitation of the environment and residential gardens could also be suitable foraging habitat in the future.

6.462 The mitigation described above will ensure the badger social group is maintained within the site and that the adverse effect of the development is minimised. It is considered that the retained habitats within the site will provide adequate foraging opportunities for the badgers. In addition, further planting will be undertaken in certain areas, thus providing new foraging resources and cover for the badgers. The retention of all of the woodland areas and the stream corridor through the Core Area, as well as a large area of grassland and scrub habitat around the existing main and annexe badger setts will ensure that existing corridors of vegetation can still be used as cover by badgers for commuting within the site and beyond.

6.463 Traffic calming methods will be used on minor roads in order to keep traffic speed low and therefore minimise the potential for badger collisions. Mitigation for larger roads within the site (principally the Western Peripheral Road) will include measures such as mammal tunnels and fences wherever practical. These measures will minimise the risk of road traffic accidents involving badgers, therefore no significant effect is expected on badgers in this respect.

6.464 Lighting and increased levels of human activity will affect the badgers’ patterns of activity. However, generally, badgers adapt to such activity by delaying emergence times and avoiding any affected areas until after all human activity has ceased (The Badger Consultancy⁴⁶). Although their existing patterns of activity are likely to alter, it is considered that the long-term survival of the badgers would be unaffected. Therefore it is considered that there will be no significant effect on badgers in the Local context.

Development control implications

6.465 Since there will be no overall effect on badgers, this is not considered to be a significant issue in respect of the planning application associated with this ES.

⁴⁶ http://www.badgerconsultancy.co.uk/
Confidence in Predictions

6.466 It is considered that the proposals will not affect the long-term survival of the badgers and that overall, with certain to near certain confidence, there will be no significant effect in the Local context on badgers.

Brown hare

Valuation

6.467 Brown hare use of the site is considered to be of ecological value in a Local Context.

Significance of Ecological Effects during Construction and Operation

6.468 A low number of brown hares were observed within the assessment area and they tended to be concentrated within the Norman Cross land to the south of the A15 road and within the woodlands just outside the boundary of the application sites. Brown hares tend to have relatively large home ranges and use open habitats such as grassland and farmland. It is therefore likely that brown hare regularly move through the application sites. The proposed development may cause severance of brown hare habitat and reduction in available forage area.

Mitigation

6.469 As brown hares were found only in small numbers and only within certain areas of the assessment area it is considered that the retention of the key habitats and creation of new green corridors will be sufficient to protect the brown hare population using the site. Grassland habitats similar to that found within the Norman Cross brick pits will be created within the northern part of the Core Area near to the woodlands where the brown hares were observed. Therefore it is considered that there will be no significant effect on brown hares in the short or long term.

6.470 The proposals for habitat retention and enhancement and the creation of green infrastructure will maintain habitat connectivity and movement corridors for brown hare within the local area.

Development control implications

6.471 Since there will be no overall effect on brown hare this is not considered to be a significant issue in respect of the planning applications associated with this ES.
Confidence in Predictions

6.472 It is considered, with certain to near certain confidence, that there will be no effect on brown hare through disturbance. Loss of areas of potential foraging habitat will be mitigated for through additional planting of grassland adjacent to areas were brown hare were observed. It is considered that the proposals will not affect the long-term survival of the brown hares and that overall, with certain to near certain confidence, there will be no significant effect in the Local context on brown hare in the longer-term through habitat loss.

Bat roosts in trees

Valuation

6.473 It is considered that the presence of trees with high bat roosting potential within the site is of District value.

Significance of Ecological Effects during Construction and Operation

6.474 A number of trees within the site that were assessed as having high or medium potential for roosting bats will be lost through the development proposals. Figure 6.4 shows all trees with either high or medium bat potential that will be removed through the development. In total 25 high and 17 medium potential trees will be removed through the development proposals. Therefore it is considered that without mitigation there is the potential for significant adverse effects in a District context on bat roosts in trees.

Mitigation

6.475 All areas of woodland will be retained through the development proposals and where possible mature trees will be retained through the development proposals. In total 14 high and 15 medium potential trees and some groups of trees with varying potential will be retained through the development proposals. If evidence of bats is found within nine other trees located in areas of open space but destined to be felled then there is the potential for them to be retained through undertaking arboricultural works in order to make them safe. Where trees need to be removed or subject to arboricultural works then in order to avoid affecting any potential bat roosts present within trees, all trees with potential bat-roosting features will be felled in the autumn (late August to early October) and checked for any evidence of bats prior to felling. This will take the form of an emergence survey of the trees that are to be felled followed by a tree climbing inspection if bats were observed emerging from the trees.
The emergence survey would involve watching the trees during the hours around dusk to observe any bats exiting from roosts within the trees.

6.476 If evidence of a bat roost is found within a tree that needs to be removed, a European Protected Species Licence will be obtained prior to any felling. Sensitive removal is proposed involving soft felling under the instruction of a licensed bat worker, in accordance with best practice outlined in the *Advice Note: Trees and Bats* from the Arboricultural Association (Cowan, 2003). If bat roosts are found to be present in trees that are removed there will potentially be a significant short-term adverse effect in a District context due to the removal of these potential roosting resources. However, if this occurs, new bat roosting locations will be introduced into the scheme. Bat boxes will be placed on selected trees within the site to replace, on a like-for-like basis, lost potential bat-roosting resources.

6.477 If trees identified as having bat roosting potential are to be removed or the subject of aboricultural works, then the mitigation measures described above will ensure that there is no long-term loss of roosting sites for bats in trees and therefore **no significant long-term effects** on bats using trees as roosting sites are anticipated.

Development control implications

6.478 Since it is considered that there will be no significant effect on bats roosting within trees, this is not considered to be a significant issue in respect of the planning applications associated with this ES.

Confidence in Predictions

6.479 If trees with bat roosting potential are to be removed or affected by aboricultural works, with the above mitigation in place, it is considered with **certain to near certain confidence** that there will be **no significant long-term effects on bat roosts in the District context**.

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Bat roosts in buildings

Valuation

Although no evidence of roosting bats has been found within the derelict Spendelows Farm buildings, it is considered that the potential presence of an unseen, transient bat roost is of Local value.

Significance of Ecological Effects during Construction and Operation

The Spendelows Farm buildings are proposed to be retained and therefore no significant impacts on an unknown transient bat roost are anticipated.

Development control implications

Since it is considered that there will be no significant effect on bats roosting within buildings, this is not considered to be a significant issue in respect of the planning applications associated with this ES.

Confidence in Predictions

At the current time, it is considered with certain to near certain confidence that there will be no significant effect in the Local context on bats roosting within buildings.

Bat activity

Valuation

The bat activity use within the site has been valued as of ecological value in a County Context.

Significance of Ecological Effects during Construction and Operation

The site is used by a range of bat species for both foraging and commuting and therefore it is anticipated that without mitigation there will be some adverse effects on bats through disturbance and severance of commuting routes.

Few impacts during the construction phase are anticipated as construction will be undertaken in phases meaning that small areas of suitable foraging and commuting habitat such as mature trees and hedgerows will be removed at any one time.

Mitigation

The key forage habitat for bats will be retained through the development proposals so no significant adverse effects in a County context on forage habitat are expected.
6.488 During construction, no night-working is to be permitted and lighting will be kept to an absolute minimum for security purposes only.

6.489 The effect on commuting routes will be minimised through the retention and strengthening of the key commuting routes throughout the site. These are considered to be the Stanground Lode corridor, the area around Jones’s Covert Woodland and the edge of the site adjacent to the SSSI/SAC/cSAC and the hedgerow in the northern section of the site that is to be developed as industrial units. This hedgerow will be retained within the development proposals. The area around Jones's Covert will be enhanced through additional planting as will the Stanground Lode corridor. In addition further habitat improvements will be created on the eastern side of the industrial units between the SSSI and the site boundary. Plus the commuting route/habitat connection along the Stanground Lode will be maintained as already described previously.

6.490 The woodland edges that are just outside the application sites are important for both foraging and commuting bats, as is Jones’s Covert Woodland that is within the site. Jones’s Covert woodland is to be retained and enhanced through additional habitat creation in this area, in the form of both woodland and grassland habitat. Strong links will be created from the woodland outside of the sites to the Stanground Lode corridor through planting of new hedgerows and woodland blocks. The Stanground Lode corridor will be improved by the addition of a wetland feature that will be used for surface water attenuation and a strip of grassland habitat of at least approximately 50m either side of the stream.

6.491 All mature woodland will be retained within the development as well as the majority of species rich and important hedgerows. Some hedgerows will be lost from the centre of the development but new hedgerows will be planted within the sites that will provide greater connectivity to key features such as woodlands, water bodies and the Stanground Lode. The majority of the hedgerows that will be removed from the area around Spendelows farm and the area opposite Yaxley did not exhibit high bat activity.

6.492 The effects of lighting on bats during the operational phase will be minimised by following current good practice. Lighting used along the roads within the site will minimize light spillage into surrounding retained habitats. This will be achieved by wherever possible using either low pressure sodium or high pressure sodium lamps...
that do not emit such high levels of UV light (Bat Conservation Trust 2008\textsuperscript{48}). The lighting along the road will be designed to minimise upward light spillage where necessary, subject to detailed design. Through the maintenance of potential commuting and foraging features and the use of low-spillage lighting in key locations, it is considered that there will be no significant effect on commuting and foraging habitats for bats post-development.

Development control implications

6.493 Since it is considered that there will be no significant effect on foraging and commuting bats, it is not considered that there will be a significant issue in respect of the planning applications associated with this ES.

Confidence in Predictions

6.494 At the current time, it is considered with certain to near certain confidence that there will be no significant effect in the County context on foraging and commuting bats.

Water vole

Valuation

6.495 The presence of water voles within the Stanground Lode and within other wet ditches within the sites is considered to be of ecological value in a County Context.

Significance of Ecological Effects during Construction and Operation

6.496 The Western Peripheral Road and a smaller residential road will cross the Stanground Lode at one point. Water voles have been identified in small numbers within the area where the Stanground Lode is to be constructed. Therefore there is the potential for short term impacts on the water vole population through the construction of the bridge. The banks of the river will not be affected but the bankside vegetation will be strimmed and construction vehicles will be in place. One other smaller road will cross the Stanground Lode, which also have the potential to damage water vole habitat.

6.497 The Stanground Lode channel is to be improved in order to accommodate higher water flow and facilitate water movement away from residential areas. This work will

be concentrated along a 630m stretch of the western part of the water course where water vole activity is at its lowest. However, there will still be impacts upon water vole habitat through the works within the channel.

Mitigation

6.498 The Stanground Lode watercourse is to be retained within the development proposals. No residential construction works will come within 50m of the edge of the water course, which will ensure that a viable wildlife corridor is maintained along the Stanground Lode.

6.499 During the construction phase there will be short term impacts where the Western Peripheral Road and the smaller road cross the water course. In order to mitigate for the potential to kill or injure water voles the construction area will be strimmed prior to any development in order to make it unsuitable for voles and exclusion fencing will be used to keep animals away from the construction area. The water voles have available habitat both up and down stream which will be enhanced to encourage movement of water voles to the parts of the water course that will not be affected by the development. The area will be surveyed prior to construction to assess the number of voles that may be affected and to find the exact location of the burrows. The crossing of the Lode has been designed to be wide enough to leave a 5m buffer zone from the edge of the watercourse in addition to the width needed for access vehicles on one side and the Green wheel bridleway on the other. Where the smaller road will cross the Stanground Lode the stream will be channelled through a culvert beneath the road or the bridge will be a single span structure that will leave bankside habitat in place along which species can move. Culverts do not seem to provide a major problem to movement or dispersal of water voles. (Strachan & Moorhouse 2006⁴⁹). However a box culvert will be used as opposed to a pipe culvert in order to allow more light to enter the culvert and therefore to encourage through movement. The box culverts also do not suffer from diminishing air space as the watercourse floods. Ledges within the culverts above the flood level will allow upstream movement of water voles during flood periods. The use of either box culverts or culverts with ledges will ensure that habitat connectivity for water voles is maintained along the entire length of the Lode.

6.500 During the channel improvement works to the Stanground Lode there will be a minor loss of water vole habitat. The area in which the works are to take place is approximately a 250m stretch of the western end of the Lode along the southern bank. During the water vole survey this section of the stream was being cleared by the farmer and therefore no water voles field signs were observed. However, it is considered likely that water voles do utilise this section of the Lode when conditions are suitable as they have been observed in habitat in all other surveyed areas. In order to mitigate the impacts of the construction phase of these works only the southern section of the bank will be affected. This will ensure that some suitable water vole habitat is retained during the entire operation, within which water voles can be moved. The area to be affected on the southern bank will be strimmed and made un-suitable for water voles. If any water voles are found within burrows before the works are undertaken then they will be trapped under license and moved to areas of retained habitat on the opposite bank. The works will include significant enhancements to the water course through the provision of marginal vegetation and banks for burrowing in order to conserve the existing water vole population and allow it to grow. Therefore in the long term there will be no adverse impacts on water voles through the channel improvements.

6.501 The measures proposed in Chapter 5 will ensure that the water quality of the Lode will be maintained and therefore, minimising any potential short and long term impact on habitat quality for water voles.

6.502 Considerable enhancements will be made to the western part of the Stanground Lode in the areas where water voles were not identified during the surveys. The habitat at this end of the Stanground Lode was not considered to be suitable for water vole as it has recently been cleared in parts and is heavily shaded in others. Therefore the habitat enhancements are considered to provide additional benefit to the resident water vole population.

Confidence in Predictions

6.503 It is considered, with certain to near certain confidence, that there will be no significant adverse effect in the County context on water voles given the mitigation described above.
Otters

Valuation

6.504 The lack of evidence of otters within the Stanground Lode and other wet ditches but the potential for them to be occasionally present within the sites is considered to be of ecological value in a Local Context.

Significance of Ecological Effects during Construction and Operation

6.505 No evidence of otters was identified from the surveys, however suitable foraging habitat can be found within the Stanground Lode habitat. The proposed development has the potential to cause severance to the forage habitat used by otters and disturbance through increased use of the sites.

Mitigation

6.506 The Stanground Lode is a key green corridor through the development sites and will be retained in full and the road crossing will be designed in such as way as to maintain habitat connectivity for this species. Enhancements to the western end of the Stanground Lode will help provide more suitable foraging habitat for otters and could provide benefits to the local otter population. Therefore it is considered that there will be no significant effect in the Local context on otters through the development proposals.

Development control implications

6.507 Since there will be no overall effect on otters, this is not considered to be a significant issue in respect of the planning applications associated with this ES.

Confidence in Predictions

6.508 It is considered, with certain to near certain confidence, that there will be no significant adverse effect in the Local context on otters given the habitat enhancements described above.

Reptiles

Valuation

6.509 The presence of good populations of both grass snake and common lizard within the assessment area means that the sites have been valued as of ecological value in a Local Context.
Significance of Ecological Effects during Construction and Operation

6.510 The majority of the reptiles were observed within the grass margins and peripheral habitat within the sites, particularly associated with habitats directly connected to the Orton Pit SSSI/SAC/cSAC. Therefore, the loss of the grass margin habitats will result in a loss of some marginal reptile habitat.

Mitigation

6.511 Certain peripheral habitats associated with the Orton Pit SSSI/SAC/cSAC will be retained and the majority of the area of the application sites is in arable production and will therefore not be supporting reptiles. Therefore, habitat loss may be restricted to certain key areas along field boundaries.

6.512 The reptile hotspots identified through the surveys are the Stanground Lode Corridor, the edge of the Orton Pit SSSI/SAC/cSAC, the Norman Cross CWS, the Green Wheel bridleway and the ditch to the north of the Stanground Lode. Habitat where reptiles were observed will be retained and enhanced through the development proposals. A population size for the sites has not been calculated as it is considered that the key habitats will be kept and in total a maximum of approximately 4ha of grass field margins will be lost. However, within the majority of these grass margins no reptile observations were made and therefore it can be said that reptiles are not regularly using this habitat. The only grass margins where reptiles (grass snakes) were observed are those immediately adjacent to the SSSI/SAC and it is considered that species were moving to and from the SSSI/SAC.

6.513 A strategy of reptile trapping and translocation of any reptiles will be adopted to ensure that reptiles are not killed or injured as a result of the pre-construction and construction works within the site. This strategy will also involve the identification and preparation of suitable reptile receptor habitats/areas in order to maintain the local population of reptiles in a favourable conservation status. During the construction phase, it is considered that reptiles will need to be trapped from areas of suitable habitat including the grass margins and some woodland edge that will have temporary disturbance during the construction phase. Before clearance works take place, one-way reptile fencing will be installed around the perimeter of the development footprint and reptiles will be trapped and translocated from the development area to receptor areas. This will be undertaken in phases that will reflect the phasing of the construction of the development. The receptor areas will be created in the phase before the construction to ensure that habitats have developed enough to support the translocated species. The one-way fencing will ensure that animals present within the retained areas of habitat surrounding the development footprint cannot move into the
construction area. These measures will minimise the possibility that reptiles will be killed or injured as a direct result of construction. The translocation will be undertaken by installing one-way fencing in the winter and carrying out translocation of reptiles the following spring (March-June) and autumn (September/October). The reptiles will be captured by hand through the use of artificial basking sites and refugia.

6.514 With this mitigation in place it is considered that there will be significant adverse impacts in the Local context through loss of reptile habitat.

Development control implications

6.515 Policy LNE19 of the Cambridgeshire and Peterborough Structural Plan is of relevance when considering the effects upon protected species.

Compensation

6.516 In order to compensate for lost habitat within the sites receptor sites will be created that will provide suitable conditions for reptiles.

6.517 Grass snakes are considered to be highly mobile species and are considered to be moving between the sites and the SSSI/SAC/cSAC and this main habitat area will still be available to them and therefore does not need to be compensated for. The retained habitat and open space on site account for approximately 145ha and because the green infrastructure is designed in such a way to buffer the SSSI/SAC/cSAC the network of habitats will be maintained and enhanced.

6.518 Therefore only approximately 4ha of receptor habitat that is linked to the original resource is considered to be required to compensate for the field margins and hedgerows that currently support the grass snakes and common lizards. It is considered that there is adequate land area within the development, ear-marked as receptor site, to accommodate this number of species. This area of land has not been accurately measured but is estimated to be in excess of 10ha and will be of a much higher value for reptiles than the existing grass margins. The potential reptile receptor habitat is shown in Figure 6.7. However this land is currently in arable production and suitable reptile habitat will have to be created on this land at least one year prior to commencement of translocation in order to ensure that the land has established before animals are moved there.

6.519 The receptor sites for reptiles will include the creation of several reptile hibernacula and refugia in the form of wood and rubble piles covered in turf. These features will provide cover for hibernation and resting reptiles. In addition, ‘mound and dip’ features will be created and micro-topography will be formed by re-profiling the soil in
certain areas of the field. The re-profiling will aim to create south-facing sheltered bays and patches of bare ground which will be suitable for basking and resting as well as other sheltered areas which could be used by reptiles as daily temperatures fluctuate. Some scrub planting will be undertaken in order to create more shelter within the grassland and to promote areas of more dense grass where grazing is restricted. This planting will be closely associated with the hibernacula piles and existing woodland to avoid any adverse impacts on the existing grassland interest.

Residual Effect including Mitigation and Compensation

6.520 Taking into account the proposed compensation, it is considered that in the long-term it is likely that there will be a significant beneficial effect on the reptile population in the Local context. This is because the habitat for reptiles will be improved from arable field edges to grassland and scrub designed specifically for reptiles and will be linked to the core habitat for reptiles which is the Orton Pit SSSI/SAC.

Confidence in Predictions

6.521 At the current time, it is considered with probable confidence that with mitigation in place there will be a significant beneficial effect on reptiles within a Local context in the short term. A probable level of confidence is given as the terrestrial habitat creation has not yet been undertaken and therefore the condition of these habitats is not yet known.

Aquatic invertebrates

Valuation

6.522 The overall assemblage of aquatic invertebrates is considered to be of District value.

Significance of Ecological Effects during Construction and Operation

6.523 Six ponds within the site have been identified as having High or Medium value for aquatic invertebrates. Only one pond with a medium value for aquatic invertebrates is to be lost; all other ponds are to be retained within the development proposals. However there may be impacts on the water quality of these ponds through the change in land use and knock-on effects on the aquatic invertebrate assemblages.

Mitigation

6.524 In order to reduce the potential impacts on the aquatic invertebrates the ponds that are near to proposed residential properties (Ponds 9 and 10) will be protected by ensuring that all run-off is channelled away from the ponds, subject to detailed design.
All ponds should be buffered by at least 5m of green space and ponds will be managed to ensure the biodiversity of the retained ponds is maximised. With this mitigation in place it is considered that there are residual significant adverse impacts in a District context.

Development control implications

6.525 Policy LNE13 of the Cambridgeshire and Peterborough Structural Plan is of relevance when considering the effects upon ponds and wetland habitats and species.

Compensation

6.526 In order to compensate for the loss of one pond with a medium value for aquatic invertebrates a new pond will be created within the immediate vicinity of the existing pond. This pond will be created in a way that will maximise its suitability to support aquatic invertebrates. The new pond will be dug before the old one is filled in and vegetation from the old will be moved to the new pond. Mud and silt from the existing pond will be deposited next to the new pond so that invertebrates within the mud can move to the new pond.

6.527 In addition further ponds are to be created on site in order to compensate for the loss of great crested newt ponds (none of which have been assessed as having high or medium value for aquatic invertebrates.) Nine ponds will be created which is more than required for the translocation of great crested newts and these ponds will be designed to provide additional benefits to aquatic invertebrates. High invertebrate diversity and the lack of fish also lends well to suitability for great crested newts so the new ponds should be managed in this way for maximum biodiversity benefit.

Residual Effect including Mitigation and Compensation

6.528 Taking into account the proposed mitigation and compensation, it is considered that in the long-term it is likely that there will be no significant adverse effects on the aquatic invertebrate population in the District context.

Confidence in Predictions

6.529 At the current time, it is considered with certain to near certain confidence that with mitigation in place there will be no significant adverse effect on the aquatic invertebrates within a District context.
Terrestrial invertebrates

Valuation

6.530 The only area that is considered to be of potential value for terrestrial invertebrates and therefore the only area that was surveyed as part of the baseline assessment is the brownfield land south of the A15 road outside the application site boundaries. The surveys recorded four Red Data Book species and the overall assemblage of invertebrates within this area of land south of the A15 is considered to be of Local value.

Significance of Ecological Effects during Construction and Operation

6.531 It is not considered that there will be any adverse effects on terrestrial invertebrates elsewhere within the site as the majority of the land that will be lost is in arable production and is not considered to support a diverse range of invertebrate species. Species such as moths and butterflies that may be using the linear features within the sites are dealt with in a separate section below. The brownfield land south of the A15 lies outside the application sites boundaries and will be unaffected by the proposed development.

Mitigation

6.532 The majority of features that have the potential to support terrestrial invertebrates will be retained through the development proposals. For example all woodland will be retained and all the hedgerows will either be retained or replaced through the development scheme.

6.533 It is considered that the current development proposals will result in no significant adverse effects in a Local context on terrestrial invertebrates.

Development control implications

6.534 Since it is considered that there will be no significant effect on terrestrial invertebrates, this is not considered to be a significant issue in respect of the planning applications associated with this ES.

Enhancement

6.535 Some of the areas that will be created as receptor habitats for reptiles will also provide suitable habitat for terrestrial invertebrates. These areas will be created by stripping the top soil, depositing crushed brick rubble at various depths in order to produce mounds and seeding with a fine grass seed mix. The nutrient poor soil will
encourage a good diversity of floral species that will provide a nectar source for invertebrates and the exposed brick and bare ground heats up quickly providing important areas for warmth loving invertebrates (Whitehouse, 2008). This habitat will have to be managed by occasional mowing to ensure that the areas of bare ground are maintained and scrub does not encroach significantly.

Residual Effect including Mitigation and Compensation

6.536 Taking into account the proposed mitigation and compensation, it is considered that in the long-term it is likely that there will be significant beneficial effects on the terrestrial invertebrate population in the Local context, through the creation of extensive areas of species rich grassland and bare ground that are part of a wider habitat mosaic.

Confidence in Predictions

6.537 At the current time, it is considered with certain to near certain confidence that there will be significant beneficial effects in a Local context on terrestrial invertebrates through the creation of grassland habitats that will support these species.

*Lepidoptera (moths and butterflies)*

Valuation

6.538 The presence of black hairstreak butterflies within the site means that the site has been valued as of ecological value in a County Context for butterflies.

6.539 The moth diversity has been assessed as being of ecological value in a Local Context.

Significance of Ecological Effects during Construction and Operation

6.540 The black hairstreak butterflies were observed on the edge of Chambers Dole woodland and Jones’s Covert woodland on mature blackthorn. Jones’s Covert woodland is to be retained through the development proposals and Chambers Dole woodland is outside of the application sites boundary therefore no significant adverse effects are likely with respect to these species.

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6.541 Other moths and butterflies identified within the site were considered to be the more common grassland species such as Gatekeeper *Pyronia tithonus* and meadow brown *Maniola jurtina*.

**Mitigation**

6.542 In order to enhance the biodiversity of the development in line with PPS9 further enhancements will be made to the woodlands within the Core Area site boundary in order to ensure the long term survival of this species. This will include active management of woodland within the application site for a range of species including the maintenance of creation of glades allowing mature blackthorn to develop on the edge of the woodlands for black hairstreak butterflies. In addition new woodland planting within this central green space and south of Jones Covert will include a scalloped edge planted with blackthorn amongst other species. Planting along the western side of the SSSI to screen the industrial units will also include some areas of scrub where mature blackthorn will be encouraged and blackthorn scrub will be planted along the western boundary of the site and along the Stanground Lode. With this mitigation in place it is considered that there will be no significant adverse effects on moths and butterflies.

**Enhancement**

6.543 The loss of small areas of grass margins will be compensated for by the creation of areas of mixed grassland and scrub habitat that is considered to be more suitable for a range of butterflies. The grassland habitat that will be created on the western side of the SSSI will provide good butterfly habitat (see section on terrestrial inverts) as will the similar habitat created as a receptor site for reptiles within the central green space. In addition new scrub and rough grassland habitat will be created along the Stanground Lode corridor and along the edge of the A1(M) road all of which will contribute to supporting butterflies and moths within the sites.

**Residual Effect including Mitigation and Compensation**

6.544 The additional blackthorn planting and creation of new grassland areas as well as enhancement of existing woodland is considered to have significant beneficial effects on the moth and butterfly populations.

**Development control implications**

6.545 Since it is considered that there will be no significant effect on moths and butterflies, this is not considered to be a significant issue in respect of the planning applications associated with this ES.
Confidence in Predictions

6.546 With the proposed mitigation and compensation in place it is considered with certain to near certain confidence that there will be a significant beneficial effect on moths and butterflies.

Assessment of Effects on Nationally Designated Sites

Orton Pits

Valuation

6.547 The Orton Pits SSSI/SAC/cSAC previously described is considered to be of International value for its ecological interest.

Significance of Ecological Effects during Construction and Operation

6.548 The Orton Pit SSSI/SAC/cSAC is located immediately adjacent to the sites and therefore has the potential to be adversely affected by the proposed development. This SSSI/SAC/cSAC is of international importance for its populations of great crested newts and stoneworts. The site also has significant populations of water vole and reptiles but these do not contribute to the special interest of the site.

6.549 The ecological effects on the special interest of the Orton Pit SSSI/SAC/cSAC have been described under the headings of great crested newts and stoneworts in the preceding sections.

6.550 There is the potential for adverse impacts on the Orton Pit SSSI/SAC through eutrophication of the waterbodies through both surface run off and nitrogen deposition.

6.551 There is the potential for wind blown seed coming from the site to affect the integrity of the SSSI/SAC by introducing unwanted seed into the pits. In addition the shadows cast by the industrial buildings in the Employment Area have the potential to cause detrimental effects on the special interest of the site, the stoneworts and great crested newts.

6.552 In addition, the potential for increased disturbance to breeding birds within the wooded areas of the Orton Pit SSSI/SAC/cSAC has been covered under the breeding bird heading in a preceding section.

6.553 Another potential impact affecting the integrity of the reserve relates to access and population pressure to the reserve. This has the potential to lead to increased fly tipping and vandalism of the site and potentially the introduction of fish into the...
Mitigation

6.554 Direct impacts of both the construction and operational phases will be avoided by the adoption of a buffer zone of at least 30m width between the SSSI and the nearest development boundary on all sides which relates to approximately a 60m to 90m buffer from the SAC boundary on its western side. This will prevent any ground works affecting the SSSI/SAC and will limit disturbance to species within the SSSI/SAC/cSAC during the construction phase. No waste or building materials will be stored within the SSSI/SAC/cSAC. Access routes to the development sites will not cross the SSSI/SAC/cSAC, nor will they cross the buffer zones. With these measures in place, it is considered that any direct impacts on the SSSI/SAC/cSAC during the construction phase will be avoided.

6.555 A shadow analysis (Figure 6.6) has been undertaken to assess the potential effects of shadows from the industrial units falling on the SAC and affecting the specialist interest of the site (stoneworts and great crested newts.) The analysis showed that shadow would fall just within the SAC boundary only during the spring equinox (20 March) during the late afternoon (5pm). During the autumn equinox (22 September) shadow will fall on the SSSI but does not spread to within the SAC. Within this part of the SAC there is just one small water body. Figure 6.6 shows the results of this analysis.

6.556 The effects of a very small area of shadow late in the day at only one time of year are not considered to have any significant impacts on the special interest of the SAC. Stoneworts are much more dependant on water quality than water temperature or shading and therefore if the water quality of the pit remains the same then there should be no adverse effects. In March when there may some very limited shading to this one water body within the SAC stoneworts may just be beginning to germinate but the majority of germination will happen later in the spring. However, de Winton et al (2004\textsuperscript{51}) state that stonewort germling numbers were not significantly affected by light regimes and germination still occurred at under 0.5 $\mu$mol photons PAR m$^{-2}$s$^{-1}$. With regards to temperature by the time the water body is within shade it would have

\textsuperscript{51} De Winton, M., Casanovab, M. and Claytona, S. 2004 Charophyte germination and establishment under low irradiance. Aquatic Botany 79: 175-187
warmed up during the day and will naturally be beginning to lose heat into the evening.

6.557 With regards to the limited shading at certain times of the year of this water body on great crested newts it is also considered that there will be no adverse effects. In September the newts will no longer be in the pond and therefore will not be affected. In March newts will be breeding in the pond but some late afternoon shading will not affect the temperature of the pond enough for this to have an adverse effect on breeding rates and egg survival as by this time in the day the water body would have been warmed by the sunlight during the main part of the day.

6.558 The assessment of the significance of identified effects on great crested newts is set out in the great crested newt section above and concludes, that taking into account the proposed mitigation measures included in the development design in particular the access strategy and newt connectivity strategy and comprehensive compensation for the loss of ponds outside of Orton Pit, that there will be a significant beneficial impact on the special interest of the site in relation to great crested newts. Full details of mitigation and compensation measures can be found in Appendix 6.3.

6.559 The assessment of the impacts on stoneworts similarly concludes that there will be no significant adverse impact on this special interest and as such it is considered that there will be no significant adverse impact on the integrity of the Orton Pit SSSI/SAC/cSAC.

6.560 The assessment of disturbance on breeding birds concludes that there will be no significant impact on birds within the SSSI/SAC/cSAC. The impacts of the WPR are to be limited through acoustic fencing and this approach is covered in the EIA for the WPR which already has planning consent.

6.561 Within the development design, strong connectivity has been established between the SSSI/SAC/cSAC and key ecological areas of the site through retention and creation of habitats. Receptor sites for great crested newts have been identified and are located in areas that are linked with the SSSI/SAC/cSAC through green corridors such as hedgerows and woodland. The location of receptor sites and new habitat creation around the Orton Pit SSSI/SAC strongly reflect those areas highlighted as Enhancement Areas in Natural England’s South Peterborough Green Parks Biodiversity Audit (see Appendix 6.2 for details on ecological connectivity throughout the sites.)

6.562 This area of land between the north western SSSI boundary and the Employment Area will be 30m wide and again strongly reflects the area highlighted as an Enhancement Area in Natural England’s South Peterborough Green Parks Biodiversity Audit.
Biodiversity Audit (see Figure 6.5 for details of the proposals for this buffer zone). Any lighting that will be used within the industrial area to the west of this buffer will be directional so that no additional light is shed on the SSSI/SAC.

6.563 In order to protect the SSSI/SAC from any detrimental effects of unwanted vegetation the planting of the buffer will comprise only of species of trees that do not have windblown seed for example oak *Quercus sp.*, rowan *Sorbus aucuparia*, whitebeam *Sorbus aria* and bird cherry *Prunus padus*.

6.564 In relation to public access pressures on the SAC, open public access is not currently allowed to the Orton Pit SSSI/SAC/cSAC due to the sensitive nature of the habitats and species the reserve supports. The current management plan allows for controlled, supervised access where requested as it is considered important that the general public have an understanding and awareness of the importance of this site. In addition, access to the Orton Pit reserve by domestic pets (in particular cats) has been prevented or discouraged through the erection of cat proof fencing and the design specification for Stages 2 and 3 of the Western Peripheral Road.

6.565 The current policy of managed access by prior arrangement with reserve managers will be maintained and open public access and control of cat incursion into the SSSI/SAC/cSAC from the Great Haddon community will be prevented by a range of physical measures along sensitive boundaries of the reserve. These measures include the creation of buffer zones, retained and new ditches, dense scrub planting and cat proof fencing. These measures collectively, will preclude open access to the reserve from Great Haddon whilst still allowing controlled access via the existing arrangements.

6.566 In addition to development buffers and physical control measures, the proposed diversion of the ‘Green Wheel’ to the south of the Stanground Lode, away from the boundary of the SSSI/SAC/cSAC and the creation of an extensive area of wetland and hedgerow planting will provide a barrier to human and domestic animal movement and reduce current access pressures on this edge of the SSSI/SAC/cSAC.

6.567 Human access to other retained and newly created habitats and green infrastructure proposed within the Great Haddon development will provide suitable opportunities for the appreciation of wildlife and nature without harm to the SAC and provide sufficient open space for leisure and recreational purposes.

6.568 Details of how the boundaries between the site and the sensitive habitats of the SSSI/SAC/cSAC will be managed and how access will be controlled are set out in greater detail in Appendix 6.4 Access Management Strategy. the principles of which are also illustrated on Figure 6.9.
Confidence in Predictions

6.569 In the short and long term, with the above mitigation in place then it is considered with certain to near certain confidence that there will be no significant adverse impact on the Orton Pits SSSI/SAC/cSAC in the International context.

Development control implications

6.570 Policies LNE14 and LNE15 of the Cambridgeshire and Peterborough Structural Plan is of relevance when considering the effects upon the SSSI/SAC’s.

The Nene Washes

Valuation

6.571 The Nene Washes Ramsar/SPA/SAC/SSSI previously described is considered to be of International value for its ecological interest.

Significance of Ecological Effects during Construction and Operation

6.572 The Nene Washes Ramsar/SPA/SAC/SSSI is some distance from the application sites but the Stanground Lode (a stream) runs through the Core Area application site and empties into the River Nene as it flows into the Nene Washes SAC.

6.573 It is considered that there are potential indirect impacts on the designated site through direct impacts on the Stanground Lode both during the construction and operation phases. This includes run-off from the construction site, which may include pollutants and sediments which could affect water quality as well as run-off from buildings and hard surfaces during the operational phase, which may also affect water quality in the same way.

Mitigation

6.574 Chapter 5 discusses the management of water and the potential effects of the development on the local water course. Baseline water quality conditions are being monitored both within the Stanground Lode and within Beeby’s West Lake where water from site will be discharged. The proposed Surface Water Strategy for the sites will ensure that the quality of the water leaving the sites will be no worse than existing conditions through the use of a positive drainage system and subsequently we can conclude here that it is considered that there will be no significant adverse effects to the Nene Washes Ramsar/SPA/SAC/SSSI in an international context.
6.575 It is considered that the mitigation put in place for the running water (set out in Chapter 5 paragraphs 5.33 to 5.39) will also mitigate for any subsequent effects on down-stream habitats including the Nene Washes Ramsar/SPA/SAC/SSSI.

Confidence in Predictions

6.576 In the long term it is considered with certain to near certain confidence that there will be no significant adverse impacts on the Nene Washes Ramsar/SPA/SAC/SSSI in the International context.

Development control implications

6.577 Policies LNE14 and LNE15 of the Cambridgeshire and Peterborough Structural Plan is of relevance when considering the effects upon Ramsar/SPA/SAC/SSSI sites.

Assessment of Effects on Locally Designated Sites

The Roughs, Caldecote Fen, Debdale Pond, Nene Park, Crown Pit No. 1, Denton Common Pit

Valuation

6.578 All of the CWSs previously described are considered to be of value in the County context.

Significance of Ecological Effects during Construction and Operation

6.579 The majority of the CWSs (The Roughs, Caldecote Fen, Debdale Pond, Nene Park, Crown Pit No. 1, Denton Common Pit) are some distance away from the application sites and it is considered that there will be no significant effect in the County context on these CWSs during the construction or operation phases, neither directly nor indirectly due to the due to the distance and the fact that the sites are not ecologically connected to the proposed development sites.

Confidence in Predictions

6.580 It is considered with certain to near certain confidence that there will be no significant effect on these CWSs in the County context.

Development control implications

6.581 Policy LNE16 of the Cambridgeshire and Peterborough Structural Plan is of relevance when considering the effects upon the CWSs.
Jones’s Covert woodland CWS complex

Valuation

6.582 Jones’s Covert Woodland complex is considered to be of value in the County context.

Significance of Ecological Effects during Construction and Operation

6.583 Jones’s Covert Woodland CWS complex includes Chambers Dole, The Belt and Two Pond Coppice Woodlands. Jones’s Covert Woodland is also part of the Orton Pit SSSI/SAC/cSAC and is therefore covered within a previous section. Chambers Dole, The Belt and Two Pond coppice wood fall just outside the site boundary. No direct impacts on the woodland are expected although there is the potential for disturbance from any adjacent development.

Mitigation

6.584 No changes to the woodland (use or access) are proposed as part of the application. In order to mitigate the effects of development on the CWS woodlands no built development of highway infrastructure will come within 20m of the woodlands and the installation of exclusion fencing proposed to control the movement of people and domestic pets into the SAC will have no significant adverse effects on the woodland habitats. These woodlands are in private ownership and the applicant has no control over their management. However they have been factored in to the biodiversity strategy for the site and provide connectivity from the SSSI/SAC/cSAC through to the wider countryside to the west through hedgerow and woodland planting and receptor site creation (see details in Appendix 6.2).

6.585 With this mitigation in place, it is considered that there will be no significant adverse impacts in the County context and it is possible to say that the additional habitat creation around the woodlands will result in a significant beneficial impact on the CWS woodlands outside of the application site boundaries.

Confidence in Predictions

6.586 It is considered with certain to near certain confidence that there will be no significant effect on the Jones's Covert Woodland complex CWS in the County context.
Development control implications

6.587 Policy LNE16 of the Cambridgeshire and Peterborough Structural Plan is of relevance when considering the effects upon the Jones’s Covert Woodland complex CWS.

Norman Cross

Valuation

6.588 Norman Cross CWS is considered to be of ecological value in the County context.

Significance of Ecological Effects during Construction and Operation

6.589 The Norman Cross CWS lies to the south of the A15 close to but outside the application site boundaries. Although the Core Area application site comes within approximately 200m of the CWS, there are no proposals for the CWS itself. It is not envisaged that there will be any impacts on this CWS during the construction or operational phases of the development.

Confidence in Predictions

6.590 It is considered with certain to near certain confidence that there will be no significant effect on the CWSs in the County context.

Development control implications

6.591 Policy LNE16 of the Cambridgeshire and Peterborough Structural Plan is of relevance when considering the effects upon the CWSs.

Cumulative and Interactive Effects

6.592 Within the immediate area of the sites there are two development proposals that need to be considered when looking at the cumulative impacts of development: the Peterborough Gateway Scheme development (‘Alwalton Hill’) and the Western Peripheral Road Stage 2 and 3.

6.593 The ES for the Western Peripheral Road did not identify any significant impacts of that development proposal on the Orton Pit SSSI/SAC/cSAC. As a consequence it is not considered that there will be a greater cumulative effect of proposed projects and plans acting in combination with the proposed Great Haddon development.

6.594 The only residual significant effect from the Western Peripheral Road was the adverse effect at the Local level on the breeding bird population. The cumulative effect of loss of farmland habitat for breeding farmland birds from the proposed Great Haddon development and the increased disturbance through the Western Peripheral...
Road is not considered to increase the cumulative impact beyond being significant at the Local level.

6.595 Significant positive impacts on habitats from the Western Peripheral Road included arable land, grassland, ditches and open water. Significant positive impacts on species from the Western Peripheral Road include reptiles, bats, water vole, aquatic invertebrates, terrestrial invertebrates and stoneworts. The cumulative positive impacts from both the Western Peripheral Road and the Great Haddon development may result in further positive impacts for these species.

6.596 The development of the Peterborough Gateway Scheme at Alwalton Hill will include commercial and industrial development. The ES for the Peterborough Gateway Scheme did not identify any significant impacts on the Orton Pit SSSI/SAC/cSAC. As a consequence it is not considered that there will be a greater cumulative effect of proposed projects and plans acting in combination with the proposed Great Haddon development.

6.597 Significant adverse impacts at the site level were identified arising from the Peterborough Gateway Scheme for brown hare and farmland birds owing to the loss of arable farmland. No significant effect on brown hare has been identified arising from the proposed Great Haddon development and as such there will be no cumulative effect on this species. A significant effect has been identified on breeding birds using the arable farmland arising from the Great Haddon development at a local level which will in combination with the Peterborough Gateway Scheme result in a wider loss of these species within the area. The loss of farmland birds including some UKBAP species from both these developments will likely result in a whole scale loss of these species from the local area which is considered to increase the cumulative impact to being significant at the District level.

6.598 Moderate beneficial impacts at the site and local level in the medium term were identified from the Peterborough Gateway Scheme for hedgerows and boundary ditches, standard trees, Alwalton Hill Wood, ponds, invertebrates and woodland birds. Substantial beneficial impacts at the site level were predicted for foraging bats and great crested newts in the medium to long-term at the site and City level respectively. The majority of these positive effects are not considered cumulatively to significantly alter the assessment of the impacts of the Great Haddon development. However the positive effects upon the great crested newt population within the Peterborough Gateway Scheme and within the Great Haddon development are considered to create a greater significant beneficial impact on the great crested newt population.
Assessment of Effects Summary Table

6.599 A summary of the assessment of effects is presented in Table 6.9. The final column of the table includes an assessment of the overall ES significance. The IEEM guidelines require significant effects to be identified and described at the relevant geographical scale ranging from effects that are considered to only be significant within the immediate zone of influence through to those considered to be significant at the international level. The guidelines then seek to describe how the different geographical levels of significance relate to policy and legislation. This approach is different from how other subjects have been treated in other chapters of this ES and to provide a guide on how the ecological impacts can be compared to the level of significance that has been attached to impacts on non-ecological issues the levels of significance listed in the summary table of effects has been based on the following:

- Ecological impacts that have been assessed as being significant at the local and immediate zone of influence geographical scales do not trigger a response in development control terms and are considered to represent impacts that overall within the ES are of negligible significance.

- Ecological impacts that have been assessed as being significant at the District or higher geographical scales and that have triggered a response in development control terms are considered to represent impacts that overall within the ES are of minor to moderate significance if appropriate mitigation and/or compensation measures adequately address to identified ecological impacts.

- Ecological impacts that have been assessed as being significant at the District or higher geographical scales and that have triggered a response in development control terms are considered to represent impacts that overall within the ES are of major significance if appropriate mitigation and/or compensation measures do not adequately address the identified ecological impacts resulting in a net loss of biodiversity.

- Ecological impacts that are assessed as enhancing habitats or species populations or providing new biodiversity interest are considered to represent impacts that overall within the ES are of beneficial significance for biodiversity.
### Table 6.9 – Summary of the Evaluation and Overall Significance of Designated sites, Habitats and Species associated with the Assessment Area

<table>
<thead>
<tr>
<th>Ecological Resource</th>
<th>Ecological Value</th>
<th>Significance of Effect including Mitigation</th>
<th>Compensation and enhancement</th>
<th>Significance of Residual Ecological Effect taking account of Compensation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Habitats</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grassland</td>
<td>District</td>
<td>No significant adverse effect in the long term in the District context</td>
<td>Create new grassland habitat on-site</td>
<td>Significant beneficial impact in the long term in the District context with near to certain confidence</td>
</tr>
<tr>
<td>Woodland</td>
<td>County (Jones Covert) to Local (other woodland)</td>
<td>No significant effect in the County to Local context</td>
<td>Creation of new linking woodland blocks</td>
<td>Significant beneficial effect in the County - Local context with near to certain confidence</td>
</tr>
<tr>
<td>Hedgerow</td>
<td>County - Local</td>
<td>Significant short term adverse impacts in the County - Local context</td>
<td>New hedge planting</td>
<td>Moderate beneficial effect in County - Local context with certain to near certain confidence</td>
</tr>
<tr>
<td>Bare ground</td>
<td>Local</td>
<td>No significant adverse effect in Local context with near to certain confidence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brownfield land</td>
<td>County</td>
<td>No significant adverse effect in County context with near to certain confidence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scrub</td>
<td>Local</td>
<td>Significant adverse effect in Local context</td>
<td>Creation of new scrub habitats</td>
<td>Significant beneficial effect in the Local context with near to certain confidence</td>
</tr>
<tr>
<td>Running water</td>
<td>District</td>
<td>No significant effect with near to certain confidence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ecological Resource</td>
<td>Ecological Value</td>
<td>Significance of Effect including Mitigation</td>
<td>Compensation and enhancement</td>
<td>Significance of Residual Ecological Effect taking account of Compensation</td>
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</tr>
<tr>
<td>Standing water</td>
<td>Local-National</td>
<td>Significant adverse effect in Local-National context</td>
<td>Create new ponds. Trap and translocate great crested newts</td>
<td>Significant beneficial effect in the Local – National context with probable confidence</td>
</tr>
<tr>
<td>Species</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stonewort</td>
<td>National</td>
<td>No significant effect in the National context with certain to near certain confidence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Great crested newts</td>
<td>International</td>
<td>Significant adverse effect in International context</td>
<td>Trapping and translocation to a suitable great crested newt sites Receptor site will have ponds created and grassland habitat enhancement and other habitat feature enhancements suitable for great crested newts</td>
<td>Significant beneficial effect in International context with certain to near certain confidence</td>
</tr>
<tr>
<td>Breeding bird assemblage</td>
<td>Regional</td>
<td>Significant adverse long-term effect in Regional context</td>
<td>Create new habitat within site Buffer existing key breeding bird habitat within and adjacent to site</td>
<td>Significant adverse effect in Local context with probable confidence</td>
</tr>
<tr>
<td>Barn owl</td>
<td>District</td>
<td>Significant adverse effect in the Local context</td>
<td>Replacement nesting boxes and forage habitat</td>
<td>No significant effect in the Local context with probable confidence</td>
</tr>
<tr>
<td>Ecological Resource</td>
<td>Ecological Value</td>
<td>Significance of Effect including Mitigation</td>
<td>Compensation and enhancement</td>
<td>Significance of Residual Ecological Effect taking account of Compensation</td>
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<tr>
<td>Marsh harrier</td>
<td>County</td>
<td>No significant effect in the County context with probable confidence</td>
<td></td>
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<tr>
<td>Cetti’s warbler</td>
<td>County</td>
<td>No significant effect in the County context with certain to near certain confidence</td>
<td></td>
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<tr>
<td>Kingfisher</td>
<td>Local</td>
<td>No significant effect in the Local context with certain to near certain confidence</td>
<td></td>
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<tr>
<td>Hobby</td>
<td>District</td>
<td>No significant effect in the District context with certain to near certain confidence</td>
<td></td>
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<tr>
<td>Badger</td>
<td>Local</td>
<td>No significant effect in the Local context with certain to near certain confidence</td>
<td></td>
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<tr>
<td>Brown hare</td>
<td>Local</td>
<td>No significant effect in the Local context with certain to near certain confidence</td>
<td></td>
<td></td>
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<tr>
<td>Bat roosts (trees)</td>
<td>District</td>
<td>No significant effect in the District context with certain to near certain confidence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ecological Resource</td>
<td>Ecological Value</td>
<td>Significance of Effect including Mitigation</td>
<td>Compensation and enhancement</td>
<td>Significance of Residual Ecological Effect taking account of Compensation</td>
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<tr>
<td>Bat roosts (buildings)</td>
<td>Local</td>
<td>No significant effect in the Local context with certain to near certain confidence</td>
<td></td>
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<tr>
<td>Bat activity</td>
<td>County</td>
<td>No significant effect in the County context with certain to near certain confidence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Vole</td>
<td>County</td>
<td>No significant effect in the County context with certain to near certain confidence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Otter</td>
<td>Local</td>
<td>No significant effect in Local context with certain to near certain confidence</td>
<td></td>
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</tr>
<tr>
<td>Reptiles</td>
<td>Local</td>
<td>Significant adverse effect in Local context</td>
<td>Trapping and translocation to a suitable receptor site Receptor site will have grassland habitat enhancement and other habitat feature enhancements suitable for reptiles</td>
<td>Significant beneficial effect in Local context with probable confidence</td>
</tr>
<tr>
<td>Aquatic invertebrates</td>
<td>District</td>
<td>Significant adverse effect in a District context</td>
<td>Creation of new ponds</td>
<td>No significant effect in the District context with certain to near certain confidence</td>
</tr>
<tr>
<td>Ecological Resource</td>
<td>Ecological Value</td>
<td>Significance of Effect including Mitigation</td>
<td>Compensation and enhancement</td>
<td>Significance of Residual Ecological Effect taking account of Compensation</td>
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<tr>
<td>Terrestrial invertebrates</td>
<td>Local</td>
<td>No significant effect in Local the context</td>
<td>Create new habitat for terrestrial invertebrates</td>
<td>Significant beneficial effect in the Local context with certain to near certain confidence</td>
</tr>
<tr>
<td>Butterflies and moths (Lepidoptera)</td>
<td>Local - County</td>
<td>Significant beneficial effect in the Local – County context</td>
<td></td>
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<tr>
<td><strong>Designated sites</strong></td>
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<tr>
<td>Orton Pit SSSI/SAC</td>
<td>International</td>
<td>No significant effect with certain to near certain confidence</td>
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<tr>
<td>TL159942</td>
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<tr>
<td>Nene Washes SSSI/SAC</td>
<td>International</td>
<td>No significant effect with certain to near certain confidence</td>
<td></td>
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<td>TL200977 to TF395029</td>
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<tr>
<td>Debdale Pond PCCWS</td>
<td>County</td>
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<td>TL153958</td>
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<tr>
<td>Nene Park PCCWS</td>
<td>County</td>
<td>No significant effect with certain to near certain confidence</td>
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<tr>
<td>TL1597</td>
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<tr>
<td>Crown Pit No. 1 PCCWS</td>
<td>County</td>
<td>No significant effect with certain to near certain confidence</td>
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<tr>
<td>TL195943</td>
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<tr>
<td>Denton Common Pit CWS</td>
<td>County</td>
<td>No significant effect with certain to near certain confidence</td>
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<tr>
<td>TL176883</td>
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<tr>
<td>The Roughs, Caldecote Fen</td>
<td>County</td>
<td>No significant effect with certain to near certain confidence</td>
<td></td>
<td></td>
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<tr>
<td>CWS</td>
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Compiled by David Lock Associates
November 2009
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<thead>
<tr>
<th>Ecological Resource</th>
<th>Ecological Value</th>
<th>Significance of Effect including Mitigation</th>
<th>Compensation and enhancement</th>
<th>Significance of Residual Ecological Effect taking account of Compensation</th>
</tr>
</thead>
<tbody>
<tr>
<td>TL190893</td>
<td></td>
<td>confidence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jones’s Covert Woodlands PCCWS TL1593</td>
<td>County</td>
<td>No significant effect with certain to near certain confidence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Norman Cross Brickpits CWS TL1690</td>
<td>County</td>
<td>No significant effect with certain to near certain confidence</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7.0 **ARCHAEOLOGY & CULTURAL HERITAGE**

**Introduction and Scope of Assessment**

7.1 This chapter of the ES has been prepared by CgMs Consulting and is based upon the results of various desk and field studies, undertaken by CgMs Consulting and other specialist archaeological organisations. The chapter presents a synthesis of the results of those studies (the studies themselves are reproduced in full in *ES Volume 3: Section 7*), identifies impacts resulting from the proposed development on the cultural heritage resources (Archaeology and Historic Buildings), and identifies and scopes appropriate measures in order to mitigate the impacts identified.

**Reference Material and Assessment Method**

7.2 In considering any planning application for development, local planning authorities are guided by the policy framework set by government guidance, by current Development Plan policy and by other material considerations.

*National Planning Policy*

7.3 In November 1990 the Department of the Environment issued Planning Policy Guidance Note 16 (PPG16) *Archaeology and Planning*, providing guidance for planning authorities, property owners, developers and others on the preservation and investigation of archaeological remains. PPG15 *Planning and the Historic Environment* issued in September 1994 also contains relevant guidance, particularly in relation to listed and other historic buildings.

7.4 In short, government guidance in PPGs 15 and 16 provide a framework that:

- Protects Scheduled Ancient Monuments;
- Protects Listed buildings;
- Protects the settings of these sites;
- Protects Conservation Areas;
- Protects Registered Historic Parks and Gardens;
- Protects Registered Battlefield sites;
- Has a presumption in favour of in-situ preservation of nationally important archaeological monuments;
• In appropriate circumstances requires adequate information (from field evaluation) to enable informed decisions;

• Provides for the excavation and investigation of sites not important enough to merit in-situ preservation.

Regional Planning Policy


7.5 The Regional Spatial Strategy (RSS) for the East of England was published in May 2008. Section 8 of The East of England Plan contains policies relating to managing the Historic Environment. Policy ENV6 encourages local authorities and other bodies to adopt policies and applications which support the conservation and, where appropriate, the enhancement of the historic environment:

“Policy ENV6: the historic environment

In their plans, policies, programmes and proposals local planning authorities and other agencies should identify, protect, conserve and, where appropriate, enhance the historic environment of the region, its archaeology, historic buildings, places and landscapes, including historic parks and gardens and those features and sites (and their settings) especially significant in the East of England:

• the historic cities of Cambridge and Norwich;
• an exceptional network of historic market towns;
• a cohesive hierarchy of smaller settlements ranging from nucleated villages, often marked by architecturally significant medieval parish churches, through to a pattern of dispersed hamlets and isolated farms;
• the highly distinctive historic environment of the coastal zone including extensive submerged prehistoric landscapes, ancient salt manufacturing and fishing facilities, relict sea walls, grazing marshes, coastal fortifications, ancient ports and traditional seaside resorts;
• formal planned settlements of the early twentieth century, including the early garden cities, and factory villages;
• conservation areas and listed buildings, including domestic, industrial and religious buildings, and their settings, and significant designed landscapes;
• the rural landscapes of the region, which are highly distinctive and of ancient origin; and
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- the wide variety of archaeological monuments, sites and buried deposits which include many scheduled ancient monuments and other nationally important archaeological assets”.

Local Planning Policy

Cambridgeshire and Peterborough Structure Plan (2003-2016)

7.6 The strategic development plan policy framework was provided by Cambridgeshire and Peterborough Structure Plan. Following the approval of the East of England Plan by the Secretary of State on 12 May 2008, none of the policies from the Cambridgeshire and Peterborough Structure Plan 2003 remaining in force relate to Cultural Heritage.

Peterborough Local Plan (First Replacement) (2005)

7.7 The Local Plan policy framework for the application sites is provided by the adopted Peterborough Local Plan (First Replacement) (2005) and the emerging Peterborough LDF. The adopted plan policies relating to Archaeology and the Historic Environment are as follows:

“CBE1 - Archaeological remains of national importance
The city council will not grant planning permission for any development which may adversely affect the preservation or setting of scheduled or other nationally important archaeological remains”.

“CBE2 - other areas of archaeological potential or importance
Planning permission will only be granted for development which would have a detrimental effect on other areas of archaeological potential or importance if the need for development outweighs the intrinsic importance of the remains; and if satisfactory arrangements can be made for the preservation, or investigation and recording of those remains.

Where development is permitted, conditions will be imposed or planning obligations sought to secure satisfactory arrangements for the preservation or investigation and recording of the archaeological remains. Their removal or preservation in whole or in part, if justified, will be required prior to development”.

Compiled by David Lock Associates
November 2009
“CBE3 – development affecting a Conservation Area
The city council will require all proposals for development which would affect a conservation area (whether the site of the development is inside or outside the boundary) to preserve or enhance the character or appearance of that area”.

“CBE7 - development affecting the setting of a listed building
The city council will not grant planning permission for any new building within or beyond the curtilage of a listed building if it would be detrimental to the setting of that listed building. In considering such proposals, the design, size, height, location and orientation of the proposed development will be assessed”.

Peterborough LDF Core Strategy Preferred Options (2008) (draft policies)

7.8 Preferred Option CS16 is relevant:

“The historic built environment:

The Council will protect, conserve and enhance the historic environment throughout Peterborough, through the special protection afforded to listed buildings, Conservation Areas and Scheduled Ancient Monuments and through careful control of development that might adversely affect non-Scheduled, nationally important archaeological remains; other areas of archaeological potential or importance; buildings of local importance; and areas of historic landscape or parkland (including, but not limited to, those on the English Heritage register of Parks and Gardens of special historic interest). All new development must respect and enhance the local character and distinctiveness of the area in which it would be situated, particularly in areas with high heritage value.

There will be particular emphasis on the following:

- A presumption against development whose height, location, bulk or design would unacceptably detract from critical views of Peterborough Cathedral;
- The use of Conservation Area appraisals and associated management plans to ensure the preservation and enhancement of the individual character of each of Peterborough’s Conservation Areas;
- The identification and protection of important archaeological sites and historic environment features;
- The identification and protection of (non-listed) buildings of local importance; and
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- The avoidance of harm to the character or setting of Burghley Park, Milton Park, Thorpe Park, and the grounds and parkland associated with Bainton House, Ufford Hall, Walcot Hall and the Abbey Fields, Thorney.

Huntingdonshire Development Plan

7.9 The application sites border land and existing housing areas within Huntingdonshire (HDC) and relevant policies are identified below with reference to the saved polices contained in the Huntingdonshire Local Plan (1995) and the Local Plan Alteration (2002) as set out in the Direction from the Secretary of State issued in September 2007. HDC is well advanced with the preparation of its LDF and in addition to the above, policies should be considered from the HDC Core Strategy (2009) which was adopted in September 2009.

7.10 The following saved policies are relevant:

EN1 The District Council will not normally grant consent for the demolition of listed buildings of special architectural or historic interest and will seek to ensure that such buildings are kept in a good state of repair.

EN2 The District Council will require that any development involving or affecting a building of special architectural or historic interest has proper regard to the scale, form, design and setting of that building.

EN3 The District Council will consider sympathetically appropriate alternative uses for listed buildings where this is the only way to retain its historic or architectural character, providing that any alterations would not themselves detract from that character and subject to environmental and traffic considerations.

EN5 Development within or directly affecting conservation areas will be required to preserve or enhance their character or appearance.

EN6 In Conservation Areas, the District Council will require high standards of design with careful consideration being given to the scale and form of development in the area and to the use of sympathetic materials of appropriate colour and texture.

EN7 The District Council will not normally consider planning applications for outline planning permission in conservation areas or on sites adjoining listed buildings without the submission of supporting details of the proposed development.

EN8 Where demolition is to be followed by redevelopment, conservation area consent may be withheld until acceptable plans for the new development have been approved. If approved, the timing of the demolition will be strictly controlled.
EN9 Development will not normally be permitted if it would impair important open spaces, trees, street scenes and views into and out of Conservation Areas.

EN11 The District Council will normally refuse planning permission for development that would have an adverse effect upon a scheduled ancient monument or an archaeological site of acknowledged importance.

EN12 Planning permission for development on sites of archaeological interest may be conditional on the implementation of a scheme of archaeological recording prior to development commencing. The District Council would need to approve a written programme of such archaeological recording and satisfy themselves that a suitably qualified archaeological organisation would be retained to implement the programme. In appropriate cases it may be necessary to ensure the preservation of archaeological deposits within the development through sympathetic foundation design or changes to the development layout.

EN13 Where development is proposed in areas of archaeological potential the District Council may require planning applications to be accompanied by the results of an archaeological field evaluation or desk-based assessment to help define the character and extent of archaeological remains that may exist in the area.


7.11 The following policies from Huntingdonshire interim planning policy statement (2007) are relevant:

Policy G1 Open space and recreational land

A development proposal should not entail the whole or partial loss of open space within settlements, or of outdoor recreation facilities or allotments. There should be no harm to spaces which:

i. Contribute to the distinctive form and character of a settlement

ii. Create focal points within the built-up framework

iii. Provide the setting for important buildings or monuments

iv. Allow views into or out of a settlement

v. Form part of an area of value for wildlife or recreation, including areas forming part of a ‘green corridor’ for wildlife or recreation.
Any potential loss would not result in (or worsen) a shortfall of land used for informal or formal recreation, when assessed against the standards set out in the local development framework.

Any replacement facility (or enhancement of the remainder of the existing site) provides a net benefit to the community in terms of the quality, availability and accessibility of open space or recreational opportunities.

**Policy G2 Landscape Character**

A development proposal should respect and respond appropriately to the distinctive qualities of the surrounding landscape. A development proposal should:

- Avoid the introduction of incongruous or intrusive elements into views (by virtue of the development’s siting, scale, form, colour or use of materials)
- Employ landscape and boundary treatments that minimise the impact of any building on its setting
- Conserve and enhance natural or semi-natural vegetation characteristic of the area
- Retain historic landscape features, such as field patterns, drains and hedgerows
- Where harm to local landscape character as a result of necessary development is unavoidable appropriate mitigation measures will be required.

**Policy G3 Trees, hedgerows and other environmental Features**

A development proposal should minimise the risk of harm to trees, hedgerows or other environmental features of visual, historic or nature conservation value. Where such features lie within a development site, they should wherever possible be incorporated effectively within the landscape scheme. A development proposal should not result in:

- The loss of trees or woodland which are subject to a tree preservation order, or
- Which are considered worthy of protection;
- A threat to the continued well-being of trees or woodland;
- An unsatisfactory relationship with trees or woodlands;

Unless:
• There are sound arboricultural reasons; or

• The work would enable development to take place in the public interest, and would bring benefits that outweigh the loss of the trees concerned.

Where the benefits of the development outweigh the harm resulting from the loss of trees, hedgerows or other features of value, provision should be made for appropriate mitigation measures, reinstatement of features and/or compensatory planting, landscaping and habitat creation to ensure no net loss of valued features.

Policy G5 Historic Parks and Gardens

A development proposal within or affecting a historic park or garden will only be permitted if it would not have an adverse impact upon the historic importance or special features and characteristics of the registered historic park or garden.

Policy B7 Listed buildings

A development proposal affecting the fabric or setting of a listed building should:

i. Demonstrate a clear understanding of the building’s architectural and historic importance; and

ii. Not harm the overall character of the building or any features that contribute to its special interest; and

iii. Support the long-term preservation of the building and its setting through sensitive restoration, adaptation and re-use.

A development proposal for the total or partial demolition of a listed building will not be permitted unless:

i. It is demonstrated that the building is structurally unsound (for reasons other than deliberate damage or neglect) and is physically beyond reasonable repair; and/or

ii. It is demonstrated that it cannot continue in its present use, no viable alternative uses exist, and redevelopment would bring wider public benefits; and, in all cases:

iii. Detailed proposals for reconstruction or redevelopment have been received.

Policy B9 Sites of archaeological interest

A development proposal that could affect a site or area of archaeological interest should:
• Be accompanied by a suitable assessment of the nature and significance of any remains, so that the implications for the scheme can be considered

• Not cause harm to remains or their setting which are recognised or identified as being of national importance, and allow for their preservation in situ

• Make satisfactory arrangement for the physical preservation, recording or removal of other remains, as appropriate to their condition and significance, prior to development taking place.

**Huntingdonshire Core Strategy (see para 7.9)**

7.12 The following parts of policy CS1 of the Huntingdonshire Core Strategy are relevant:

*Policy CS 1*

*Sustainable development in Huntingdonshire*

All plans, policies and programmes of the council and its partners, with a spatial element, and all development proposals in Huntingdonshire will contribute to the pursuit of sustainable development.

Reflecting environmental, social and economic issues the following criteria will be used to assess how a development proposal will be expected to achieve the pursuit of sustainable development, including how the proposal would contribute to minimising the impact on and adaptability to climate change. All aspects of the proposal will be considered including the design, implementation and function of development. The criteria are:

• Preserving and enhancing the diversity and distinctiveness of Huntingdonshire’s towns, villages and landscapes including the conservation and management of buildings, sites and areas of architectural, historic or archaeological importance and their setting;

**Discussion**

7.13 National, regional, county and local planning policies all protect nationally important cultural heritage features. Should such remains be encountered within the application sites the implications of these policies would require the preservation and protection in situ of such remains through either design or not developing specific areas.

7.14 Where archaeological features of lesser importance are known or suspected the policies allow for evaluation and, where present, an assessment of their significance
will be made. Where it is considered that the significance of the remains is not sufficient to justify preservation in situ, policies require allowances for the preservation by record of the archaeological remains. Should such remains be present within the application sites then a programme of archaeological work could be secured by an appropriately worded planning condition.

**Assessment Methodology**

7.15 To inform the preparation of this chapter and in accordance with guidance in PPG16, an archaeological desk-based assessment was undertaken in 2005 across the application sites (CgMs Consulting *Archaeological Desk-Based Assessment for the Proposed Southern Expansion Land 2005* is included in ES Volume 3: Appendix 7.1).

7.16 A walkover of the application sites was undertaken as part of the archaeological desk-based assessment. It also included an assessment of the results of archaeological investigations undertaken in the area surrounding the application sites.

7.17 The following sources were consulted during the preparation of the archaeological desk-based assessment:

- Peterborough Sites and Monuments Record
- Peterborough County Records Office
- Cambridgeshire County Sites and Monuments Record
- Cambridgeshire County Records Office

7.18 Following discussions with Peterborough City Archaeologist, additional research was carried out in relation to the Scheduled Ancient Monument of Norman Cross Prisoner of War Camp (a report entitled *Norman Cross Scheduled Ancient Monument Report 2007* is included in Volume 3 of the ES at Appendix 8.2). The research was to establish the presence of possible features and structures beyond the designated area of the Scheduled Monument and in particular to location of the cemetery or cemeteries known to have formed part of the prisoner of war camp.

7.19 The following sources were consulted during the preparation of the additional Scheduled Ancient Monument assessment:

- The National Archives
- Peterborough Museum
• Berkshire Record Office

7.20 An Historic Hedgerow Assessment (Historic Hedgerow Assessment Report 2008 is included in Volume 3 of the ES at Appendix 7.6) was carried out across the sites to identify archaeological or historically important hedgerows according to the 1997 Hedgerow Regulations.

7.21 The following sources were consulted during the preparation of the assessment:

• Cambridgeshire Historic Environment Record
• Peterborough Historic Environment Record
• Cambridgeshire County Record Office (Huntingdon)
• Local Studies Library

7.22 Geophysical and Fieldwalking surveys were carried out in 2007-2008 to identify the extent and nature of archaeological activity within the application sites. These are included in ES Volume 3: Appendices:

• Appendix 7.2: Stratascan Geophysical Survey Report Great Haddon Peterborough January 2008;
• Appendix 7.3: Geophysical Survey Report Great Haddon Peterborough Phase 2, August 2008;
• Appendix 7.4: Albion Archaeology Great Haddon, Peterborough Archaeological Fieldwalking (Phase 1) November 2008

7.23 Where appropriate, these results have been subsequently targeted by archaeological evaluation, and detailed in ES Volume 3: Appendix 7.5 (Albion Archaeology Great Haddon, Peterborough Archaeological Trial Trench Evaluation (Phase 1) November 2008).

7.24 An assessment of the setting of the Scheduled Ancient Monument, Listed Buildings and the Yaxley Conservation Area has also been carried out, the results of which are included in this chapter.

Assumptions, Limitations and Technical Difficulties

7.25 The identified extent of archaeological activity within the application sites has been established on the assumption that the geophysical and fieldwalking surveys have positively identified all areas of potential archaeological activity. The majority of the application site areas were subject to the above described surveys, and although
limited areas were unavailable in time for inclusion with the ES, the extent of the survey work was sufficient enough to give confidence that all areas of significant archaeology have been identified.

7.26 It is proposed that these areas which were not available for survey will be subject to survey in the event of planning permission being granted.

**Impact Assessment Criteria**

7.27 The significance of any effect on the buried archaeological resource can be ascertained by undertaking an assessment of the importance of the resource. Straightforward judgements can be made for Scheduled Ancient Monument and the Listed Buildings that are protected by national legislation. However, more subjective, professional judgements must be made for the majority of undesignated sites. Nevertheless, the non-statutory criteria set out at Annex 4 to PPG16 provide relevant criteria to assist this process. Table 7.1 below summarises the criteria used for assessing the significance of heritage resources.

**Significance Criteria**

**Table 7.1: Significance criteria for evaluating importance of cultural heritage resources**

<table>
<thead>
<tr>
<th>Significance criteria for evaluating importance of cultural heritage resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very (Nationally) Important</td>
</tr>
<tr>
<td>• Scheduled Monuments.</td>
</tr>
<tr>
<td>• Listed Buildings (Grade 1 and 2)</td>
</tr>
<tr>
<td>• Archaeological sites and monuments of schedulable quality and importance, but undesignated.</td>
</tr>
<tr>
<td>• Previously unknown sites of schedulable quality and importance, discovered in the course of evaluation or mitigation (i.e. sites of demonstrable national or international importance).</td>
</tr>
<tr>
<td>Important</td>
</tr>
<tr>
<td>• Local authority designated heritage sites and landscapes: local listed buildings, conservation areas and archaeological sites of regional importance.</td>
</tr>
</tbody>
</table>
Significance criteria for evaluating importance of cultural heritage resources

| Minor importance            | • Archaeological sites and landscapes whose importance is limited by poor preservation and/or poor survival of contextual associations.  
|                            | • Sites and features of limited value in themselves or whose importance is limited. These may include those for which detailed information is available in primary sources and where archaeological investigation would add no significant additional information (e.g. some modern sites). |
| Not important              | • Archaeological sites or landscapes with no surviving archaeological component. |

Criteria for Appraisal of Magnitudes of Effects

7.28 The appraisal of the magnitude of effects will derive from the extent or proximity of the proposed works to the receptor, but will not take into account the importance or sensitivity of the receptor which is taken into account in assessing the overall significance of effect (see Table 7.2 below).

Table 7.2: Criteria for appraisal of magnitude of effects on heritage resources

<table>
<thead>
<tr>
<th>Criteria for appraisal of magnitude of effects on heritage resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adverse (Very High, High, Medium, Low)</td>
</tr>
<tr>
<td>• Demolition of historic (listed) building;</td>
</tr>
<tr>
<td>• Loss of archaeological site in whole or part;</td>
</tr>
<tr>
<td>• Intrusion on setting of listed building or up-standing field monument;</td>
</tr>
<tr>
<td>• Change in noise or visual ambience;</td>
</tr>
<tr>
<td>Negligible/none</td>
</tr>
<tr>
<td>• No direct effect on resource;</td>
</tr>
<tr>
<td>• No observable change in setting or ambience of listed building or upstanding monuments</td>
</tr>
</tbody>
</table>
Criteria for appraisal of magnitude of effects on heritage resources

| Beneficial (Very High, High, Medium, Low) | • Increase in archaeological knowledge;  
• In the case of up-standing field monuments, enhancement of existing poor noise or visual ambience by positive work (e.g. screening) or removal of source (e.g. road closure) |

Assessing the Significance of the Effects

7.29 The severity of effect is dependent on:

- The importance of the cultural heritage receptors affected; and
- The magnitude of the effects.

7.30 This assessment will be guided by the matrix in Table 7.3, which demonstrates how effects will be defined:

Table 7.3: Tabular Matrix of Effects – Significance of Effects

<table>
<thead>
<tr>
<th>Importance of Resource</th>
<th>Adverse (Very High to High)</th>
<th>Adverse (Medium to Low)</th>
<th>Negligible</th>
<th>Beneficial (Medium to Low)</th>
<th>Beneficial (High to Very High)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Important</td>
<td>Major</td>
<td>Moderate</td>
<td>Negligible</td>
<td>Moderate</td>
<td>Major</td>
</tr>
<tr>
<td>Important</td>
<td>Moderate</td>
<td>Moderate/Minor</td>
<td>Negligible</td>
<td>Moderate/Minor</td>
<td>Moderate</td>
</tr>
<tr>
<td>Minor Important</td>
<td>Minor</td>
<td>Minor</td>
<td>Negligible</td>
<td>Minor</td>
<td>Minor</td>
</tr>
<tr>
<td>Not important</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
</tbody>
</table>
Baseline Ground Conditions

Geological and Topographical Factors

7.31 The solid geology for the application sites is Oxford Clay and Kellaway Beds, which comprise clay and sand (British Geological Survey Sheet 172).

7.32 High ground is situated in the southwest corner of the Great Haddon Core Area application site, in the area surrounding Norman Cross Camp. The camp itself is situated on a spur of high ground (up to a maximum of 40m Above Ordnance Datum (AOD)). From this high ground the site slopes downwards in a north-easterly direction. Low ground is situated in the north-east corner of the Great Haddon Core Area application site at approximately 11m AOD. The central and north-western areas of the application sites gently undulate between 15-25m AOD.

7.33 A large pond is situated in the northeast of the Great Haddon Core Area application boundary with a smaller linear pond along the north-eastern extent. These are associated with former clay extraction. Two main drainage channels run though the centre of the Great Haddon Core Area application site in a northeast to southwest orientation. Additional smaller drainage channels are present throughout the sites.

Archaeological Resource

7.34 The desk-based assessment confirmed that the statutory registers held by English Heritage indicate there are no Registered Battlefields or Historic Parks and Gardens within or close to the application sites. There are no Scheduled Ancient Monuments (SAM) within the application sites. However, SAM CB268 lies to the immediate southwest of the Great Haddon Core Area application site. The SAM is Britain’s first prisoner of war camp and was established at the end of the 18th century to accommodate French prisoners from the Napoleonic Wars. The surviving above ground remains comprises a series of earthworks, together with part of the enclosing wall. Both the commandant’s house, now known as Norman House, and the Old Governor’s House including the attached Barrack Masters Lodge, are listed buildings (Grade II). The listed building registers of both Peterborough City and Cambridgeshire County Council indicate that the application sites do not lie within a conservation area (Yaxley Conservation Area lies to the east of the Core Area application site within the jurisdiction of Huntingdonshire District Council). In addition to the two listed buildings mentioned above, there are three other listed structures located to the immediate south and east of the Great Haddon Core Area application site. These comprise the Eagle Monument, which has been moved from its original location to the west of the application site, and two mileposts, one on the A15 and one on the Old Great North Road to the east of the SAM. All of the above...
buildings fall within Huntingdonshire District (see ES Volume 2 Figure 7.1 for locations).

7.35 Although the Desk-based Assessment revealed no known buried archaeological sites within the application sites, it did identify a high potential for Prehistoric, Roman and later activity based on limited artefactual evidence and examples of identified sites from the wider area in similar topographical locations. For the Prehistoric period this activity is likely to be situated on the high ground. The area to the north and along the western boundary of the application sites has considerable potential to contain evidence of late Iron Age and Roman period activity which may be masked below areas of former ridge and furrow and colluvial build up in the valley bottom south of Alwalton Hill. Iron Age and Roman period finds can be expected on the fen edge and beneath the later silts relating to activity prior to the rise in water levels. The assessment also concluded that Post Roman and Anglo-Saxon evidence is sparse, but sufficient evidence has been recorded from the Nene valley to the north to suggest the potential this period to be recovered from the high ground within the Great Haddon Core Area application site. The assessment suggested that evidence for the Medieval period was likely to be confined to agricultural activity as settlement tends to cluster around the existing villages.

7.36 During the Post-Medieval period the assessment confirmed that the assessment area was used for agriculture, with a notable exception. This is the Napoleonic Prison of War Camp located to the immediate southwest of the Great Haddon Core Area application site. This feature survives as earthworks and is a scheduled monument (SAM CB268).

7.37 While there is potential for archaeology within the sites, it is not such that it suggests the survival of sites of national importance, and archaeology should not in this respect provide an absolute constraint to development. There are no ‘Sites of High Archaeological Potential’, defined in the Peterborough Local Plan within the application sites. The application sites themselves are not subject to any archaeological designation.

7.38 As a result of the findings of the desk-based assessment a programme of archaeological work was agreed with the City Archaeologist at Peterborough City Council. A series of geophysical surveys were conducted across the application sites in 2007-2008. A reconnaissance geophysical survey was conducted across 184ha of the application sites (Stratascan Geophysical Survey Report Great Haddon Peterborough January 2008, Appendix 7.2); the subsequent results were targeted with approximately 26ha of detailed geophysical survey (Stratascan Geophysical Survey Report Great Haddon Peterborough Phase 2, August 2008, Appendix 7.3)
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(Volume 3 of ES). This identified four main areas of archaeological activity as well as periphery features. Trial trenches were excavated, targeted at the areas of archaeological activity as well as ‘blank’ areas (to confirm the validity of the results of the geophysics). The results of the geophysics and trial trenching revealed the presence of Iron Age and Roman settlement activity, a single Saxon sunken-featured building, medieval or post-medieval ridge and furrow across the majority of the Great Haddon Core Area application site and post-medieval or modern features that may relate to the prisoner of war camp (Albion Archaeology Great Haddon, Peterborough Archaeological Trial Trench Evaluation (Phase 1) November 2008, Appendix 7.5) (Volume 3 of ES).

7.39 Following discussions with English Heritage (which included Peterborough City Council and Cambridgeshire County Council), CgMs Consulting also contributed to the detailed appraisal of the Norman Cross SAM completed by LDA Design during 2007 and the resultant report has been submitted to English Heritage, Peterborough City Council and Cambridgeshire County Council. A detailed geophysical survey was carried out around the northern and eastern extents of the SAM to assess the presence of archaeological remains, covering an area of 54ha. Trial trenches were excavated to further elucidate on the results of the geophysical survey. These confirmed that no structures relating to the camp survive outside of the scheduled area. No conclusive indication of any buildings associated with the camp was indentified during the trial trenching. A single post-medieval post-hole was identified to the north of the camp and a second undated post-hole to the east, these were the only structural features revealed adjacent to the camp. A linear feature first indentified as a cropmark on aerial photographs was also partially identified within the geophysics and later confirmed by the trail trenching as a possible earlier road between Yaxley and Norman Cross. Quarrying was recorded by the trial trenching across an extensive area to the east of the camp; the majority of the post-medieval finds recovered from the backfill came from a trench nearest to the camp, which may suggest contemporaneity. The quarry activity may be associated with the construction of the camp or relate to the construction of the road (A15).

7.40 The location of the prison cemetery today has not been positively identified; however documentary evidence suggests that the main cemetery outside the depot site was situated to the north of the prison on the western side of Peterborough Road (A1(M)), outside the application sites. The cemetery field may be identified by the original location of the memorial eagle, which has now been obscured by the widening of the A1 (M), and relocated along the A15 to the southwest corner of the camp. During the early 20th century, the location of the cemetery was known to the locals and was kept
fresh by the uncovering of human remains by agricultural activity and the faint presence of mounds associated with the burials were still visible in the early 1900s.

7.41 The scoping report issued to Peterborough City Council in June 2008 addressed the potential for significant effects on archaeological and cultural heritage assets. The comments received from the scoping report in July 2008 confirmed the need to assess the setting of the Scheduled Ancient Monument of Norman Cross Prisoner of War Camp, the impact of development upon the setting of the listed buildings surrounding the camp and the Yaxley Conservation Area with its landmark spire of the parish church of St. Peter and the gathering of sufficient information regarding the extent and character of the archaeological remains within the application sites.

7.42 The geophysical survey identified possible areas of quarry activity beyond the northern boundary of the SAM, trial trenching later revealed these features to be associated with sand and gravel deposits and discrete cut features dating to the Iron Age. A series of possible cut features of archaeological origin were identified in the south of the Great Haddon Core Area application site, to the east of the SAM. A discrete area of curvilinear cut features to the northwest of the SAM represented an area of prehistoric activity. Three additional areas of possible archaeological settlement activity were identified within the Great Haddon Core Area application site (areas B, C and D). Areas C and D representing complex multiphase activity possible associated with the late Prehistoric/early Romano-British period.

7.43 Archaeological fieldwalking of some 40ha of the Great Haddon Employment Area application site was undertaken in November 2008 (Albion Archaeology Great Haddon, Peterborough Archaeological Fieldwalking (Phase 1) November 2008, Appendix 7.4) (Volume 3 of ES). The results revealed no significant concentrations of artefacts that would indicate the presence of buried archaeological remains.

7.44 Trial trenching took place from August to October 2008 (Appendix 7.5 of Volume 3 of ES). An initial 112 trenches were positioned within the Great Haddon Core Area application site (areas A-E). Seven additional trenches were opened at the request of the Peterborough City Archaeologist within these areas. The trial trenching remains date primarily to the Iron Age and Roman periods, a single Saxon sunken-featured building was identified within Area E along with post-medieval or modern features that may relate to the scheduled prisoner of war camp.

7.45 Seven trenches were excavated in Area A, the depth to archaeology ranged between 0.4-0.9m. The area revealed little archaeological potential.

7.46 Six trenches were excavated in Area B, the depth to archaeology ranged between 0.38-0.6m. The trenches revealed the remains of a Middle to Late Iron Age
settlement/farmstead, the trenching supported the layout of the ditches suggested by the geophysical survey. Settlement activity seems primarily to have been enclosed by substantial ditches, up to 3m wide and 0.9m deep. The identified settlement is likely to be of regional significance.

7.47 Twenty-eight trenches were excavated in Area C, the depth to archaeology ranged between 0.3-0.57m. Area C contained the dense remains of a substantial Roman settlement which appears to have a significant industrial component. Evidence of Iron Age activity was revealed in the north-eastern quarter of Area C, the original layout of the Iron Age remains was obscured by subsequent features.

7.48 The remains identified comprise a series of square or sub-rectangular enclosures, all with subdivisions. The ditches defining the enclosures varied considerably in size. Despite the depth of the larger ditches (at least 0.8m), no waterlogged deposits were identified. However, it is possible that waterlogged deposits may occur within large, discrete features such as ponds or water pits.

7.49 No in situ masonry structures were recorded, although quantities of irregular shaped blocks of limestone were present in several features. Its presence in significant quantities may be an indication of masonry structures lying beyond the limit of the trial trenches. No kilns were identified within the trenches, but kiln furniture was recovered from three trenches. The presence of the kiln furniture combined with the quantity of locally made pottery strongly suggests the presence of kilns within Area C. This settlement activity is thought to be of regional significance.

7.50 Thirty-nine trenches were excavated in Area D, the depth to archaeology ranged between 0.38-0.7m. Area D contained an extensive area of Iron Age and Roman settlement, comprising a series of enclosures, pits and ditches. The earliest feature identified within Area D was an Iron Age pond, which was at least 1.2m deep and contained waterlogged deposits. The extensive spread of Roman activity was identified in the northern half of Area D and broadly datable to the 2nd-4th centuries. No buildings were conclusively identified; a key-hole shaped kiln was recorded in the north of Area D. This settlement activity is thought to be of regional significance.

7.51 Thirty-nine trenches were excavated in Area E, the depth to archaeology ranged between 0.25-0.66m. Iron Age remains were on a smaller scale, comprising a maximum of two enclosures and a single roundhouse, this is believed to be of local or regional significance. No Roman remains were identified at all in Area E. A single Saxon sunken-featured building was identified to the east of the SAM, the presence of this single building is currently of local significance, but the presence of further buildings would be of regional significance. No conclusive indication of buildings
associated with the SAM was identified. Quarrying was recorded by the trial trenching across an extensive area to the east of the camp; the majority of the post-medieval finds recovered from the backfill came from a trench nearest to the camp, which may suggest contemporaneity. The quarry activity may be associated with the construction of the camp or relate to the construction of the road (A15), this activity may be of regional significance dependant on whether it is associated with the scheduled prisoner of war camp. The linear feature first indentified as a cropmark on an aerial photograph was later confirmed by the trail trenching as a possible earlier road between Yaxley and Norman Cross and is considered to be provisionally of local significance.

7.52 The trial trenching results have corresponded very well with the geophysical results and together have provided an accurate indication of the remains lying within the five areas of detailed survey (areas A-E). The magnetic susceptibility reconnaissance technique has also largely shown to have been successful in determining the limits of greater archaeological activity, ensuring reasonable confidence in identifying the areas of higher archaeological potential compared to the remaining areas of low susceptibility.

7.53 The historic hedgerow assessment identified four archaeologically and historically Important Hedgerows as defined by the 1997 Hedgerow Regulations (Appendix 7.6). Two of these hedgerows relate to former parish boundaries and the other two are associated with the SAM. None of these hedgerows will be affected by the proposed development.

The setting of the Listed Buildings and SAM

7.54 With regard to issues of setting, in terms of the historic assets, consideration needs to be had of what constitutes the setting of the SAM and the listed buildings. Taking into account the wider landscape, consideration is also required of the setting of the Grade I listed parish church of St. Peter in the neighbouring village of Yaxley, parts of which are designated as a Conservation Area.

7.55 Turning to the SAM and listed buildings associated with Norman Cross, the location of the historic assets has had, in effect, two settings; the original and the modern. The original setting of the SAM and the adjacent listed buildings was that of a prison camp erected in open countryside in effect standing in isolation whilst the present day setting is one of a small group of buildings located within a well wooded enclave adjacent to an open area of grazed pasture in which there are mature deciduous trees bordered along two sides by major roads with extensive arable land beyond the SAM to the north and east.
7.56 By way of background in order to more fully understand the original setting of the SAM and its associated listed buildings it is useful to note the history of the site in brief. The camp was established in 1796 as the first purpose built prisoner-of-war camp, although at the time such facilities were known as ‘depos’. It was built to hold French prisoners captured during the Napoleonic War. At its height over 7,000 prisoners were held at Norman Cross.

7.57 The need for such camps arose from the decision to capture and hold all opposing forces during the Napoleonic War. Military commanders had until that time only allowed the capture of officers and nobles and this marked a significant change in the tactics of warfare not witnessed in previous conflicts.

7.58 The location and construction of depots was the responsibility of the Transport Office, of which Norman Cross was one of three specifically chosen locations, the others being Dartmoor and Perth. Norman Cross was ideally positioned next to a good road network within easy reach of a port albeit far enough away to make escape difficult, had a good and reliable water supply as well as having local markets nearby for provisions. It is interesting to note that a direct result of the depot being built, the market in Yaxley was revived in order to supply fresh produce to the depot.

7.59 The urgency to house prisoners meant that the prison required the erection of prefabricated and cheap buildings, in effect the development of ‘pre-fabricated’ housing and accommodation. In the case of Norman Cross the barrack building frames were all constructed in London prior to erection on site. The first prisoners arrived in April 1797.

7.60 The depot was laid out on a grid pattern with four quadrants, each surrounded on all sides by a high wooden fencing. Within each quadrant were four two-storey timber barrack buildings which housed the prisoners. In the centre of the depot was an armed octagonal watch tower from which it would have been possible to see all four quadrants. The boundary of the entire camp was encircled by a wide ditch and timber perimeter fence, which was later rebuilt in brick following an attempted escape. The painting titled ‘A view of the prisons of war situated at Norman Cross, Huntingdonshire’ illustrates the layout of the camp during the early 19th century.

7.61 The garrison troops were stationed outside the depot in barracks to the east and west which also included additional utility buildings such as kitchens, sheds and officers’ buildings. The present listed buildings date from the period of the camp; Norman House served as the Camp Commandant’s accommodation whilst the Old Governors House and Barrack Masters Lodge housed other camp officials.
7.62 Parts of the brick prison wall survive within the grounds of Norman House whilst the collection of service buildings around the Governors Building have been converted and altered. Those structures and dwellings do not meet the criteria set out in PPG15 on curtilage listed buildings and are therefore not statutorily protected.

7.63 The depot had a relatively short-lived history and closed in 1814 and the buildings and materials were sold allowing the site to be cleared in June 1816, barely 20 years after it was established.

7.64 Understanding how the depot developed is important in order to understand what the original form and setting of the prison camp was and how that setting swiftly changed with the prison camp having been cleared and left as an area described as a ‘parkland’ setting with a collection of domesticated properties located alongside two main roads. In this respect it is the latter environment that is more relevant to any assessment of the impact upon the SAM and the listed buildings that the proposed development may have. As a result it is apparent that the main impact will be upon the SAM rather than the listed buildings.

7.65 The present environment as described above includes two main roads. The historic analysis of the site shows that the depot was located at Norman Cross specifically because it had good connections to the transport network of the day. It is clear that those transport routes have been upgraded which have had major implications both on the setting and the SAM. The high volume of traffic that use the modern road network means that vehicle noise is a major intrusion into the site and the properties that adjoin it. Physically the A1(M) and the parallel New Road cut across the northwest corner of the original depot site which significantly compromises the integrity of the historic site.

7.66 The built development along the western boundary has also had a detrimental impact upon the setting as well as the appearance of the SAM. It has led over time to the erosion of the defined boundary of the SAM along this edge and although, in parts, it is well screen from within the SAM it forms an unfortunate collection of buildings of little merit.

7.67 Overall the existing setting has changed from that of a fortified prison camp in an isolated location to one of an area of open ‘parkland’ in a location that is squeezed into a corner bordered by modern roads, built development of little merit and modern intensive agricultural practices. There is a mix of architectural styles surrounding the former depot, not of all which reflect the historic significance of the SAM. The collection of buildings to the east of Norman House have not all been sensitively renovation or converted and as such this has weakened their significance as
buildings of historic merit, and compromised the overall setting of the SAM and listed buildings.

7.68 In assessing the importance of the setting of the listed buildings, the well stocked gardens with mature trees have created dense screens that obscure most views of the properties along the A15 as well as those from the north. In this respect their setting can be considered as being confined to their immediate location which only includes the SAM as part of the wider landscape setting.

7.69 The setting of the two listed mileposts has remained largely unchanged over time as they have remained in situ alongside the roads. The Eagle Monument is different in that it has been relocated from its original position adjacent to the A1(M), as part of the road widening scheme. As a result there remains an issue in regard to whether the monument should still retain its listed status. Regardless of this however, the setting of the monument has been changed and now it resides further south next to the A15 and a roadside layby where it is easily accessible for visitors.

7.70 As described above, the Grade I listed Church of St. Peter and the conservation area of Yaxley need to be assessed in terms of setting.

7.71 Yaxley is located to the east of Norman Cross. It is a large village comprising the historic core along Main Street, designated as a conservation area in October 1974, and areas of extensive housing. The village is situated on the escarpment between the Fens and higher arable land to the north.

7.72 In regard to the proposed expansion of Peterborough, careful consideration has taken place as to the setting of the village and the church. It is clear that Yaxley is located well to the south of Peterborough and as such is clearly identifiable as a settlement in its own right. Expansion, in the manner proposed, will have an impact upon that separation and it is therefore important to ensure that it remains, at least visually separate to any new development from the north.

7.73 An assessment of the setting of the conservation area showed that it is well screened from the north by later village developments and it is only the prominence of the church spire as a landmark that is at risk from being adversely affected by the proposed development along the ridge of the escarpment.

Potential Impacts

7.74 The Development Framework Plan ref: PST021/DFP/01 Rev I displays the proposed mixed use development of the application sites. The areas of archaeological activity identified from the geophysical surveys and trial trenching lie within or partially within
the residential or district/neighbourhood development. During the construction phase, the stripping of subsoil, diversion of services, mass excavations for foundations, landscaping and ancillary works will have an adverse affect on below ground archaeology present within the application sites.

7.75 There will be no effects on archaeological resources once the proposed development is completed and occupied (all potential effects will have occurred and been mitigated at the construction phase).

7.76 The Development Framework Plan indicates an area of open space between 90m and 100m+ wide will be left around the north and east sides of the SAM. This will comprise ‘parkland areas to the north and informal sports areas to the east’. Following discussions with English Heritage, Peterborough City Council and Cambridgeshire County Council it has been agreed that this proposal will provide a beneficial impact on the setting of the SAM.

7.77 There will be no impact upon the historic hedgerows within the proposed development.

7.78 As set out above the setting of the listed buildings has already undergone change. The buildings are set well back from the edge of the proposed development and it is only the impact of those areas along the eastern side of Norman Cross that may affect the setting of the listed buildings. The continuation of or expansion of the ‘parkland’ setting into the proposed development north and east of the SAM will provide a buffer zone which will effectively pull any development away from the historic buildings, and as with the SAM described above will provide a beneficial impact upon the setting.

7.79 There will be no impact upon the listed mileposts and monument.

7.80 The Development Framework Plan indicates that an area of open space will be created between the diverted A15 and the entrance to the village. The road will be rerouted north and development predominantly set along the west and north sides of the new road. This will maintain a visual separation at this point, which will be beneficial for the village, the conservation area and listed church.

7.81 In regard to the impact of the proposed development along the A15 escarpment, the development is to be set 30-40m back from the road edge. There will be open space between the existing tree-line and the new housing. Although some additional planting may take place to reinforce gaps and sections of hedge-line that have deteriorated there is a need to ensure a degree of transparency along this sight line.
7.82 The main impact on the conservation area will come from traffic implications such as street lighting, noise, volume of traffic.

Mitigation Measures

7.83 The archaeological surveys and fieldwork have identified four distinct areas of archaeological activity as well as periphery features within the application sites. None of the sites are considered to be of such archaeological significance as to require preservation in situ and thereby prevent development. It is proposed that a programme of archaeological work will be carried out prior to the start of construction to record any archaeological features from within the site. This work will preserve the archaeological features by record, as specified in PPG16. We suggest this work should be secured through a condition attached to the planning permission. Paragraph 30 of PPG16 suggests the following wording for such a condition:

"No development shall take place within the area indicated [this would be the area of archaeological interest] until the applicant has secured the implementation of a programme of archaeological work in accordance with a written scheme of investigation which has been submitted by the applicant and approved by the Planning Authority."

7.84 The proposed Development Framework Plan shows that the areas of development adjacent to the SAM, listed buildings and conservation area will be allocated to housing and this will be no higher than two storeys. The areas between the boundary of the SAM and the development will be planted in a manner which will reflect a 'parkland' setting, similar in appearance to the existing SAM. Likewise the eastern boundary of the SAM will incorporate informal pitches which will secure a more open setting along this edge.

7.85 In regard to those measures, there remains a requirement to set any development back from the existing and proposed A15 and to divert the road to north away from the village, leaving a distinct visual and physical separation between the area of urban expansion and Yaxley. This will ensure any harm to the setting of Yaxley is minimised.

Residual Impacts

7.86 The preservation by record of any archaeological deposits within the sites prior to the start of construction will enhance the archaeological record of the region. This is a positive long term benefit.
7.87 To the north and east of the SAM a new ‘parkland’ setting will be created which will create an appropriate semi-wooded environment between the proposed development and the existing SAM and listed buildings. The agricultural landscape will be turned into public open space, which over time will provide an appropriate setting for the SAM.

7.88 Access roads will be formed off the A15 into the development and one will be formed to the east of the listed buildings. This will affect the immediate environment of the listed buildings in terms of noise and lighting but the A15 will be modified to lessen the impact of speed and noise that the additional traffic will generate and in this regard the proposed works will help to reduce the noise currently experienced along this road.

7.89 The change from a rural landscape to that of a construction site will have a short term impact upon the setting of the SAM and listed buildings. The long term effects will have mitigation measures put into place as discussed above. These will reduce the impact of the proposed development when viewed from the SAM, listed buildings and the land to the south.

7.90 The setting of the SAM and listed buildings will be initially affected by noise and dust. The creation of the access road from the A15 into the Core Area development site will have a physical impact upon the immediate setting of the listed buildings. These effects can be mitigated against by screening along the new road and the formation of the parkland to the east of the listed buildings.

7.91 There will be no adverse impact upon the physical fabric of the SAM or the listed buildings. There will however be a moderate impact upon its setting. The implementation of a landscaping scheme and the sensitive design of new transport routes will minimise the impact and enable the development to proceed without causing unacceptable harm to the already compromised setting.

7.92 Interpretation boards are proposed to be installed (describing the significance of the SAM and the listed buildings) as part of a circular walk from the monument. Although access onto the SAM will not be possible, this will enhance the visitor’s understanding of the site. This is a long term benefit.

**Cumulative and Interactive Effects**

7.93 While the permanent loss of the archaeological deposits both here and at other nearby development sites such as Stanground and Alwalton Hill, the preservation by record of the archaeological deposits within the site prior to the start of construction
will enhance the archaeological record of the region. This is a positive long term benefit.

7.94 The installation of interpretation panels as part of a designated walk will enable the visitor to gain a better understanding of the significance of the SAM and the buildings which surround it. This will be a benefit to both the visitor and those who live in the new development.

7.95 The realignment of the A15 through the Great Haddon site will maintain the separation between Yaxley and the development and will allow for the formation of a new entrance into the village enhancing both its significance and its setting. The new road design will have the added benefit of reducing speed and therefore noise which will enhance the environment of Yaxley and the listed buildings which is currently blighted by noise intrusion.

7.96 The inhabitants of Yaxley will be able to benefit from the facilities within the new development whilst maintaining a separate identity to that of the proposed urban extension. This will be a long term benefit for the village.

### Summary Matrix of all Impacts Before Mitigation

<table>
<thead>
<tr>
<th>Issue</th>
<th>Description of impact</th>
<th>Geographical significance</th>
<th>Impact, Significance</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Archaeology and Historic Buildings</td>
<td>On Completion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Removal of known archaeological deposits through construction</td>
<td></td>
<td>Moderate adverse</td>
<td>Minor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Permanent</td>
</tr>
<tr>
<td></td>
<td>Removal of as yet undiscovered archaeological deposits through construction</td>
<td></td>
<td>Moderate adverse</td>
<td>Minor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Permanent</td>
</tr>
</tbody>
</table>

Compiled by David Lock Associates
November 2009
## Issue

<table>
<thead>
<tr>
<th>Description of impact</th>
<th>Geographical significance</th>
<th>Impact, Significance</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effect on the Setting of Scheduled Monument</td>
<td>Negligible</td>
<td>Minor</td>
<td>Permanent</td>
</tr>
<tr>
<td>Effect on the Setting of Listed Buildings/Structures</td>
<td>Negligible</td>
<td>Minor</td>
<td>Permanent</td>
</tr>
<tr>
<td>Effect on the Setting of the Conservation Area</td>
<td>Negligible</td>
<td>Minor</td>
<td>Permanent</td>
</tr>
</tbody>
</table>

### Summary of Mitigation and Enhancement Measures and Residual Effects

<table>
<thead>
<tr>
<th>Issue</th>
<th>Mitigation/enhancement measures</th>
<th>Residual Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Archaeology and Historic Buildings</td>
<td>On Completion</td>
<td>Enhance archaeological record of the area - Positive long term benefit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description of impact</th>
<th>Mitigation/enhancement measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removal of archaeological deposits through construction</td>
<td>Archaeological excavation and recording</td>
</tr>
</tbody>
</table>

Compiled by David Lock Associates
November 2009
<table>
<thead>
<tr>
<th>Issue</th>
<th>Description of impact</th>
<th>Mitigation/enhancement measures</th>
<th>Residual Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effect on the Setting of the Scheduled Monument</td>
<td>Formation of parkland setting around boundaries of SAM with interpretation panels as part of designated walk.</td>
<td></td>
<td>Enhanced setting for SAM, physical and visual break between the historic asset and the new development. Greater interpretation of the SAM positive long term benefit</td>
</tr>
<tr>
<td>Effect on the Setting of the Listed Buildings/Structures next to the SAM</td>
<td>Formations of parkland setting around boundaries of SAM.</td>
<td></td>
<td>The provision of additional buffer zone will provide an enhanced setting for the listed buildings.</td>
</tr>
<tr>
<td>Effect upon the Setting of the Yaxley Conservation Area</td>
<td>Divert A15 to north and create open space to north of village and ‘gated’ entrance to the village. Ensure housing along the A15 is two storey and set back from the existing treeline.</td>
<td></td>
<td>The measures will ensure a visual and physical separation between Yaxley and the development.</td>
</tr>
</tbody>
</table>
8.0 LANDSCAPE AND VISUAL AMENITY

Introduction and Scope of Assessment

8.1 This chapter of the Environmental Statement considers landscape and visual matters. It describes the baseline condition of the application sites and considers the effects of the proposed development on the existing landscape and visual environment. All references to the ‘site’ within this Chapter relate to the area of both applications unless otherwise stated.

8.2 Specifically the assessment addresses:

- The landscape planning context for the development with reference to landscape planning policy and landscape designations relevant to the site;
- The context and landscape character of the site and its relationship with surrounding land uses;
- The visual prominence of the site within the local landscape including the location and sensitivity of key visual receptors;
- The landscape strategy for the site including the need for specific mitigation to minimise adverse landscape and visual effects and create a high quality setting for new development.
- The significance of landscape and visual effects arising from the proposed development in both the short and longer term;

8.3 The assessment has been undertaken by LDA Design, landscape and environmental consultants. LDA Design has a detailed knowledge of the Peterborough landscape and has provided landscape and ecological consultancy advice to O&H Properties at Hampton since 2001.

Reference Material and Assessment Methodology

8.4 The landscape and visual assessment has been completed with reference to the guidance set out in the Guidelines for Landscape and Visual Impact Assessment (Second Edition) 2002, published jointly by the Landscape Institute and the Institute of Environmental Management and Assessment. In addition, the methodology recommended for landscape character assessment in the Countryside Agency’s Landscape Assessment Guidance 2002 has been employed where relevant.
8.5 The assessment considers the direct effects of the proposed development on existing landscape features, the indirect effects on landscape character, and the visual effects on key viewpoints and visual receptors. Throughout the evolution of the development proposals for Great Haddon, the likely landscape and visual effects of the proposals have been taken into account. Mitigation measures have therefore been designed into the proposals from the outset and are fully integrated into the scheme design. The landscape and visual effects presented in this Chapter are therefore the effects of the proposals with mitigation measures in place and the significance of any residual effects is identified where relevant.

8.6 It is also recognised that built development of the scale proposed at Great Haddon will take several years to complete as part of a phased development programme and that much of the mitigation for landscape and visual effects involves the introduction of new woodland and buffer planting which will inevitably take some years to reach its full height and effect. For this reason, the assessment of visual effects has been undertaken at completion of the development (year 1) and at year 10 following completion. Effects related to initial construction operations across the site have also been assessed.

8.7 The assessment has been informed by a number of visits to the site and surrounding area during 2007 and 2008. These visits were used to update earlier surveys completed in 2005 to provide an accurate baseline record of the site. Photographs used to record the conclusions of the visual survey and assessments were taken during April and November 2008 using an SLR camera with a 50mm focal length lens.

EIA Scoping

8.8 The scope and approach to the landscape and visual assessment accords with the approach and methodology set out in the EIA Scoping Report submitted to Peterborough City Council (PCC) in June 2008. The assessment also addresses the points raised in the scoping response from PCC dated 25 July 2008 in relation to landscape and visual matters. (A summary of the comments made by PCC on the Scoping Report is contained in ES Volume 3: Section 1, including how the ES has been adapted in response to these comments).

Assessment of Significance

8.9 The significance of landscape and visual effects has been determined by assessing the sensitivity of the landscape or visual receptor against the magnitude of the change to that receptor resulting from the development proposed. For example, a slight change to a highly sensitive view may be more significant than a major change to a
view of low quality or sensitivity. Similarly, a slight change to a highly valued and protected landscape is likely to be more significant than a substantial change to a low quality or relatively ordinary landscape.

8.10 In accordance with this approach, the significance of landscape and visual effects has been determined in accordance with the following categories of significance: Major, Moderate, Minor, Negligible/No Effect. The assessment methodology is set out fully in Appendix 8.1.

8.11 It should be noted that in each case landscape and visual effects can be both adverse or beneficial. ‘No Effect’ is used where there is an absence of effect or where an effect is judged to be so small as to be negligible.

**Reference Material**

8.12 The following documents have been referred to in the preparation of this Chapter:

- *Peterborough Core Strategy Preferred Options Report* (2008);
- *Peterborough Local Plan First replacement* (2005);
- *Peterborough Green Grid Strategy* (2006);
- *Peterborough Landscape Character Assessment* (2007);
- *Peterborough City Council’s Supplementary Planning Guidance ‘Geological Conservation and Development’* (2000);
- *Huntingdonshire Core Strategy – (Submission version 2008)*;
- *Huntingdonshire Local Plan 1995 and Local Plan Alteration 2002*;
- *Huntingdonshire Landscape and Townscape Assessment* (2007)
8.13 Plans and Figures referred to below are included in the ES Volume 2: Plans. Other supporting documents as listed below are included in the ES Volume 3: Appendices, specifically Section 8.1 to 8.4:

Figures:
- Figure 8.1 Site location and context
- Figure 8.2 Environmental designations
- Figure 8.3 Norman Cross - Scheduled Ancient Monument Survey
- Figure 8.4 Landscape character areas
- Figure 8.5 Topography
- Figure 8.6 Landscape survey
- Figure 8.7 Vegetation survey
- Figure 8.8 Visual analysis
- Figure 8.9 Viewpoint photographs
- Figure 8.10 Yaxley edge – Visual appraisal
- Figure 8.11 Tree retention and removal
- Figure 8.12 Hedgerow Strategy
- Figure 8.13 Public Access

Appendices
- Appendix 8.1 Assessment methodology
- Appendix 8.2 Norman Cross Scheduled Ancient Monument Report
- Appendix 8.3 Arboricultural Survey and Pre Development Assessment
- Appendix 8.4 Summary of Hedgerow Survey Results

Supporting Information

Great Fen Landscape and Visual Setting Study (Draft June 2008, extract only)
Technical Assumptions and Limitations

8.14 All field based landscape surveys were carried out during 2007 and spring 2008 and the record of existing features and views included within this assessment is based upon the appearance and condition of the site at that time.

8.15 Access to private residential properties bordering the application sites was not possible and as such, vegetation within private gardens and views from these properties have been recorded as far as possible from adjacent land within the control of the applicants.

Environmental and Landscape Planning Context

Site Context

8.16 The application sites lie to the southern edge of the Peterborough administrative area as illustrated on Figure 8.1 and together are bounded on three sides by highways infrastructure including the old north road and the A1M to the west, the Fletton Parkway to the north, and the A15 London Road to the south and south east.

8.17 The north eastern site boundaries of both applications abut the Orton Pit Special Area of Conservation (SAC) beyond which to the east is the existing and consented development at Hampton. Housing to the western edge of Yaxley along the A15 borders a small section of the Core Area eastern site boundary.

Existing Development allocations/permissions

8.18 Land to the north east of the application sites lies within the area of approved development at Hampton, the broad extent of which is illustrated on Figure 8.1.

8.19 Land to the north west of the Great Haddon Employment Area site boundary at Alwalton Hill has outline planning consent for employment development, the extent of which is also illustrated on Figure 8.1.

Landscape quality

8.20 The planning context of the site and the landscape and environmental designations within and adjacent to the site are illustrated on Figure 8.2. Consultations with Peterborough City Council (PCC) and Huntingdonshire District Council (HDC) have confirmed that the site is not affected by any statutory or non-statutory landscape designations and is not recognised through specific designation or protection as an area of special or notable landscape value or quality.
Tree Preservation Orders

8.21 The site contains no areas of ancient woodland or any individual trees protected by Tree Preservation Orders (TPO). Woodland at Jones’s Covert (outside the application sites) lies within the Orton Pit Special Area of Conservation (SAC) designated for its nature conservation value.

8.22 Consultation with HDC has confirmed that land adjacent to the Great Haddon Core Area application site in the vicinity of Norman Cross contains a number of trees and tree groups protected by TPOs. These are located within the gardens of existing dwellings along the northern side of London Road at Norman House (TPO 09.90), Norman Cottage (TPO22.90) and the former Barrack Masters Lodge (TPO 176). These trees are all outside the site boundary and will be unaffected by the development proposed.

Watercourses

8.23 The Stanground Lode watercourse passes through the Core Area site running from the west to east before passing under the A15 and continuing north east through the approved development area of Hampton Leys. The Environment Agency classifies the Stanground Lode as a Main River. Landscape impacts on the watercourse are assessed below. Ecological impacts are assessed in Chapter 6.

Cultural Heritage

8.24 The site does not lie within or immediately adjacent to a Conservation Area and contains no Listed Buildings, Scheduled Ancient Monuments or registered historic landscapes.

8.25 A Scheduled Ancient Monument (SAM) at Norman Cross is located adjacent to the south western boundary of the Great Haddon Core Area application site at the junction of the A1 (M) and the A15. The designated area includes the site of a former prisoner of war camp built between 1797 and 1815 although no buildings remain within the scheduled area.

8.26 A baseline survey and assessment of the SAM was carried out by LDA Design and CgMS Consulting in 2007 for submission to English Heritage to inform discussion regarding the relationship of proposed development to the scheduled area. A copy of this report is included as Appendix 8.2. Further details of the archaeological and cultural heritage interest on the site are included within Chapter 7 of this Environmental Statement.
8.27 The nearest Conservation Area is centred on the historic centre of Yaxley approximately 200 m south east of the site boundary, within Huntingdonshire District. The designation extends along Church Street and Main Street and includes several listed buildings.

8.28 The character of the Conservation Area nearest to the site is defined by large buildings to the eastern side of Church Street including a number of Grade II listed buildings set within their own grounds, and the Grade 1 Listed Church of St Peter which is a notable local landmark in views from the south and south west of the village.

8.29 In addition, there are four listed buildings or structures at Norman Cross to the south west of the core area site as identified on Figure 8.3 and including:

- Norman House – Grade II Listed and recorded as a late 18 Century Barrack Master’s House. It is one of two buildings to survive the dismantlement of the Camp in the early 1800’s;

- Old Governors House – Grade II Listed and located to the east of Norman House set back slightly from the A15 London Road and comprising two separate dwellings the Old Governors House and the Barrack Masters Lodge;

- A cast iron milepost Listed as Grade II is located on the northern verge of London Road to the south of Norman House;

- The Norman Cross Monument (Grade II Listed) located to the northern edge of London Road at the end of a residential access road and lay-by.

8.30 The Scheduled Monument and the above Listed Buildings lie within Huntingdonshire District.

RIGS

8.31 Regionally important Geological/Geomorphological sites (RIGS) have been identified within the ‘Peterborough Geology Audit’ and details are included in Peterborough City Council’s Supplementary Planning Guidance (SPG) Geological Conservation and Development.

8.32 Areas within the site north of London Road are identified on RIGS Plan 3 within the SPG and are referred to as ‘Orton Brickworks and Brickpits.’ An action plan has been prepared for the site which focuses upon securing access arrangements for recording and interpretation purposes. The location and extent of the RIGS designations within the site are illustrated on Figure 8.2.
Green Infrastructure

8.33 Peterborough City Council has recently completed a citywide study of Green Infrastructure, the conclusions of which are set out in the Peterborough Green Grid Strategy (2006). The strategy sets out a broad spatial framework and vision for green infrastructure provision and considers ways in which the implementation of the Green Grid (including land within the application sites) could be achieved.

8.34 The Green Grid Strategy has not currently been adopted as a Supplementary Planning Document (SPD) although draft Policy CS18 of the emerging Peterborough Core Strategy includes reference to the Green Grid concept and is intended to ensure that new development makes adequate provision for open space and green infrastructure within the context of the overall strategy. The landscape strategy for the proposed development set out below incorporates and delivers aspects of the Peterborough Green Grid and South Peterborough Green Parks Initiative.

Landscape Policy Context

8.35 A review of the relevant policies contained within the Adopted and emerging Development Plans for Peterborough has been carried out to identify relevant policies which relate to landscape and/or visual matters. Policies considered to be of particular relevance are set out below and have been taken into account in the preparation of the development proposal and landscape strategy for the site.


8.36 Policy ENV1 (Green Infrastructure) requires local development documents to define a hierarchy of green infrastructure including the retention of substantial connected networks of green spaces in urban fringe areas to serve the growing communities in key areas of change and development. Peterborough City Council has already prepared a Green Grid Strategy, details of which are set out above.

8.37 Policy ENV2 (Landscape Conservation) is focused on the protection and enhancement of nationally designated landscapes and the diversity and local distinctiveness of the countryside character areas. The character of the Peterborough landscape has been recently assessed in the Peterborough Landscape Character Assessment, details of which are set out below.

8.38 Policy ENV5 (woodlands) seeks to achieve an increase in woodland cover by protecting and managing existing woodland and promoting new planting where consistent with landscape character. Details of the protection and enhancement of woodlands within the site are set out below.
8.39 Policy ENV6 (The Historic Environment) seeks to protect, conserve and where appropriate enhance the historic environment of the region. The effect of proposed development on the setting of historic features is addressed below and included in Chapter 7 which deals specifically with Cultural Heritage.

8.40 Policy ENV7 (Quality in the Built Environment) requires new development to be of high quality which complements the distinctive character and best qualities of the local area. Details of the contribution made by layout and landscape features to achieving quality design are set out below.


8.41 The purpose of the Cambridgeshire and Peterborough Structure plan is to set out the strategic planning policies for Cambridgeshire and the Peterborough area. Following the approval of the East of England Plan by the Secretary of State on 12 May 2008, only certain policies from the Cambridgeshire and Peterborough Structure Plan 2003 remain in force. Only one of these policies, Policy P9/8, has any bearing on landscape matters. This relates to infrastructure requirements and expects that all development likely to have a definable impact on infrastructure will make provision for infrastructure accommodating local impacts, including the provision of environmental improvements and provision of open space.

8.42 Those policies that were previously saved have now been incorporated in the East of England Plan.

Peterborough Local Plan (First Replacement) adopted 2005

8.43 The policies listed below are the saved policies in the Peterborough Local Plan (First Replacement) 2005 as confirmed by the Direction from the Secretary of State issued in June 2008. In addition, the emerging Policies contained within the Peterborough Core Strategy Preferred Options are included, although these policies are currently in draft form and are subject to the outcome of the latest consultation and also the EiP likely to take place during 2010.

8.44 Policy LT1 (Open Space in New Residential Development) requires the provision of open space as part of new development in accordance with the minimum standard and total requirement for 3.65 hectares of open space per 1,000 population. The open space strategy for the proposed development is set out within this Chapter. Details of the quantum of the different open space uses is set out in Chapter 14.

8.45 Policy LNE 6 (Buffer zones) states that where development would border on the countryside or some other open landscape setting, and that adjoining land does not
itself have planning permission or is not allocated for development, a buffer zone will be required on the edge of the development site of adequate size and with appropriate landscape treatment to assimilate the development into the landscape satisfactorily. Details of the landscape strategy proposals for the development are set out below which include the provision of appropriate landscape buffers to sensitive and adjacent land uses.

8.46 Policy LNE9 (landscape proposals) requires that development proposals make adequate provision as far as is reasonably practical for the retention and protection of existing trees and other natural features and makes adequate provision for landscaping as an integral part of any development. The supporting text to LNE9 at paragraph 11.27 confirms that “whilst development proposals will usually be expected to retain and protect trees and other natural features that make a positive contribution to the quality of the local environment, careful consideration will need to be given to ensure that the retention and protection of such features does not unduly compromise design quality”.

8.47 Details of the existing natural features within the application sites are set out below along with a strategy for the retention of these features where practical as part of the landscape strategy for the proposed development.

8.48 Policy LNE10 (detailed landscape schemes) sets out the City Council’s requirements and approach to the provision of an appropriate landscape scheme through the imposition of planning conditions or planning obligations. The landscape strategy for the sites set out below provides the framework for the preparation of more detailed proposals at subsequent stages in the planning and approval process.

8.49 Policy LNE11 (trees, woodlands and hedgerows). Details of the existing woodlands within the sites are set out below and the ecological value of these woodlands is considered in Chapter 6.

8.50 Policy LNE12 (hedgerows) promotes the retention of established hedgerows on development unless it can be shown that this would not be feasible. Details of the existing hedgerows within the site are provided below and in the accompanying ecological assessment included as Chapter 6.0.

8.51 Policy LNE18 (Regionally important geological/geophysical sites) (RIGS) relates to the effects of development on regionally important geological/geophysical sites and states that “Planning Permission will not be granted for development which would be likely to have an adverse impact on a RIG site unless there are demonstrable reasons for the proposal which outweigh the need to safeguard the nature conservation value
of the site”. RIGS within the application sites are identified on Figure 8.2 (see ES Volume 2) and the nature conservation interests of these areas are considered in Chapter 6.

8.52 The RIGS at Orton Pit relates to areas of agricultural land, areas of clay extraction and areas with existing planning permission for development. The supporting text of the Geological Conservation and Development SPG identifies the potential interest at Orton which relates to Jurassic fossils and the importance of the overlying glacial deposits. These deposits are exposed during clay extraction, which has now ceased, and the RIGS action plan for the site is related to the recommencement of extraction.

8.53 Policy CBE1 (scheduled monuments) sets out a presumption in favour of the physical preservation of nationally important remains and their setting. The scheduled ancient monument at Norman Cross lies adjacent to the south western corner of the site and the visual effect of development on views to and from the monument is addressed below.

8.54 Policy CBE7 (listed building setting) seeks to protect the setting of listed buildings from development within and beyond the curtilage. The effect of proposed development on the setting of the listed buildings at Norman Cross to the south west of the site is addressed below and included in Chapter 7 which deals specifically with Cultural Heritage.

8.55 Policy T2 (Development Affecting Footpaths and Public Rights of Way) requires development proposals to satisfactorily incorporate rights of way into the development or divert these. Details of the existing rights of way within the site are illustrated on Figure 8.2 and the effect of proposed development on existing rights of way is assessed below.

Peterborough Core Strategy Preferred Options (2008)

8.56 Preferred Option CS3 (Urban Extensions) identifies Great Haddon as a proposed location of a new urban extension and sets out a number of features which should be provided including “a network of open spaces for play, sport and recreation, including local nature reserves and green spaces that will contribute to the creation of the Peterborough Green Grid”.

8.57 Preferred Option CS15 (Urban Design and the Public Realm) promotes high quality and inclusive design including the creation of safe and attractive open spaces and green corridors appropriate for their location and accessible to all potential users.
8.58 Preferred Option CS16 (The Historic Built Environment) relates to the protection, conservation and enhancement of the historic built environment including listed buildings, conservation areas and scheduled ancient monuments. All new development must respect and enhance the local character and distinctiveness of the area in which it would be situated.

8.59 Preferred Option CS18 (Open Space and Green Infrastructure) relates to the provision of new open space for new residential development in accordance with standards to be set out in due course, and the promotion of the Peterborough Green Grid as a network of green spaces, water bodies, footpaths and cycleways.

8.60 Preferred Option CS19 (landscape character) requires that new development in and adjoining the countryside should be located and designed in a way that is sensitive to its landscape setting; retaining and enhancing the distinctive qualities of the landscape character area and sub area in which it would be situated. A summary of the landscape character of the sites and the surrounding landscape with reference to the Peterborough Landscape Character Assessment (2007) is included below.

_Huntingdonshire Development Plan_

8.61 The southern boundaries of the site border land and existing housing areas within Huntingdonshire and relevant policies are identified below with reference to the saved polices contained in the _Huntingdonshire Local Plan (1995)_ and the _Local Plan Alteration (2002)_ as set out in the Direction from the Secretary of State issued in September 2007). HDC is well advanced with the preparation of its LDF and in addition to the above, policies should be considered from the HDC and the Huntingdonshire Interim Planning Policy Statement (April 2007) and the Submission Core Strategy (adopted September 2009).

_Huntingdonshire Local Plan (1995)_

8.62 Policy En2 (historic and special buildings) requires that development proposals have proper regard to the scale, form, design and setting of historic buildings. The effects of development on listed buildings at Norman Cross are considered below.

8.63 Policy En5 and En9 (Conservation Areas). Development within or directly affecting conservation areas will be required to preserve or enhance their character or appearance and to not impair important views into and out of Conservation Areas. The visual effects on the Conservation Area at Yaxley are considered below.

8.64 Policy En11 (Ancient monuments and archaeological sites) sets out that development should not have an adverse effect upon a scheduled ancient monument or an
archaeological site of acknowledged importance. The landscape and visual effects on the Norman Cross SAM are considered below and in Chapter 7.

_Huntingdonshire Interim Planning Policy Statement (2007)_

8.65 Policy G2 (Landscape Character) promotes the conservation of the quality and distinctive characteristics of the Huntingdonshire landscape. A summary of the landscape character of the sites and the surrounding landscape with reference to the Huntingdonshire Landscape and Townscape Assessment is included below.

8.66 Policy G3 seeks to protect trees hedgerows and other environmental features wherever possible on development sites by incorporating features within the landscape scheme. The impact of development on existing natural features within Huntingdonshire is considered below.

8.67 Policy G6 (Areas of Strategic Greenspace Enhancement) identifies areas as a focus for enhancement including woodland, wetland, and grassland creation as part of the South Peterborough Green Parks Initiative.

8.68 Policy B7/B8 (Listed Buildings and Conservation Areas) seeks the preservation of listed buildings and their settings, and the preservation, and enhancement of the character and appearance of a Conservation Area. The effects of development on listed buildings at Norman Cross and the Conservation Area at Yaxley are considered below and in Chapter 7 which deals specifically with matters of Cultural Heritage.

_Huntingdonshire Submission Core Strategy (see para 8.61)_

8.69 Policy CS9 (Strategic Green Space Enhancement) identifies areas of strategic green space enhancement with new and enhanced green corridors to form a coherent network linking with areas of population growth. The supporting text to the policy makes reference to the Cambridgeshire Horizons Green Infrastructure Strategy which indentifies a number of Green Infrastructure Initiatives including a proposed green corridor (corridor 13) proposed to link the Great Fen project with the Peterborough urban area and the area of the South Peterborough Green Park as identified in the Peterborough Green Grid.

**Baseline Ground Conditions**

**National Landscape Character Context**

8.70 The landscape character context of the site is described below and illustrated on Figure 8.4 with reference to published guidance on landscape character at the District scale.
8.71 At the top tier of the character assessment hierarchy for England published by the then Countryside Commission, the site is located within the Bedfordshire and Cambridgeshire Claylands Countryside Character Area (CCA88). The claylands comprise most of northern Bedfordshire and Western Cambridgeshire and represents a broad sweep of lowland plateau bisected by a number of shallow valleys including the river Great Ouse and Ivel. It is typically an empty, gently undulating lowland landscape with expansive views of large-scale arable farmland, contained either by sparse trimmed hedgerows, open ditches or streamside vegetation. There are numerous scattered ancient woodlands, most notably in a band in the north of the area.

8.72 A number of distinctive sub areas have been identified. The sites lie within the area to the south of Peterborough which is noted for the distinctive character created by the effects of clay extraction and brick manufacture, consisting of worked and redundant pits and skylines punctuated by chimneys. A number of pits have been restored to open water or are used for landfill. These form prominent features on the horizon with mature poplars often emphasizing their presence.

8.73 The sites lie at the periphery of this broad character area and whilst a number of characteristic features are present, the landscape is strongly influenced by the evidence of the former brick making industry, infrastructure and recent housing development at Hampton to the north east and Yaxley to the south east.

8.74 Land to the south of the A15 lies with the expansive Fens Countryside Character Area (CA46). This area is characterised by low-lying level terrain, much of which is below sea level and relies on pumped drainage and sluices to maintain agricultural viability. The level horizons and large-scale open landscape with geometric field boundaries dictated by the pattern of drains create a strong landscape structure.

**County Scale Landscape Character**

8.75 The Cambridgeshire Landscape Guidelines published in 1991 locate the site within the Western Claylands Landscape Character Area being closely bordered to the east by the Fenlands Character Area. This follows the clear distinction between the neighbouring Countryside Character Areas at the National Scale.

8.76 The Western Claylands are described as being gently undulating and consisting of large-scale arable farmland with open fields, sparse trimmed hedgerows and watercourses often cleared of bankside vegetation. There are scattered woodlands, approximately half of which are ancient semi natural woodlands and which are important in visual and nature conservation terms. The landscape is noted as being
greatly affected by modern agricultural practices; increased mechanization having led to the removal of hedgerows and the amalgamation of fields. Many of the remaining hedges are described as ‘gappy’. Large farm units have led to the need for large storage buildings which can be prominent in the landscape.

8.77 Small villages and hamlets scattered throughout the landscape are characteristic, and usually occupy sheltered locations with grass paddocks on their edges. Church spires and towers are described as enlivening the skyline. Whilst the impact of agricultural intensification is discussed, and principles for landscape improvement and management presented, there is no recognition of the particular characteristics of the southern Peterborough landscape resulting from clay extraction and significant development at Hampton which had not progressed at the time of the study but is now reflected in the more recent Peterborough Landscape Character Assessment outlined below.

**Peterborough Landscape Character Assessment 2007**

8.78 A landscape character assessment (LCA) of the Peterborough area completed by The Landscape Partnership on behalf of Peterborough City Council was published in May 2007. The assessment has not yet been adopted as a supplementary planning document although the study conclusions have been considered as part of the assessment of landscape and visual effects set out below.

8.79 Reference to the LCA confirms that the site is located within the area identified as Area 6, the South Peterborough Claylands. The South Peterborough Claylands is subdivided into two contrasting character types, the South Peterborough Farmed Claylands (Area 6A), a predominantly arable landscape that has not been directly affected by clay extraction, and the South Peterborough Brickfields (Area 6B), a heavily disturbed area that has seen major changes as a result of clay extraction, and is currently undergoing large scale restoration and redevelopment. The application sites form the majority of land within Area 6A with the adjacent Orton Pit SAC and Haddon Lake included in Area 6B as illustrated on Figure 8.4.

8.80 The LCA records the influence of existing development within area 6A concluding that “The A1(M), to the west of the area, provides audible disturbance to a large proportion of the area, as does the A605 Fletton Parkway. Parts of the A1(M) are screened from the area, particularly where it is in cutting, but other stretches notably to the north west are more visible creating additional visual disturbance. The A605, and beyond it the southern edge of Peterborough, are well screened by vegetation along the sides of the parkway apart from the tops of large warehouse and industrial buildings on the south
western edge of Peterborough. The edge of development at Hampton is very visually intrusive on much of the area. There is currently no established planting or other form of screening to soften the edge of development, and the new housing is very prominent in many views looking east”. (Page 70)

8.81 The overall condition of the landscape as a whole is assessed in the LCA as **moderate** with the area being described as **visually coherent, although there is visual intrusion from built development and adjacent roads**. The cultural sensitivity of the landscape is assessed as **low** with overall visual sensitivity assessed as **moderate** due to overlooking from higher ground to the west of the A1M. The landscape strategy for this character area recommends a number of guidelines for the integration of new development which have informed the landscape strategy for the proposed development as set out later in this chapter.

*Huntingdonshire Landscape and Townscape Assessment (2004)*

8.82 The landscape south of the A15 falls within Huntingdonshire District and is described in terms of landscape character, within the Huntingdonshire Landscape and Townscape Assessment. The northern edge of the Fen Margin landscape character area at the transition with the clayland landscapes is described above and illustrated on Figure 8.4. This area is elevated above the Fen Margin and characterised by large pits and areas of bare ground resulting from former clay extraction and industrial development.

8.83 The landscape to the south of this ridge falls sharply to the wider Fen landscape characterised by strong geometry, long distance views and an absence of significant woodland vegetation. The A15 is partially screened by tree belts along the road corridor and ridgeline.

8.84 The landscape to the west of the A1(M) within Huntingdonshire District lies within the Northern Wolds. This is a more elevated and undulating landscape with a distinctive pattern of ridges, valleys and settlements extending from the Nene Valley in the north to the village of Kimbolton to the south of the A14. The village of Stilton lies at the transition of the Fen Margin and Northern Wolds.

*Historic Landscape Character*

8.85 Peterborough City Council has no published Historic Landscape Assessment although it is understood that some background data and analysis has previously been carried out in 2004 as part of a characterisation study. In relation to the land at Great Haddon,
it is apparent that large sections of the area have lost or had modifications to field boundaries in the last 50 years.

8.86 The historic field systems for the area have no regulated pattern and seem to suggest that the area has always been constructed of irregular fields created in a piecemeal style as a link between the fenland edge and uplands. This transition might be important but due to development around the area there is no cohesive historic pattern so this pattern remains as fragmented fields in a disturbed landscape. The Cambridgeshire Historic landscape assessment may provide better examples of the fen-upland transition landscape as there will be large areas of undisturbed field patterns within the Fen landscape and therefore a greater understanding of how this transition was created.

8.87 In general terms, the Historic Character around and within the application sites is of a disturbed landscape with little or cohesive historical pattern. Although further archaeological investigation might uncover evidence from ancient landscapes this is not supported by the archaeological desk based assessment or other recent archaeological surveys and assessments.

8.88 The application sites coincide therefore, with a landscape that has been evolving and changing since before 1881 and as such, there appear to be no significant implications for development from a Historic Landscape Assessment perspective.

Local Landscape Character

8.89 The character of the sites is defined by a gently undulating landscape of medium to large scale arable fields contained in part by often sparse and intermittent hedgerows, open ditches or linear belts of tree and scrub vegetation along watercourses and boundaries. The majority of the sites undulate within the range of 15 -25m AOD but rise to the south west to 35m AOD and 40M AOD in the vicinity of Norman Cross and London Road. The landform of the sites and their relationship to the surrounding landform is illustrated on Figure 8.5.

8.90 There are a number of woodland blocks and mature trees along field boundaries and farm tracks. The majority of land is in arable production or set aside and whilst the woodland blocks and mature trees provide notable features in the local landscape, many of the trees are in poor condition.

8.91 The character of the local landscape and the sites is influenced by existing highway infrastructure and the ongoing development at Hampton and is typical of an agricultural landscape at the urban edge being of moderate to low inherent landscape quality.
8.92 The landscape of the sites is physically and visually distinct from the lowland fen landscape to the south of Yaxley as a result of a significant change in topography and the very limited inter-visibility.

Existing Landscape Features

8.93 A landscape and visual survey of the sites has been carried out with reference to aerial photographs and field surveys completed during 2007 and 2008. The conclusions of the survey are summarised below and illustrated on Figure 8.6.

Land Use

8.94 The sites comprise a variety of land uses including arable, pasture, watercourses, deciduous woodland and the occasional farmhouse and farm outbuildings. The majority of land is laid to arable and consists of varying field sizes, defined by fragmented hedgerows, woodland blocks and individual trees or tree groups. The fields are bounded in part by drainage ditches and a section of the main watercourse of Stanground Lode passes through the site in a north easterly direction.

Public Access

8.95 The location of public rights of way within the sites have been confirmed by reference to the Definitive Maps held by Peterborough City Council and Huntingdonshire District Council and are illustrated on Figures 8.2 and 8.13.

8.96 A public bridleway travels south through the Employment Area (Bridleway No. 1) before heading east as part of the Peterborough Green Wheel strategic cycleway network toward the Stanground Lode (Bridleway No. 2) and the site boundary with the Orton Pit SAC. The bridleway is surfaced in stone for most of its length.

8.97 There are two public footpaths linking with the Green Wheel from Yaxley to the east (footpath No. 12) and the old north road to the west (footpath No. 14). These footpaths are unmade, poorly defined on the ground and generally follow field edges. The Old North Road is identified as part of the Sustrans National Cycle Network (Route 12) which continues to the west and south of the site.

Watercourses and Ponds

8.98 This Stanground Lode is a relatively narrow watercourse flanked in parts along its northern banks by dense tree and scrub vegetation. The Lode flows north east through the Core Area application site and adjacent to the north eastern boundary before passing under London Road and continuing through the area of approved development at Hampton Leys.
8.99 A number of balancing ponds for the A1(M) are located adjacent to the western boundary of the sites. The pond areas are fenced from public access and surrounded by tree and shrub vegetation.

8.100 A number of agricultural drainage ditches occur along field edges and approximately 16 small field ponds occur across the sites within field edges and woodland. These ponds have been subject to an ecological survey, the details of which are recorded in Chapter 6. The main ponds are identified on Figure 8.6.

**Tree and Woodland Vegetation**

8.101 The sites contains two significant areas of woodland, individual mature trees along field boundaries, hedgerows and linear tree belts along the A15, A1 (M) and Fletton Parkway. The main areas of vegetation are illustrated on Figure 8.6 and Figure 8.7 and a detailed survey record of existing vegetation within the site is included in Appendix 8.3.

8.102 Two woodlands are located toward the north of the Core Area at Madam Whites Covert and to the eastern edge of the Core Area adjacent to the urban edge of Yaxley. Woodland at Jones’s Covert lies adjacent to north eastern boundary of the Core Area application site and is included within the Orton Pit SAC managed by O&H Hampton under agreement with Natural England.

8.103 The woodland at Chambers Dole and Two Pond Coppice is in private ownership and lies outside the boundaries of the application sites. This woodland is designated a County Wildlife site but has no public access.

8.104 In addition to areas of woodland, the site contains 186 individual trees located predominantly along hedgerows and field boundaries. A survey of these trees was carried out in 2008 and 2009 in accordance with BS 5837 and confirms that the majority of trees are in a relatively poor condition with a large number in need of felling or significant remedial surgery. The number and percentage of trees in each category defined within BS 5837 is set out in Table 8.1 below.
Table 8.1 Summary of Tree Condition

<table>
<thead>
<tr>
<th>Category</th>
<th>No.</th>
<th>% of total trees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category A - Those of high quality and value</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>Category B - Those of moderate quality and value</td>
<td>59</td>
<td>32%</td>
</tr>
<tr>
<td>Category C - Those of low quality and value</td>
<td>79</td>
<td>42.5%</td>
</tr>
<tr>
<td>Category R – Trees recommended for removal</td>
<td>46</td>
<td>24.5%</td>
</tr>
<tr>
<td>Total</td>
<td>186</td>
<td>100%</td>
</tr>
</tbody>
</table>

8.105 The results of the tree survey are illustrated on Figure 8.7 and the full survey report is included at Appendix 8.3.

8.106 In addition to the individual trees, there are linear belts of semi mature trees along the western site boundary providing screening from the adjacent road and the A1(M), and along the majority of the boundary with London Road where Poplars dominate the road frontage consistent with others areas of road frontage further north at Hampton. A 10m wide shelterbelt of trees has been established to the north of the existing farm track to Spendelows Farm and the Stanground Lode corridor and the associated Green Wheel route to the east of the site is flanked by dense tree and scrub vegetation.

**Hedgerows**

8.107 A survey of hedgerows within the sites in terms of their location, ecological and historic value has been carried, the results of which are summarising in Appendix 8.4. Further details of the historic and ecological assessment of hedgerows are provided in Chapter 7 and Chapter 6 respectively.

8.108 The sites contain over 13,000 linear metres of hedgerows of varying quality and condition although the overall hedgerow structure is poor with no comprehensive network and a number of field boundary hedgerows either absent or gappy and intermittent. Eight hedgerows have been classified as ‘Important Hedgerows’ for ecological and/or historic reasons including hedgerows along sections of the Green Wheel to the north, along the northern banks of Stanground Lode, at the urban edge of
Yaxley to the east, and around the eastern and northern boundaries of the SAM at Norman Cross. A number of other hedgerows have been assessed as species-rich of value for biodiversity.

**Baseline Visual Survey**

8.109 The visibility of the sites and the extent of the visual envelope has been established through a combination of desktop analysis and field survey to assess the overall visual prominence of the sites from surrounding visual receptors. Existing buildings structures and woodland within and surrounding the sites have provided a useful point of reference in determining both the visual prominence of the sites, and the potential impact of development proposals.

8.110 The survey has been used to determine the range of locations from where views of the sites and proposed development will be possible and the visual receptors likely to be affected, including residents and users of local roads and rights of way. A number of representative viewpoints were proposed as part of the EIA scoping report which have been amended and added to take on board the scoping response from PCC. The viewpoints have been selected to illustrate the typical view from a representative range of visual receptor groups.

8.111 The conclusions of the visual analysis are illustrated on Figure 8.8 and reference should also be made to the Viewpoint Photograph Panels (Figures 8.9 A to G) which illustrate the existing view from each location. A description of the existing view and an assessment of the sensitivity of the visual receptor is included in Table 8.2 below. The sensitivity of the receptor has been determined with reference to the methodology at Appendix 8.1.

**Visual Prominence of the Sites**

8.112 The sites are relatively well contained visually within the landscape being largely screened from external locations to the south and west by existing vegetation along the western and southern site boundaries and the relative topography particularly to the south where the land falls away to the fens. There are no significant or widespread views of the sites from the wider rural landscape to the west of the A1(M) or from the villages of Stilton of Folksworth to the south west of the sites.

8.113 The entire Great Haddon site is not openly visible or prominent in views from external vantage points and the majority of views are longer distance, partial and seen in the context of existing development and infrastructure. There are close range views from a small number of residential properties which immediately border the site to the south.
west and east, and from public rights of way which pass through the sites. There are however, no views across the sites from the centre of Yaxley or from properties along the Broadway to the east of the A15.

8.114 To the north, the planted embankments of the Fletton Parkway (which is in deep cutting) provides a high degree of physical and visual separation between the sites and residential areas to the north of the Parkway although partial views are possible from the intersection of the Parkway and the A1(M). From the A1(M) views across the sites are generally precluded by the motorway cutting but become possible where the motorway leaves cutting to the north of the bridge over Haddon Road.

8.115 Views of the sites from land to the south of the A15 are generally precluded by the relative topography between the site and the Fen Margin landscape (which is significantly lower) although the treebelts along London Road which define the south eastern site boundary are visible along the ridgeline.

Views from Public Highways

8.116 There are limited views across the sites from the surrounding highway network and existing vegetation along site boundaries and road corridors provides a degree of screening and visual containment.

8.117 Views from the A1 (M) and Haddon Road to the west of the sites are generally precluded by the motorway being in deep cutting along much of the boundary and the screening effect of substantial scrub and hedgerow vegetation along the road embankments and site boundary (Viewpoint 1). There are however views into the sites along the north western section of the motorway beyond Haddon Lane where the road comes out of cutting and there are breaks in the boundary vegetation (Viewpoint 2).

8.118 West of the A1(M), there are occasional glimpses from Haddon Road of existing woodland outside the application sites which become more apparent as the road crosses under the A1(M) to the east where there are views across the northern site area from a short section of the road. The existing woodland itself restricts longer distance views from this road.

8.119 There are minor and filtered views north west from sections of the A15 London Road through the existing tree belts and roadside vegetation (Viewpoint 3). To the south as the road approaches Norman Cross dense linear woodland and verge planting along both sides of the road corridor screen the majority of the sites and only intermittent views are possible where gaps occur (Viewpoint 4).
8.120 Views from the Fletton Parkway and residential areas to the north are largely screened by vegetation along the road embankments (Viewpoint 5) although fleeting views are possible from the elevated section near the Junction with the A1M.

8.121 To the west of the A1M there are very minor and longer distance views toward the site from Morborne Road to the south west (Viewpoint 6) and from the road at Morborne Hill which lies approximately 2.5km west of the site boundary (Viewpoint 7).

8.122 There are no major roads to the south of the A15 although views are possible from a short section of Fen Lane approximately 1.5 km to the south. From here the ridge south of London Road forms the horizon, although views are filtered by existing hedgerows in places.

**Views from Rights of Way and Public Open Space**

8.123 With the exception of views from the footpaths and bridleways within the sites, the sites are not widely visible from the surrounding rights of way network and there are only very minor views from public footpaths to the south at the edge of Yaxley, and to the west of the A1(M).

8.124 From the public footpath which enters the Core Area through the paddocks at the urban edge of Yaxley, there are clear views across the Core Area toward Spendelows Farm and Jones covert woodland (Viewpoint 8).

8.125 From the eastern section of the Peterborough Green Wheel which lies outside the application sites north of Stanground Lode, views south across the Core Area are screened by dense vegetation to the south of the bridleway (Viewpoint 9) but views are possible from the central and northern sections of the bridleway where this passes through the Core Area alongside the central woodlands and from the northern section of bridleway as it approaches the Fletton Parkway overbridge through the Employment Area site (Viewpoints 10, 11 and 12).

8.126 To the west of the A1(M), there are minor, longer distance views toward the western site boundary across the infrastructure of the A1(M) from the footpath immediately adjacent to the motorway between Morborne Lane and Folksworth Road (Viewpoint 13), from the footpath north of Morborne village (Viewpoint 14), and from the footpath north west of Haddon (Viewpoint 15).

8.127 To the south of the A15 from the footpath between Yaxley and Stilton, views of the sites are very limited due to the relative topography (Viewpoints 16 and 17). Minor and long distance views of the south west corner of the Core Area site dominated by the
Premier Lodge are also possible from the footpath between Folksworth and Stilton. (Viewpoint 18).

Views from Existing Properties

8.128 The sites are bounded and contained on three sides by highways infrastructure and views from residential property are limited to a small number of locations within the immediate area. There are no significant or widespread views across the sites from the settlements of Yaxley, Stilton, Folksworth, Morborne or from the housing at Orton Goldhay to the north of the Fletton Parkway.

8.129 A small number of properties are located along the old A1 to the west of the sites and have gardens and rear elevations which back directly onto the sites, although ground level views across the sites are partially restricted by vegetation and fencing to the property boundaries. A typical view from the rear of these properties is illustrated on Viewpoint 20.

8.130 A bungalow to the southern end of the old A1 adjacent to the Premier Inn, and two other residential properties to the south, back onto or lie adjacent to the Norman Cross SAM which is enclosed by vegetation along its northern and eastern boundaries precluding direct and open views across the sites.

8.131 The eastern parts of the Core Area are visible from a small number of properties at Yaxley to the western side of the A15 which directly abut the site boundary and have views across the eastern areas of the site from rear gardens and first floor windows (Viewpoint 21). The properties most likely to be affected are identified on Figure 8.10 based on field assessment from publicly accessible locations only.

8.132 There are no significant views across the site from the western edge of Yaxley or from streets and properties within Yaxley Conservation Area (Viewpoint 22).

8.133 Views from residential areas at Hampton to the north east are limited by fencing and planting to rear gardens and the main views are across the development area and west across Haddon Lake rather than across the sites (viewpoint 23). Views may be possible from first floor windows of a few properties although these will be dominated by the land in the foreground already consented for development and the Orton Pit SAC and Haddon Lake.

Views from Listed Buildings

8.134 The Scheduled Ancient Monument report included at Appendix 8.2 identifies the location of existing residential properties and outbuildings at Norman Cross to the
south west of the sites and the location of the Listed Buildings at Norman House, the Old Governors House and the associated listed structures.

8.135 The two listed buildings are set back from London Road within established grounds and the main aspect is south or west. Land to the north and north east of these buildings comprises gardens with established planting, other non listed buildings, and the remnant parkland landscape of the Norman Cross Monument. The established hedgerow with mature trees around the northern and north eastern boundaries of the SAM provide a degree of screening particularly during the summer months (Viewpoint 19) and there are no open views of these properties from areas proposed for development to the north and north east.

8.136 In the absence of access agreements with the individual owners it has not been possible to fully confirm the potential for views north from within these properties which may be possible from upper storey windows although assessment of views toward these buildings from external locations suggests that there is limited intervisibility between the buildings and the sites.

Views to and from the Norman Cross Monument

8.137 The report at Appendix 8.2 considers the views toward the monument from the landscape and public rights of way to the north and north east and concludes that the monument is largely screened by established tree and hedgerow vegetation around the northern and north eastern boundaries of the scheduled area although there are filtered views through this boundary planting particularly during the winter months.

8.138 The parkland landscape of the monument is not significant in views from the Peterborough Green Wheel which lies over 1.5km to the north of the SAM boundary, and there are no views into or across the SAM from public rights of way to the west, and to the south of the A15 due to changes in topography as the land falls sharply to the Fen Margin.

8.139 Glimpsed views across the scheduled area are possible from London Road and the land immediately adjacent to the northern and eastern boundaries of the monument where minor gaps in the existing hedgerows occur. Overall, the monument is visually well contained from surrounding vantage points and is not open to public access.

Views to and from Yaxley Conservation Area

8.140 There are no significant views towards the sites from the Yaxley Conservation Area due to the screening effect of existing development, vegetation and landform
(Viewpoint 22). The sites do not contribute to the setting of the Conservation Area or any of the listed buildings along Church Street.

8.141 The significant views of the Grade 1 Listed St Peter’s Church are gained from within the Conservation Area or from rights of way and the wider landscape to the south and south west of Yaxley. Views of the church and the vegetated ridge along London Road (which defines the southern edge of the Core Area application site) are however possible from the public footpath between Yaxley and Stilton (Viewpoint 17).
### Motorists and road users

<table>
<thead>
<tr>
<th>Receptor group</th>
<th>Distance from site</th>
<th>Existing View</th>
<th>Receptor sensitivity</th>
<th>Representative Viewpoints</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motorists travelling along the A1(M) and Haddon Road to the west of the site</td>
<td>Within/adjacent to the application sites boundary</td>
<td>Views east from Haddon Road and the A1(M) are largely screened by existing vegetation along the road corridors although views open up around Keepers Cottage as the road turns west to pass under the A1M. From here the north western areas of the site are visible with distant views of existing development at Hampton. There are no views across the site from the A1(M) south of Jones Covert woodland due to the motorway cutting and associated vegetation but views are possible where the motorway exits cutting north of the Haddon Lane underpass.</td>
<td>Low</td>
<td>1/2</td>
</tr>
<tr>
<td>Motorists travelling along the A15 London Road</td>
<td>Adjacent to Core area application site boundary</td>
<td>Views north from London Road across the site are intermittent being partially screened by vegetation along the northern road edge but more apparent along the section of road in the vicinity of the entrance to Spendelows Farm. Vegetation along the southern road edge precludes the majority of views out across the fen landscape to the south east. The road corridor is already heavily influenced by existing and emerging development at Hampton to the north.</td>
<td>Moderate</td>
<td>3/4</td>
</tr>
<tr>
<td>Motorists travelling along the Fletton Parkway</td>
<td>Adjacent to the northern site boundary</td>
<td>Views from the Fletton Parkway are largely screened by the road being in cutting along the northern site boundary and the screening provided by vegetation along the road embankments. Fleeting views south across the site are possible from the western section of the Parkway approaching the junction with the A1(M) and there are elevated views south from the A1(M) and Fletton Parkway roundabout.</td>
<td>Low</td>
<td>5</td>
</tr>
<tr>
<td>Motorists travelling along Morborne Road between Morborne and Folkesworth</td>
<td>1.5km</td>
<td>Views north towards the site from Morborne Road across arable land are predominantly screened by intervening vegetation. Distant views of the woodland blocks within the site and the Premier Inn to the south west edge of the site are visible beyond the A1M. Views are predominantly rural and unaffected by significant development.</td>
<td>Low</td>
<td>6</td>
</tr>
<tr>
<td>Motorists travelling along Morborne Lane at Morborne</td>
<td>3km</td>
<td>Distant, elevated views from Morborne Hill towards the site to the west are precluded by intervening vegetation and the village of Morborne which lie on lower ground. Distant views of the woodland block within the site and properties</td>
<td>Low</td>
<td>7</td>
</tr>
</tbody>
</table>
### Motorists and road users

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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Hill west of the A1M</td>
<td></td>
<td>adjacent to the site are visible on the horizon.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Users of rights of way and public open space

<table>
<thead>
<tr>
<th>Receptor group</th>
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<th>Existing View</th>
<th>Receptor sensitivity</th>
<th>Representative Viewpoints</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrians using the footpath from Yaxley</td>
<td>Within the site</td>
<td>There are clear views across the immediate landscape of the site towards the adjacent woodland and woodlands at Jones Covert, which defines the horizon. Views east encompass built development to the edge of the village</td>
<td>High</td>
<td>8</td>
</tr>
<tr>
<td>Pedestrians using the Peterborough Green Wheel through the site</td>
<td>Within the site</td>
<td>Where the Green Wheel passes along the southern edge of Haddon Lake from the junction with the A15 views south are screened by established vegetation along the Lode corridor (viewpoint 9). Where the route turns west across the southern edge of Jones cover woodland and then north toward the Fletton Parkway there are clear views across the site and the adjacent SAC. Employment buildings and development at Hampton to the east are prominent from the northern section of the Green Wheel where tree and hedgerow cover is limited and the landscape is more open. From the Fletton Parkway bridge views south are possible due to the elevated viewing location although the woodland blocks within the centre of the site preclude views across the southern site areas.</td>
<td>High</td>
<td>9/10/11/12</td>
</tr>
<tr>
<td>Pedestrians using the public right of way west of the A1M between Morborne and Norman Cross</td>
<td>200m</td>
<td>The immediate foreground agricultural landscape and the A1(M) dominate views from this footpath and there are no clear views across the landscape of the site with vegetation along the western site boundary defining the majority of the horizon.</td>
<td>Moderate</td>
<td>13</td>
</tr>
<tr>
<td>Pedestrians using the public right of way north west of</td>
<td>1.4km</td>
<td>The woodland blocks within the site are visible beyond the motorway. There are minor and long distance views of the site from this footpath beyond the A1M which</td>
<td>Moderate</td>
<td>14</td>
</tr>
</tbody>
</table>
### Users of rights of way and public open space

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</tr>
</thead>
<tbody>
<tr>
<td>Morborne</td>
<td></td>
<td>runs across the line of sight.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pedestrians using the public right of way north west of Haddon</td>
<td>1.5km</td>
<td>Distant and elevated views of the woodland blocks within the site in the distance although the view is dominated by the foreground landscape of the Northern Wolds.</td>
<td>Moderate</td>
<td>15</td>
</tr>
<tr>
<td>Pedestrians using the public right of way between Yaxley and Stilton</td>
<td>600 to 800m</td>
<td>There are no clear views of the site area north of London Road from this location due to the low lying topography and treed skyline which defines the road corridor and provides a degree of screening. A number of properties at Norman Cross are however visible from the western section of the footpath within the treed setting. Traffic can be seen moving along the London Road.</td>
<td>Moderate</td>
<td>16/17</td>
</tr>
<tr>
<td>Pedestrians using the public right of way between Stilton and Folksworth</td>
<td>1.9km</td>
<td>There are long distance views toward the site edge from sections of the footpath across the intermediate agricultural landscape. The village of Stilton is clearly visible in the near distance along with the edge of Yaxley. The Premier Inn to the south west edge of the site is visible beyond the A1(M) with the vegetated backdrop of Norman Cross and the London Road corridor.</td>
<td>Moderate</td>
<td>18</td>
</tr>
</tbody>
</table>

### Residential occupiers

<table>
<thead>
<tr>
<th>Receptor group</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Residents at Norman Cross</td>
<td>Adjacent to Core Area application site boundary</td>
<td>There are no significant views north or north east across the application sites from gardens or ground floor locations within properties at Norman Cross which are bounded by established vegetation around the boundaries of the SAM. Views are possible from the garden of a single property immediately adjacent to the site boundary where a break in the boundary vegetation occurs. Views may be possible from first floor windows from 2 or 3 properties.</td>
<td>High</td>
<td>19</td>
</tr>
<tr>
<td>Residents along the western site</td>
<td>Adjacent to site boundary</td>
<td>A small number of properties along Haddon Road lie adjacent to the western boundary of the site. All of these properties front the road and have rear</td>
<td>High</td>
<td>20</td>
</tr>
</tbody>
</table>
### Residential occupiers

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>boundary.</td>
<td>or within 150m</td>
<td>elevations and gardens to the site edge. Views across the site are possible from the rear of these properties toward the woodland within the centre of the site. The bungalow to the southern end of Haddon Road north of the Premier Inn Hotel backs onto the landscape of the SAM and views across the application site area are largely screened by boundary vegetation around the northern and north eastern boundaries of the SAM.</td>
<td>High</td>
<td>21</td>
</tr>
<tr>
<td>Residents of properties that adjoin the site boundary to the western edge of Yaxley</td>
<td>Adjacent to Core Area application site boundary</td>
<td>There are no views across the site from the majority of houses along the western side of the A15 due to the screening effect of existing woodland, the presence of boundary hedgerows along rear property boundaries, and the presence of several bungalows with no rear first floor windows. There are however, views from a small number of rear gardens and first floor windows across the eastern site areas from properties, which either directly abut the site boundary or have views across the paddocks and landscape beyond. There are no significant views from properties to the eastern side of the road due to the screening of built development to the west.</td>
<td>High</td>
<td>21</td>
</tr>
<tr>
<td>Residents and road users within Yaxley Conservation Area</td>
<td>300m</td>
<td>The site is not be visible from residential property or roads within the Conservation Area due to the screening provided by existing buildings, established vegetation along the road corridor and tree belts on land between the northern edge of the Conservation Area and the development boundary.</td>
<td>High</td>
<td>22</td>
</tr>
<tr>
<td>Residents at Hampton</td>
<td>400m</td>
<td>Views from residential properties to the north east of the site are limited because of the hedgerow and tall trees to the rear of the houses. These residential properties are north facing and therefore the views are predominantly north facing away from the site. Where views are possible through the trees the views are of short to medium distance. Haddon Lake dominates the view and extensive views across the site are cut short by a tall hedgerow running adjacent to the public right of way around the south side of the Lake.</td>
<td>Moderate</td>
<td>23</td>
</tr>
</tbody>
</table>
Landscape and Green Infrastructure Strategy

8.142 A description of the proposed development is included in Chapter 2 and shown on the Development Framework Plan (DFP Ref. PST021-DFP-01 Rev I. The Development Framework has been influenced and shaped by the conclusions of the landscape, ecological and visual assessments. The layout has also been informed and revised in response to pre-application consultations with Natural England, English Heritage, Peterborough City Council, Huntingdonshire District Council, Cambridgeshire County Council and Yaxley Parish Council.

8.143 The DFP provides therefore for the retention and incorporation of significant landscape features and avoids built development in sensitive areas of the sites directly adjacent to the Orton Pit SAC, along the course of the Stanground Lode and adjacent to Listed Buildings and Scheduled Ancient Monument at Norman Cross. Landscape mitigation is proposed along the western development boundary to provide an attractive development edge and enhanced screening of the sites from the wider landscape to the west of the A1(M).

8.144 The development layout provides opportunities for the creation of a comprehensive network of multi functional green corridors and open spaces throughout the sites for biodiversity, public access, and recreation, recognising the objectives of the Peterborough Green Grid and South Peterborough Green Parks initiatives and the need for a high quality environment for the new community.

Landscape Strategy Objectives

8.145 The principal objectives of the landscape and green infrastructure strategy for the site include:

- To provide a range of attractive, accessible and linked open spaces across the site including areas for formal and informal recreation and biodiversity which recognise the overarching Vision and objectives for the Peterborough Green Grid;
- To create a high quality and distinctive landscape and public realm setting for new development which incorporates opportunities for landscape and biodiversity enhancement;
- To provide an appropriate development buffer to the Listed Buildings and Scheduled Ancient Monument at Norman Cross, and to the Orton Pit SAC;
- To minimise the impact of development on existing landscape features through the retention and incorporation of significant features including watercourses,
• To minimise the adverse impact of development upon views from the wider landscape to the west and south east by the provision of structural planting in key locations and at an appropriate scale;

• To promote the use of native species and patterns of planting which are consistent with the local landscape character.

8.146 The key elements of the proposed landscape and open space strategy are illustrated on Parameter Plans PST021-DFP-07 and PST021-DFP-08 included in Volume 2: Plans. Illustrative design principles for key spaces are also included within the Design and Access Statement.

8.147 The landscape strategy proposals will be developed to a greater level of detail in consultation with PCC and other relevant stakeholders through preparation and approval of future Development Briefs, reserved matters applications and/or conditions requiring the submission and approval of a Landscape Strategy Plan.

Strategic Landscape and Open Space Proposals

8.148 A network of green corridors and open spaces is proposed across the sites building upon the framework provided by existing and retained landscape features and the opportunities for improved public access. In total, the Development Framework Plan incorporates in excess of 103 ha of publically accessible open space including existing and proposed woodland but excluding surface water features and the SAC Buffer. This open space network offers significant opportunities for biodiversity, public access, formal and informal recreation.

8.149 A significant open space corridor is proposed east to west across the Core Area along the course of the Stanground Lode and its tributary to the north, incorporating sections of the Peterborough Green Wheel, existing and proposed woodlands (including those proposed for public access) and areas proposed for formal recreation. A new public access woodland of approximately 6ha in area is proposed to the west of Chambers Dole adjacent to the Peterborough Green Wheel linked to the wider greenspace network both within the development and at Hampton Leys and Crown Lakes to the east of the A15.

8.150 It is anticipated this strategic open space corridor will be designed to be semi-natural in character in contrast to the more urban character of key spaces within proposed development areas. The Lode corridor will be subject to a programme of landscape and habitat enhancement, which will be agreed with the planning authority and the
Environment Agency at the detailed design stage. Where the Lode crosses the main highway access to the development from the north (a continuation of the consented Western Peripheral Road), the watercourse will be accommodated within a wide green corridor under the road designed to allow the continued movement of animals and people.

8.151 This central green space corridor will be linked to other strategic open space corridors along the western edge of the development, around the northern and eastern boundaries of the Norman Cross SAM, and to the eastern areas of the sites incorporating existing woodland proposed for informal public access.

8.152 A new 'Town Common' including community recreation facilities and sports pitches is proposed to the west of Yaxley with this major area of greenspace linked to the retained woodland to the north, and to the proposed village green and extension to Yaxley cemetery proposed to the east.

8.153 Formal recreation facilities will be provided at several locations across the site in accordance with the requirements of the Peterborough Local Plan and Sport England Active Design Guidance. Facilities will be designed to meet the relevant use standards in consultation with PCC within the overall level of provision set out in Chapter 14.

8.154 There are significant opportunities for tree and shrub planting within areas of strategic open space to create an attractive environment, promote biodiversity and offer opportunities for local food production and environmental education.

8.155 The landscape strategy and strategic open space network incorporates provision for formal and informal access including existing public footpaths and bridleways, informal leisure, recreation and equestrian routes. The overall level of existing formal access will be retained and footpaths and bridleways will be incorporated into strategic open space corridors through partial diversion of these existing routes as set out below and illustrated on Figure 8.13. These proposed diversions will be subject to separate detailed applications and formal orders prior to the commencement of the development phase within which the diversion is proposed.

**Creating a High Quality setting for Development**

8.156 Significant areas of open space and public realm are proposed to create a high quality environment linking development areas and neighbourhoods and including:

- A landscape corridor running north to south through areas of residential development and the proposed District Centre. This space will be fronted by built development and incorporate water as a key design element. Tree and shrub
planting will create an active and attractive central focal space with opportunities for public access, informal recreation and biodiversity.

- A major public space/square within the proposed District Centre designed to incorporate opportunities for public art;

- Green corridors linking the proposed Schools with areas of housing to the north and south. This corridor will incorporate opportunities for new tree and hedgerow planting;

- A series of ‘urban squares’ within residential development areas offering flexibility for a range of uses including children’s play, allotment gardens, community orchards and amenity open space, design principles for which are included in the Design and Access Statement;

- Avenues of trees along primary streets and within highway verges to provide a legible and attractive environment.

**Design Response to the Adjacent Areas of Heritage and Biodiversity Importance**

8.157 The landscape strategy incorporates measures to protect the setting and special qualities of the Norman Cross SAM and the Orton Pit SAC.

8.158 A significant open space buffer is proposed to the north and east of the scheduled ancient monument at Norman Cross which will accommodate areas for recreation within a proposed parkland landscape consistent in character to the landscape of the monument. This buffer will be between 90m and 100m in width and will incorporate opportunities for access and interpretation the details of which will be agreed with English Heritage, Peterborough City Council and Huntingdonshire District Council.

8.159 The existing boundary hedgerows around the monument will be retained and supplemented by additional tree and hedgerow planting. Details of the measures proposed to respond to the sensitivity and setting of the monument are set out in Appendix 8.2 and have been agreed in principle with English Heritage.

8.160 The development layout and landscape strategy also provides for open space and habitat buffers to the Orton Pit SSSI/SAC. A significant area of open space incorporating surface water attenuation features is proposed to the south of the SAC and Haddon Lake to deter cat incursion into the SAC and to minimise human disturbance. This buffer will be an average of 65m in width providing a semi natural edge to the development and a focus for informal recreation.
8.161 The woodland at Jones’s Covert (within the SAC) will be retained and continue to be managed under agreement with Natural England as part of the Orton Pit Reserve. A significant open space buffer of a minimum 250m width is proposed to the south and west of the woodland which will incorporate areas for habitat creation and species receptor sites. A buffer of approximately 70m width is proposed between the north western corner of the woodland and areas of proposed employment development in order to avoid direct impacts on the woodland through development.

8.162 Public access to the woodland will be precluded by a combination of fencing, ditches and dense scrub planting to minimise disturbance on sensitive habitats and species. These access control measures are set out in full in Chapter 6.

8.163 To the eastern boundary of the proposed employment site, a 30m buffer is proposed between the western edge of the SSSI and the proposed employment area. This buffer will include a 10m wide planting belt of suitable species to screen employment buildings along with other habitat enhancement proposals, details of which are set out in Chapter 6.

Retention and Incorporation of Existing Landscape Features

8.164 The proposed development layout allows the retention and incorporation of existing landscape features including woodland, watercourses, trees and hedgerows primarily within areas of strategic open space.

8.165 The woodland at the edge of Yaxley will be retained and enhanced for wildlife and public access and a programme of landscape and habitat enhancement will be agreed with the planning authority in advance of construction of the adjacent development phase.

8.166 Madam Whites Covert will be retained within a broader green corridor with an open space buffer of between 30m and 60m width between the woodland edge and areas of proposed development. The woodland will be open to public access and being located adjacent to the proposed primary school, offers opportunities for outdoor study. The woodland at Chambers Dole and Two Pond Coppice to the west of Jones Covert lies outside the application sites and will be retained in private ownership.

8.167 The existing tree belts along the northern and southern sides of London Road, along the western site boundary, and to the north of the track to Spendelows Farm will be retained and incorporated into the development layout. These tree belts will be supplemented with new tree and shrub planting where appropriate to provide a robust and attractive landscape setting for built development and adjacent areas of public
open space. Infill and understorey planting along London Road will filter views of the
development edge.

8.168 The existing vegetation along the Stanground Lode corridor will be retained with the
exception of areas of clearance required where the Lode passes under the primary
street and clearance required to accommodate pedestrian crossings to link
development areas to the north and south.

8.169 The majority of better quality trees and hedgerows within the sites will be retained
within areas of open space in order to safeguard their retention and facilitate future
management and maintenance. Where trees and hedgerows are proposed for
removal, these losses will be more than compensated by opportunities for new tree
and hedgerow planting within areas of open space and throughout the development.
Retained hedgerows will be connected to a wider network through new native
hedgerow planting, the opportunities for which are illustrated on Figure 8.14.

Landscape Mitigation

8.170 The development layout incorporates sufficient allowance for specific mitigation
measures in key locations to minimise adverse landscape and visual effects. The
broad locations of the mitigation measures set out below are set out in the Parameter
Plans: Volume 2 and include:

- Setting the built development edge back from Listed Buildings and existing
  residential properties to the south west of the site at Norman Cross, and along
  the western edge of the site along the old A1.

- Planting linear belts of tree and woodland edge planting along the western site
  boundary within a minimum 50m wide open space corridor to screen
development in views from the landscape beyond the A1(M);

- Planting a 15m to 20m wide belt of tree and shrub planting to the south western
  edge of the site to provide enhanced screening of development from residential
  properties at Norman Cross;

- Planting a 10m wide belt of tree and shrub planting to the eastern edge of the site
to filter views of development in views from rear gardens and rear elevations of
houses at the western edge of Yaxley;

- Planting additional trees and understory shrubs along the London road frontage
to provide an attractive edge to the development screen views of low level activity
and development;
• Tree and shrub planting to the eastern edge of the proposed employment area to screen views from the Western Peripheral road and SAC to the east.

**Contribution to Green Grid Initiatives**

8.171 The strategic proposals for the south of Peterborough proposed by the Green Grid indicate a Local Green Infrastructure Corridor (No. 11) running east to west along the course of Stanground Lode through the site linking Yaxley with the landscape to the west of the A1M. The objective for this corridor is to "protect, enhance and extend the mosaic of lakes, water features and woodland within the former brick pits to the south and east of Peterborough". (paragraph 8.7)

8.172 The landscape proposals outlined above and illustrated on Parameter Plan PST021-DFP-08 will implement this strategic green infrastructure corridor through the sites, protecting existing woodlands and water bodies, and extending the environmental mosaic through new woodland creation, hedgerow planting, and the provision of multi functional green corridors for access, biodiversity and recreation.

8.173 In addition, the landscape strategy proposals support and deliver the objectives and priority sites identified in the South Peterborough Green Parks Delivery Plan for the Great Haddon site area. Specifically, the proposals support and deliver Biodiversity Projects (B3 and B4) relating to woodland creation and green infrastructure links, and Access Project (A13) related to access and biodiversity enhancements.

**Planting Details**

8.174 Structure and mitigation planting will comprise predominantly native species but will include an element of evergreen trees and shrubs in key locations to provide greater screening during the winter period. The patterns of planting proposed to strategic areas of open space are consistent with the pattern of woodland, copse and hedgerows found within the local landscape and species selection will be informed by existing species and prevailing ground conditions. Tree planting within the proposed buffer to the west of the SSSI will comprise species which minimise the risk from windblown seed.

**Phasing of Structural Landscape**

8.175 The phasing of development across the site has not been fully determined at this stage although this will allow for the laying out of strategic landscape infrastructure, open space and structural planting on a phased basis as the development proceeds. It is anticipated that the implementation of new woodland and habitat areas within the central part of the development area will be delivered earlier in the development
 programme with the detailed phasing to be agreed with the City Council through submission and approval of a Landscape Strategy Plan.

Implementation of landscape and green infrastructure strategies

8.176 Further details of the landscape strategy and mitigation proposals set out above will be progressed in consultation with Peterborough City Council and relevant statutory agencies through future development briefs and/or reserved matters applications and in response to planning conditions associated with outline consents. All details will be subject to formal submission and approval by the City Council and suitably worded planning conditions will be agreed in respect to the following:

- A woodland management plan for all woodlands within the application sites - setting out details of tree management, new planting, signage and access improvements. The plan will also include details of the new woodland creation and protective measures proposed to deter public access to private woodlands adjacent to the sites.

- Tree and Hedgerow Protection Plan – setting out measures to protect retained trees and hedgerows during construction operations including root protection areas and details of protective fencing.

- A Landscape Strategy Plan – Setting out the strategy and phasing for implementation of areas of strategic open space, new structural planting and informal access provision linked to an Ecological Management Plan.

Potential Impacts and Assessment of Effects

8.177 The assessment of landscape and visual effects considers the direct effects on existing landscape features, the indirect effects on landscape character, and the visual effects on key viewpoints and visual receptors in the short, medium and longer term.

8.178 The assessment has been completed in relation to the description of the proposed development included in Chapter 2, the Development Framework Plan Ref. PST021-DFP-01, and the associated Parameter Plans included in Volume 2: Plans.

8.179 The DFP also identifies a comprehensive network of public open space and landscape infrastructure which have been planned and designed as an integral part of the development to provide opportunities for access, recreation, biodiversity and flood risk management and to minimise wherever possible, adverse effects on the environment whilst also taking account of other design and technical requirements.
8.180 Mitigation measures have therefore been designed into the proposals progressively from the outset and are fully integrated into the project design. The environmental effects presented in this Chapter are therefore the effects of the design proposals with all mitigation measures in place. Where the assessment identified a need for additional mitigation measures, the development proposals were modified to include those measures and a new assessment was made; it is the latter assessment that is presented below. The effects presented are therefore the predicted likely effects of the scheme that is intended to be built, rather than those of a hypothetical scheme lacking mitigation measures, which will not be built.

Potential Sources of Impact

8.181 Having considered the character, condition and sensitivity of the sites and the potential visual receptors against the type and arrangement of development proposed, potential landscape and visual effects are likely to arise as a result of:

- The direct effects of construction operations on existing landscape features within the site;
- The indirect effects of development on the character and qualities of the surrounding landscape including features of cultural heritage importance;
- The indirect effects of development on the views and amenity of identified receptors including residents in close proximity to the site and users of local roads and rights of way.

8.182 These are addressed in turn below.

Direct Effects on Landscape Features

Existing Woodland

8.183 The woodlands within the sites will be retained and enhanced through a programme of selective tree surgery and new planting. Open space buffers are proposed around these woodlands to ensure they are not adversely impacted by construction operations and protection measures set out in Appendix 8.2 can be implemented through appropriate conditions on future planning applications. Public access to the woodland west of Yaxley can be provided along existing tracks without the loss of woodland cover, and informal access to Madam White’s Covert can be accommodated with minimal clearance of dead and fallen timber.

8.184 There will be no direct effects on the woodlands at Jones’s Covert and Chambers Dole (outside the application sites) which will be retained and protected during
8.185 There is currently no public access to Chambers Dole and Two Pond Coppice, and this will continue once the Great Haddon proposal is implemented. Initial discussions with landowners of the woodland have indicated a willingness in principle to manage the status quo by permitting timber fencing, hedgerow planting and signage around the perimeter of the wood. These measures will be implemented early in the development programme and will minimise the potential for unauthorised access to the woodland.

8.186 In the short term, an area of bramble encroachment with occasional trees and scrub to the north west corner of the woodland west of Yaxley (approximately 0.5ha in area) will be removed to facilitate construction of the realigned A15 (Yaxley Bypass). The short-term landscape effects resulting from the removal of this vegetation are assessed as minor adverse.

8.187 In the longer term, the loss of this vegetation will be more than offset by new woodland and woodland edge planting proposed as part of the landscape strategy for the development including management, replanting and habitat creation to improve existing woodlands, the establishment of 6ha of new public access woodland within the central area, and new areas of woodland edge planting along the western edge of the development. Whilst this planting will take several years to fully establish, the longer term effects on woodlands are assessed as major beneficial.

Existing Trees and Tree Belts

8.188 The existing tree belts along the northern and southern sides of London Road, along the western site boundary, and to the north of the track to Spendelows Farm will be retained and incorporated into the development layout. These tree belts will be supplemented with new tree and shrub planting where appropriate to provide a robust and attractive landscape setting for built development and adjacent areas of public open space.

8.189 The existing vegetation of suitable condition along the Stanground Lode corridor will be retained with the exception of minor breaks to accommodate highway and pedestrian crossings of the Lode and link development areas to the north and south.

8.190 The majority of individual trees within the sites will be retained and protected during construction including the main tree groups along the Stanground Lode and along the route of the Peterborough Green Wheel. Of the 186 individual trees recorded for the
sites, approximately 60% will be retained within the development layout predominantly in areas of strategic open space to allow adequate space for the trees to be retained and to facilitate future management and maintenance. A programme of tree surgery will be agreed with the planning authority and implemented on a phased basis as the development proceeds to improve the condition and life expectancy of many of the mature trees to be retained within the development.

8.191 A total of 82 trees are proposed for removal although the majority of these trees (90%) are Category C trees in poor condition with a limited life expectancy, or Category R trees recommended for removal within the arboricultural assessment on the grounds that they are dead, diseased, dying or structural unsound. These trees are of limited landscape value and are considered generally unsuitable in condition for retention in the longer term within a site proposed for major development. A number of trees in categories C and R are proposed for retention within areas of public open space for their biodiversity value subject to ongoing monitoring of their condition and structural safety.

8.192 Of the 61 Category A and Category B trees within the site, the ES has assumed that a total of 1 Category A tree and 7 Category B trees will be removed in areas which conflict with the proposals for highway access through the development or which are located within proposed development parcels where design layouts have not been progressed to a sufficient level of detail at this stage of the planning process to guarantee retention of these trees. Every effort will be made to retain these trees within future development layouts but at this stage, the ES has assumed a ‘worst case’ scenario in relation to potential tree removal. A further four trees are proposed for translocation into areas of strategic open space. The trees to be removed are illustrated on Figure 8.12 and further details are provided in Appendix 8.3.

<table>
<thead>
<tr>
<th>Category</th>
<th>No. of trees in category</th>
<th>No. to be removed</th>
<th>% of total No. of trees on site</th>
<th>% of total No. of trees in each category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category A - Those of high quality and value</td>
<td>2</td>
<td>1</td>
<td>0.5%</td>
<td>50%</td>
</tr>
<tr>
<td>Category B - Those of moderate quality and value</td>
<td>59</td>
<td>7</td>
<td>4%</td>
<td>12%</td>
</tr>
</tbody>
</table>

Table 8.3 - Trees to be removed by Category
### Tree Management Plan

<table>
<thead>
<tr>
<th>Category</th>
<th>No. of trees in category</th>
<th>No. to be removed</th>
<th>% of total No. of trees on site</th>
<th>% of total No. of trees in each category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category C - Those of low quality and value with limited lifespan</td>
<td>79</td>
<td>32</td>
<td>17%</td>
<td>40%</td>
</tr>
<tr>
<td>Category R – Trees recommended for removal</td>
<td>46</td>
<td>42</td>
<td>22%</td>
<td>91%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>186</strong></td>
<td><strong>82</strong></td>
<td><strong>44%</strong></td>
<td><strong>44%</strong></td>
</tr>
</tbody>
</table>

8.193 Due to the generally poor and declining condition of many of the retained trees on site and the proposal to retain a number of trees in poorer condition in the short term for biodiversity reasons, tree condition will be monitored periodically over the duration of the project to ensure that all trees proposed for retention remain structurally sound and appropriate for retention particularly in locations where unsound trees may pose a risk to public safety of private property. Any significant changes in tree condition over the lifetime of the development will be advised to the planning authority. A pre-construction tree survey and arboricultural method statement including details of the construction stage tree protection measures, will be prepared and agreed with the planning authority in advance of the commencement of construction in each phase as part of a long term strategy to monitor and sustain the existing mature trees and to guide ongoing management and replanting as appropriate.

8.194 The loss of predominantly poorer quality trees within the site will give rise to a moderate adverse effect on tree cover and landscape features in the short term. These losses will be compensated as the development proceeds by enhanced management of retained mature trees and by new tree planting within areas of strategic open space, within development areas and along primary streets. This planting will include a range of species and planting sizes and will mitigate for short term tree losses, create an attractive setting for new development and enhance the quality, condition and overall coverage of trees within the site. The longer term effects on trees are assessed as moderately beneficial.

### Effects on Hedgerows

8.195 Approximately 65% of the existing hedgerows within the site are proposed for retention, the locations of which are identified on Figure 8.12. The majority of the...
better quality hedgerows have been retained and incorporated into areas of public open space and green corridors through the development and isolated hedgerows will be connected to a wider network where practical through new native hedgerow planting. Retained hedgerows will be protected during construction in accordance with a method statement to be agreed with Peterborough City Council prior to the commencement of construction in areas likely to affect retained hedges.

8.196 Whilst the exact details of development in relation to each individual hedgerow cannot be established at this stage in the absence of detailed design layouts, a number of hedges (including important hedgerows) will need to be removed in whole or in part to accommodate the proposed development. The extent of hedgerow removal has been minimised as far as possible but retention of all hedgerows within the development layout cannot be achieved whilst taking into account other design constraints and technical requirements. The assessment below assumes the following hedgerows will be removed in whole or significant part.

- 70 linear metres of hedgerow 8 to the northern part of the Core Area site to accommodate the proposed primary school in this location. This hedgerow is classified as an ‘Important Hedgerow’ for ecological reasons and the majority of the hedge (250 linear metres) will be retained within public open space.

- 150 linear metres of hedgerow 6 to the eastern edge of the Core Area site to accommodate construction of the realigned A15 (Yaxley Bypass). This hedgerow is classified as an ‘Important Hedgerow’ for ecological reasons and the majority of the hedge (350 linear metres) will be retained as the boundary to the proposed village green and cemetery to the east of the A15. Translocation of this hedge is not considered feasible but a new hedge will be planted as a replacement following road construction.

- Hedgerows 1, 2, 5, 33 and 7 in part to the eastern areas of the Core Area site adjacent to the edge of Yaxley. These hedgerows are proposed for removal to allow proposed development in this area of the site and the creation of a new ‘town common’ to integrate existing development at Yaxley with the new community at Great Haddon. None of these hedgerows are classified as ‘Important’ or species rich.

- Hedgerows 13, 14, 15, 16 and 36 to the centre of the site where retention is considered inappropriate given the residential and access proposals in the Core Area. None of these hedgerows are classified as ‘Important’ or species rich.
• Hedgerows 22, 23 and 27 within the Employment Area where retention is considered inappropriate given the employment development proposed. None of these hedgerows are classified as ‘Important’ or species rich.

• Hedgerow 17 and 18 within the Employment Area adjacent to the bridleway. Retention of these hedgerows is not feasible given the requirements for highway access to the site from the Fletton Parkway and the proposed employment development. Hedgerow 17 is classified as an Important hedgerow.

8.197 New native hedgerows will be planted within areas of strategic open space and to gap up existing hedgerows where appropriate. The opportunities for new hedgerow planting will create a network of linked features across the sites. This planting will create opportunities for approximately 6000 linear metres of new hedgerows within the sites and increase the overall provision and connectivity of hedgerows compared to the current situation in the longer term.

8.198 Overall, there will be a moderate adverse effect on existing hedgerows during the construction phase resulting from hedgerow removal, rising to a minor beneficial effect as the development is completed and new hedgerows are planted, and a moderate beneficial effect 10 years post completion when new hedgerows will be fully established providing a robust landscape framework to areas of public open space with greater connectivity between retained features.

Effects on Ponds and Watercourse

8.199 The Stanground Lode and the connecting tributary to the north will be retained and incorporated within a green infrastructure corridor through the sites. The Lode will form an important component of the open space corridor which will be designed to balance the need for public safety, with those of access, nature conservation and surface water attenuation. The watercourse corridor will be subject to a programme of landscape and habitat enhancement, which will be agreed with the City Council and Environment Agency at the detailed design stage.

8.200 The water body at ‘Long Lake’ in the north east corner of the Core Area will be retained as a landscape feature and new water bodies will be created across the sites for surface water attenuation and as receptor sites for newts, reptiles and other species details of which are included in Chapters 5. and 6. These proposals will increase the area of open water within the sites compared to the current situation.

8.201 Three of the sixteen ‘wet ponds’ within the sites will be lost to accommodate the proposed development. The loss of these ponds during the construction stages of the project will be compensated by the creation of new ponds in open space areas and
species receptor sites in the broad locations identified on Parameter Plan PST021-DFP-08.

8.202 Retained ponds will be protected during construction by the erection of protective fencing around the perimeter of each pond and ponds to be retained will be clearly marked on a plan for issue to site operatives. Ponds will be subject to a programme of clearance and improvement where required to promote biodiversity and minimise risks to public safety. Any improvement proposals will be prepared with the input of a suitably qualified ecologist and agreed with the planning authority through submission and agreement of an Ecological Management Plan.

8.203 The loss of a small number of field ponds during the construction phase of the development will be compensated by the creation of new ponds within open space and habitat areas and the long term effect on existing watercourses and ponds is assessed as *moderately beneficial*.

Effects on Topography

8.204 No major changes to the overall topography of the site are proposed and whilst details of proposed levels have not been fully resolved at the outline stage, it is anticipated that earthworks will be localised and restricted to a maximum of +/- 2m vertical deviation. The areas of higher ground in the south western part of the Core Area of the site in the vicinity of Norman Cross have been retained as open space in order to minimise the need for major earthworks in this area of the site.

8.205 Localised earthworks will be required to create formal play pitches at acceptable gradients and surface water attenuation features within areas of public open space. In addition, minor and localised cut and fill will be required along the south western section of the Stanground Lode open space corridor to carry out channel widening and provide flood plain compensation, details of which are set out in Chapter 5.

8.206 Earthworks within the canopy of retained trees and within 2m of retained hedgerows will be avoided wherever possible. Where this is unavoidable, excavations will be carried out in accordance with the guidance set out in BS5837 (2005) *Trees in Relation to Construction*.

8.207 There will be a minor and very localised effect on existing landform in the short term but the development will not give rise to significant long term effects on the overall topography of the sites or the elevation of land within the sites in relation to adjacent residential properties, rights of way or adjacent land uses.
Effects of Rights of Way

8.208 The strategic proposals for the future diversion of existing rights of way within the sites are set out below. These diversions will be subject to separate and detailed applications at a later date. The proposed diversions are identified at this stage to determine the impacts of the proposed development on existing rights of way and provision for public access, and to fix the location of the bridleway crossing of the western peripheral road which is required under the Section 106 associated with the outline planning consent for Hampton.

8.209 The existing and proposed rights of way are illustrated on Figure 8.13 and the following diversions are proposed.

8.210 Public footpaths – Footpaths No. 12 and 14 within the Core Area site are proposed for partial diversion to incorporate these into proposed open space corridors through the development. The principle of these proposed diversions has been agreed with Peterborough City Council. The proposed routes are equally as convenient for users as the existing routes and will be surfaced with stone catering for a wider diversity of users and abilities. The design of safe footpath crossings required at highway junctions will be agreed in consultation with the City Council as part of the detailed design of the highway and footpath infrastructure and many include light controlled crossings or other carriageway works.

8.211 Bridleway 2/11 - Partial diversion of the bridleway to move this to the south of the Stanground Lode in order to minimise ecological impacts on the SAC through increased access and disturbance, and to provide an underpass crossing of the western peripheral road at a location which minimises environmental impacts.

8.212 The eastern section of the proposed diversion will minimise adverse ecological impacts on the Orton Pit SAC and sensitive bird species, details of which are set out in Chapter 6. The proposed diversion provides the following benefits compared to retention of the existing route:

- It minimises the potential for, and impact of, unauthorised human access to the Orton Pit SAC. Relocating a section of the bridleway to the south of the Stanground Lode will deter public access from the bridleway to the edge of the SAC. Access to the edges of Haddon Lake will still be possible from the bridleway to the east of the proposed diversion.

- It minimises the potential impacts on the SAC through increased numbers of cats and dogs. The Stanground Lode will lie between the proposed bridleway route and the SAC providing a significant natural barrier to the movement of cats and
dogs into the SAC. This cannot be achieved along the existing bridleway route without the need for significant cat proof fencing which is not desirable from an amenity perspective.

- It provides greater certainty that Marsh Harriers nesting along the existing route will remain present and breeding on site. Marsh Harriers are sensitive to disturbance and the proposed diversion will mitigate this potential impact (refer to Chapter 6. for details).

- It minimises public access pressure through the centre of the proposed nature conservation buffer between the line of the WPR and the western edge of the SAC as indicated on the Development Framework Plan. Retention of the bridleway on its current alignment would divide this area in two diminishing opportunities, increasing potential disturbance to newly created habitats and the adjacent SAC.

8.213 Impacts associated with the proposed eastern section of the diversion are therefore, beneficial from an ecological perspective.

8.214 Further west, the diversion is proposed to pass under the western peripheral road running parallel to the southern bank of the Stanground Lode, approximately 200m to the south of the existing alignment. The Western Peripheral Road will be elevated at this point to cross the watercourse and sufficient headroom and width can be achieved to provide for bridleway users.

8.215 Providing a crossing at this location provides the following benefits compared to a crossing on the existing bridleway alignment:

- Because of natural ground levels (the Lode runs through the lowest point of the site), the proposed crossing point avoids having to raise the road level by several metres above that which would otherwise be required to accommodate a crossing on the existing alignment. Initial assessment by Peter Brett Associates indicates that to accommodate the crossing on its existing alignment, the road would have to be elevated by 3 to 4 metres over a distance of approximately 200m to achieve the required clearance. This would give rise to additional construction, environmental and visual effects compared to the proposed crossing point.

- It avoids the need for significant earthworks or cuttings and provides a safe crossing point with good forward visibility. Providing a crossing on the existing alignment without having to raise road levels would require the bridleway to be located within a deep cutting on either side of the road to achieve the necessary
gradients and headroom under the road. This cutting would extend over many metres either side of the WPR, impacting upon the proposed SAC buffer to the east, and areas of public open space to the west. In addition, a bridleway in deep cutting would represent a potential increased risk to public safety and present drainage difficulties.

- It minimises construction impacts and the use of materials which would otherwise be required to construct a second crossing of the Western Peripheral Road on the existing alignment.

8.216 In relation to impacts on public convenience and use of the bridleway as a means of getting from A to B, the proposed diversion runs parallel to the existing route for much of its length and will have no significant impact on the overall length of the route or on journey times. The proposed diversion does however allow the bridleway to be more fully integrated with the Great Haddon community and link users with other public footpaths, open spaces and leisure routes proposed within the development. The proposed route would be surfaced with stone and can be provided at acceptable gradients to accommodate all users. Crossings of the Stanground Lode and the secondary street to the north of Madam Whites Covert can be provided by suitably designed crossing points to ensure the safety of bridleway users.

8.217 In relation to impacts on public amenity, the diverted route will be located through areas of open space and run parallel to the Stanground Lode watercourse providing an attractive, active and secure environment for users. Whilst the existing character of this section of the bridleway will undoubtedly change as it passes through the development area and close distance views across the SAC will be lost from some sections, the impact on views and public amenity of the proposed route is not considered significant given that the character of the existing bridleway route as a whole will change as a consequence of this scale of development in this location, the principle of which is supported by the City Council in its emerging Core Strategy and Site Allocations DPD.

8.218 Overall, and on balance, the impacts associated with the proposed diversion of bridleway 2/11 offer benefits compared to retention of the current bridleway alignment which would undoubtedly give rise to increased environmental effects.

8.219 **Bridleway 1** – Diversion of a 500m length of the northern section of the bridleway within the Employment Area site to allow construction of a highway link to the Fletton Parkway Junction 1 required to access the development as part of the overall transport strategy. The broad location of this is indicated on Figure 8.13.
8.220 In this location the bridleway will be diverted between 25 and 30m to the east to run parallel to the existing route. The diverted route will be surfaced to stone and new native trees and hedgerows will be planted on both sides to define the route and provide an attractive green corridor consistent with the proposed treatment of the remainder of bridleway No. 1 to the south. Overall therefore, there will be no significant impact on the length, width, or surface condition of the bridleway in this location which would adversely affect users.

8.221 The remainder of bridleway No. 1 will be retained on its current alignment with existing hedgerows and trees along both sides of the route (12-15m in width) retained and supplemented with new planting to create a green corridor of between 25 and 30m in width. The overall route and the connection points with the wider network to the north and south will also be retained.

8.222 Impacts on bridleway users will result from the need to cross secondary access roads serving the proposed employment development to the east, and safe crossing points will need to be agreed with the City Council as part of future highway applications. In this regard, the proposals will lead to some disadvantages to users compared with the existing situation.

8.223 In relation to public amenity, views from the bridleway will change significantly as a consequence of development proposed to the east and west (including strategic employment development already consented at Alwalton Hill), although the visual impact of this will be mitigated in part by the landscape proposals outlined above. The significance of impact depends on the expectations of bridleway users which will change as development proceeds and the new community becomes established.

8.224 In summary, adverse impacts on bridleway No. 1 will result from changes to existing views which can only be partially mitigated, and the introduction of highway crossing points along the route which will inconvenience users. Beneficial landscape and ecological impacts will result through new hedgerow and tree planting proposed along both sides of the route and by avoiding adverse impacts on sensitive species and habitats.

Proposed Access

8.225 A network of access routes are proposed within areas of strategic open space linking with designated routes and the wider environment to the west and north east, the principles of which are illustrated on Figure 8.13.

8.226 This proposed network will provide access for existing and new communities to significant areas of public open space, nature conservation sites, woodland, informal
and formal recreation facilities and community facilities including schools. In addition, in response to public consultation, a dedicated equestrian access route is proposed to link the existing livery yard at Yaxley with the Green Wheel to the north. These proposals will have a significant beneficial impact on overall access to the outdoor environment for existing and new communities and promote healthy and active lifestyles. These benefits will not be achieved in the absence of the development.

Summary

8.227 Balancing all of the above issues and impacts, it is clear that there are both adverse and beneficial impacts on rights of way and public access provision. The positive impacts resulting from the strategy and proposals set out above will minimise and mitigate adverse environmental effects and compensate in part, for adverse impacts on bridleway users but which, cannot be wholly avoided. Overall, impacts on rights of way and provision for public access are assessed therefore as Neutral to Minor Beneficial in the longer term.

Effects on Heritage Features

8.228 The Scheduled Monument and Listed buildings and structures at Norman Cross are outside the site boundaries and there will be no direct effects on any Listed Buildings, Conservation Areas or Scheduled Ancient Monuments as a result of the proposed development. Highway improvements proposed to the A15 London Road will have no direct effects on the Norman Cross Monument, the Listed Milepost or the boundary features to existing buildings along the northern side of the road.

8.229 Indirect effects may arise where the proposed development adversely affects the setting of either the SAM or the Listed Buildings for which policies exist in the current and emerging development plan for Huntingdonshire. This issue is considered in full in Chapter 7 and the assessment below focuses on the landscape and visual impact of proposed development on views to and from the Norman Cross SAM and the associated Listed Buildings which may contribute to the setting of these features. The assessment also considers the effect on views to and from Yaxley Conservation Area in response to comments made by English Heritage at the EIA scoping stage.

Norman Cross Scheduled Ancient Monument

8.230 The monument contains no physical remains or buildings which are visible above the boundary hedgerows to the north and east and which could be adversely affected by built development proposed north of London Road. The monument is not open to public access and is not a significant feature in views from rights of way or roads.
8.231 The existing service road and hedgerow along the northern edge of the A15 to the southern boundary of the monument will be retained and mitigation is proposed to minimise the visual impact of development proposed to the north, on views across the monument from London Road and potentially the rear of residential properties at Norman Cross. This mitigation includes setting the development edge back from the northern and eastern boundaries of the scheduled monument boundary by a minimum of 90m through the creation of an open space buffer designed to reflect the parkland character of the monument, and planting an additional screen belt to the north and east of the existing boundary hedgerows.

8.232 Interpretation features will be implemented within the open space buffer proposed to the north of the monument, the details of which will be agreed with English Heritage and Peterborough City Council and delivered through the S106 Agreement or a suitably worded planning condition.

8.233 In the short term as construction proceeds, housing proposed to the north of the monument will be glimpsed through and beyond the boundary hedgerows from specific locations along London Road and potentially from the rear of one or two properties at Norman Cross. Given that the changes to the existing views are not widespread or affect large number of receptors, the significance of short-term effects is assessed as minor adverse.

8.234 In the longer term, planting proposed to the north of the monument will become established providing improved screening of development in views from the south and the parkland landscape will provide an appropriate landscape buffer to the monument offering opportunities for public access and interpretation. These measures will protect the character and setting of the monument and overall, the significance of longer-term effects is assessed as Minor Beneficial.

Listed Buildings

8.235 There will be no direct effects on Norman House or the Old Governors House as a result of the proposed development. The Norman Cross Monument and the Listed Milepost will be retained in situ and highway works proposed to this section of London Road will retain the existing arrangements for vehicular and pedestrian access to the Monument.

8.236 The original setting of the listed buildings has changed significantly over time through loss of the original POW Camp and is now largely defined by the gardens and curtilage of the individual buildings and the collection of associated houses and outbuildings at Norman Cross. The wider landscape setting of the buildings is defined
by the parkland landscape of the Norman Cross Monument which is outside the application sites and will be retained.

8.237 There will be no significant effect on views of these buildings from locations the north and north east due to the screening effect of established vegetation although filtered views of properties north of the Old Governors House are possible through the eastern boundary hedgerow during the winter months. It has not been possible to agree access to establish the potential for views north from within the buildings although it is likely that there will be views north toward development from the upper elevations of Norman House.

8.238 Built development has been set back from the SAM as described above and at its nearest, will be approximately 200m from Norman House and 100 from the Old Governors House to the north east, and 400m to the north of Norman House beyond the retained landscape of the monument. Additional planting proposed to the north of the monument and east of the Old Governors House will improve the screening value of the existing hedgerows, protect the enclosed character of the buildings and their grounds, and provide a robust edge to the development.

8.239 Highway improvement proposals to the A15 will have no significant impact on views south to and from the buildings which will remain unchanged with the exception of minor changes to the existing road layout in this location.

8.240 Overall, there will be no significant impact on existing views to and from the existing Listed Buildings at Norman Cross as a result of the development proposed and the significance of landscape and visual effects on the setting of these buildings is assessed as Minor Adverse.

Yaxley Conservation Area

8.241 No development is proposed within the Yaxley Conservation Area the nearest boundary of which is approximately 200m to the east of the Core Area application site boundary beyond Yaxley Cemetery. This area of the Conservation Area is defined by large buildings to the eastern side of Church Street set within their own grounds, and the Grade 1 Listed Church of St Peter.

8.242 The proposed development will not be visible from within the Conservation Area due to the screening effects of existing vegetation to the north west of the Conservation Areas (refer to Viewpoint 22), the relative topography (with the Conservation Area being significantly lower than the Core Area application site) and the enclosure provided by properties and vegetation along Church Street.
8.243 Land within the Core Area site to the west of London Road and closest to the Conservation Area boundary is proposed for open space and cemetery uses to reflect the character and qualities of this edge of Yaxley and the adjacent Conservation Area. These proposals will enhance the approach to Yaxley and the Conservation Area from the north and south along London Road.

8.244 The significant views of St Peter’s Church are gained from within the Conservation Area from rights of way to the south and south west of Yaxley and will be largely unaffected by the proposed development. The eastern edge of the proposed development (north of London Road) will be visible within the context of views of the church from the public footpath between Yaxley and Stilton (refer photo viewpoint 17) in the short to medium term until proposed mitigation planting becomes established. Development will not however, obstruct views of the church or encroach into the landscape setting of the church to the west of the village or in views from the south of Yaxley. Screen planting proposed along London Road will provide improved screening of development in the longer term. Overall, the proposed development will have no significant adverse visual effect on the character and qualities of the Conservation Area or existing views toward St Peters Church from local rights of way which will remain.

Effects on Landscape Character

8.245 Only those character areas which include the sites, or those adjacent character areas where there is considerable inter-visibility with the sites and which could potentially be affected by the proposed development, have been considered. These include:

- The Northern Wolds to the west of the A1
- The Fen Margin to the south of the A15
- The South Peterborough Farmed Claylands within which the site is located

Northern Wolds

8.246 The Northern Wolds lie to the west of the A1(M) extending as far as the Huntingdonshire District boundary and contains some of the highest land in the District. No development is proposed within the character area and the potential impact of development is therefore limited to the visual impact of development on the character and qualities of the landscape including the landscape setting of Stilton and Folksworth which lie at the very north eastern edge of the character area.

8.247 Analysis of the existing views toward the sites from roads and footpaths within the Northern Wolds has established that the proposed development is not highly visible
from locations to the west being partially screened by landform or intermediate vegetation. Where views of the western site boundary are possible, development will be seen beyond the infrastructure of the A1(M) and set back from the site boundary by approximately 50m. The existing boundary vegetation to this edge of the development will be retained and supplemented by additional woodland edge planting. Development will not form a significant component of the view and will not adversely affect the character or qualities of the wider landscape of the Northern Wolds.

8.248 In relation to key settlements, the site does not form part of the landscape setting of Stilton or Folksworth and the proposed development will not detract from the character and qualities of these settlements or result in their physical or visual coalescence with development at Great Haddon.

8.249 Given the extensive geographical area of the Northern Wolds which includes numerous settlements, the limited inter-visibility between the sites and the wider landscape, and the mitigation proposed along the western edge of the development, the overall effect on the character of the wider landscape is assessed as Minor to Negligible.

Fen Margin

8.250 The Fen Margin is an extensive character area to the south of the A15 and to a lesser extent west of the A1(M). It forms the transitional landscape to the Fens proper which lie to the south and south east. The character of the Fen Margin is influenced by the expansive views south across the Fens and existing development in the form of settlement and infrastructure including the village of Yaxley, the A1(M), the east coast railway and the B660.

8.251 There is little inter-visibility between the Fen Margin and development proposed to the north of London Road as a consequence of the relative topography and the established planting along London Road which defines the northern boundary of the Fen Margin and which will be retained and supplemented with additional tree and shrub planting.

8.252 Given the extensive geographical area of the Fen Margin, the influence of existing development and infrastructure, the limited inter-visibility, and the mitigation proposed, the overall effect on the character of the Fen Margin is assessed as Minor to Negligible.
Peterborough Claylands

8.253 With the exception of land east of the A15, which has consent for a Country Park as part of approved development at Hampton Leys, the sites forms the entirety of Character Type 6a. This landscape can be described as having moderate sensitivity on account of it being a typical agricultural landscape not highly valued for its scenic quality.

8.254 The proposed development will clearly change the character of the existing landscape although the significant landscape features, which contribute to a sense of character, have been retained and incorporated within the development layout. In addition, many of these features are retained within open space corridors with greater opportunities for public access to the landscape resource. New planting will reflect the species and patterns of planting typical to the area providing a connected network of green spaces through the development.

8.255 This approach and the landscape strategy proposals set out above recognise and implement the landscape strategy and development guidelines recommendations set out in the Peterborough Landscape Character Assessment and which include:

- The conservation and extension of existing woodlands;
- Improvements to hedgerows to restore landscape structure
- Measures to minimise visual and audible disturbance from surrounding roads and built development.
- Measures to improve the visual quality of Yaxley and maintain the separation of the village from the southern edge of Peterborough

8.256 During the construction phases of the development a number of existing landscape features will be lost and construction activity will significantly change the character of the landscape-giving rise to moderate adverse effects on existing character. However, as the development is completed, the new planting and areas of open space will be established creating a strong and coherent landscape structure for new development and public enjoyment. When compared to the current predominantly arable landscape with a fragmented landscape structure, the long term effects on landscape character are assessed as Neutral to Minor Beneficial.

Effects on the Setting of the Great Fen Project

8.257 The vision for the Great Fen Project is to develop a nationally significant area of new wetland habitat, which it is acknowledged will take many years to come to fruition.
The nearest boundary of the Great Fen Project Area lies approximately 2.6 km to the south east of the sites beyond the railway embankment.

8.258 Huntingdonshire District Council (HDC) have recently commissioned a landscape study to help determine the extent of a ‘zone of influence’ around the Great Fen Project within which it is understood the Council will carefully development proposals that would adversely affect the visual and tranquil experience of visitors to the area through inclusion of appropriate policies within the Local Development Framework. At the current time however, the ‘zone of influence’ has not been published and there is no specific policy in place against which an assessment can be made. Notwithstanding, the effects of the proposed development are considered below with reference to an extract of the draft study provided by HDC.

8.259 The draft study defines the limits and proposes boundaries for the Great Fen setting area and includes Boundary Section M which runs along the A15 between Norman Cross and the junction with the B1091 (Broadway). The Great Haddon sites are not included within the proposed boundary and the justification for the proposed boundary acknowledges that “The ridgeline which runs along the western edge of Yaxley to Norman Cross and the higher land which rises up the B1043, forms the termination of view at this location. Beyond this point, there is little or no visibility, with the exception of small glimpses to higher areas of land west of Stilton. Given the nature of the views from this section of the GFPA the visual envelope has been set as running along the definable features that are the A15 and B1043. The setting boundary reflects this”. (Boundary Section M written Justification)

8.260 Visual assessment work carried out as part of this assessment confirms that there is little visibility between the sites and the landscape to the south of the A15, and the sites lie outside the proposed GFPA setting boundary. Whilst development proposed to the north of London Road may be partially visible from within the setting area to the south, the setting back of development beyond the tree line and the retention and enhancement of planting along the road corridor will improve screening in the longer term. Development at Great Haddon lies over 2.6 km from the Project Area and will not give rise to significant adverse effects on the landscape and visual setting of the Great Fen Project Area or adversely affect the tranquil experience of visitors to the area. Impacts on the setting and special qualities of the project area are therefore, assessed as Negligible.

Visual Effects

8.261 The visual impact assessment considers the effects of the proposed development upon views from the surrounding landscape and from rights of way within the sites
themselves. The assessment considers the sensitivity of visual receptors identified in Table 8.2 and agreed at the EIA scoping stage, the magnitude of change to existing views as a result of development, and the significance of effects in the short and longer term. The assessment takes account of the landscape and mitigation proposals described earlier which are seen as an integral part of the development layout.

8.262 It has been competed through desk studies, photographic analysis and field assessment informed by the height of existing woodland and built development and the proposed maximum building heights set out below.

- Max. 15m for development within the proposed District and Neighbourhood Centres;
- Max. 12m for high density residential development within the central part of the Core Area;
- Max. 9m for medium density residential development to the outer edges of the Core Area;
- Max. 10.5m for and Community Buildings and Schools;
- Max 15m for employment development within the Employment Area.

8.263 The visual assessment also assumes that that areas of consented development at Hampton to the north east and Alwalton Hill (Peterborough Gateway) to the north west will be completed in advance of full completion of development at Great Haddon.

8.264 It is acknowledged, however, that the development will take many years to fully complete and that the ‘short term’ effects of construction operations also needs to be considered. In view of the duration of the construction period and the phasing of development across the sites, it is not possible to identify a particular date at which construction effects can be assessed, as these effects will vary across different parts of the sites at any one time. The assessment of construction effects relates therefore to the effects resulting from initial clearance of vegetation across the sites which it has been assumed will be completed during the first three years and the effects of ongoing construction activities within the nearest or most visible development phase or phases.

Assessment of Visual Receptors and Viewpoint Locations

8.265 The assessment tables below consider the effects on key visual receptors identified through the baseline survey. Representative viewpoints were identified as part of the
baseline studies and where the view changes along for example a road or footpath, the worst case scenario has been selected as the viewpoint location. The viewpoint locations are identified on Figure 8.8.

8.266 The main purpose of the assessment is to determine the potential significance of effects resulting from the proposed development on the character and quality of views from the surrounding landscape and to assess potential effects on residential amenity. The assessment in relation to each receptor is included below. Viewpoint photographs at each location are included as Figures 8.9 and are referred to below in relation to the assessment. The conclusions are summarised in Table 8.6 at the end of this chapter.

8.267 In addition, the assessment considers the effects on views from public rights of way within the sites acknowledging that the context and character of these rights of way will change significantly through development.

Views from External Roads and Rights of Way

8.268 **Representative Viewpoint 1**: Views from the old A1 to the west of the sites. The main visual receptors at this viewpoint are motorists and cyclists travelling along the road adjacent to the western development boundary.

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<th>Receptor Sensitivity</th>
<th>Magnitude of Effect</th>
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<td></td>
<td>Construction Phase</td>
<td>Operation Year 1</td>
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<td>Low</td>
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8.269 Views east toward development within the sites will be largely screened by existing tree and hedgerow vegetation along the eastern edge of the road, which will be retained and supplemented with additional planting. This will include tree and woodland edge planting of between 10 and 20m in width within the open space corridor proposed along this edge of the development which is set back from the road by approximately 50m. It is anticipated that planting along this edge of the site will be implemented in advance of the completion of built development in these areas of the site.

8.270 Construction activity will not be clearly or openly visible to motorists and cyclists using the road which will be over 50m away from the development edge beyond the
hedgerow giving rise to Minor to Negligible effects. At completion of the development (Operation Year 1) there will be intermittent views of completed residential development and highway access points to the western edge of the sites although planting along this boundary will have established providing a degree of screening and an attractive edge to the development. By year 10 the planting will provide a substantial screen and robust edge to the development.

8.271 **Representative Viewpoint 2:** Views from A1(M) at the bridge over Haddon Road. The main visual receptors at this viewpoint are motorway users.

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<th>Receptor Sensitivity</th>
<th>Magnitude of Effect</th>
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<tr>
<td>Construction Phase</td>
<td>Operation Year 1</td>
<td>Operation Year 10</td>
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8.272 Development proposed will not be prominent in views from the majority of the A1(M) due to the road being in cutting to the south and the screening provided by existing vegetation and acoustic fencing along the eastern motorway embankments and along the western edge of the sites. However, travelling north, where the motorway starts to rise to go over Haddon Road views of employment development proposed in the Employment Area site will be visible for a brief period as far as Junction 17. Travelling south, employment development at Alwalton Hill (Peterborough Gateway) will dominate the foreground although views of Great Haddon development along the western edge of the site will also be possible.

8.273 Construction activity within the sites will be visible from a section of the motorway but seen within the context of other consented development and the infrastructure of the motorway. By Year 1 employment development within the Employment Area site will be complete and prominent in the near distance view although this development will be seen within the context of consented development at Alwalton Hill which it has been assumed will also be complete. Due to the potential scale of these buildings, screen planting proposed along the western site boundary will have only a minor effect at this stage. By year 10 screen planting to the edge of the site and the woodland proposed to the west of Chambers Dole will provide a degree of screening softening the outer edges of the development.
8.274 **Representative Viewpoints 3/4**: Views south along London Road. The main visual receptors at this viewpoint are motorists and pedestrians travelling along London Road.

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<th>Receptor Sensitivity</th>
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<td>Construction Phase</td>
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8.275 Views across areas proposed for development will vary along the length of London Road. From the northern sections of the London Road, construction activity and development to the north will be visible through the existing tree belt (viewpoint 3) although the majority of the foreground view will include significant areas of open space proposed to the edge of Yaxley. To the south, in the vicinity of Norman Cross, views north will generally be precluded by properties and established vegetation along the road corridor and along the southern boundary of the Scheduled Ancient Monument (viewpoint 4).

8.276 Construction activity associated with development in this area including the movement of construction and plant machinery will be evident from this viewpoint through the existing tree belt but views will be of relatively short duration and seen within the context of recent and ongoing development at Hampton to the north.

8.277 By Year 1, tree and understorey planting proposed along the southern edge of the development will provide a degree of screening of low level activities and the lower elevation of residential properties along this edge of the site. This planting will enhance the green character of the road corridor and this approach to Peterborough. By year 10 planting will have become established and will provide an effective landscape edge to the development frontage and road corridor.

8.278 **Representative Viewpoint 5**: Views from Fletton Parkway adjacent to the northern site boundary (Employment Area). The main visual receptors at this viewpoint are motorists travelling along Fletton Parkway.

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<th>Receptor Sensitivity</th>
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<td>Construction Phase</td>
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8.279 The Fletton Parkway defines the northern boundary of the sites and a new junction will be formed at Junction One to provide vehicular access from the north into the Employment Area. The Parkway is in deep cutting along the majority of the site boundary and the dense and established vegetation along the road embankments will screen views south across the proposed development (viewpoint 5).

8.280 Fleeting views of construction activity and employment development proposed in the Employment Area may be possible from the western section of the Parkway approaching the junction with the A1(M) although development will be seen beyond the consented development at Alwalton Hill assuming that has been completed prior to completion of development at Great Haddon.

8.281 **Representative Viewpoint 6**: Views from Morborne Road between Morborne and Folkesworth. The main visual receptors at this viewpoint are motorists travelling along Morborne Road.

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<th>Receptor Sensitivity</th>
<th>Magnitude of Effect</th>
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<td>Construction Phase</td>
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<td></td>
<td>Operation Year 10</td>
<td>Construction Phase</td>
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<tr>
<td>Low</td>
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8.282 Development within the sites will not be prominent in views from the road which is approximately 1.5km west of the site boundary with views screened by established hedgerows along the road corridor for much of its length. Glimpses of development to the south western part of the Core Area and the Premier Inn at Norman Cross will be possible in the distance over these hedgerows during the winter months and in places where gaps occur at field entrances.

8.283 Construction activity within the sites will not intrude into views from the road. At completion, (Year 1) glimpses of residential development along the western edge of the site may be possible from specific locations but these are oblique to the general direction of road travel and development will not intrude into the rural qualities of the local environment. In the longer term, planting proposed along the western edge of the development will provide substantial screening, maintaining the existing vegetated horizon and assimilating development into the landscape.

8.284 **Representative Viewpoint 7**: Views east from Morborne Hill. The main visual receptors at this viewpoint are motorists travelling along Morborne Hill.
8.285 There are no views of the sites from the majority of the road with the exception of a very short section at the high point adjacent to the Telecommunications Station where development proposed to the south western areas of the Core Area will be glimpsed in the distance when travelling eastbound. The majority of construction activity will be screened by existing intervening vegetation, agricultural land and trees along the western edge of the sites although distant views of construction activity may be discernable within the central area.

8.286 In Operation (Year 1) glimpses of the development along the south western edges of the Core Area and of the Premier Inn and scheduled monument will be possible but will not intrude above the exiting skyline and treed horizon. In the longer term, new planting proposed to the western edge of the sites and internal to the development areas will assimilate development into the landscape.

8.287 **Representative Viewpoint 13:** Views from the public right of way west of the A1M between Morborne and Norman Cross. The main visual receptors at this viewpoint are pedestrians.

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<th>Receptor Sensitivity</th>
<th>Magnitude of Effect on Receptors</th>
<th>Significance of Effect on Receptors</th>
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<tr>
<td>Construction Phase</td>
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<td>Operation Year 10</td>
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<td>Low</td>
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8.288 There are no clear or open views across the sites from this footpath and the landscape of the sites does not form an important part of the existing panorama or experience of footpath users. The A1(M) is clearly visible and audible from this location.

8.289 Construction activity along the western edge of development will take beyond existing tree and hedgerow vegetation, which will be retained and enhanced. The immediate
agricultural landscape and the A1(M) dominate the foreground views from the footpath and construction activity would not be prominent to footpath users.

8.290 In Operation Year 1, existing and proposed planting along the western development edge will provide improved screening and strengthen the existing tree lined horizon visible beyond the A1 (M). The upper elevations of housing and employment buildings may be partially visible above the vegetation line but development will not obstruct or intrude into any longer distance rural views. In Operation Year 10 the new planting along the western edge will have reached approximately 15m in height and will provide substantial screening of development in the longer term.

8.291 **Representative Viewpoint 14**: Views east from the public right of way north west of Morborne. The main visual receptors at this viewpoint are pedestrians.

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<th>Receptor Sensitivity</th>
<th>Magnitude of Effect</th>
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<td></td>
<td>Construction Phase</td>
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<td>Constructio n Phase</td>
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<td></td>
<td>Minor adverse</td>
<td>Moderate adverse</td>
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8.292 The footpath is approximately 1.8km west of the sites and whilst construction activity within the sites will be visible, this will not materially change the nature of the existing view or adversely affect the amenity of footpath users.

8.293 In Operation Year 1, employment and housing development to the north and west of Jones’s Covert will be visible in the distance beyond the A1 (M) resulting in a moderate change to the existing views. 10 years post completion, planting proposed along the western boundary and to the east of Jones Covert will have established providing improved screening of development which will be barely discernable on the horizon.

8.294 **Representative Viewpoint 15**: Views east from the public right of way west of Haddon. The main visual receptors at this viewpoint are pedestrians.

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<th>Receptor Sensitivity</th>
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<td>Construction Phase</td>
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<td>Construction Phase</td>
<td>Operation Year 1</td>
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<td>-Minor adverse</td>
<td>Moderate to Minor adverse</td>
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Compiled by David Lock Associates
November 2009
8.295 The majority of the sites and therefore the development is not visible from this viewpoint which is approximately 2km to the east. There are glimpsed views of the north eastern section of the site (Employment Area) and woodland blocks within the area. Construction activity will be largely screened by existing intervening dense vegetation and built form.

8.296 In Operation Year 1, foreground vegetation will have reached a greater height although the upper elevations of employment buildings within the Employment Area may be partially visible in the distance. Development will have little or no effect on the character or quality of the existing view given the distances involved and the expansive nature of the existing view which contains built development in the near distance and which will remain largely unchanged. In Operation Year 10 new tree planting along the western development edge will provide increased screening from this location.

8.297 **Representative Viewpoint 16 and 17**: Views north from the public right of way between Yaxley and Stilton. The main visual receptors at this viewpoint are pedestrians.

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8.298 The footpath is approximately 600m south of the sites and at a significantly lower level. Existing tree planting along London Road which is approximately 15m to 20m in height will be retained and supplemented with additional planting. Construction operations north of London Road will be partially screened from the footpath due to the relative topography and the tree belts along the ridgeline and road corridor.

8.299 At completion (Year 1) planting proposed along the development boundary will provide improved screening of development. Three and four storey houses proposed to the north of London Road will sit below the existing tree line and will not intrude significantly into existing views from the footpath which encompass a much wider panorama south across the Fens than illustrated in the viewpoint photographs. At Year 10 post completion, mitigation planting will have established and views of development will be very minor and seen within the context of an established landscape framework and the urban edge of Yaxley.
8.300 **Representative Viewpoint 18:** Views from the public right of way between Stilton and Folksworth. The main visual receptors at this viewpoint are pedestrians.

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<td>Construction Phase</td>
<td>Operation Year 1</td>
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<tr>
<td>Moderate</td>
<td>Negligible</td>
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<td>Minor Adverse</td>
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8.301 Construction activity within the sites will not be readily perceived from this distance which is over 2km to the south west of the nearest development edge. Development will have no impact upon views of the village of Stilton, views toward Yaxley Parish Church, or the overall panorama available to footpath users.

8.302 In Operation Year 1 the upper elevations of three and four storey buildings to the western areas of the Core Area may be visible on the horizon but will not intrude significantly into the view. In Operation Year 10 planting along the western edge of the site will have established and the long term effects of development on footpath users will be negligible.

**Views from Residential Property**

8.303 The sites are not directly adjacent to any significant settlements and are not overlooked by any large areas of housing. Development will not adversely affect views from the existing urban edge of Peterborough to the north of the Fletton Parkway or views to and from the Yaxley Conservation Area. Views of development are therefore limited to a relatively small number of properties in close proximity to the sites including properties at Norman Cross, houses along the old A1 to the western boundary of the sites and houses to the western edge of Yaxley.

8.304 **Representative Viewpoint 19:** Views from the eastern boundary to housing at Norman Cross. The main visual receptors are residents.

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<th>Receptor Sensitivity</th>
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<td></td>
<td>Construction Phase</td>
<td>Operation Year 1</td>
</tr>
<tr>
<td>High</td>
<td>Medium</td>
<td>Medium to Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium to Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
8.305 The enclave of properties at Norman Cross are set within grounds and gardens with significant mature vegetation including boundary hedgerows, which preclude significant views of the houses from the north or north east. There are a total of 7 or 8 separate properties including the two Listed Buildings one of which, the Old Governors House (and adjoining Barrack Masters Lodge) is two separate dwellings. Only two of these, the Old Coach House and Norman Lodge appear to have partial views across the sites from gardens or first floor windows although due to restrictions on access, it has not been possible to fully assess views out from the properties. However, the degree of visual enclosure has been assessed from external locations and viewpoint photograph 19 illustrates the existing tree and hedgerow vegetation to the boundary with the sites. Further details are also included in Appendix 8.3.

8.306 Land to the north of these properties is proposed as open space including formal playing pitches, and built development has been set back by approximately 100m to minimise adverse impacts. A 20m wide belt of tree and shrub planting is proposed adjacent to the northern and eastern property boundary which will be implemented during the first phase of development and the existing boundary hedgerows will be gapped up where necessary to provide a robust boundary between development and these properties.

8.307 During the construction stages, construction activity associated with housing to the north east may be partially visible from the upper floor windows and gardens of two or three houses but this will be approximately 100m away and views will be partially filtered by intermediate vegetation. None of these properties will have an open aspect across areas of proposed development and given the small number of properties affected, the effects will be experienced by a small number of people.

8.308 At completion (Operation Year 1) planting implemented to the north and east will have established to several metres in height, which together with the retained hedgerows, will provide a high degree of screening of development. At year 10 this planting will have become fully established and views across areas of development, if any remain, will be of minor significance.

8.309 **Representative Viewpoint 20:** Views from residents along the western site boundaries. The main visual receptors at this viewpoint are residents in a small number of properties along Haddon Road which lie to the western boundary of the sites.
<table>
<thead>
<tr>
<th>Receptor Sensitivity</th>
<th>Magnitude of Effect</th>
<th>Significance of Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Construction Phase</td>
<td>Operation Year 1</td>
</tr>
<tr>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>

8.310 There are 7 houses along the western boundary of the development including a single bungalow north of the Premier Inn, two houses north of the A1(M) balancing pond and four properties where Green Wheel joins Haddon Road. None of these properties face directly onto the sites. Development will have no significant visual impact on the bungalow, which backs onto the scheduled monument and beyond which a 100m wide open space buffer with screen planting is proposed.

8.311 From the remainder of the properties, construction activity will be visible in the short term from rear gardens and windows seen against the backdrop of existing woodland at Madam Whites Covert. At completion (Year 1), development will be clearly evident beyond areas of open space although planting proposed along the western development edge and to the east of these properties will filter views of development. In Operation Year 10 the planting and open spaces will have become established providing an attractive aspect from rear gardens although built development beyond will remain visible.

8.312 Representative Viewpoint 21: Views from residents of properties that adjoin the site boundary (Core Area) to the western edge of Yaxley. The main visual receptors at this viewpoint are residents.

<table>
<thead>
<tr>
<th>Receptor Sensitivity</th>
<th>Magnitude of Effect</th>
<th>Significance of Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Construction Phase</td>
<td>Operation Year 1</td>
</tr>
<tr>
<td>High</td>
<td>Medium</td>
<td>High</td>
</tr>
</tbody>
</table>

8.313 Development will not be visible from the majority of properties to the western edge of Yaxley due to the screening provided by existing buildings and the existing woodland which will be retained, and the arrangement and height of individual houses. Whilst it has not been possible to assess the views from within individual properties, Figure
8.10 identifies those houses which have greatest potential for views of development within the site.

8.314 This identifies 14 properties with the greatest potential for views of development. For the majority of these, views will be from rear gardens and first floor windows across the existing horse paddock to the west. Construction activity and development will be over 350m to the west and will be seen across areas of open space associated with the proposed ‘town common’.

8.315 Construction activity and development will be more visible from the rear gardens and elevations of a small number of properties to the south (approximately 7 No.) which directly abut areas proposed for residential development, giving rise to Major effects. In Operation Year 1, new screen planting proposed to the west of these properties will have established providing a degree of screening to development although views will remain. In Operation Year 10 screen planting to the development edge and planting within open spaces will provide enhanced screening.

8.316 Whilst the effects on the above properties will be more significant due to their proximity to the development edge, overall, development will not have a significant effect on the visual amenity of the majority of residential occupiers to this edge of Yaxley.

8.317 **Representative Viewpoint 22:** Views from residents and road users within Yaxley Conservation Area. The main visual receptors at this viewpoint are residents and motorists.

<table>
<thead>
<tr>
<th>Receptor Sensitivity</th>
<th>Magnitude of Effect</th>
<th>Significance of Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Construction Phase</td>
<td>Operation Year 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Operation Year 10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Construction Phase</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Operation Year 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Operation Year 10</td>
</tr>
<tr>
<td>High</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No effect</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Negligible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No effect</td>
</tr>
</tbody>
</table>

8.318 Development will not be openly visible from residential property or roads within the Conservation Area due to the screening provided by existing buildings, established vegetation along the road corridor and tree belts on land between the northern edge of the Conservation Area and the development boundary.
8.319 **Representative Viewpoint 23**: Views from residents at Hampton. The main visual receptors at this viewpoint are residents at Hampton.

<table>
<thead>
<tr>
<th>Receptor Sensitivity</th>
<th>Magnitude of Effect</th>
<th>Significance of Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Construction Phase</td>
<td>Operation Year 1</td>
</tr>
<tr>
<td></td>
<td>Operation Year 1</td>
<td>Construction Phase</td>
</tr>
<tr>
<td></td>
<td>Operation Year 10</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>Negligible</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

8.320 Construction activity within the sites will not be readily perceived from this viewpoint due to intervening vegetation and the expanse of Haddon Lake which dominates the foreground view. At Operation Year 1 the upper elevations of development proposed south of Haddon Lake may be partially visible beyond the retained vegetation along the Stanground Lode corridor and within areas of open space proposed along this edge of the development. At Year 10 development will have become assimilated into its landscape setting and will have no significant effect on the visual amenity of residents at Hampton.

**Visual Receptors from Rights of Way within the sites**

8.321 Development will be clearly apparent in the near distance views from sections of the bridleway and Green Wheel where this passes through the sites, and from the two other public footpaths which connect to the Green Wheel, the locations of which are illustrated on Figure 8.13. Viewpoint photographs 9 to 12 illustrate the range of existing views from the Peterborough Green Wheel whilst Viewpoint Photograph 8 illustrates a typical view from the public footpath within the site (Core Area) to the west of Yaxley.

8.322 Construction activity and the completed development will be visually prominent in the near distance from these rights of way and their context and character will change significantly through development. The effects of this will be most significant during the construction phases when the final landscape and open space network will not have been fully implemented or established.

8.323 In the longer term, the Green Wheel and footpaths will be incorporated into an active and attractive open space network including additional access routes and incorporating areas of grassland, tree and woodland planting, new ponds and watercourses and areas for community activity and recreation. In this context, whilst development will remain highly prominent in views from existing rights of way, the opportunities provided for landscape and biodiversity enhancement along access
routes, and the creation of a more accessible open space network, will provide benefits to local communities.

8.324 When considered against the quality and diversity of existing uses along the rights of way, and the limitations of access to other areas of semi-natural habitat, the proposed development cannot be seen as entirely negative in terms of the amenity and enjoyment of footpath users. Overall therefore, whilst it is acknowledged that development will fundamentally change the character and context of the rights of way, the significance of effects is considered to be of High magnitude but Neutral in effect.

<table>
<thead>
<tr>
<th>Receptor Sensitivity</th>
<th>Magnitude of Effect</th>
<th>Significance of Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Construction Phase</td>
<td>Operation Year 1</td>
</tr>
<tr>
<td></td>
<td>Operation Year 1</td>
<td>Operation Year 10</td>
</tr>
<tr>
<td></td>
<td>Operation Year 1</td>
<td>Operation Year 10</td>
</tr>
<tr>
<td>High</td>
<td>High</td>
<td>High</td>
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<td></td>
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<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Residual Effects**

8.325 There will be no widespread and Major long-term adverse landscape or visual effects resulting from the proposed development.

8.326 There will be no significant residual adverse effects on existing landscape features or the character and qualities of the wider rural landscape as a result of the proposed development. Long term residual effects in relation to existing natural features and green infrastructure provision will be beneficial when compared to the existing baseline.

8.327 Long term residual visual effects will be Minor or Negligible from the majority of receptor locations although it is not possible to fully screen the development from adjacent land uses and Major to Moderate residual adverse visual effects will be experienced from a small number of residential properties immediately adjacent to the site (Core Area.)
<table>
<thead>
<tr>
<th>ISSUE</th>
<th>SHORT TERM / CONSTRUCTION EFFECTS</th>
<th>MITIGATION MEASURES</th>
<th>LONG TERM/RESIDUAL EFFECTS</th>
</tr>
</thead>
</table>
| Woodland      | Minor adverse                     | • Development buffers to retained woodland.  
• Retention of existing woodlands and protection during construction by submission and agreement of tree protection plan and arboricultural method statement prior to commencement of development in each phase.  
• Planting over 6ha of new public access woodland and enhancement of condition of retained woodlands.  
• Measures to control and manage public access to adjacent private woodland. | Major Beneficial            |
| Trees         | Moderate adverse                  | • Incorporation of retained trees within areas of strategic open space and protection during construction through submission and agreement of tree protection details prior to commencement of development in each phase.  
• Planting of new trees and shrubs along development edges, within open space, development areas and along primary infrastructure routes.  
• Ongoing management of retained mature trees to improve condition and life expectancy. | Moderate Beneficial         |
| Hedgerows     | Moderate adverse                  | • Incorporation of retained hedgerows into strategic open space  
• Protection of retained hedgerows during construction through submission and approval of a hedgerow protection plan  
• Planting 6km of new native hedgerows connected wherever possible with each other and other natural features | Moderate Beneficial         |
| Watercourses/Ponds | Minor adverse                  | • Retention of Stanground Lode and incorporation into strategic open space corridor  
• Accommodation of the watercourse within the design of highway crossings  
• Enhancements to bankside vegetation and habitat with details to be agreed with the Environment Agency  
• Creation of new field ponds for biodiversity  
• Creation of surface water attenuation features with reed beds and aquatic vegetation | Moderate Beneficial         |
| Public Access | Moderate adverse                  | • Tree and hedge planting along Green Wheel to retain and enhance green corridor  
• Incorporation of rights of way into strategic open space  
• Provision of underpass crossing to western peripheral road  
• Provision of equestrian link with Yaxley  
• Provision of comprehensive access network linking with public rights of way | Neutral/Minor Beneficial   |
### Table 8.5 – Summary Matrix of indirect Landscape Effects

<table>
<thead>
<tr>
<th>ISSUE</th>
<th>SHORT TERM / CONSTRUCTION EFFECTS</th>
<th>MITIGATION MEASURES</th>
<th>LONG TERM/RESIDUAL EFFECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surrounding landscape character</td>
<td>Minor adverse</td>
<td>• Development set back from site boundaries behind landscape buffers</td>
<td>Minor adverse to Negligible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Screen planting along western boundary to assimilate development in views from the Northern Wolds</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reduced building heights with screen planting to minimise impacts on fen margin</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Patterns and scale of planting proposed in keeping with the wider landscape</td>
<td></td>
</tr>
<tr>
<td>Local Landscape Character</td>
<td>Moderate adverse</td>
<td>• Retention of key features contributing to local character e.g. woodlands, watercourses, landform</td>
<td>Neutral to Minor Beneficial</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Landscape strategy proposals consistent with the local landscape character</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Landscape strategy proposals address landscape recommendations set out in the Peterborough Landscape Character Assessment and the Peterborough Green Grid Strategy</td>
<td></td>
</tr>
<tr>
<td>Scheduled Ancient Monument</td>
<td>Minor adverse</td>
<td>• Development set back from SAM boundary by approximately 100m</td>
<td>Minor Beneficial</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Open space buffer designed to reflect and extend parkland landscape character of the existing monument</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Boundary hedgerows retained and enhanced with additional planting to provide a robust boundary</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Access links with historic features along London Road</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Implementation of interpretation features to north of monument</td>
<td></td>
</tr>
<tr>
<td>Listed Buildings/Conservation Areas</td>
<td>Minor adverse</td>
<td>• Retention of existing boundary hedgerows to north and east of buildings</td>
<td>Minor to Negligible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Development set back from property boundaries</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Screen planting to north east of buildings to maintain the existing enclosed character of the enclave of properties at Norman Cross</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Creation of a village green and space for cemetery expansion at the gateway into Yaxley and the Conservation Area</td>
<td></td>
</tr>
</tbody>
</table>
### Table 8.6 – Summary Matrix of Operational Phase and Residual Visual Effects

<table>
<thead>
<tr>
<th>Viewpoint No.</th>
<th>Location</th>
<th>Distance from site</th>
<th>Receptor groups</th>
<th>Sensitivity</th>
<th>Summary of mitigation measures</th>
<th>Magnitude of effect</th>
<th>Significance of effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Old A1 west of site</td>
<td>Adjacent</td>
<td>Motorists and cyclists</td>
<td>Low</td>
<td>Set back of development by average 50m from boundary. Retention of existing planting with additional woodland edge planting.</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>2</td>
<td>A1 (M)</td>
<td>Adjacent</td>
<td>Motorists</td>
<td>Low</td>
<td>Set back of development by average 50m from boundary. Retention of existing planting with additional woodland edge planting.</td>
<td>Medium</td>
<td>Medium/Low</td>
</tr>
<tr>
<td>3/4</td>
<td>London Road</td>
<td>Adjacent</td>
<td>Motorists and pedestrians</td>
<td>Moderate</td>
<td>Retention of existing vegetation along road corridor with exception of entrances to site. Additional tree and shrub planting to northern development frontage.</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>5</td>
<td>Fletton Parkway</td>
<td>Adjacent</td>
<td>Motorists</td>
<td>Low</td>
<td>Retention of existing vegetation to road embankments.</td>
<td>Medium</td>
<td>Minor (-)</td>
</tr>
<tr>
<td>6</td>
<td>Morborne Road</td>
<td>1.5km</td>
<td>Motorists</td>
<td>Low</td>
<td>Setting development back from western edge with open space and additional screen planting along this boundary.</td>
<td>Low</td>
<td>Low to Negligible</td>
</tr>
</tbody>
</table>

Compiled by David Lock Associates
November 2009
<table>
<thead>
<tr>
<th>Viewpoint No.</th>
<th>Location</th>
<th>Distance from site</th>
<th>Receptor groups</th>
<th>Sensitivity</th>
<th>Summary of mitigation measures</th>
<th>Magnitude of effect</th>
<th>Significance of effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Morborne Hill</td>
<td>3km</td>
<td>Motorists</td>
<td>Low</td>
<td>Setting development back from western edge with open space and additional screen planting along this boundary.</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>8/9/10/11/12</td>
<td>Footpaths and bridleways within site</td>
<td>Within site</td>
<td>Pedestrians and bridleway users</td>
<td>High</td>
<td>Incorporation of rights of way within open space areas linked to community and recreation facilities. Tree and hedgerow planting alongside routes.</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>13</td>
<td>Footpath west of the A1(M0</td>
<td>200m</td>
<td>Footpath users</td>
<td>Moderate</td>
<td>Setting development back from western edge with open space and additional screen planting along this boundary.</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>14</td>
<td>Footpath north west of Morborne village</td>
<td>1.4km</td>
<td>Footpath users</td>
<td>Moderate</td>
<td>Setting development back from western edge with open space and additional screen planting along this boundary.</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>15</td>
<td>Footpath west of Haddon</td>
<td>1.5km</td>
<td>Footpath users</td>
<td>Moderate</td>
<td>Setting development back from western edge with open space and additional screen planting along this boundary.</td>
<td>Medium</td>
<td>Low</td>
</tr>
</tbody>
</table>

Compiled by David Lock Associates
November 2009
<table>
<thead>
<tr>
<th>Viewpoint No.</th>
<th>Location</th>
<th>Distance from site</th>
<th>Receptor groups</th>
<th>Sensitivity</th>
<th>Summary of mitigation measures</th>
<th>Magnitude of effect</th>
<th>Significance of effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>16/17</td>
<td>Footpath west of Yaxley</td>
<td>600m</td>
<td>Footpath users</td>
<td>Moderate</td>
<td>Retention of existing tree belts along London Road. Setting back development north of London Road with additional tree and shrub planting along road corridor and ridgeline.</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>18</td>
<td>Footpath between Stilton and Folksworth</td>
<td>1.9km</td>
<td>Footpath users</td>
<td>Moderate</td>
<td>Setting development back from western edge with open space and additional screen planting along this boundary.</td>
<td>Low</td>
<td>Negligible</td>
</tr>
<tr>
<td>19</td>
<td>Houses at Norman Cross</td>
<td>Adjacent</td>
<td>Residents</td>
<td>High</td>
<td>Setting development back from property boundaries with screen planting to boundary of open space and private gardens</td>
<td>Medium</td>
<td>Medium to Low</td>
</tr>
<tr>
<td>20</td>
<td>Houses along Haddon Road</td>
<td>Adjacent</td>
<td>Residents</td>
<td>High</td>
<td>Setting development back from property boundaries with planting and open space in intermediate landscape</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>Viewpoint No.</td>
<td>Location</td>
<td>Distance from site</td>
<td>Receptor groups</td>
<td>Sensitivity</td>
<td>Summary of mitigation measures</td>
<td>Magnitude of effect Year 1</td>
<td>Operation Year 10</td>
</tr>
<tr>
<td>--------------</td>
<td>----------</td>
<td>--------------------</td>
<td>----------------</td>
<td>-------------</td>
<td>--------------------------------</td>
<td>---------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>21</td>
<td>Houses to the western edge of Yaxley</td>
<td>Adjacent to 350mt</td>
<td>Residents</td>
<td>High</td>
<td>Retention of woodland which provides significant screening to many properties. Open space proposed to this boundary with screen planting to adjacent property boundaries</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>22</td>
<td>Yaxley Conservation Area</td>
<td>200m</td>
<td>Residents and road users</td>
<td>High</td>
<td>Land nearest conservation area proposed for cemetery and open space uses Planting and open space to road corridor to enhance approaches to conservation area and minimise views of development north of London Road</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>23</td>
<td>Hampton</td>
<td>400m</td>
<td>Residents</td>
<td>Moderate</td>
<td>Retention of vegetation along the Lode Corridor with development set back from boundary with open space and planting to this edge Landscape proposals agreed for WPR will screen employment edge supplemented by new planting along north eastern development boundary.</td>
<td>Low</td>
<td>Negligible</td>
</tr>
</tbody>
</table>
TRANSPORTATION AND ACCESS

Introduction and Scope of Assessment

9.1 This chapter of the Environmental Assessment assesses the transport related effects of the proposed development of an urban extension at Great Haddon. This Environmental Assessment has been based on the Transport Scoping (TS), Transport Assessment (TA) and Framework Travel Plan (TP) report which contain a detailed analysis of the transport issues and mitigation measures.

9.2 This Environmental Assessment takes into account the Environmental Assessment Standards, highlights the national, regional and transport policy relevant to the development sites, identifies the baseline ground conditions of current traffic flows, public transport provision and walking and cycling routes. The potential impacts from the developments and construction effect are also identified and assessed along with mitigation measures to reduce transportation environmental impacts.

9.3 Overall, this Environmental Statement examines the potential environmental impacts within the vicinity of the development with respect to the transport related impacts of the application proposals.

Reference Material and Assessment Method

9.4 References within this section are taken from work carried out in preparing the TS, TA and TP reports in support of these proposals and include relevant national, regional and local transport policies. These include:

- Planning Policy Statement 1: Delivering Sustainable Development and the Supplement to PPS1: Planning and Climate Change
- Planning Policy Statement 3: Housing
- Planning Policy Guidance 13: Transport
- Regional Spatial Strategy (East of England Plan)/ Draft Regional Transport Strategy
- London to South Midlands Multi-Modal Study
- Peterborough Local Transport Plan 2 (LTP2) 2006-2011
- Peterborough Local Plan (First Replacement) 2005
Great Haddon, Peterborough
Environmental Statement
Great Haddon Consortium

- Peterborough Transport Model (PTM) and software programmes ARCADY 6.1 (roundabout capacity calculation), TRANSYT (linked signals capacity calculation) and LINSIG 2.4.10 (traffic signals capacity calculation)

- Great Haddon, Peterborough Transport Scoping Report

- Great Haddon, Peterborough Travel Plan Report, and

- Great Haddon, Peterborough Transport Assessment Report.

Assumptions, Limitations and Technical Difficulties

9.5 The findings of the assessment of the transport impact of the development proposals are summarised from an environmental perspective. It has been assumed that the development will be built out in four phases with up to approximately 500 dwellings being built per year in peak years.

9.6 Although vehicle traffic will have some environmental effect on the area, measures to reduce the traffic impact of Great Haddon have been proposed in order to give future residents and employees the opportunity to travel by alternative modes of transport to the car and reduce the environmental impact associated with travel by car.

9.7 Traffic impact testing on the local highway network was carried out utilising traffic flow data taken from the PTM. Sensitivity checks were undertaken for the 2006 base year and in the 2026 forecast year with and without the development of Great Haddon. Limitations in the PTM could be in the form of assumed mode split used for Great Haddon which has been based upon an adjacent ward (Orton Waterville) to the north of the application sites as this ward has a similar make up of dwellings to jobs. There is no certainty that these mode splits will be accurate; however, the mode split has been calculated using Census 2001 data, the Travel Behaviour Research (completed on behalf of Peterborough City Council (Peterborough CC)) and Orton Waterville mode split. This is therefore considered to represent a realistic mode split for the development. Furthermore, the outputs are limited to the assumptions that have been applied within the PTM. Further details on these are provided in the TA.

Policy Background

9.8 This section considers the national, regional and local policies relevant to the development at Great Haddon and demonstrates how the proposed development would contribute towards realising policy aspirations, drawing out the underlying themes of sustainability that are common to all of these. These policies are described further in the TA.
9.9 Over the last decade, national planning policy has increasingly recognised the significance of delivering more sustainable patterns of development in locations that are highly accessible to non-car modes. Emphasis has been placed on the important role of planning in creating sustainable and vibrant communities that reduce the need to travel and encourage environmental sustainability. The relevant national policies include: Planning Policy Guidance (PPG) 13: Transport; Planning Policy Statement (PPS) 1: Delivering Sustainable Development and Supplement to PPS1: Planning and Climate Change.

9.10 The national policies highlighted above present the backdrop to the creation and implementation of policy at the regional level. The Regional Spatial Strategy (RSS) for the East of England adopted in 2008 provides a vision to sustain and improve the quality of life for all people who live in, work in, or visit the region, by developing a more sustainable, prosperous and outward-looking region, while respecting its diversity and enhancing its assets. The London to South Midlands Multi-Modal Study was primarily concerned with strategic inter-urban movement, and reported that the A1/ A1(M) in the vicinity of Peterborough was not specifically identified as an area which was likely to have existing or future problems with respect to congestion, although lack of capacity on the East Coast Main Line Railway between Peterborough and Huntingdon was identified.

9.11 At a local level, the Peterborough CC second Local Transport Plan (LTP2), published in March 2006, covers the period 2006-2011 and sets out the Council’s overall transport strategy. The document balances the need to maintain good accessibility by car against the requirement to meet the growing demand for travel by the promotion of attractive and safe sustainable alternatives through travel choice. LTP2 notes that “an acceleration rate of growth, higher than that included in the East of England Plan, may be deliverable in Peterborough. This could see Peterborough CC achieving the 21,200 additional homes and 17,400 additional jobs earlier than the 2021 target date”. It also refers to the East of England Plan’s transport-related objectives, including “delivering more integrated patterns of land-use, movement, activity and development”, and to the then draft Regional Transport Strategy.

9.12 The Peterborough Local Plan was adopted in July 2005 and remained in force until July 2008. The majority of policies have been saved beyond July 2008 by means of a Direction from the Secretary of State. Policies saved include transport whereby the following policies have been identified that will need to be addressed for planning permission to be given for such developments:
9.13 Policy T2 – Development Affecting footpaths and Public Rights of Way

“Planning permission will only be granted for development that affects a footpath or public right of way if the route is satisfactorily incorporated into the development or diverted, unless:

a) there is no prospect of the footpath or Right of Way serving a beneficial purpose;

or

b) in the case of a footpath, its closure would be in the best interests of crime reduction

9.14 This policy recognises that there may be circumstances where the alternative routeing or alignment of a footpath or right of way is acceptable. 'Satisfactorily' in the policy means that the route as retained, or any alternative route or alignment provided, must be no less attractive, safe or convenient to users than that existing prior to the development. It will be for the applicant to demonstrate that users (which may include pedestrians, those with mobility difficulties, cyclists and horse riders) would not be materially disadvantaged. In the case of criterion (b) Peterborough CC will need to be satisfied that there is an overriding community safety justification before agreeing a development that would result in closure. In the case of development which affects a Right of Way the separate procedures of Sections 247/257 of the Town and Country Planning Act 1990 give added protection and the appropriate procedures must be followed if closure or diversion is proposed.

9.15 Policy T3 – Accessibility to Development – Pedestrians and those with mobility difficulties

“Planning permission will only be granted for new development if it is safely and easily accessible by pedestrians and those with mobility difficulties. Provision should be made for new connections and improvements to pedestrian routes, where they are directly related to the proposed development”.

9.16 The development proposals will incorporate an integrated network of pedestrian and cycle links that will enable safe and good accessibility for those with mobility difficulties.

9.17 Policy T4 – Development Affecting the Cycle Route Network

“Planning permission will not be granted for any development that would prejudice the safety of, or cause significant inconvenience to cyclists using any elements of the cycle route network”.

Compiled by David Lock Associates
November 2009
9.18 The proposals for the development as set out in the Development Framework Plan ref: PST021/DFP/01 rev I will incorporate the existing National Cycle Network Route 53 (NCN Route 53) and National Route 12 (a spoke of the Green Wheel) (NR 12) currently intersecting the sites. These routes will provide future residents with cycling opportunities throughout the sites and further afield.

9.19 Policy T5 – Accessibility to Development – Cyclists

“Planning permission will only be granted for development which has significant transport implications if it provides safe and convenient access for cyclists. Provision should be made for new connections and improvements to the cycle network where they are directly related to the proposed development”.

9.20 The development will provide safe and easy access to cycle routes and the cycle route network providing opportunities to make journeys to work, school and local facilities.

9.21 Policy T7 – Public Transport Accessibility to Development

“Planning permission will only be granted for development which has significant transport implications if it is well served by public transport or if infrastructure/service improvements are to be made to create safe and convenient access to the development by public transport”.

9.22 The development will include the provision of a public transport network connecting throughout the sites and into the wider community.

9.23 Policy T8 – Connections to the Existing Highway Network

“Planning permission will only be granted for a development if vehicular access is on to a highway whose design and function is appropriate for the level and type of vehicular traffic likely to be generated by the proposed development. Planning permission will only be granted for development requiring an access on to or off any existing or proposed Primary Route or Principal Road where:

- it is by way of an existing intersection; or
- it is by way of a proposed intersection safeguarded in this Plan; or
- in the case of motorways and trunk roads, it would provide a junction with other Primary Routes or Principle Roads, or access to major transport infrastructure facilities; or
- in the case of routes other than motorways and trunk roads, it would support integrated transport and sustainable development initiatives”. 

9.24 There will be a number of new access points into the sites from the north along the A1139 Fletton Parkway at Junctions 1 and 2 and to the south off the A15 London Road. The access points into the development will also allow for public transport services connecting residential, employment, education and local centre facilities within the sites and also within the wider community. The highway proposals in and around Yaxley support and prioritise public transport aspirations to deliver a sustainable development.

9.25 Policy T9 – Cycle Parking Requirements

"Planning permission will not be granted for development outside the city centre unless it provides high quality off-street cycle parking in accordance with Peterborough’s minimum standards”.

9.26 Cycle parking standards for the sites will be guided by Peterborough CC Cycle Parking Standards. Peterborough CC has recommended that these be applied pragmatically, particularly in the application of standards for housing, where spaces for one or two cycles per house are provided rather than one per bedroom.

9.27 Policy T10 – Car and Motorcycle Parking Requirements

"Planning permission will only be granted for car and motorcycle parking outside the city centre if it is in accordance with standards”.

9.28 The proposed Parking Plan will identify Parking Standards to which the developments will seek to conform. Peterborough CC has recommended the adoption of a pragmatic approach to car parking, particularly for residential parking provision, rather than adopting maximum standards.

Baseline Ground Conditions

9.29 The TA has been prepared to assess the impact of the proposed developments at Great Haddon in terms of highway capacity and the expected levels of development traffic flows associated with the developments. It is therefore considered appropriate to draw on this detailed work to determine the likely transport related environmental impact of the developments on the local area. A summary of the TA’s findings on baseline conditions is provided in this Environmental Statement.

Walking and Cycling

9.30 Peterborough CC and Sustrans website identifies that there are a number of cycle/walking routes within the vicinity of the sites. The sites provide a NCN Route and a NR on site. NCN Route 53 (on-road route) Peterborough to Birmingham is situated to the west of the sites running along the Great North Road providing connectivity to
Warmington to the west and Stilton and Norman Cross to the south of the sites. NCN Route 53 uses pedestrian routes, disused railways, minor roads, canal towpaths, or traffic-calmed routes in towns and cities.

9.31 NR 12 (a spoke of the Green Wheel) currently runs from the north of the sites in the Ortons across the A1139 Fletton Parkway/ Orton Parkway roundabout connecting to the NCN Route 53 to the south of the sites. From here it then travels east from the sites across A15 London Road immediately south of Eagle Way (cycle and equestrian Pegasus crossing facility) in the direction of Farcet. The Green Wheel is a circular regional NR of cycleways, footpaths and bridleways that provide safe, continuous routes around the city. Figure 9.1 identifies the existing footpaths, cycleways and bridleways located throughout the sites.
9.32 The quality of provision for pedestrians and cyclists along the A15 London Road currently varies considerably along its length from the A1(M) Junction 16 to the A1260 Serpentine.

9.33 Cyclists currently do not have any allocated footway space south of Hampton. On-road provision for cyclists is provided and they can wait in front of the stop line at the traffic signals at A15 London Road/ Brunel Drive.

Public Transport Provision

Bus Services

9.34 The TA identifies the current bus services that provide connections from Yaxley and Hampton to Peterborough. Local bus services are operated by Stagecoach, Cavalier Travel, Peterborough CC and Whipset Coaches. Details of current services and frequencies are provided in the TA.

Rail

9.35 In terms of rail connectivity, the rail station in Peterborough City Centre provides regular services to London, the North and the East. The rail station is situated on the East Coast Main Line and is served by four train operating companies – National Express East Coast, Cross Country Trains, East Midlands Trains and First Capital Connect which enable connections to many local, regional and national destinations. Further details of rail services from Peterborough rail station are provided in the TA.

Highway Network

9.36 The highway network consists of the A1(M) to the west of the sites providing links to London and the North. To the north of the sites lies the A1139 Fletton Parkway taking traffic into Peterborough City Centre and to the south and east lies the A15 London Road. The Great North Road lies directly adjacent to the A1(M) to the west of the sites and is currently an access road for residential dwellings at Norman Cross.

Baseline Traffic Flows

9.37 Baseline traffic flows have been taken from the agreed Peterborough Transport Model (PTM). The agreed Transport Scoping Report identified that the use of the PTM would be the preferred approach in assessing the traffic impact of the Great Haddon development. Following assessment and validation of the base year model outputs, it has been agreed with Peterborough CC, Cambridgeshire County Council (Cambridgeshire CC) and the Highways Agency (the Agency) that the base year outputs are acceptable.
9.38 Baseline traffic flows have been taken for the surrounding local highway network and include:

- A1(M) – Junctions 16 and 17
- A1139 Fletton Parkway – Junctions 1, 2, 3 and 3a
- A15 London Road
- B1091 Broadway, and
- A1260 Serpentine.

9.39 Table 9.1 shows the AM peak (0800-0900) and PM peak (1700-1800) flows from the agreed 2006 Base PTM for the local highway network, as well as 18 hour traffic flows.

<table>
<thead>
<tr>
<th>Road Name</th>
<th>Description</th>
<th>AM Peak</th>
<th>PM Peak</th>
<th>18 Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1(M) J16-17</td>
<td>Between J16 and 17</td>
<td>NB 3,555</td>
<td>3,318</td>
<td>29,998</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SB 3,242</td>
<td>3,443</td>
<td>29,489</td>
</tr>
<tr>
<td>A1139 Fletton Parkway (A1(M) to J1)</td>
<td>Between A1(M) to J1</td>
<td>WB 2,617</td>
<td>2,576</td>
<td>23,889</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EB 2,662</td>
<td>2,245</td>
<td>24,799</td>
</tr>
<tr>
<td>A1139 Fletton Parkway (J1-J2)</td>
<td>Between J1 and J2</td>
<td>WB 3,843</td>
<td>2,578</td>
<td>29,805</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EB 3,263</td>
<td>2,989</td>
<td>29,332</td>
</tr>
<tr>
<td>A1139 Fletton Parkway (J2-J3)</td>
<td>Between J2 and J3</td>
<td>WB 3,465</td>
<td>2,228</td>
<td>28,566</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EB 3,215</td>
<td>2,646</td>
<td>28,274</td>
</tr>
<tr>
<td>A1139 Fletton Parkway (J3-J3a)</td>
<td>Between J3 and J3a</td>
<td>WB 2,690</td>
<td>2,623</td>
<td>23,462</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EB 2,558</td>
<td>2,722</td>
<td>23,695</td>
</tr>
<tr>
<td>A15 London Road</td>
<td>North of A1(M) J16</td>
<td>NB 1,079</td>
<td>626</td>
<td>7,928</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SB 581</td>
<td>952</td>
<td>7,838</td>
</tr>
<tr>
<td>A15 London Road</td>
<td>North of Yaxley</td>
<td>NB 766</td>
<td>656</td>
<td>6,679</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SB 574</td>
<td>811</td>
<td>7,106</td>
</tr>
</tbody>
</table>
### Road Name, Description, AM Peak, PM Peak, 18 Hour

<table>
<thead>
<tr>
<th>Road Name</th>
<th>Description</th>
<th>AM Peak</th>
<th>PM Peak</th>
<th>18 Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>A15 London Road</td>
<td>North of junction with Serpentine (under A1139 Fletton Parkway)</td>
<td>451</td>
<td>327</td>
<td>3,681</td>
</tr>
<tr>
<td></td>
<td></td>
<td>352</td>
<td>326</td>
<td>3,456</td>
</tr>
<tr>
<td>B1091 Broadway</td>
<td>Through Yaxley</td>
<td>941</td>
<td>391</td>
<td>6,138</td>
</tr>
<tr>
<td></td>
<td></td>
<td>255</td>
<td>858</td>
<td>6,451</td>
</tr>
<tr>
<td>B1091 Broadway</td>
<td>East of Yaxley</td>
<td>432</td>
<td>479</td>
<td>4,605</td>
</tr>
<tr>
<td></td>
<td></td>
<td>394</td>
<td>460</td>
<td>4,278</td>
</tr>
<tr>
<td>Serpentine</td>
<td>Between J3 – Hargate Way</td>
<td>991</td>
<td>1,173</td>
<td>14,143</td>
</tr>
<tr>
<td></td>
<td></td>
<td>735</td>
<td>1,643</td>
<td>14,321</td>
</tr>
<tr>
<td>Serpentine</td>
<td>Between Hargate Way – Serpentine Roundabout</td>
<td>862</td>
<td>1,299</td>
<td>14,143</td>
</tr>
<tr>
<td></td>
<td></td>
<td>735</td>
<td>1,643</td>
<td>14,143</td>
</tr>
<tr>
<td>Serpentine</td>
<td>Between Serpentine Roundabout – A15 London Road</td>
<td>582</td>
<td>617</td>
<td>14,321</td>
</tr>
<tr>
<td></td>
<td></td>
<td>349</td>
<td>810</td>
<td>14,143</td>
</tr>
</tbody>
</table>

9.40 The base line traffic flows taken from the agreed PTM provides an acceptable representation of the surrounding local highway network.

**Impact Assessment Criteria**

**Environmental Assessment Standards**

9.41 The assessment of individual environmental elements has been carried out in accordance with the ‘Guidelines for the Environmental Assessment of Road Traffic’ published by the Institute of Environmental Assessment (IEA), the ‘Manual of Environmental Appraisal’ published by the Department for Transport (DfT) and the
Main development impacts as identified in the Guidelines for the Environmental Assessment of Road Traffic which could arise from the development sites are as follows:

- Severance;
- Driver delay;
- Pedestrian and cycle delay and pedestrian amenity;
- Fear and intimidation;
- Accidents and road safety; and
- Dust and dirt.

**Severance**

Severance is described as the perceived division of a community that may arise when a road traffic link runs through an existing settlement. This can occur when a road becomes too heavily trafficked, making crossing the road a problem, or when a new route physically divides existing land. It is particularly relevant to situations where access to an essential amenity is impaired.

The measurement and prediction of severance is extremely difficult. The correlation between the extent of severance and the physical barrier of a road is not clear and there are no predicative formulae which give simple relationships between traffic factors and levels of severance. Factors which need to be given attention in determining whether severance is likely to be an important issue include road width, traffic flow and composition, traffic speeds, the availability of crossing facilities and the number of movements that are likely to cross the affected route.

The *Manual of Environmental Appraisal* published by the DfT sets out a range of indicators for determining the significance of the relief from severance. These figures have been derived from studies of major changes in traffic flow and therefore should be used cautiously in any environmental assessment. The impact on severance of the increase in traffic can be quantified as outlined in Table 9.2 below.
9.46 The assessment of severance should pay full regard to specific local conditions, for example, whether crossing facilities are provided or not, traffic signal settings etc. In addition it should aim to estimate the current severance caused by traffic and related factors, and the extent to which additional traffic will exacerbate this problem.

**Driver Delay**

9.47 Delay to drivers can be predicted through capacity assessments at key points on the local highway network. The addition of new development generated traffic could result in an increase in the number of vehicles using key routes and junctions. This may lead to additional delays, depending on the existing operation of key routes and junctions, levels of background traffic and development generated traffic. The values for delay due to these elements can be determined by junction assessments (ARCADY, PICADY or LINSIG). By testing each intersection for the baseline condition and with the development, it is possible to estimate increased driver delays. These delays are only likely to be significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the system or where no mitigation is proposed.

**Pedestrian Delay and Pedestrian Amenity**

9.48 Pedestrian delay and amenity for a particular walking journey are related to traffic flows through the impact of changes in vehicular demand on the ability of pedestrians to cross individual routes. This will therefore affect an individual’s desire to make a particular walking journey. Changes in the volume, speed or composition of traffic are most likely to affect pedestrian delay, with the level of severity dependent on the general level of pedestrian activity and the physical condition of crossing points. The *Manual of Environmental Appraisal* sets out a predictive method for determining the mean delay experienced by pedestrians for different types of crossing for different levels of traffic flows. This does not suggest any threshold for judging the significance of absolute or actual changes in levels of delay.
**Fear and Intimidation**

9.49 A further impact relating to traffic flows on pedestrian and cycle movements is the problem of fear and intimidation of individual travellers with respect to the proximity of vehicular movements. The impact of this factor is dependent on the volume of traffic, the percentage of Heavy Goods Vehicles content, the width of footpath and closeness of the footpath to the carriageway edge.

9.50 There are, however, no commonly agreed thresholds for estimating levels of danger, or fear and intimidation, from known traffic and physical conditions. Research in the past on thresholds has defined the degree of hazard to pedestrians by average traffic flow, 18 hour heavy vehicle flow and average speed over an 18 hour day in miles/hour.

9.51 Table 9.3 identifies that these values could be used as a first approximation of the likelihood of pedestrian fear and intimidation, although other factors need to be included.

<table>
<thead>
<tr>
<th>Degree of hazard</th>
<th>Average traffic flow over 18 hour day vehicle/ hour two-way</th>
<th>Total 18 hour heavy goods vehicle flow</th>
<th>Average speed over 18 hour day miles/ hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extreme</td>
<td>1,800+</td>
<td>3,000+</td>
<td>20+</td>
</tr>
<tr>
<td>Great</td>
<td>1,200-1,800</td>
<td>2,000-3,000</td>
<td>15-20</td>
</tr>
<tr>
<td>Moderate</td>
<td>600-1,200</td>
<td>1,000-2,000</td>
<td>10-15</td>
</tr>
</tbody>
</table>

9.52 These, as outlined in the IEA, can be weighted to provide an overall score of fear and intimidation. Whilst there is no defined approach outlining how the three factors influencing fear and intimidation should be weighted, it is important that the factors are weighted consistently. Therefore, it is proposed to assign a score of 3 to any ‘extreme’ criteria met, 2 for a value which is within the extents of ‘great’ and 1 to ‘moderate’ criteria as defined in Table 9.3.

9.53 It is also not defined in the IEA how to score the overall rating of fear and intimidation once each factor has been assigned a weight. It is therefore proposed that where the majority of factors show the degree of hazard to be moderate, then the fear and intimidation for the road is moderate. Therefore, the following scoring approach has been adopted in the assessment of fear and intimidation:
9.54 This approach has been consistently applied in the assessment of fear and intimidation in the appropriate elements of this section.

**Dust and Dirt**

9.55 Dust and dirt is often associated with substantial volumes of construction traffic and/or large Heavy Goods Vehicle based operations. Dust can often have health impacts for those who work on-site or live in close proximity to the development sites and can cause localised disruption for residents. There are no simple formulas to predict the level of dust and dirt which might arise from vehicle movements. Description of the number of lorry movements, prevailing wind direction and experience of similar developments elsewhere, either locally or nationally, will be useful background information on which to base an informed judgement. It should be noted that problems with dust and dirt are unlikely to occur at distances greater than 50m from the road. The impact of this problem can often be regulated by good on-site practice and correct vehicle management.

**Potential Impacts**

9.56 The development of the sites has the potential to cause transport related impacts within both the vicinity of the sites and within the wider Peterborough area. The aim of the TA was to identify these impacts and mitigate them to minimise the overriding impact where possible. These impacts relate to both development and construction phases, and are considered in further detail below.

**Forecast Traffic Conditions**

9.57 The peak hour forecast traffic conditions are taken from the PTM and outlined in Table 9.4 below for the forecast year 2026. This includes the widening of Fletton Parkway which is required as a result of background growth within Peterborough up to the forecast year of 2026.
### Table 9.4 – 2026 Forecast Peak Hour Volumes

<table>
<thead>
<tr>
<th>Road Name</th>
<th>Direction</th>
<th>Morning peak hour vehicle movements</th>
<th>Evening peak hour vehicle movements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2026 Base 2026 Dev % Change 2026 Base 2026 Dev % Change</td>
<td></td>
</tr>
<tr>
<td>A15 London Road – North of A1(M) J16</td>
<td>NB</td>
<td>1,119 484 -57% 1,310 817 -38%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SB</td>
<td>1,615 1,079 -33% 1,124 419 -63%</td>
<td></td>
</tr>
<tr>
<td>A15 London Road – North of Yaxley</td>
<td>NB</td>
<td>716 988 38% 625 631 1%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SB</td>
<td>272 533 96% 620 711 15%</td>
<td></td>
</tr>
<tr>
<td>A15 London Road – North of junction with Serpentine (under A1139 Fletton Parkway)</td>
<td>NB</td>
<td>309 377 22% 501 568 13%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SB</td>
<td>316 374 18% 109 235 116%</td>
<td></td>
</tr>
<tr>
<td>B1091 Broadway – Through Yaxley</td>
<td>EB</td>
<td>285 308 8% 987 553 -44%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>WB</td>
<td>1,091 1,022 -6% 397 323 -19%</td>
<td></td>
</tr>
<tr>
<td>B1091 Broadway – East of Yaxley</td>
<td>EB</td>
<td>509 565 11% 538 548 2%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>WB</td>
<td>478 449 -6% 579 861 49%</td>
<td></td>
</tr>
<tr>
<td>Serpentine – Between J3 – Hargate Way</td>
<td>NB</td>
<td>1,461 1,492 2% 1,983 1,817 -8%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SB</td>
<td>1,342 1,276 -5% 1,788 1,636 -9%</td>
<td></td>
</tr>
<tr>
<td>Serpentine – Between Hargate Way – Serpentine Roundabout</td>
<td>NB</td>
<td>1,217 1,193 -2% 2,213 2,006 -9%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SB</td>
<td>1,342 1,276 -5% 1,788 1,636 -9%</td>
<td></td>
</tr>
<tr>
<td>Serpentine – Between Serpentine Roundabout – A15 London Road</td>
<td>NB</td>
<td>1,015 925 -9% 987 717 -27%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SB</td>
<td>377 326 -14% 900 680 -24%</td>
<td></td>
</tr>
</tbody>
</table>
The forecast 18 hour flows, also taken from the PTM, are provided in Table 9.5 below.

### Table 9.5 – 2026 Forecast Traffic Volumes

<table>
<thead>
<tr>
<th>Road Name</th>
<th>Direction</th>
<th>18 Hour Vehicle Movement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2026 Base</td>
</tr>
<tr>
<td>A1(M) J15-16</td>
<td>NB</td>
<td>39,479</td>
</tr>
<tr>
<td></td>
<td>SB</td>
<td>48,872</td>
</tr>
<tr>
<td>A1(M) J16-17</td>
<td>NB</td>
<td>35,579</td>
</tr>
<tr>
<td></td>
<td>SB</td>
<td>35,242</td>
</tr>
<tr>
<td>A1(M) J17-18</td>
<td>NB</td>
<td>25,968</td>
</tr>
<tr>
<td></td>
<td>SB</td>
<td>23,762</td>
</tr>
<tr>
<td>A1139 Fletton Parkway (A1(M) to J1)</td>
<td>EB</td>
<td>28,711</td>
</tr>
<tr>
<td></td>
<td>WB</td>
<td>26,744</td>
</tr>
<tr>
<td>A1139 Fletton Parkway (J1-J2)</td>
<td>EB</td>
<td>37,539</td>
</tr>
<tr>
<td></td>
<td>WB</td>
<td>37,222</td>
</tr>
<tr>
<td>A1139 Fletton Parkway (J2-J3)</td>
<td>EB</td>
<td>38,548</td>
</tr>
<tr>
<td></td>
<td>WB</td>
<td>40,057</td>
</tr>
<tr>
<td>A1139 Fletton Parkway (J3-J3a)</td>
<td>EB</td>
<td>31,606</td>
</tr>
<tr>
<td></td>
<td>WB</td>
<td>31,089</td>
</tr>
<tr>
<td>A15 London Road – North of A1(M) J16</td>
<td>NB</td>
<td>11,243</td>
</tr>
<tr>
<td></td>
<td>SB</td>
<td>10,942</td>
</tr>
</tbody>
</table>
### Table 4.

<table>
<thead>
<tr>
<th>Road Name</th>
<th>Direction</th>
<th>18 Hour vehicle movement</th>
<th>2026 Base</th>
<th>2026 Dev</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>A15 London Road – North of Yaxley</td>
<td>NB</td>
<td>6,225</td>
<td>6,158</td>
<td>-1%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SB</td>
<td>3,769</td>
<td>4,527</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>A15 London Road – North of junction with</td>
<td>NB</td>
<td>3,029</td>
<td>3,361</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>Serpentine (under A1139 Fletton Parkway)</td>
<td>SB</td>
<td>1,755</td>
<td>2,491</td>
<td>42%</td>
<td></td>
</tr>
<tr>
<td>B1091 Broadway – Through Yaxley</td>
<td>EB</td>
<td>7,249</td>
<td>5,601</td>
<td>-23%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>WB</td>
<td>6,005</td>
<td>4,538</td>
<td>-24%</td>
<td></td>
</tr>
<tr>
<td>B1091 Broadway – East of Yaxley</td>
<td>EB</td>
<td>5,154</td>
<td>7,366</td>
<td>43%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>WB</td>
<td>4,675</td>
<td>5,511</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td>Serpentine – Between J3 – Hargate Way</td>
<td>NB</td>
<td>18,097</td>
<td>17,943</td>
<td>-1%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SB</td>
<td>16,679</td>
<td>16,573</td>
<td>-1%</td>
<td></td>
</tr>
<tr>
<td>Serpentine – Between Hargate Way – Serpentine Roundabout</td>
<td>NB</td>
<td>18,097</td>
<td>17,943</td>
<td>-1%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SB</td>
<td>16,679</td>
<td>16,573</td>
<td>-1%</td>
<td></td>
</tr>
<tr>
<td>Serpentine – Between Serpentine Roundabout – A15 London Road</td>
<td>NB</td>
<td>18,097</td>
<td>17,943</td>
<td>-1%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SB</td>
<td>16,679</td>
<td>16,573</td>
<td>-1%</td>
<td></td>
</tr>
</tbody>
</table>

9.59 As can be seen from Table 4 and Table 5, as a result of traffic generated from the developments and the highway infrastructure proposed within Great Haddon, there are changes to the volume of traffic forecasted on the surrounding highway network.
In some instances this decreases, typically on local roads and in proximity to Yaxley and Norman Cross, and on other roads increases, typically on higher capacity roads.

**Development Impacts**

9.60 The main development impacts in relation to the proposals are primarily a result in the change in traffic flow and would relate to:

- Severance
- Driver delay
- Pedestrian and cycle delay and pedestrian amenity
- Fear and intimidation, and
- Dust and dirt.

9.61 The increase in the need to travel, by all modes, directly causes the impacts listed above. This therefore, as outlined in the TA, generates new trips on the local highway network. Transport impacts are likely to occur during peak travel demand periods and for this study area these have been identified as 0800-0900 and 1700-1800 hours. These traffic flows are provide in Table 9.6. The impact is also likely to extend throughout the day, although impact on the operation of the highway network is likely to be negligible outside of the peak hours. Notwithstanding this, 18 hour and 24 hour traffic flows are required to assess transport related criteria and therefore these flows have been prepared.

<table>
<thead>
<tr>
<th></th>
<th>Inbound</th>
<th></th>
<th>Outbound</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>% HGV</td>
<td>Total</td>
<td>% HGV</td>
<td>Total</td>
<td>% HGV</td>
</tr>
<tr>
<td>Morning Peak Hour</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(08:00-09:00)</td>
<td>1,785</td>
<td>0%</td>
<td>2,248</td>
<td>0%</td>
<td>4,033</td>
<td>0%</td>
</tr>
<tr>
<td>Evening Peak Hour</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(17:00-18:00)</td>
<td>2,363</td>
<td>0%</td>
<td>2,754</td>
<td>0%</td>
<td>5,117</td>
<td>0%</td>
</tr>
<tr>
<td>18 Hour</td>
<td>26,765</td>
<td>0%</td>
<td>28,536</td>
<td>0%</td>
<td>55,301</td>
<td>0%</td>
</tr>
<tr>
<td>24 Hour</td>
<td>25,754</td>
<td>0%</td>
<td>27,053</td>
<td>0%</td>
<td>52,807</td>
<td>0%</td>
</tr>
</tbody>
</table>
9.62 The assessment of impacts will determine whether the development impacts are acceptable or whether mitigation will be needed to reduce any potential impacts.

**Severance**

9.63 Table 9.2 sets out the range of indicators for determining the significance of the relief from severance. A number of factors are considered in determining the level of severance including road width, traffic flow and composition, traffic speeds, absolute traffic volumes and the availability of crossings.

9.64 The change in traffic flows as shown in Table 9.5 clearly demonstrates that the perceived severance as a result of road traffic is decreased on all roads except the northernmost extents of the A15 London Road and to the east of Yaxley. Furthermore, the mitigation measures associated with the developments are intended to reduce vehicle speeds and increase and enable pedestrian connectivity through crossing facilities, which would also support the reduction in severance that is evident in the reduction in traffic flows.

9.65 The analysis of Table 9.5 identifies that there are slight increases in traffic flow leading to an increase in severance on the A1139 Fletton Parkway (A1(M) to Junction 1 westbound, A1139 Fletton Parkway Junction 1 to Junction 2, the A15 London Road (north of junction with Serpentine (under A1139 Fletton Parkway)) southbound and the B1091 Broadway (through Yaxley) eastbound.

**Driver Delay**

9.66 Junction assessments have been carried out in the TA on the A1(M) Junction 16 and Junction 17. These show that both junctions will operate with acceptable queues and delay. The A1(M) Junction 16 will in fact operate better with the development of Great Haddon than in the 2026 Do Minimum, as strategic traffic is reassigned to the appropriate network. The A1(M) Junction 17 will also continue to operate with satisfactory queues and delay.

9.67 Using traffic flows from the agreed 2026 Do Minimum PTM, it is clear that there is a need for Peterborough CC to widen Fletton Parkway Junction 1 to 2 in order to accommodate projected growth in the region. Furthermore, the 2026 Do Minimum PTM outputs indicate that there is a need to also increase junction capacity at Fletton Parkway Junction 1 to 4 as a result of increased traffic as a result of the growth within Peterborough as a whole. This is identified in the Outline Transport Assessment prepared as part of Peterborough’s *Integrated Growth Strategy* and the results of the 2026 Do Minimum PTM support this. Discussions with Peterborough CC and the Highways Agency as part of the consultation on the applications will confirm the
additional level of impact generated by the Great Haddon proposals as a basis for determining a contribution to the cost of the wider works.

9.68 An assessment of junction operation and therefore driver delay is included in the TA, with regard to 2026 Do Minimum and 2026 Do Something traffic flows taken from the PTM. This demonstrates that local junctions will continue to operate with satisfactory queues and delays to vehicles.

**Pedestrian Delay and Pedestrian Amenity**

9.69 The results shown in Table 9.4 show that whilst many links experience peak hour two way flows in excess of the lower threshold of 1,400 vehicles per hour, there is a noticeable reduction in traffic on the local highway network which improves pedestrian amenity.

9.70 In order to reduce delay and amenity, the development proposals include a comprehensive network of dedicated cycling and pedestrian routes and associated crossing facilities within the developments and along the A15 London Road. These dedicated routes and crossing facilities along the A15 London Road and local highway network will be segregated from the main road, wherever possible, in order to make them safer and more attractive for the user, thus reducing the level of delay and raising the level of amenity on the A15 London Road.

9.71 Therefore, the impact of pedestrian delay and pedestrian amenity is in fact positive.

**Fear and Intimidation**

9.72 A number of factors are considered in determining changes in the level of fear and intimidation experienced by pedestrians and cyclists including changes in traffic volumes, Heavy Goods Vehicle content, its speed and its proximity to people. Table 9.3 identifies a suggested threshold for estimating levels of danger, or fear and intimidation. These thresholds have been applied and weighted as detailed previously, and are summarised for key local links in Table 9.7 (2026 Do Minimum) and Table 9.8 (2026 Do Something), to show the change as a result of the development.
Table 9.7 – Fear and Intimidation – 2026 Do Minimum traffic flows from PTM

<table>
<thead>
<tr>
<th>Road Name</th>
<th>Flow</th>
<th>Score</th>
<th>Flow</th>
<th>Score</th>
<th>Est. Speed</th>
<th>Score</th>
<th>Degree of hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>A15 London Road – North of A1(M) J16</td>
<td>1,233</td>
<td>2</td>
<td>2,012</td>
<td>2</td>
<td>50</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>A15 London Road – North of Yaxley</td>
<td>555</td>
<td>1</td>
<td>555</td>
<td>1</td>
<td>40</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>A15 London Road – North of junction with Serpentine (under A1139 Fletton Parkway)</td>
<td>266</td>
<td>1</td>
<td>388</td>
<td>1</td>
<td>20</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>B1091 Broadway – Through Yaxley</td>
<td>736</td>
<td>1</td>
<td>245</td>
<td>1</td>
<td>25</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>B1091 Broadway – East of Yaxley</td>
<td>546</td>
<td>1</td>
<td>517</td>
<td>1</td>
<td>38</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Serpentine</td>
<td>1,932</td>
<td>3</td>
<td>1,040</td>
<td>1</td>
<td>40</td>
<td>3</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 9.8 – Fear and Intimidation – 2026 Do Something traffic flows from PTM

<table>
<thead>
<tr>
<th>Road Name</th>
<th>Flow</th>
<th>Score</th>
<th>Flow</th>
<th>Score</th>
<th>Est. Speed</th>
<th>Score</th>
<th>Degree of hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>A15 London Road – North of A1(M) J16</td>
<td>631</td>
<td>1</td>
<td>1,115</td>
<td>1</td>
<td>35</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>A15 London Road – North of Yaxley</td>
<td>594</td>
<td>1</td>
<td>452</td>
<td>1</td>
<td>35</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>
9.73 Table 9.8 shows that with the development of Great Haddon, whilst the volume of traffic flows and traffic speeds are generally lower, the level of fear and intimidation remains ‘Great’ on most links when compared to the 2026 Do Minimum scenario. Through provision of segregated pedestrian and cycle links along the A15 London Road north of A1(M) J16 fear and intimidation will be further reduced. Fear and intimidation will also be reduced through reduced speed and volume of traffic travelling along the current A15 London Road through Yaxley as a result of the proposed bus only link to the north of Yaxley.

**Dust and Dirt**

9.74 The construction traffic generated as a result of the development could generate large amounts of dust and dirt into the local area. It is therefore anticipated that any new highway access points for construction traffic will be tarmac surfaces to reduce dust pick up and emissions. In order to minimise any potential problems associated with dust and dirt from construction traffic, wheel washing facilities would be provided at all exits from the construction sites to reduce mud deposits on the public highway and keep any contaminated material on-site.

<table>
<thead>
<tr>
<th>Road Name</th>
<th>Average two-way traffic flow over 18 hour day vehicle/ hour</th>
<th>Total 18 hour heavy goods vehicle flow</th>
<th>Average speed over 18 hour day miles/ hour</th>
<th>Degree of hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Flow</td>
<td>Score</td>
<td>Flow</td>
<td>Score</td>
</tr>
<tr>
<td>A15 London Road – North of junction with Serpentine (under A1139 Fletton Parkway)</td>
<td>325</td>
<td>1</td>
<td>362</td>
<td>1</td>
</tr>
<tr>
<td>B1091 Broadway – Through Yaxley</td>
<td>563</td>
<td>1</td>
<td>276</td>
<td>1</td>
</tr>
<tr>
<td>B1091 Broadway – East of Yaxley</td>
<td>715</td>
<td>1</td>
<td>629</td>
<td>1</td>
</tr>
<tr>
<td>Serpentine</td>
<td>1,089</td>
<td>1</td>
<td>994</td>
<td>1</td>
</tr>
</tbody>
</table>
Construction Impacts

9.75 The proposed developments are anticipated to generate new traffic movements on the local highway network during the construction phases due to the activities taking place on site. These construction effects will be spread out over a number of months and years.

9.76 These construction movements will be a temporary addition to the local highway network due to the fact that they will cease to take place when the construction period has been completed.

9.77 It is anticipated that there will be three elements to construction traffic at the development sites; Heavy Goods Vehicle traffic transporting materials, main contractor staff and sub-contractor staff and that normal site working hours will be as follows:

- Monday to Friday – 0700 to 1700
- Saturdays – 1200 to 1600
- Sundays – Closed
- Bank Holidays – Closed

9.78 Construction vehicle impacts are to be expected as a result of preparation of the sites and construction of the units, as well as construction of new access roads and other works during the life cycle of the construction period.

9.79 The main transport impacts of construction vehicles are from mainly Heavy Goods Vehicle movements on roads leading to the sites and associated issues in terms of noise, air quality, dust and detritus on the highway, causing nuisance and inconvenience to other road users.

9.80 Material deliveries and construction traffic will arrive in the construction phase during the working hours described above and where practical, the traffic will be limited to during peak morning and evening travel periods. Additionally, back-loading whereby inbound vehicles could potentially be utilised for return loads will be explored to minimise unnecessary trips.

9.81 Although it is subjective at this stage in the planning process to accurately estimate the likely level of traffic movements associated with construction vehicle movements, in volume terms it is anticipated that around 150-160 construction-related trips may be made per weekday and around 80 on Saturdays.
9.82 It is anticipated that there will be between 60-70 main contractor staff on site per weekday, and a reduced number of up to 40 on Saturdays, travelling to and from the sites at the start and end of the day, potentially with additional trips during the day. It is estimated that this element would therefore generate in the order of 120-140 vehicle movements per weekday; around 80 vehicle trips on Saturdays.

9.83 For the sub-contractor staff movements, it is anticipated that there will be between 60-70 staff on site per weekday, and a reduced number of 40-50 on Saturdays. At this stage, the anticipated vehicle movements will be 120-140 per weekday, and 80-100 movements on Saturdays.

9.84 The main concentration of sub-contractor staff arrivals is likely to be before the traditional weekday morning peak travel hour of between 0800-0900 hours and the departures are likely to be during the traditional weekday peak travel hour of between 1700-1800 hours. Traffic associated with construction at the sites on a Saturday will occur to either side of the anticipated peak travel period of mid-morning.

9.85 Every effort will be made to minimise disruption to other road users, including walkers and cyclists during the construction phase by ensuring adequate traffic and safety measures are in place to control all vehicle movements associated with the sites.

9.86 It is likely that on-site construction work will have an impact on cycling routes within the development sites as they are currently intersected by NCN 53 and NR 12. The impacts of construction work will mean that these cycling routes will either have to be re-routed while construction work is undertaken or appropriate measures, for example, safe zones will be set up to allow continued use of these cycle routes. This is further explained in Peterborough’s Local Plan (First Replacement – Adopted 2005) whereby Policy T2 Development Affecting Footpaths and Public Right of Way (as identified in paragraph 9.13) recognises that there may be circumstances where the alternative routing or alignment of footpath or Right of Way is acceptable.

Mitigation Measures

Development Mitigation

9.87 Measures to reduce the impact of Great Haddon are proposed in order to give future residents and employees the opportunity to travel by alternative modes of transport to the car. These measures include the provision of high quality public transport, cycle routes and parking as well as well designed pedestrian links. The successful implementation of these measures supports the delivery of a sustainable development.
Walking and Cycling Mitigation

9.88 Walking and cycling represent the most sustainable modes of transport and are therefore important travel modes for local journeys within the sites and also further afield into Peterborough City Centre.

9.89 The development at Great Haddon will provide an integrated network of walking and cycling routes connecting to residential, employment, schools and local centres within the sites.

Cycling – On-site measures

9.90 The sites are already well served by the Green Wheel and NCN Route 53. To further enhance connectivity for cyclists throughout the sites, new segregated cycle routes within the primary street network will encourage permeability throughout the development enabling connections to core amenities, employment and schools. Further cycle routes for leisure and connectivity will be incorporated into the street network allowing for linkages between residential dwellings, schools, open spaces and woodland areas. By efficient design of cycle routes and crossing points it will maximise the opportunity for cyclist movement. Furthermore, the connections between the residential development (Core Area) and the Employment Area in the north will encourage travel to work by cycle. Parameter Plan ref: PST021/DFP/04 (see ES Volume 2 Plans) provides further details.

Walking – On-site measures

9.91 The developments will provide an integrated network of pedestrian routes to further encourage sustainable travel and permeability throughout the development to key areas within the sites. Segregated pedestrian footpaths will be included within the primary street layout to encourage sustainable movement to local centres, schools, employment and residential dwellings. Pedestrian crossing points will also be located through the development to allow for safe crossing and appropriate movement. Crossing provision will also be provided along the realigned regional and local routes as well as providing Pegasus crossings accommodating pedestrians and horseriders where the bridleway crosses the primary street network to the north west of the residential area (Core Area). The design of pedestrian routes will also be in accordance with the DMRB and Manual for Streets (see Great Haddon Design and Access Statement for further details).

Walking and Cycling – Off-site measures

9.92 The development sites currently provide good linkages off-site to the surrounding area. NR 12/ the Green Wheel/ permitted bridleway connects off-site to the north
Great Haddon, Peterborough
Environmental Statement
Great Haddon Consortium

Transportation and Access

9.93 NCN Route 53 connects off-site to the west and south of the sites. To the west of the sites NCN Route 53 is also connected by a number of permitted footpaths on the opposite side of the A1(M). To the south of the sites this route travels past Norman Cross, Stilton and then further afield.

9.94 The development will provide leisure routes off-site along the A15 London Road segregated from the main road thus making them safer and more attractive to use. These leisure routes will connect to the permitted footpath along Beeby’s West Lake to the north east of Great Haddon. In addition, crossing facilities along the A15 London Road will provide safe pedestrian/ cyclist points into Yaxley.

9.95 From the local area and existing communities, pedestrian routes will also be integrated into the wider community connecting to the Ortons to the north, Hampton and Hempsted to the north east, and Yaxley to the east. These are tied together by the connections to and improvements to the national and regional routes referenced earlier.

Framework Travel Plan

9.96 The Framework Travel Plan provides measures to minimise single occupancy car use and to set the principles for Subsidiary Travel Plans as full or interim Travel Plans at the appropriate stage dependent upon the availability of data when appropriate. The Framework Travel Plan measures include a package of hard and soft measures to encourage a shift away from single occupancy car use and a move towards public transport, car sharing and walking and cycling initiatives. In promoting and implementing such measures a Site-wide Travel Plan Co-ordinator will be appointed for the site, with Local Travel Plan Forums for each land use (school, residential and workplace) to support the delivery of the Subsidiary Travel Plans. Some of the measures may be land use-specific but each have the overall aim of reducing car usage and maximising travel by alternative modes of transport.

Public Transport Measures

9.97 The principles for the bus services to be provided at Great Haddon focus on the connections and links they provide to key destinations: employment, retail, leisure, Peterborough rail station and Peterborough City Centre. The principle for the bus services is also to ensure that the majority of residents are within 400m of a bus stop.
9.98 Local services will provide interconnection between the local centres in the surrounding areas, as well as connecting with Peterborough City Centre. This will be promoted to provide a comprehensive public transport network enabling access to as many destinations as possible including local centres and key facilities such as GPs to enable the community to function. It is anticipated that one service will terminate at the transport hub located in the district centre and Peterborough City Centre, whilst other services will call at the transport hub and continue to other regional links. Public transport services operating within Great Haddon are likely to benefit from bus priority at signal controlled junctions. The form and nature of bus priority will be discussed with Peterborough CC at the appropriate time in the technical design stage.

**Highways**

9.99 The main vehicle access is likely to be from the A15 London Road and is anticipated to provide access for construction traffic at appropriate phases of the development build out. Additional access points will be located along the A15 London Road to allow for vehicle access to the south of the development. Access points will also be situated along the A1139 Fletton Parkway at Junction 1 for access to employment and at Junction 2 for access to residential dwellings.

9.100 The current speed limit along the A15 London Road from the A1(M) Junction 16 to Yaxley is 60 mph and is anticipated to be reduced to 40 mph to the site accesses to reduce the risk of accidents, pedestrian delay and fear and severance and create a gateway to the developments. A 30 mph speed limit is likely to be adopted on the Yaxley Bypass and along the Central Boulevard within the Core Area. In addition speed limits of 20 mph could be adopted along elements of the internal road network in order to reduce associated problems as a result of construction traffic.

9.101 Measures designed at influencing and reducing vehicle speeds within the development and on key routes within the area would encourage responsible driver behaviour to the benefit of pedestrians and cyclists.

**Construction Mitigation**

**Routeing**

9.102 The indicative phasing strategy for the development is expected to be based on a four-phase build out process. The phasing strategy for the development is indicative and may be subject to changes in the future due to landowner decisions, delivery of sustainable transport measures and other external factors.
9.103 It is envisaged that during Phase 1 construction traffic will be routed along the A15 London Road and the Yaxley Bypass. Using the Yaxley Bypass for construction traffic will minimise impact on local residents in Yaxley. The indicative layout is shown in Figure 9.2 below. [Note: all Phasing Plans are indicative only].

Figure 9.2 – Indicative Phasing Strategy - Phase 1
9.104 For Phase 2 of the development construction traffic will be routed along the proposed Central Boulevard and the A1139 Fletton Parkway, thus avoiding Yaxley and development in Phase 1 where possible. The indicative arrangements are shown in Figure 9.3 below.

![Figure 9.3 – Indicative Phasing Strategy – Phase 2](image-url)
9.105 During Phase 3 of the development (development between Central Boulevard and the Great North Road), construction traffic will be routed along the A1139 Fletton Parkway and the Western Peripheral Road where possible to minimise impact on local residents. The indicative layout is shown in Figure 9.4 below.
9.106 Finally, for Phase 4 of the development (development off Great North Road), construction traffic will be routed via the Western Peripheral Road where possible to further minimise any impact on local residents. The indicative layout is shown in Figure 9.5.

![Figure 9.5 – Indicative Phasing Strategy – Phase 4](image)

9.107 The employment area in the north of Great Haddon is likely to be implemented in tandem with development of all phases of the Core Area. Construction traffic will be routed along the A1139 Fletton Parkway for the construction of the employment area.
9.108 Traffic Management would be employed to ensure that access for construction traffic is maintained on all roads wherever possible. Construction traffic activity for the development of the sites will be lessened by phasing the developments rather than completing the entirety of the development sites at one time.

9.109 If Heavy Goods Vehicle deliveries are restricted to outside of peak periods then the effect of the development upon fear and intimidation is not considered significant. A routeing strategy for construction traffic will ensure that pedestrian and cyclist fear and intimidation is not significantly decreased.

Hours of Operations

9.110 To minimise potential construction generated traffic to/from the sites, construction site employees will be encouraged to car-share, use public transport and other sustainable modes to access the site wherever possible. Travel by public transport will depend on shift patterns and levels of service from their origin points. Where employees travel to the site by car or other vehicles, designated and adequate parking facilities will be provided. This could be implemented through a Travel Plan for construction staff to encourage them to use more sustainable modes of transport during the construction phase of the developments. By doing so this could reduce trips by and therefore reduce the impact of employee construction traffic.

Employees

9.111 Detailed signage for Heavy Goods Vehicles and cars should be implemented to inform drivers of the appropriate route to use for access to the development sites. This will therefore limit the likelihood of vehicles using other routes to gain access to the sites. The appropriate signage for employees will be dependent on each phase of the development. It is anticipated that most of the signage will be located along the A15 London Road and the A1139 Fletton Parkway.

Cleaning/ other measures

9.112 Implementation of cleaning measures for Heavy Goods Vehicles such as wheel washing and wash-down facilities to minimise the spread of dust, mud and other materials on the road. In addition, regular sweeping of roads, both on and off site will limit the spread of material.

Residual Impacts

9.113 Residual impacts are likely to arise from increased demand to travel by car to and from the development sites. Increased traffic flows are likely to be generated onto the local highway network as a result of construction traffic travelling to and from the sites. However the level of impact on the highway will be reduced through road
improvements and mitigation measures. Any impacts as a result of construction of the sites will be temporary and therefore there will be no residual impacts.

9.114 There are also several positive residual impacts relating to the provision of new infrastructure and services relating to the development including the creation of new public transport services and routes, improved walking and cycling facilities and highway alterations to provide an improvement of the current provision. These improvements would be available for a greater proportion of the public as local residents will benefit from the development as well as those travelling to and from the sites.

**Severance**

9.115 The mitigation measures associated with the development are intended to reduce vehicle speeds. With a network of pedestrian and cycle connectivity through crossing facilities allowing for greater accessibility throughout the sites and into the surrounding communities, the perceived division through traffic will be significantly decreased and will therefore create a positive residual impact on the local area.

**Driver Delay**

9.116 It is not envisaged that during the construction phase there will be significant issues to driver delay as traffic management will ensure that construction traffic does not create driver delay at site entrances where there will be additional turning movements or on key junctions.

9.117 Junction assessments carried out in the TA on the A1(M) Junction 16 using traffic flows from the PTM indicate that in 2026 Do Minimum the junction will operate within capacity. A1(M) Junction 16 has been shown in the TA to operate better with the development of Great Haddon than it was anticipated to without it as strategic traffic is reassigned to the appropriate network. A1(M) Junction 17 will also operate with satisfactory queues and delays.

9.118 Using traffic flows from the agreed 2026 Do Minimum PTM, it is clear that there is a need for Peterborough CC to widen Fletton Parkway Junction 1 to 2 in order to accommodate projected growth in the region. Furthermore, the 2026 Do Minimum PTM outputs indicate that there is a need to also increase junction capacity at Fletton Parkway Junction 1 to 4. This is identified in the Outline Transport Assessment prepared as part of Peterborough’s *Integrated Growth Strategy* and the results of the 2026 Do Minimum PTM support this. The increase in flows in the future will act as a negative residual impact; however, it has already been identified in the 2026 Do Minimum that without the development of Great Haddon, capacity will already be
reached and this is recognised by Peterborough CC in the *Integrated Growth Strategy*.

9.119 Public transport services will provide connection from the development to core destinations including employment, retail, leisure, Peterborough City Centre and the rail station. These services will maximise existing and proposed public transport priority along the A15 London Road. These improvements in the public transport services will act as a positive residual impact on the local area.

**Pedestrian Delay and Pedestrian Amenity**

9.120 The development will provide an integrated network of pedestrian and cycle routes connecting the local area and existing communities such as the Ortons to the north, Hampton and Hempsted to the north east, and Yaxley to the east. Pedestrian and cyclists will therefore benefit from the improvements in access and reduction in associated pedestrian and cycle delay. This will therefore provide a positive residual impact.

**Fear and Intimidation**

9.121 The integrated network of pedestrian and cycle routes within the sites and into the local area and existing communities will significantly reduce fear and intimidation providing a positive residual impact.

**Dust and Dirt**

9.122 The impact of dust and dirt will be temporary, while construction of development is underway, and therefore the anticipated residual impact is negligible.

**Cumulative and Interactive Effects**

9.123 The use of traffic flows from the PTM in the analysis of the environmental impact of the proposed development at Great Haddon from a transport perspective ensures that other committed developments in and around Peterborough are included. This assessment has shown that in many circumstances, the developments at Great Haddon have a positive impact from a transport perspective. It has also been shown that the wider impacts on local surrounding areas, particularly on Yaxley and Norman Cross, are also positive.

9.124 The TA for Great Haddon refers to the *Integrated Growth Strategy* for Peterborough, which looks at the implications of delivering the planned c. 20,000 new dwellings by 2026. Great Haddon is identified within both the *Integrated Growth Strategy* and the *Core Strategy* as a preferred site to deliver the new housing required in Peterborough.
9.125 From a transport perspective, the development of urban extensions well related to the existing urban area provides opportunities to further support the good coverage of public transport services and integrated cycle/footway links across the city, increasing the propensity to travel by non-car modes. Delivering new development in urban extensions as part of a broader growth strategy including development in existing urban areas and on redevelopment sites throughout the city reduces the likelihood of a single new development overloading the local highway network at one point, but distributes traffic more evenly across the city. This, in turn, acts as progressive growth in traffic on the highway network, rather than a step change from existing patterns. Therefore, it is considered that when viewed as part of the overall growth of the city to meet its housing requirements through delivery of the Integrated Growth Strategy and Core Strategy, the net impact from the findings of this Environmental Assessment (Transport) will be negligible.
### Table 9.9: Summary Matrix of all Impacts Before Mitigation

<table>
<thead>
<tr>
<th>Issue</th>
<th>Description of impact</th>
<th>Geographical significance</th>
<th>Impact, Significance</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I</td>
<td>N</td>
<td>R</td>
</tr>
<tr>
<td><strong>Transportation</strong></td>
<td><strong>During Construction</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Severance</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Additional construction traffic</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td><strong>Driver Delay</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Driver delay where potential site entrances are situated</td>
<td>✓</td>
<td>✓</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td><strong>Pedestrian Delay and Pedestrian Amenity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Impact of construction work on cycle/pedestrian and bridleway routes.</td>
<td>✓</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td><strong>Fear and Intimidation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The degree of hazard in the 2026 Do Something still remains 'great' on most links when compared to 2026 Do Minimum.</td>
<td>✓</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td><strong>Dust and Dirt</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Construction traffic will generate dust and dirt</td>
<td>✓</td>
<td>✓</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td><strong>On Completion</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Severance</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Slight increases in severance on the A1(M) Junction 17 to Junction 1 and A1139 Fletton Parkway Junction 3 and 3a</td>
<td>✓</td>
<td>✓</td>
<td>Slight</td>
</tr>
<tr>
<td></td>
<td><strong>Driver Delay</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increases in traffic flows along the A1139 Fletton Parkway Junction 1-4</td>
<td>✓</td>
<td>✓</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td><strong>Pedestrian Delay and Pedestrian Amenity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TABLE 9.10: SUMMARY OF MITIGATION AND ENHANCEMENT MEASURES AND RESIDUAL EFFECTS

<table>
<thead>
<tr>
<th>Issue</th>
<th>Description of Impact</th>
<th>Mitigation/enhancement measures</th>
<th>Residual Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation During Construction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severance</td>
<td>Additional HGV, LGV and employee vehicle traffic on the local highway network</td>
<td>Routeing system to avoid sensitive and residential areas. Encourage car sharing, use of public transport and other sustainable modes of transport to reduce employee travel by car. Construction traffic activity for the development of the sites will be lessened by phasing the developments rather than completing the entirety of the development sites at one time.</td>
<td>The construction traffic associated with the developments will be a temporal residual impact.</td>
</tr>
</tbody>
</table>
### Transportation and Access

<table>
<thead>
<tr>
<th>Issue</th>
<th>Description of impact</th>
<th>Mitigation/enhancement measures</th>
<th>Residual Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Driver Delay</strong></td>
<td>Driver delay where potential site entrances are situated for construction traffic.</td>
<td>Construction work to be restricted to non-peak travel where practical.</td>
<td>As construction traffic will be temporary, the residual impact will also be temporary.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Appropriate signage for employees in order to avoid residential and sensitive areas.</td>
<td></td>
</tr>
<tr>
<td><strong>Pedestrian Delay and Pedestrian Amenity</strong></td>
<td>Impact of construction work on cycle/ pedestrian and bridleway routes.</td>
<td>Safe zones to allow for continued use of these routes. Re-routeing of footpaths/ cycleways and bridleways while construction work is undertaken.</td>
<td>These safe zones and any re-routeing will be a temporal aspect of the construction of the developments.</td>
</tr>
<tr>
<td><strong>Fear and Intimidation</strong></td>
<td>Level of fear and intimidation does not change from the 2026 Do Minimum to the 2026 Do Something.</td>
<td>Pedestrian and cycle links throughout the sites and connecting to the wider community will further reduce fear and intimidation.</td>
<td>There will be a long lasting residual effect of the proposed pedestrian and cycle links which will provide benefit to residents and the wider community.</td>
</tr>
<tr>
<td><strong>Dust and Dirt</strong></td>
<td>Construction traffic generated could generate large amounts of dust and dirt into the local area</td>
<td>New highway access points for construction traffic will have tarmac surfaces to reduce dust and dirt. Wheel washing facilities at all exits to reduce mud deposits. Regular sweeping of roads, both on and off site will limit the spread of material.</td>
<td>Dust and Dirt will be temporary.</td>
</tr>
<tr>
<td>Issue</td>
<td>Description of impact</td>
<td>Mitigation/enhancement measures</td>
<td>Residual Effects</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Transportation On Completion</td>
<td></td>
<td>A network of pedestrian and cycle connectivity through crossing facilities allowing for greater accessibility throughout the sites and into the surrounding communities.</td>
<td>Reduced vehicle speeds will decrease the perceived division through traffic and create a positive residual impact.</td>
</tr>
<tr>
<td>Severance</td>
<td>Slight increases in severance on the A1139 Fletton Parkway (A1(M) to Junction 1 westbound, A1139 Fletton Parkway Junction 1 to Junction 2, the A15 London Road (north of junction with Serpentine (under A1139 Fletton Parkway)) southbound and the B1091 Broadway (through Yaxley) eastbound.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Driver Delay</td>
<td>Increases in traffic flows along the A1139 Fletton Parkway Junction 1-4. The 2026 Do Something scenario shows that the A1(M) Junction 16 will operate better with the development of Great Haddon and the A1(M) Junction 17 will continue to operate with satisfactory queues and delays.</td>
<td>Traffic management will ensure that construction traffic does not create driver delay at site entrances where there will be additional turning movements or on key junctions. The Integrated Growth Strategy recognises that widening of Fletton Parkway Junction 1 to 2 and increasing junction capacity at Fletton Parkway Junction 1 to 4 is needed in order to accommodate projected growth.</td>
<td>The A1(M) Junction 16 and Junction 17 will operate with satisfactory queues and delays.</td>
</tr>
<tr>
<td>Pedestrian Delay and Pedestrian Amenity</td>
<td>Pedestrian Delay and Pedestrian Amenity will improve in the 2026 Do Something when compared to the 2026 Do Minimum scenario.</td>
<td>The developments will provide an integrated network of pedestrian and cycle routes connecting the local area and existing communities.</td>
<td>This will create a positive residual impact for residents of the sites and within the wider area.</td>
</tr>
</tbody>
</table>
### Transportation and Access

**Issue**

<table>
<thead>
<tr>
<th>Fear and Intimidation</th>
</tr>
</thead>
</table>

**Description of impact**

The level of fear and intimidation remains 'great' in both the 2026 Do Minimum and 2026 Do Something scenario.

**Mitigation/enhancement measures**

The provision of pedestrian and cycle routes will significantly reduce fear and intimidation.

**Residual Effects**

This will provide a positive residual impact and will be of benefit to residents on sites and further afield.
10.0 NOISE AND VIBRATION

Introduction and Scope of Assessment

10.1 This chapter of the Environmental Statement assesses the impact due to noise on the surrounding area resulting from the proposed Great Haddon development, as well as the impact of the existing noise climate upon the proposed development.

10.2 During the EIA scoping process consideration of the following noise issues were identified for consideration:

- The suitability of the existing noise climate for the proposed developments;
- The potential impact on the existing noise climate as a result of construction works during the construction phase;
- The potential impact on the existing noise climate that would be generated by alterations in the flow of motor vehicles using the existing highway network, due to the developments;
- The potential impact from the proposed employment areas upon the amenity of the proposed residential properties and noise sensitive developments (such as schools) within the sites and existing residential properties adjoining the sites;
- The potential impact of the developments on the adjacent Orton Pit Special Area of Consideration in relation to disturbance of breeding birds and detailed mitigation measures as appropriate.

10.3 The main existing sources of noise at the Great Haddon development have been determined as the A1(M) motorway to the west of the proposed development and the A15 carriageway to the south and east.

10.4 The proposed development has been assessed using Planning Policy Guidance Note 24: Planning and Noise for the baseline scenario (current situation).

10.5 The rifle range to the south of the application sites, with opening hours from 9:00am to sunset, and Haddon Lodge Shooting Ground (to the north west of the sites) have also been assessed with regard to their potential noise impact on the Great Haddon development.

10.6 The assessment of the noise impact associated with the proposed development is divided into the following key areas:
• The suitability of the current noise climate for the proposed developments, including residential dwellings, school buildings and other noise-sensitive uses;

• The noise impact during the construction phase at existing and proposed noise-sensitive receptors;

• The noise impact during the operational phase at existing noise-sensitive receptors.

10.7 There are no nearby sources of vibration and the proposed development would not introduce any new vibration sources; therefore, the assessment of vibration has been scoped out.

10.8 This chapter has been produced by Peter Brett Associates LLP (PBA).

Reference Material and Assessment Method

Planning Policy Guidance 24: Planning and Noise

10.9 Planning Policy Guidance 24: Planning and Noise (PPG24) sets out the Government's policy and gives advice to local authorities in England on the use of their planning powers to minimise the adverse impact of noise. PPG24:

• Outlines the considerations to be taken into account in determining planning applications both for noise sensitive developments and for those activities that will generate noise;

• Introduces the concept of Noise Exposure Categories (NEC's) for residential development, encourages their use and recommends appropriate levels for different sources of noise;

• Advises on the use of conditions to minimise the impact of noise.

10.10 The NEC noise levels for road traffic and the associated advice are given below in Tables 10.1 and 10.2 below.
Table 10.1 – Noise Exposure Category Levels – Road Traffic Noise

<table>
<thead>
<tr>
<th>Road Traffic</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>07:00-23:00</td>
<td>&lt;55</td>
<td>55-63</td>
<td>63-72</td>
<td>&gt;72</td>
</tr>
<tr>
<td>23:00-07:00</td>
<td>&lt;45</td>
<td>45-57</td>
<td>57-66</td>
<td>&gt;66</td>
</tr>
</tbody>
</table>

1Night-time noise levels (23:00 – 07:00): sites where individual noise events regularly exceed 82 dB $L_{A_{max}}$ (S time weighting) several times in any hour should be treated as being in NEC C, regardless of the $L_{A_{eq,hr}}$ (except where the $L_{A_{eq,hr}}$ already puts the sites in NEC D)

Table 10.2 – Noise Exposure Category Advice

<table>
<thead>
<tr>
<th>NEC</th>
<th>Advice</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.</td>
</tr>
<tr>
<td>B</td>
<td>Noise should be taken into account when determining planning applications and, where appropriate conditions imposed to ensure an adequate level of protection against noise.</td>
</tr>
<tr>
<td>C</td>
<td>Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.</td>
</tr>
<tr>
<td>D</td>
<td>Planning permission should normally be refused.</td>
</tr>
</tbody>
</table>

10.11 Annex 6 of PPG24 advises that for non-residential noise sensitive developments the internal levels should be determined according each activity, having regard to the general guidance in BS 8233:1999 (which supersedes BS 8233:1987).

10.12 PPG24 recommends the use of:

- BS 8233 for general guidance on acceptable noise levels within buildings,
- BS 4142 for guidance on noise from arising from industrial developments,
- BS 5228 Parts 1 and 4 for noise from construction sites,

- Calculation of Road Traffic Noise for the prediction of noise due to alterations in traffic flows,

- Department for Education Design Note 17: Guidelines for Environmental Design in Educational Buildings for guidance for schools regarding noise. This Design Note has been superseded by Building Bulletin 93: Acoustic Design of Schools.

10.13 These documents are discussed below.

**BS 8233: 1999 Sound insulation and noise reduction for buildings – Code of practice**

10.14 BS 8233 sets out design criteria for internal sound levels for a range of building uses, assuming that the external noise source is anonymous, such as road traffic. The design criteria for residential habitable rooms and offices are shown in Table 10.3.

Table 10.3 – Indoor ambient noise levels in spaces when they are unoccupied, BS 8233

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Typical situations</th>
<th>Design Range $L_{Aeq,T}$ dB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Good</td>
</tr>
<tr>
<td>Reasonable Resting/Sleeping Conditions</td>
<td>Living Rooms</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Bedrooms*</td>
<td>30</td>
</tr>
<tr>
<td>*For a reasonable standard in bedrooms at night, individual noise events (measured with F time weighting) should not normally exceed 45 dB $L_{A_{MAX}}$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reasonable conditions for study and work requiring concentration</td>
<td>Cellular office</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Executive office</td>
<td>40</td>
</tr>
<tr>
<td>Reasonable industrial working conditions</td>
<td>Light engineering, warehouses</td>
<td>65</td>
</tr>
</tbody>
</table>

10.15 BS 8233 advises for gardens and balconies, etc that 55 dB $L_{A_{eq,T}}$ should be regarded as the upper limit.
BS 4142: 1997 Method for rating industrial noise affecting mixed residential and industrial areas

10.16 PPG24 refers to BS 4142 for the assessment of industrial noise, which describes a method for determining, at the outside of a building, the likelihood of complaints due to noise from industrial premises. This can be assessed by subtracting the measured background noise level from the ‘rating level’ (which is calculated by adjusting the noise source for a character correction if appropriate). The greater the difference the greater the likelihood of complaints. A difference of around +10 dB or more indicates that complaints are likely and a difference of around +5 dB is of marginal significance. If the ‘rating level’ is more than 10 dB below the measured background noise level then this is said to be a positive indication that complaints are unlikely.

10.17 The method of assessment is based on a reference time period of 1-hour during the daytime (07:00-23:00hrs) and 5-minutes during the night-time (23:00-07:00hrs).

10.18 Certain acoustic features can increase the likelihood of complaint over that expected from a simple comparison between the ‘specific noise level’ (noise from the industrial premises only) and the background noise level. Where present at the assessment location, such features are taken into account by adding 5 dB to the ‘specific noise level’ to obtain the ‘rating level’. Such features include:

- The noise contains a distinguishable, discrete, continuous note
- The noise contains distinct impulses
- The noise is irregular enough to attract attention

BS 5228-1:2009 Code of Practice for Noise and Vibration Control on Construction and Open sites Part 1. Noise

10.19 For construction noise, PPG24 refers to BS 5228: Parts 1-3 1984 and Part 4 1992 which have since been superseded with BS 5228-1:2009 Code of Practice for Noise and Vibration control on construction and open sites. This standard provides a method for assessing noise from construction sites. The standard also gives recommendations for basic methods of noise control relating to construction sites where work activities/operations are likely to generate significant noise levels.

Calculation of Road Traffic Noise (CRTN):1988

10.20 CRTN, Department of Transport (DoT), Welsh Office: 1988, is a memorandum that describes the procedure for calculating noise from road traffic. The methodology is used to determine noise levels from roads due to factors such as the volume and
speed of traffic. In Section III it also provides two methods for measuring the day-time road traffic noise level (LA10, 18hr, dB).

**Building Bulletin 93: Acoustic Design of Schools: 2003**

10.21 Table 1.1 on page 9 of Building Bulletin 93 (BB93) Acoustic Design of Schools published by the Department of Education and Skills in 2003, details the performance standards as upper limits for internal ambient noise levels, LAeq, 30min for each type of room. These levels will include noise from external sources (e.g. traffic) and building services (such as ventilation systems). If the room is to be naturally ventilated, the windows should be open during testing as would be required to provide adequate ventilation. The noise levels refer to “finished but unoccupied and unfurnished spaces”.

10.22 Section 2.2 of BB93 gives an upper LAeq, 30min limit of 60 dB for external noise at the boundary of external premises used for formal and informal outdoor teaching and recreational areas. BB93 also says that noise levels in unoccupied playgrounds, playing fields and other outdoor areas should not exceed LAeq, 30min 55 dB and that there should be one area suitable for outdoor teaching activities with a LAeq, 30min limit of 50 dB for example, for teaching sport.

**Local Planning Policy**

10.23 The local planning policy of Peterborough City Council (PCC) regarding noise is to follow PPG24 guidelines that noise-sensitive and noise-producing sites should be sited away from each other.

10.24 However, PCC recognises that in “compact urban areas, particularly with increased emphasis on mixed-use developments at higher densities, this separation is not always possible” (Peterborough City Council, Peterborough Local Plan (First Replacement), section DA13) and that noise attenuation will therefore be required. PCC states that: “In those circumstances, any permission that is granted would be subject to conditions requiring all necessary work to be undertaken before any of the developments to be permitted is made available for occupation” (Peterborough City Council, Peterborough Local Plan (First Replacement), section DA13).

10.25 PCC will also take into account potential effects of noise from any proposed roads. Excessive noise should be avoided when considering the highest density of housing.

10.26 Peterborough City Council were consulted regarding the BS 4142 limit that would be required for any noise affecting the residential properties emitted by commercial or industrial units. In an email dated 23 March 2009 Lynden Leadbeater (PCC) advised
that a noise rating level limit of 5 dB above the background noise level \( L_{A90,T} \) is usually the maximum permitted and that 0 dB is preferred.

10.27 PCC and Huntingdonshire District Council (HDC) were consulted regarding Haddon Lodge Shooting Ground approximately 2.3km from the nearest proposed dwelling and on the opposite side of the A1(M) motorway. There is currently a residential development approximately 2.1km from the clay pigeon shooting ground.

10.28 The clay pigeon shooting ground falls within the remit of HDC but the dwellings are situated within the PCC area. Neither authority is aware of any complaints regarding the clay pigeon shooting ground. Given the similarity of distance and placement of the proposed residential dwellings it is concluded that noise from activities at Haddon Lodge Shooting Ground would not generate complaints from new residents in the proposed Great Haddon developments.

Methodology

Baseline Noise Survey

10.29 A baseline noise survey was undertaken between 23 and 24 July 2008 and 2 and 3 April 2009 to establish the existing noise climate of the sites and to identify any existing noise sources.

10.30 Nine measurement positions were selected and are detailed in Appendix 10.1 (see ES Volume 3, section 10) and illustrated in Figure 10.1 (see ES Volume 2).

10.31 Table 10.4 below describes the noise measurements undertaken:

<table>
<thead>
<tr>
<th>Location Reference</th>
<th>Date</th>
<th>Daytime Measurement</th>
<th>Night-time Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPG24 1</td>
<td>02/04/09 – 03/04/09</td>
<td>A continuous 16-hour measurement undertaken between 07:00Hrs and 23:00Hrs</td>
<td>A continuous 8-hour measurement undertaken between 23:00Hrs and 07:00Hrs</td>
</tr>
<tr>
<td>PPG24 4</td>
<td>02/04/09 – 03/04/09</td>
<td>Four sets of 15-minute measurements</td>
<td>Two sets of 15-minute measurements</td>
</tr>
<tr>
<td>PPG24 5</td>
<td>02/04/09 – 03/04/09</td>
<td>Four sets of 15-minute measurements</td>
<td>Two sets of 15-minute measurements</td>
</tr>
<tr>
<td>CRTN 2</td>
<td>02/04/09</td>
<td>A consecutive 3-hour measurement taken between 12:42 and 15:42</td>
<td>-</td>
</tr>
</tbody>
</table>
### Location Reference Table

<table>
<thead>
<tr>
<th>Location Reference</th>
<th>Date</th>
<th>Daytime Measurement</th>
<th>Night-time Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRTN 3</td>
<td>24/07/08</td>
<td>A consecutive 3-hour measurement between 10:17 and 13:17</td>
<td>-</td>
</tr>
<tr>
<td>CRTN 6</td>
<td>23/07/08</td>
<td>A consecutive 3-hour measurement between 11:08 and 14:08</td>
<td>-</td>
</tr>
<tr>
<td>CRTN 7</td>
<td>23/07/08</td>
<td>A consecutive 3-hour measurement between 11:30 and 14:30</td>
<td>-</td>
</tr>
<tr>
<td>CRTN 8</td>
<td>02/04/09</td>
<td>A consecutive 3-hour measurement between 12:31 and 15:31</td>
<td>-</td>
</tr>
<tr>
<td>CRTN 9</td>
<td>24/07/08</td>
<td>A 1-hour measurement between 14:26 and 15:26</td>
<td>-</td>
</tr>
</tbody>
</table>

10.32 The PPG24 measurements were undertaken to determine the ambient noise levels currently existing on the sites. PPG24 1 was undertaken using a long term unattended monitoring station and measured continuously for a 24-hour period. PPG24 4 and PPG24 5 measured short sample measurements during the daytime and night-time. The CRTN measurements 2, 3, 6, 7, 8 and 9 were undertaken for transportation noise model validation purposes. The surveys for these were undertaken in accordance with the shortened Calculation of Road traffic Noise (CRTN) methodology. The measurement at CRTN 9 was not undertaken for the full three hours as recommended in (CRTN).

10.33 Both the daytime and night-time noise surveys measured the equivalent continuous noise level ($L_{Aeq,T}$), the noise level exceeded for 10% of the measurement time ($L_{A10,T}$) and the noise level exceeded for 90% of the measurement time ($L_{A90,T}$). For the night-time period, the maximum noise level with a slow time weighting ($L_{Amax,slow}$) was additionally acquired. The $L_{Aeq}$ and $L_{Amax}$ parameters are used within PPG24 to assess the suitability of proposed residential development plots against the NECs. The $L_{A10,T}$ parameter is used within CRTN to predict the level of noise generated by road traffic noise and the $L_{A90,T}$ is used for a BS 4142 assessment of industrial sources in mixed residential and industrial areas.

10.34 Appendix 10.2 (see ES Volume 3) details the instrumentation used during the noise measurement survey.
10.35 The sound level meter was mounted on a tripod with the microphone positioned 1.3 m above ground level during the surveys.

10.36 A windshield was fitted over the microphone at all times during the survey period to reduce the effects of any wind-induced noise.

10.37 Calibration checks were performed before and after measurements and no significant fluctuation was recorded.

*Rifle Range Noise Survey*

10.38 A noise assessment of the rifle range at Norman Cross was undertaken on 25 February 2009 in order to establish the typical noise level in the approximate location of the nearest proposed dwellings.

10.39 Appendix 10.3 (see *ES Volume 3*) details the instrumentation used during the rifle range survey.

10.40 A sound level meter was set to record in close proximity to a typical shooting position, (“Location R1”). A second sound level meter, with the clock set to exactly the same time as the first, was positioned in the approximate location of the nearest proposed dwellings on the opposite side of the A15 carriageway (“Location R2”). Figure 10.2 illustrates the rifle range survey measurement location.

10.41 The timing of the rifle shots was observed from the sound level meter in Location R1, and the noise level at the corresponding time at Location R2 was compared to the ambient noise level.

10.42 Calibration checks were performed before and after measurements with a Brüel & Kjær Sound Calibrator and no significant fluctuation was recorded.

10.43 The sound level meter positioned in Location R2 was mounted on a tripod with the microphone positioned 1.3 m above ground level during the surveys. The sound level meter in Location R1 was tripod-mounted approximately 1m above ground level to minimise the distance to the rifle.

10.44 A windshield was fitted over each microphone at all times during the survey period to reduce the effects of any wind induced noise.

10.45 The weather conditions during the survey were overcast with a light to moderate westerly breeze and a maximum gust of 5.5ms-1.

*Noise Model*

10.46 The information outlined in Table 10.5 below was used to construct the noise model.
10.47 The noise survey results were compared to results from the model in the same location to ascertain the accuracy of the model. The results are presented in Tables 10.13 and 10.14.

**Assumptions, Limitations and Technical Difficulties**

10.48 It is assumed that the definition of “HV” used for the percentage of Heavy Vehicles shown in the data received from PBA LLP Transportation Group corresponds with the traffic data request of HV as “a vehicle with an unladen weight of greater than 1.5t”.

10.49 The assumed alignment of the Phase 2 and 3 Western Peripheral Road (WPR) from the northern edge of the Core Area application site to its connection with Phase 1 of the WPR (constructed) and junction 2 of the A1139 Fletton Parkway is that approved under full planning consent 04/01900/FUL (granted in August 08).

10.50 The noise model assumes an open site with no screening from buildings and is therefore a worst case prediction: it does not take into account the screening effect of buildings fronting noise sources (e.g., roads) as mitigation for development further away from the noise source.

10.51 No traffic flow data is available for Southgate Way. However, the Great Haddon development area is on the opposite side of the busy A1139 carriageway to Southgate Way and the noise from traffic using Southgate Way is not likely to be greater than that of the noise from traffic using the A1139. In addition to this, the boundary of the application sites is further from the A1139 and Southgate Way in the northwest corner. Therefore Southgate Way has not been included in the model.

10.52 The A1(M) has been entered into the model as a motorway from Junction 16 to Junction 17 and a dual carriageway after Junction 17. No topographical data is available for the A1(M) as it travels under Junction 16; however, the sites are far enough from the junction that the attenuation due to this underpass is assumed to be insignificant. This assumption has been verified by comparing the noise levels across the south of the sites with normal traffic flow of the A1(M) at junction 16 and by removing traffic at junction 16 with the two situations demonstrating little difference in noise level within the boundaries of the sites.
10.53 It is also assumed that any mapping, topographical and traffic data received is accurate.

**Impact Assessment Criteria**

10.54 The significance of an effect is determined by the sensitivity of the receptor and the magnitude of the effect.

10.55 Tables 10.6 – 10.8 below illustrate how the sensitivity of the receptor and the magnitude of the effect determines the significance level of the effect which can be “not significant”, “minor”, “moderate”, “major” or “severe”.

**Sensitivity**

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High</td>
<td>Nationally protected noise-sensitive wildlife, e.g. SSSI or Ramsar Site where changes in noise would result in altered breeding habits or would threaten species.</td>
</tr>
<tr>
<td>High</td>
<td>Dwellings, Habitats supporting important wildlife communities that are sensitive to noise.</td>
</tr>
<tr>
<td>Medium</td>
<td>Schools, Hospitals, Quiet Recreation areas.</td>
</tr>
<tr>
<td>Low</td>
<td>Offices, cafes/bars with external areas.</td>
</tr>
<tr>
<td>Non Sensitive</td>
<td>Industrial, Retail.</td>
</tr>
</tbody>
</table>

---

1 PPG 24 paragraph 20

2 WHO Guidelines for Community Noise
### Magnitude

**Table 10.7 – Magnitude Descriptors**

<table>
<thead>
<tr>
<th>Magnitude</th>
<th>dB difference compared with baseline or guideline level</th>
<th>Description (^3)(^4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>&lt;3 dB</td>
<td>Not perceptible to human ear within margins of error of measurement. For changes of an industrial noise source the rating level must be below the background noise level for this magnitude.</td>
</tr>
<tr>
<td>Medium</td>
<td>3 - 5.9 dB</td>
<td>Perceptible but less than a doubling/halving of sound energy. For changes of an industrial noise source the rating level must be between background and 5 dB above the background noise level.</td>
</tr>
<tr>
<td>High</td>
<td>6 - 9.9 dB</td>
<td>Up to a doubling/halving of loudness. For changes of an industrial noise source the rating level must be between 5 dB and 10 dB above the background noise level.</td>
</tr>
<tr>
<td>Very High</td>
<td>&gt;10 dB</td>
<td>Over a doubling of loudness. For changes of an industrial noise source the rating level must be 10 dB or more than the background noise level.</td>
</tr>
</tbody>
</table>

\(^3\) References to industrial noise based on BS 4142:1997

\(^4\) Perception descriptors from PPG 24: Planning and Noise 1994 (Glossary)
Sensitivity/Magnitude Matrix:

<table>
<thead>
<tr>
<th>Magnitude</th>
<th>Non sensitive</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
<th>Very High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Not significant</td>
<td>Not significant</td>
<td>Not significant</td>
<td>Not significant</td>
<td>Minor</td>
</tr>
<tr>
<td>Medium</td>
<td>Not significant</td>
<td>Minor</td>
<td>Minor</td>
<td>Minor</td>
<td>Moderate</td>
</tr>
<tr>
<td>High</td>
<td>Minor</td>
<td>Minor</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Major</td>
</tr>
<tr>
<td>V high</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Major</td>
<td>Severe</td>
</tr>
</tbody>
</table>

10.56 An increase in noise level is described as ‘adverse’ and a decrease in noise level as ‘beneficial’.

Results

Baseline Noise Survey

Observation of Noise Survey and Noise Climate

10.57 Subjectively, locations PPG24 1, CRTN 2, PPG24 4 and PPG24 5 were dominated by road traffic from the A1(M) motorway. The noise at CRTN 3 was dominated by traffic noise from the A1139 carriageway, at CRTN 6 the dominant noise source was traffic using the A15 carriageway and at CRTN 7, CRTN 8 and CRTN 9 local traffic noise was dominant. At CRTN 8 and CRTN 9 the A1(M) motorway could be heard between traffic movements.

10.58 Bird song and aircraft were also noted at all locations.
10.59 Appendix 10.4 (see ES Volume 3) presents a summary of the results of the baseline noise surveys. The figures shown for PPG24 4 and PPG24 5 are the logarithmic average of the $L_{\text{Aeq,T}}$ and arithmetic average of the $L_{\text{A10,T}}$ and $L_{\text{A90,T}}$ measurements in each location, along with the maximum $L_{\text{Amax}}$.

10.60 Tables 10.9 and 10.10 show the NECs (based on road traffic noise) of the measurement locations for day and night time periods for the baseline surveys.

Table 10.9 – Noise Exposure Categories of the April 2009 Measurement Positions
(Daytime)

<table>
<thead>
<tr>
<th>Measurement Location</th>
<th>Measurement Date</th>
<th>$L_{\text{Aeq,T}}$ (dB)</th>
<th>NEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPG24 1</td>
<td>02 to 03/04/09</td>
<td>44.0</td>
<td>A</td>
</tr>
<tr>
<td>PPG24 4</td>
<td>02 &amp; 03/04/09</td>
<td>49.8</td>
<td>A</td>
</tr>
<tr>
<td>PPG24 5</td>
<td>02 &amp; 03/04/09</td>
<td>44.4</td>
<td>A</td>
</tr>
</tbody>
</table>

Table 10.10 – Noise Exposure Categories of the April 2009 Measurement Positions
(Night time)

<table>
<thead>
<tr>
<th>Measurement Location</th>
<th>Measurement Date</th>
<th>$L_{\text{Aeq,T}}$ (dB)</th>
<th>$L_{\text{Amax}}$ (dB)</th>
<th>NEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPG24 1</td>
<td>02 to 03/04/09</td>
<td>44.0</td>
<td>64.5</td>
<td>A</td>
</tr>
<tr>
<td>PPG24 4</td>
<td>02 &amp; 03/04/09</td>
<td>43.1</td>
<td>54.6</td>
<td>A</td>
</tr>
<tr>
<td>PPG24 5</td>
<td>02 &amp; 03/04/09</td>
<td>42.3</td>
<td>55.4</td>
<td>A</td>
</tr>
</tbody>
</table>

10.61 The 16-hour day and 8-hour night time $L_{\text{Aeq,T}}$ for PPG24 1 have been used to calculate a full 16-hour day and 8-hour night time $L_{\text{Aeq,T}}$ for PPG24 4 and PPG24 5.

10.62 The sample measurements of road traffic noise were taken over 3 consecutive hours in accordance with the shortened measurement procedure from CRTN (Section III). The estimated $L_{\text{A10,18hr}}$ for each location are presented in Table 10.11.

Table 10.11 – Results for CRTN 2, CRTN 3, CRTN 6, CRTN 7 and CRTN 8

<table>
<thead>
<tr>
<th>Location</th>
<th>Date</th>
<th>Start Time</th>
<th>End Time</th>
<th>$L_{\text{A10,3hr}}$ (dB)</th>
<th>$L_{\text{A10,18hr}}$ (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRTN 2</td>
<td>02/04/2009</td>
<td>12:42:51</td>
<td>15:42:51</td>
<td>82.6</td>
<td>81.6</td>
</tr>
<tr>
<td>CRTN 3</td>
<td>24/07/2008</td>
<td>10:17:05</td>
<td>13:27:05</td>
<td>64.2</td>
<td>63.2</td>
</tr>
<tr>
<td>CRTN 6</td>
<td>23/07/2008</td>
<td>11:08:31</td>
<td>14:08:31</td>
<td>70.2</td>
<td>69.2</td>
</tr>
<tr>
<td>CRTN 7</td>
<td>23/07/2008</td>
<td>11:30:01</td>
<td>14:30:01</td>
<td>70.8</td>
<td>69.8</td>
</tr>
<tr>
<td>CRTN 8</td>
<td>02/04/2009</td>
<td>12:31:08</td>
<td>15:31:08</td>
<td>67.7</td>
<td>66.7</td>
</tr>
</tbody>
</table>
10.63 Although the measurement at Location 9 was not a complete 3-hour measurement, it is assumed to be representative of the 3-hour period. The CRTN shortened measurement procedure has been used for the measurement in this location to allow for approximate comparison with the noise model and is presented below in Table 10.12.

Table 10.12 – Results for CRTN 9.

<table>
<thead>
<tr>
<th>Location</th>
<th>Date</th>
<th>Start Time</th>
<th>End Time</th>
<th>$L_{A10,3hr}$ (dB)</th>
<th>$L_{A10,18hr}$ (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRTN 9</td>
<td>24/07/2008</td>
<td>14:26:20</td>
<td>15:26:22</td>
<td>67.5</td>
<td>66.5</td>
</tr>
</tbody>
</table>

**Baseline Noise Model**

**Validation of the Model**

10.64 The baseline noise model and noise survey have been compared to ensure that the model is showing accurate noise level predictions. Tables 10.13 and 10.14 below detail the comparison.

Table 10.13 – Comparison of Baseline Noise Survey and Noise Model $L_{Aeq, 16h}$ Results

<table>
<thead>
<tr>
<th>Position</th>
<th>Noise survey (average)</th>
<th>Noise model</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPG24 1</td>
<td>51.1</td>
<td>+3.0</td>
<td>51.1</td>
</tr>
<tr>
<td>PPG24 4</td>
<td>53.3</td>
<td>+3.5</td>
<td>53.3</td>
</tr>
<tr>
<td>PPG24 5</td>
<td>41.2</td>
<td>-0.2</td>
<td>41.2</td>
</tr>
</tbody>
</table>

Table 10.14 – Comparison of Baseline Noise Survey and Noise Model $L_{A10, 18h}$ Results

<table>
<thead>
<tr>
<th>Position</th>
<th>Noise survey (average)</th>
<th>Noise model</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRTN 2</td>
<td>81.6</td>
<td>80.1</td>
<td>-1.5</td>
</tr>
<tr>
<td>CRTN 3</td>
<td>63.2</td>
<td>62.4</td>
<td>-0.8</td>
</tr>
<tr>
<td>CRTN 6</td>
<td>69.2</td>
<td>69.9</td>
<td>+0.7</td>
</tr>
<tr>
<td>CRTN 7</td>
<td>69.8</td>
<td>69.3</td>
<td>-0.5</td>
</tr>
<tr>
<td>CRTN 8</td>
<td>66.7</td>
<td>66.4</td>
<td>-0.3</td>
</tr>
<tr>
<td>CRTN 9</td>
<td>66.5</td>
<td>67.4</td>
<td>+0.9</td>
</tr>
</tbody>
</table>
10.65 A positive figure in the difference column of Table 10.13 and 10.14 indicates that the noise model predicts a higher noise level at the survey location than the noise survey measured and a negative figure indicates that the noise survey is higher.

10.66 The comparison demonstrates a good correlation between the baseline noise model and baseline noise survey for the CRTN measurements. It is unlikely that a model and survey provide exactly the same result as the noise model is a simplified representation of the area using road traffic data only. Factors such as other environmental noise (for example, bird song and aircraft), differences between the traffic data used in the model and actual traffic on the day of measurement and wind speed and direction influencing the transmission of sound will also have an affect on the noise.

10.67 The baseline noise model demonstrates higher $L_{A_{eq}, 16hr}$ levels than those measured during the noise survey (PPG 24 locations 1 and 4). The most likely reason for this discrepancy is the distance of these points from the road. CRTN is defined over a quoted range of validity (300 metres) and reduced accuracy results from extrapolation above this distance. It should be emphasised that both the noise model and noise survey results fall within NEC A for the survey locations.

**Potential Impacts**

*Impact of the Existing Noise Climate on the Developments*

*Bri**ckworks, Residential and Retail Areas*

10.68 The brickworks, residential and retail areas to the north east of the sites are included in the baseline noise measurements and therefore do not need to be considered separately.

*Existing Road Traffic Noise*

10.69 To assess the impact of the existing road on the development areas, a SoundPLAN v6.5 noise model has been completed. The following situations have been modelled:

- Baseline – the noise climate without the developments using 2008 traffic flows;

- Opening Year (2011) – the “Do Minimum” situation has been modelled to assess the predicted noise climate without the developments and predicted traffic volumes at 2011. PBA LLP Transportation Group advised that the road traffic flows for the “Do Something” situation in the opening year are very similar to “Do Minimum” and that the difference would be insignificant;
• Development Year (2026) – the “Do Minimum” and “Do Something” situations have been modelled to assess the noise climate with and without the developments and predicted traffic volumes at 2026.

10.70 Using the baseline noise model and noise survey above, the NEC contours of the sites have been assessed.

10.71 The baseline noise survey and model demonstrate that the majority of the sites fall into NEC A; however a small area of the developments, to the west, falls within NEC B. For NEC B PPG24 advises that: “Noise should be taken into account when determining planning applications and, where appropriate conditions imposed to ensure an adequate level of protection against noise”.

10.72 A small area of the development adjacent to the A1(M) motorway falls into NEC C. The PPG24 guidance for NEC C areas is: “Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise”. It is therefore recommended that residential development is avoided within the NEC C areas. The Development Framework Plan (DFP) ref: PST021-DFP-01 rev I reflects this recommendation, creating a buffer zone between the edge of the proposed residential area close to the A1(M) of between approximately 14m and 60m from the site boundary. This is illustrated in Figure 10.4.

Rifle Range

10.73 The rifle range is approximately 60m to the south of the nearest proposed dwellings and on the opposite (south) side of the A15 London Road.

10.74 Noise from rifle shots is known to be directional, with most noise in front of the firing point, i.e. in the direction of shooting. The direction of shooting of the rifle range at Norman Cross is towards the A15 carriageway, to the north. During shooting, a rifle was noted to be fired approximately once every 10 seconds.

10.75 The rifle range is predominantly used on Monday and Wednesday afternoons, with some use on some Friday afternoons. The range is also used on Saturdays and some Sundays.

10.76 The targets are positioned against stop butts that are approximately 6-7m high. The stop butts also act as a barrier to the noise.

10.77 The main source of noise on site, in the location approximately 60m from the rifle range, is traffic using the A15 carriageway. In gaps between vehicle movements,
distant traffic on the A1(M) motorway can be heard. During the survey there were also a number of gas-fired bird-scarers operating in the area.

10.78 Subjectively, the rifle noise could be distinguished from the ambient noise in the area and was heard as a very distant bang. However, no correlation was observed between the gun shots measured at Location R1 and the variation of the noise level in Location R2. The noise level at the location of the proposed dwellings did not increase due to the shots; therefore, the noise from this source has not been considered further within this assessment.

*Clay Pigeon Shooting*

10.79 The clay pigeon range is approximately 2.3km to the north west of the nearest proposed residential property and 1.5km to the north west of the nearest employment area on the opposite (west) side of the A1(M) motorway.

10.80 We understand from PCC and HDC that there has been no history of complaints from existing residents in dwellings situated closer to the shooting range than the proposed development edge; therefore, the noise from this source has not been considered further within this assessment.

**Impact of the Development upon the Existing Noise Climate**

*Construction Phase*

10.81 Potential effects of the construction phase on noise levels at existing noise-sensitive receptors can be fully assessed when a detailed construction programme and management plan is formulated. However, the potential sources of noise during the construction phase are anticipated to include:

- Earthworks including stripping and relaying topsoil; excavation and digging foundations; and landscaping;
- Operation of heavy plant machinery;
- The construction of internal roads;
- Material handling including storage of material in stockpiles;
- movement of vehicles to and from, and within the sites;
- Construction of buildings.
10.82 Construction noise is assessed differently to noise from permanent installations, as it is recognised that construction works are a temporary or short-term operation.

10.83 As the area around the proposed development sites is an urban area and located near to three main roads (A1(M) motorway, A1139 dual carriageway and A15 carriageway), the recommended construction noise target level as is outlined in Department of the Environment Advisory Leaflet 72 is an $L_{A90,T}$ of 75 dB at the façade of the nearest noise-sensitive receptor during normal daytime working hours.

Receptors to Construction Work

10.84 The main receptors to construction work noise are residential properties in Yaxley on the opposite side of the A15 carriageway to the east of the sites and residential properties in Hampton to the north of the sites.

10.85 The most significant sources of noise from the development are increased traffic volumes, and noise from occupiers of the employment area in the north of the development area.

Construction Traffic

10.86 The impact of noise from construction traffic associated with the development can be assessed upon receipt of relevant details.

Impact of Increased Road Traffic Flow

10.87 The development sites have been modelled with regard to noise as described in sections 10.47-10.53. This includes road traffic noise and will therefore demonstrate the effect of increased road traffic flow and traffic flow along the proposed new roads.

10.88 The results of the noise model demonstrate that there is little effect of noise on the development areas from increased road traffic for Do Minimum 2011 and Do Minimum 2026 and that the majority of the development remains below 55 dB during the day (i.e. equivalent to NEC A) and below 57 dB at night (equivalent to NEC B).

10.89 The Do Something 2026 noise model result demonstrates that a large proportion of the development area would fall within $<55$ dB (i.e. equivalent to NEC A) during the day time. However, once the existing roads around the site and proposed primary streets through the development are in full use, then the majority of properties fronting this source of noise will fall within 55-63 dB (NEC B) where some mitigation may be required. The Do Something 2026 model demonstrates that much of the sites fall within the range 45-57dB (equivalent to NEC B) at night time.
10.90 55-63 dB is a large range of noise levels for which the magnitude could be described as “low”, “medium” or “high”. As such the results of the noise model in this range have been split into the three significance magnitudes. For 55-58 dB (light green on Figure 10.9) the magnitude is “low”; for 58-61 dB (yellow-green on Figure 10.9) the magnitude is “medium”; for 61-63 dB (orange on Figure 10.9) the magnitude is “high”. Paragraph 10.108 gives an outline of the mitigation for each of these areas.

10.91 Similarly the range at night time is broken down to 45-48 (light green); 48-51 (yellow green), 51-54 (orange) and 54-57 (brown).

10.92 The area of NEC C land increases to a maximum of 130m (night time) from the development boundaries (depending on location within the sites adjacent to the A1(M)) between the Baseline and Do Something 2026 scenarios. Depending upon the screening effect of properties fronting the noise source (roads), properties positioned in this area may require additional mitigation to reduce the internal noise levels to those specified in BS 8233. This is detailed in section 10.112.

10.93 Offsite survey locations CRTN 7, CRTN 8 and CRTN 9 were used in the model to determine the noise impact at off-site receptors in the year 2026 when comparing the Do minimum and Do something scenarios (Appendix 10.5 in ES Volume 3 sets out the results). The difference in the results demonstrate that there is a beneficial impact in those areas; however this would be defined as “not significant” in relation to the significance criteria in paragraph 10.55.

10.94 The requirements for outdoor areas of schools as set out in BB93 are provided in section 10.21. The noise model demonstrates that Primary Schools “PS1” and “PS3” on the Development Framework Plan may have areas of external space that exceed the recommended $L_{Aeq, 30min}$ limit of 55 dB in the DS 2026 scenario, however there are areas where the limit is met.

10.95 The noise model predicts that the areas of Secondary School “SS1” nearest to the Yaxley By-pass will also experience noise levels greater than $L_{Aeq}$ 55dB, however a large area falls below 55dB.

10.96 At the detailed design stage these factors will need to be considered and outdoor teaching spaces will be identified according to these criteria.

**BS 4142 Assessment of Operational Noise from Employment Area**

10.97 BS 4142 is used to assess noise of an industrial nature, including the ventilation plant common to employment areas. A BS 4142 assessment of plant cannot be conducted until the exact plant and associated noise levels are known. However, using the
existing background noise levels local to the area, an upper limit has been recommended in accordance with BS 4142 and the advice of PBC which advised that a rating level of 5 dB above background \( L_{A90,T} \) is the maximum that is usually permitted and that 0 dB above background \( L_{A90,T} \) is preferred.

10.98 The \( L_{A90,T} \) used for calculating the rating level has been calculated by averaging the measured \( L_{A90,15\text{min}} \) from each survey at the nearest measurement location, then selecting the minimum \( L_{A90,T} \) from the two surveys. Table 10.15 presents the maximum cumulative specific noise level permissible at the nearest proposed residential property to the employment area. The calculations include a distance correction from the employment area to the nearest proposed residential property (using the method in BS 5228 F.2.2.2.1 “Method for Activity \( L_{\text{Aeq}} \) - Procedure”, hard ground calculation to give a conservative result).

**Table 10.15: BS 4142 Assessment of Noise from Employment Areas**

<table>
<thead>
<tr>
<th>Nearest proposed residential property</th>
<th>400 m</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Daytime</strong></td>
<td></td>
</tr>
<tr>
<td>( L_{A90} ) of nearest measurement location (PPG24 4b)</td>
<td>45 dB</td>
</tr>
<tr>
<td>Maximum allowable rating level</td>
<td>50 dB</td>
</tr>
<tr>
<td>Character correction</td>
<td>-5 dB</td>
</tr>
<tr>
<td>Allowable specific noise level at nearest proposed residential property</td>
<td>45 dB</td>
</tr>
<tr>
<td>Allowable specific level at 1m from the Employment Area</td>
<td>97 dB</td>
</tr>
<tr>
<td>Level preferred by Peterborough Borough Council</td>
<td>92 dB</td>
</tr>
<tr>
<td><strong>Night Time</strong></td>
<td></td>
</tr>
<tr>
<td>( L_{A90} ) of nearest measurement location (PPG24 4b)</td>
<td>38 dB</td>
</tr>
<tr>
<td>Maximum allowable rating level</td>
<td>43 dB</td>
</tr>
<tr>
<td>Character correction</td>
<td>-5 dB</td>
</tr>
<tr>
<td>Allowable specific noise level at nearest proposed residential property</td>
<td>38 dB</td>
</tr>
<tr>
<td>Allowable specific level at 1m from the Employment Area</td>
<td>90 dB</td>
</tr>
<tr>
<td>Level preferred by Peterborough Borough Council</td>
<td>85 dB</td>
</tr>
</tbody>
</table>

10.99 The recommended maximum specific noise level is a cumulative noise level of all plant affecting the residential property. Provided the allowable specific noise level 1m from the Employment Area is adhered to, the noise from the Employment Area would be deemed “not significant”.

10.100 BS 5228 advises that “at distances over 300m noise predictions should be treated with caution” because of the “increasing importance of meteorological effects”.

Compiled by David Lock Associates
November 2009
10.101 The only attenuation assumed for the BS 4142 calculation is that due to distance. All other attenuation (e.g. due to buildings between the source and receiver) have been ignored. This is therefore considered to be a worst-case condition.

10.102 The Employment Area includes provision for a site for a Household Waste Recycling Centre (HWRC). From previous experience of HWRCs it is known that the highest noise levels occur when items are placed into empty skips which is unlikely to be the typical situation, but will occur at times. As a result, noise from the HWRC is unlikely to cause a significant impact to the users of the employment area but this issue will be considered in detail at such time an detailed application for a HWRC is submitted to assess whether mitigation would be required to further reduce the likelihood of annoyance to the occupants of the employment areas.

**Operational noise from the District and Neighbourhood Centres**

10.103 The proposed district/neighbourhood centres within the development sites could introduce noise sources such as ventilation plant and extract fans close to residential areas. As such, an assessment of the appropriate BS 4142 rating level for this area is presented in Table 10.16. The exact distance to the nearest dwelling are unknown, therefore they have been assumed to be 10m from the community areas.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Table 10.16: BS 4142 Assessment of Noise from District and Neighbourhood Centres</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$L_{A90}$ of nearest measurement location (PPG24 5)</td>
<td>39 dB</td>
<td></td>
</tr>
<tr>
<td>Maximum allowable rating level</td>
<td>44 dB</td>
<td></td>
</tr>
<tr>
<td>Character correction</td>
<td>-5 dB</td>
<td></td>
</tr>
<tr>
<td>Allowable specific level at 1m from the District and Neighbourhood Areas</td>
<td>39 dB</td>
<td></td>
</tr>
<tr>
<td>Allowable specific noise level at nearest proposed residential property 10m away</td>
<td>59 dB</td>
<td></td>
</tr>
<tr>
<td>Level preferred by Peterborough Borough Council</td>
<td>54 dB</td>
<td></td>
</tr>
</tbody>
</table>

**Night Time**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$L_{A90}$ of nearest measurement location (PPG24 5)</td>
<td>35 dB</td>
<td></td>
</tr>
<tr>
<td>Maximum allowable rating level</td>
<td>40 dB</td>
<td></td>
</tr>
<tr>
<td>Character correction</td>
<td>-5 dB</td>
<td></td>
</tr>
<tr>
<td>Allowable specific level at 1m from the District and Neighbourhood Areas</td>
<td>35 dB</td>
<td></td>
</tr>
<tr>
<td>Allowable specific noise level at nearest proposed residential property 10m away</td>
<td>55 dB</td>
<td></td>
</tr>
<tr>
<td>Level preferred by Peterborough Borough Council</td>
<td>50 dB</td>
<td></td>
</tr>
</tbody>
</table>

10.104 The Development Framework Plan Ref: PST021/DFP/01 rev I proposes residential areas adjacent to the district centre. Therefore the distance from the plant to the nearest residential property has been assumed to be 10m as a worst case scenario.
The BS 4142 assessment can be reviewed on receipt of more accurate layout of the sites and an appropriate design of plant will be undertaken at the detailed design stage.

10.105 Provided the allowable specific noise level 10m from the District and Neighbourhood Areas is adhered to, the noise from the District and Neighbourhood Areas will be “not significant”.

Operational Noise from the CHP

10.106 A combined heat and power (CHP) unit is envisaged as part of the district centre. Provided that the CHP building is of high-density construction (brick, concrete block or similar) with acoustically attenuated vents it is very unlikely that noise from this unit will impact at either existing or proposed dwellings.

10.107 Any noise issues relating to the operation of a CHP plant will be assessed in detail as part of a detailed planning application (including sound power levels of the plant and details of the building’s construction, precise location and orientation). Appropriate acoustic attenuation will be addressed at the detailed design stage.

Impact on Noise Sensitive Ecological Receptors

10.108 Four main areas of ecological importance in or close to the sites have been determined with regard to breeding birds:

- Jones’ Covert woodland;
- Madam White’s woodland;
- The existing woodland in the north east of the Core Area adjacent to the A15;
- The Orton Pit SAC/SSSI (which was also included in the assessment of the Western Peripheral Road planning application).

10.109 The impact of noise on the breeding birds in these areas has been assessed in Chapter 6 of this Environmental Statement.

Mitigation Measures

Construction Phase

10.110 The following environmental management control measures could be considered as appropriate during this construction period to reduce potential disturbance from noise
generated by construction site activities. These are based on guidance provided in BS 5228: Part 1: 2009:

- Use of normal working hours 08:00 to 18:00hrs Monday to Friday and 08:00 to 13:00hrs on Saturdays, with no works expected to occur on Sundays. However it is anticipated that, where there are no noisy operations, working hours would be unrestricted;

- All construction plant and equipment should comply with EU noise emission limits;

- Where reasonably practicable, ensuring the use of quiet working methods, the use of the most suitable plant, reasonable hours of working for noisy operations, and economy and speed of operations;

- Machines in intermittent use should be shut down in the intervening periods between work or throttled down to a minimum; Allowing machines to run unnecessarily also wastes energy;

- Materials should be handled with care and whenever practicable not dropped;

- Materials should be delivered during operating hours;

- All ancillary plant such as generators, compressors and pumps should be positioned so as to cause minimum noise disturbance. If necessary, acoustic enclosures should be provided and/or acoustic screening;

- Locating noisy plant and equipment as far away from noise-sensitive receptors as reasonably practicable and, where possible, carry out loading and unloading in these areas;

- Noise caused by resonance of body panels and cover plates of machinery could be reduced by stiffening with additional ribs or by increasing the damping effect with a surface coating of special resonance damping material;

- Orientating plant that is known to emit noise strongly in one direction so that the noise is directed away from noise-sensitive receptors, where possible;

- Regular and effective maintenance by trained personnel to reduce noise from machinery;

- Use of site buildings such as temporary offices to form a substantial barrier separating site operations and nearby noise-sensitive premises.
10.111 Following this, the construction work at this stage would incorporate completing the plot development. This would involve less movement of machinery and reduced noise emissions from plant as the development areas would generally not be an open site. Therefore, it is not anticipated that construction for this phase of the construction programme would require specific control measures beyond those already recommended for the above.

Operational Phase

10.112 The noise model assumes an open site with no screening from buildings and is therefore a worst case prediction. Buildings fronting the noise source (ie primary streets) act as a noise barrier for properties to their rear, and therefore reduce noise levels for properties further from the noise source.

10.113 Mitigation for proposed dwellings should therefore be designed having regard to the “Do Something” model which shows a large proportion of exposed frontages within the sites to expect noise levels of 55-63 dB $L_{A_{eq}}$ during the day and 45-57 dB $L_{A_{eq}}$ at night. This is the equivalent of NEC B.

10.114 BS 6262:Part 2:2005 provides details on various glazing specifications and their sound reduction performance. Mitigation for residential buildings in the 55-58 dB area can achieve the “good” BS 8233 $L_{A_{eq},T}$ criteria of 30 dB inside bedrooms with typical glazing which has $R_W$ 29 dB. This can be achieved with a configuration of 4/12/4 (glass/cavity width/glass (mm)). In the 58-61 dB area the required $R_W$ of the glazing is up to 31 dB (6/12/6) and in the 61-63 dB areas glazing with $R_W$ 33 dB is required (10/12/4).

10.115 There are many options for mitigation which can be adopted as part of the detailed design of residential areas. In addition to siting, screening and layout options, consideration of ventilation could be required, particularly on façades exposed to the noise sources (roads), to ensure that the windows could remain closed whilst maintaining adequate levels of ventilation. Acoustically attenuated ventilation, such as trickle vents, may also be appropriate.

10.116 Mitigation based on the DS 2026 scenario (section 10.89-10.93 provides details) has been considered for the proposed dwellings forming part of R9 that are within the extended buffer areas adjacent to the A1(M), and the facades adjacent to the new proposed roads within the sites. This is considered to be a sustainable approach. The façades facing the traffic in these areas require the highest level of mitigation during the night time, when an $R_W$ of 27 dB is necessary to reduce the internal noise level to the BS 8233 “good” criteria of 30 dB. It should be noted that these are worst
case levels which have been assessed without consideration of the screening effect of proposed buildings.

10.117 At the detailed design stage, consideration would also be required for garden areas to ensure that they meet the recommended external noise levels of $L_{A_{equ},16hr}$ 50-55 dB. This can be achieved through use of screening from buildings and fences to reduce the noise levels in gardens and open spaces.

10.118 Similar mitigation may also be required to ensure a maximum $L_{A_{equ},30min}$ of 55 dB in external areas of the proposed schools. BB93 advises that where outdoor $L_{A_{equ},30min}$ noise levels are predicted to exceed 55 dB, mitigation can be achieved by acoustic screening.

10.119 There are no specific requirements for mitigation to achieve recommended internal levels for employment uses identified by the “Do Something” model.

**Combined Heat and Power Unit**

10.120 Sound power levels for the plant inside the CHP building have not yet been specified. Detailed design of the building will be undertaken at the detailed design stage when this information is known. However, the following recommendations are made for any subsequent detailed proposal:

- that the building is constructed from single leaf solid brick with a sufficient weighted sound reduction (for example, at least $R_W = 45$ dB);

- that the roof of the CHP building will need to be constructed from a material or combination of materials that provide an overall weighted sound reduction comparable to that of the walls;

- that any access door should be constructed of solid material, such as hardwood or steel and ideally located on a façade that does not face any residential units. If it is not possible to orientate the door in such a way then an alternative location would be on the façade facing the residential units that are the furthest away or on a façade that faces residential units that do not have windows overlooking the CHP building. The CHP access door-set should be supplied as a single package comprising the door leaf, framework and integral seals. Vertical resilient seals are required down the sides of the door and across threshold;

- that, if the CHP building requires ventilation, this should be provided by acoustically attenuated vents or ductwork ideally located on a façade that does not face any noise-sensitive receptors such as residential properties or nearby offices. If it is not possible to orientate the vents in such a way then the most
suited location would be on the façade facing the properties that are the furthest away or on a façade that faces buildings that do not have windows overlooking the CHP building. There should be no plant installed externally to the CHP building, such as cooling towers.

10.121 It will be necessary to undertake acoustic design work at the detailed design stage to ensure that the proposed CHP building provides an adequate level sound reduction such that the CHP plant does not impact on nearby noise-sensitive receptors.

Residual Impacts

Impact of the Existing Noise Climate on the Development

Road Traffic Noise

10.122 If the residential properties are constructed with appropriate mitigation (options include siting, layout, screening, orientation and glazing) and are located in NEC A or B areas the effect of road traffic noise would be considered to be not significant.

Impact of the Development upon the Existing Noise Climate

Construction Phase

10.123 Noise levels as a result of the construction works will be minimised by implementing the mitigation methods advised in BS 5228 via a Construction Environmental Management Plan. However, if piling is used, this stage of the construction phase will produce some noise that is considered to be temporary major adverse on the areas of ecological importance and temporary moderate adverse on the residential and commercial receptors.

Operational Noise

10.124 Operational noise will be minimised through selection and mitigation of plant associated with employment uses. The residual effect is considered to be not significant.

Cumulative and Interactive Effects

10.125 The traffic data entered into the noise model includes other committed developments within the area local to the sites.
## Summary Matrix of all Impacts Before Mitigation

<table>
<thead>
<tr>
<th>Issue</th>
<th>Description of impact</th>
<th>Geographical significance</th>
<th>Impact, Significance</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise</td>
<td>Construction noise impacting the SAC and SSSI areas</td>
<td>I</td>
<td>Adverse</td>
<td>Major</td>
</tr>
<tr>
<td></td>
<td>Construction noise impacting the woodlands in the centre of the Great Haddon sites and the lakes to the south of the sites</td>
<td>R</td>
<td>Adverse</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Construction noise impacting the commercial and residential areas of the developments</td>
<td>L</td>
<td>Adverse</td>
<td>Moderate</td>
</tr>
<tr>
<td>On Completion</td>
<td>Traffic noise impacting the proposed residential properties</td>
<td>L</td>
<td>Adverse</td>
<td>Not significant, minor or moderate depending on proximity to road</td>
</tr>
<tr>
<td></td>
<td>Traffic noise impacting the proposed schools</td>
<td>L</td>
<td>Adverse</td>
<td>Low to high depending on proximity to road</td>
</tr>
<tr>
<td></td>
<td>Noise from the proposed Employment Area impacting noise-sensitive receptors</td>
<td>L</td>
<td>Adverse</td>
<td>Dependent on selection of plant</td>
</tr>
</tbody>
</table>
## Noise and Vibration

### Great Haddon, Peterborough

**Environmental Statement**

**Great Haddon Consortium**

Compiled by **David Lock Associates**

November 2009

### Noise and Vibration

#### Geographical Significance

<table>
<thead>
<tr>
<th>Issue</th>
<th>Description of impact</th>
<th>Geographical Significance</th>
<th>Impact, Significance</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I</td>
<td>N</td>
<td>R</td>
</tr>
<tr>
<td>Noise from the proposed District and Neighbourhood Areas impacting noise-sensitive receptors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise from the CHP impacting noise-sensitive receptors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Summary of Mitigation and Enhancement Measures and Residual Effects

<table>
<thead>
<tr>
<th>Issue</th>
<th>Description of impact</th>
<th>Mitigation/enhancement measures</th>
<th>Residual Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise</td>
<td>Construction noise impacting the ecologically sensitive areas</td>
<td>Implement mitigation measures outlined in Section 10.108, avoid noisy work during breeding/nesting seasons</td>
<td>Temporary minor adverse</td>
</tr>
<tr>
<td></td>
<td>Construction noise impacting the commercial and residential areas of the developments</td>
<td>Implement mitigation measures outlined in Section 10.108.</td>
<td>Temporary minor adverse</td>
</tr>
<tr>
<td></td>
<td>Traffic noise impacting the proposed residential properties</td>
<td>Detailed design options such as screening, glazing, orientation of buildings/rooms, buffer zone to road</td>
<td>Not significant</td>
</tr>
</tbody>
</table>
### Noise and Vibration

<table>
<thead>
<tr>
<th>Issue</th>
<th>Description of impact</th>
<th>Mitigation/enhancement measures</th>
<th>Residual Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Traffic noise impacting the proposed schools</td>
<td>Detailed design options such as screening, glazing, orientation of buildings/rooms, buffer zone to road</td>
<td>Not significant</td>
</tr>
<tr>
<td></td>
<td>Noise from the Employment Area impacting the proposed dwellings</td>
<td>Plant selection, consideration of BS 4142</td>
<td>Not significant</td>
</tr>
<tr>
<td></td>
<td>Noise from the District and Neighbourhood Areas impacting the proposed dwellings</td>
<td>Plant selection, consideration of BS 4142</td>
<td>Not significant</td>
</tr>
<tr>
<td></td>
<td>Noise from the CHP impacting noise sensitive receptors</td>
<td>Structural design, consideration of BS 4142</td>
<td>Not significant</td>
</tr>
</tbody>
</table>

### References


Peterborough City Council, Peterborough Local Plan (First Replacement)


**Abbreviations**

- $L_{Aeq,T}$: Equivalent noise level: the A-weighted steady sound pressure level that would contain the same amount of acoustical energy as the actual, fluctuating sound measured over a period, $T$.
- $L_{A10}$: The A-weighted sound pressure level exceeded for 10% of the time. It is used to describe road traffic noise.
- $L_{A90}$: The A-weighted sound pressure level exceeded for 90% of the time. It is used to describe the background noise level.
- $L_{AFmax}$: The maximum A-weighted sound pressure level recorded over the measurement period. The F denotes a fast time-weighting has been used.
- NEC: Noise Exposure Category, as set out in Planning Policy Guidance 24 “Planning and Noise”
- VDV: Vibration Dose Value a measure of assessing the human exposure to vibration.
11.0 AIR QUALITY

Introduction and Scope of Assessment

11.1 This chapter has been prepared by Peter Brett Associates LLP. It considers the potential air quality effects from the proposed Great Haddon development as set out in the two outline applications.

11.2 The potential issues with regard to air quality were agreed with Peterborough City Council (PCC) to be as follows:

- Dust annoyance and elevated concentrations of PM$_{10}$ associated with construction works
- The impact of emissions from traffic generated by the proposed developments on existing residential receptors close to the development sites and on the adjacent designated area of conservation
- The impact of emissions from a possible CHP plant
- The suitability of the core site for residential use

11.3 This chapter focuses on nitrogen oxides (NO$_x$), nitrogen dioxide (NO$_2$) and particulate matter (PM$_{10}$), since these are the pollutants of most concern from road transport and CHP plant, and dust and PM$_{10}$ during construction. It includes an assessment of the impact of NO$_x$ and nitrogen (N) deposition on the Orton Pit Special Area of Conservation (SAC).

Reference Material and Assessment Method

Legislation

Local Air Quality Management

11.4 Part IV of the Environment Act 1995 introduced a system of Local Air Quality Management (LAQM). This requires Local Authorities to regularly and systematically review and assess air quality within their boundaries against a series of objectives, and appraise development and transport plans against these assessments.

11.5 The Air Quality Strategy (2007) establishes the policy for ambient air quality for the UK. Its primary objective is to ensure that everyone can enjoy a level of ambient air quality in public places that poses no significant risk to health or quality of life, and to protect the environment. The Strategy sets out the national air quality objectives
Air Quality

11.6 The air quality objectives for the protection of human health apply to outdoor locations where people are regularly present, and where they might reasonably be expected to be exposed over the relevant averaging times (which vary from 15 minutes to a year). The air quality objectives do not apply to occupational, indoor or in vehicle exposure.

11.7 Where a NAQO is unlikely to be met, the local authority must designate an Air Quality Management Area (AQMA) and may need to draw up an Air Quality Action Plan (AQAP) setting out the measures it intends to introduce in pursuit of the objectives within its AQMA.

11.8 Over 230 local authorities have declared AQMAs. PCC has declared an AQMA for sulphur dioxide (SO₂) emitted from the brickworks in Whittlesey, around 10km from Great Haddon. The proposed development will not impact on it, nor will it impact on the proposed development.

Air Quality Objectives

11.9 The NAQOs for NO₂ and PM₁₀, set out in the Air Quality (England) Regulations 2000 are shown in Table 11.1.

11.10 The Air Quality Strategy includes a new exposure reduction target of 25µg/m³ for smaller particles known as PM₂.₅ to be achieved by 2020. PM₂.₅ is a subset of PM₁₀; therefore if concentrations of PM₁₀ are less than 25µg/m³, then the exposure reduction target for PM₂.₅ is achieved. This pollutant has not been included in this assessment because it is not included in LAQM.

11.11 The Air Quality Strategy also includes objectives for the protection of vegetation and ecosystems, and the objective for NOₓ is shown in Table 11.1. An assessment of the impact on vegetation and ecosystems from sulphur dioxide and ammonia has not been included because road transport is not a significant source of these pollutants. Traffic emissions are an important precursor for ozone. However close to roads nitric oxide (NO) emissions from vehicles remove ozone from the atmosphere, and it is only over relatively long time scales, and hence distances, that traffic emissions result in a net production of ozone. Due to the proximity of major roads to the designated areas of conservation, ozone resulting from local traffic emissions will not have a significant impact.
Table 11.1: NOx, NO2 and PM10 Objectives included in the Air Quality (England) Regulations 2000 and the Air Quality Strategy

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Objective</th>
<th>Date to be achieved by and maintained thereafter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Health Objectives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrogen dioxide (NO2)</td>
<td>200µg/m³ measured as a 1 hour mean, not to be exceeded more than 18 times a year</td>
<td>31 December 2005</td>
</tr>
<tr>
<td></td>
<td>40µg/m³ measured as an annual mean</td>
<td></td>
</tr>
<tr>
<td>Particulate matter (PM10)</td>
<td>50µg/m³ measured as a 24 hour mean, not to be exceeded more than 35 times a year</td>
<td>31 December 2004</td>
</tr>
<tr>
<td></td>
<td>40µg/m³ measured as an annual mean</td>
<td></td>
</tr>
<tr>
<td>Vegetation and Ecosystem Objectives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrogen Oxides (NOx)</td>
<td>30µg/m³ measured as an annual mean</td>
<td>31 December 2000</td>
</tr>
</tbody>
</table>

**Air Quality Limit Values**

11.12 The Air Quality Standards Regulations 2007 implement the European Union’s 1996 Air Quality Framework Directive on ambient air quality assessment and management (96/62/EC) and its ‘daughter’ directives (1999/30/EC, 2000/69/EC, 2002/3/EC and 2004/107/EC). It includes limit values for NO2 and PM10 (protection of human health) and for NOx (protection of vegetation and ecosystems). These are essentially the same as the NAQO values but the compliance date for NO2 is 2010 instead of 2005. The onus is on central not local government for ensuring that the limit values are met. These are mandatory whereas there is no legal obligation to meet the NAQOs. Therefore, the limit values carry more weight than the NAQOs.

11.13 A new Air Quality Directive (2008/50/EC) came into force in June 2008. This does not change the existing limit values but allows flexibility where compliance is difficult. The deadline for complying with the PM10 limit values can be postponed for three years after the Directive’s entry into force (i.e. to June 2011), or by a maximum of five years from the compliance date for NO2 (i.e. to January 2015), provided action measures are proposed.

11.14 Given the widespread exceedence of these objectives, the Government has applied to the European Commission for exemption from the obligation to apply the 24-hour mean limit value for PM10 in 8 zones/agglomerations, including the Eastern zone where Peterborough is located. It is anticipated that the UK Government will also apply to the European Commission for exemption from the obligation to apply the annual mean limit value for NO2 in many areas.
Habitats Directive


11.16 The Habitats Directive requires EU Member States to create a network of protected wildlife areas, known as Natura 2000 sites, across the European Union. This network consists of Special Areas of Conservation (SAC) established under the Habitats Directive and Special Protection Areas (SPA), established to protect wild birds under the Birds Directive (Council Directive 79/409/EEC).

11.17 Regulation 48 of the Habitats Regulations requires that a competent authority will need to undertake an appropriate assessment of the implications for a Natura 2000 site before giving consent to any proposed developments that may impact on the site. In this case PCC is the competent authority, in consultation with Natural England. Development can go ahead only if it is ascertained that it will not adversely affect the integrity of the Natura 2000 site.

11.18 However, Regulation 49 allows development to go ahead despite a negative assessment if there is overriding public interest. If there are no priority habitat types or species on the Natura 2000 site (as identified in Annex I and Annex II of the Habitats Directive), then that public interest may be of a social or economic nature. Orton Pit SAC was not selected for any priority habitat types or species.

11.19 Where development is permitted despite an adverse effect, compensatory measures can be secured under Regulation 53 to ensure that the overall coherence of a Natura 2000 site is protected.

Planning Policy

National Policy

11.20 Planning Policy Statement 23: Planning and Pollution Control (PPS23) sets out the Government's current policies on air quality and planning. It advises that any consideration of air quality and potential impacts arising from development, possibly leading to impacts on health, is capable of being a material planning consideration. It requires existing and likely future air quality in an area be considered when a local planning authority considers a planning application, and that AQMA action plans are taken into account.
11.21 PPS23 advises that statutory nuisance is not intended to secure a high level of amenity, but is intended to deal with excessive emissions. Nuisance does not equate to a loss of amenity; that is there may be a loss of amenity before statutory nuisance occurs. It is therefore important for planning authorities to consider the loss of amenity from dust during construction in the planning process in its wider context and not just from the narrow perspective of statutory nuisance.

11.22 Planning Policy Statement 9: Biodiversity and Geological Conservation (PPS9) sets out the Government’s planning policies on the protection of biodiversity and geological conservation through the planning system.

11.23 Circular 06/2005: Biodiversity and Geological Conservation – Statutory Obligations and Their Impact within the Planning System accompanies PPS9 and states that “The decision on whether an appropriate assessment is necessary should be made on a precautionary basis.” This circular defines the integrity of a Natura 2000 site as “the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified”.

Regional Policy


Local Policy

11.25 None of the saved policies within PCC’s Local Plan (First Replacement) (2005) or in any of the Local Development Documents within PCC’s emerging Local Development Framework specifically reference air quality.

Air Quality Planning Guidance

11.26 Guidance for local authority air quality and planning officers on how to consider air quality within the development control process was issued by Environmental Protection UK (formerly the National Society for Clean Air and Environmental Protection (NSCA)) in November 2006. Although this has no statutory standing it is widely used by local authorities.
**Dust Annoyance**

11.27 There are no statutory limits on dust deposition or soiling during construction of infrastructure, and a number of different criteria and monitoring methods have been developed to assess whether or not complaints are likely.

11.28 *Minerals Policy Statement 2* (MPS2) on controlling and mitigating the environmental effects of mineral extraction in England was published in March 2005. Annex 1 covers dust, and lays out the planning considerations the Government expects to be applied by Mineral Planning Authorities to dust emissions from surface mineral operations. It explicitly excludes building operations from its scope but then goes on to state that, as these operations share many features with surface mineral operations, operators should take account of the annex.

11.29 Enforcement action to control dust annoyance can be taken under Part III of the Environmental Protection Act 1990. However, the Government expects developers to make proposals that are environmentally acceptable from the outset rather than relying on retrospective action.

**Assessment Methodology**

11.30 This air quality impact assessment provides baseline data on air quality around the area of the proposed development and investigates the effect that the development will have during the construction and operational phases. It focuses on those pollutants of most concern locally in the context of the proposed development; that is NOx, NO2, PM10, and dust. It also considers nutrient nitrogen deposition at receptors within the Orton Pit SAC.

11.31 The other pollutants in the National Air Quality Strategy have not been included because the Air Quality Review and Assessments undertaken by PCC show that the NAQOs will be achieved and the proposed development is unlikely to significantly affect their concentrations. Wet deposition has not been considered at receptors within the Orton Pit SAC as they are too close to the source.

**Consultation**

11.32 The Environmental Health Department at PCC was consulted over the approach to this air quality assessment and agreed with the methodology\(^1\).

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\(^1\) Telephone conversation and email with Lynden Leadbeater, in the Environmental Health Department, PCC 7 May, 2008
Baseline Air Quality

11.33 Current air quality around the sites has been assessed by drawing on the following measured and modelled data.

11.34 PCC’s LAQM review and assessment reports provided information regarding historical air quality in the city.

11.35 There are no continuous air quality monitors operating in Peterborough.

11.36 PCC’s NO2 diffusion tube monitoring network is concentrated within Peterborough’s urban area to the north of the A1139 Fletton Parkway. Background data from diffusion tubes north of Fletton Parkway are presented, along with results from a roadside location at Hampton Vale on Eagle Way (see Volume 2, Figure 11.1).

11.37 The data from two roadside diffusion tubes located on Fletton Parkway, approximately 3km north-east of the sites, have been used to verify the model results.

11.38 Data from NO2 diffusion tube monitoring undertaken for this assessment (see below).

11.39 Modelled data for 1km x 1km grids referred to in LAQM.TG(09) and available at www.airquality.co.uk have been used to determine the background air quality in the area. The data used was prior to the amendment made on 12 May 2009, which reduced background NO2 concentrations slightly.

11.40 Predicted background NOx concentrations and nitrogen deposition rates from the Air Pollution Information System (APIS).

NO2 Diffusion Tube Monitoring

11.41 Nitrogen dioxide was monitored at 26 locations in and around the Great Haddon sites using passive diffusion tubes prepared using 20% triethanolamine (TEA) in water and analysed by Gradko International Ltd, a UKAS accredited laboratory. The monitoring was undertaken over 13 periods of four weeks each. The monitoring programme commenced on 9 June 2008, and ended on 8 June 2009. At the time of writing, data from ten monitoring periods was available. A report presenting the results from the full monitoring period will be prepared when all the data is available.

11.42 The monitoring locations were set up in agreement with PCC, and are described in Volume 3 (Appendix 11.1) and shown in Volume 2 (Figure 11.1).

11.43 As there is no continuous NOx monitor in the city of Peterborough, three tubes were co-located with a continuous monitor in the city centre of Bristol (Parson Street). A bias adjustment factor derived from this data was used to adjust the results from the
rest of the monitoring survey. This adjustment will correct the systematic bias of the diffusion tubes, which generally have an uncertainty of around ±25%. The full set of results for all diffusion tubes and the bias adjustment calculation is shown in ES Volume 3 (Appendix 11.2).

11.44 An estimate of the annual mean concentration for the previous year (June 2007 to June 2008) can be made by comparing the ten months monitoring data with data from three background continuous monitors (Market Harborough, Northampton and Wicken Fen). The full details of this methodology are shown in Volume 3 (Appendix 11.3).

Chemoluminescent NOx Monitoring

11.45 Background NOx concentrations were measured at Yaxley Lodge Farm (see Volume 2, Figure 11.1) to give an indication of the current background concentrations at the nearby designated areas of conservation. The monitoring will be undertaken over a period of 12 months. The monitoring commenced in February 2009 and at the time of writing no data is available.

Predicted Baseline Concentrations

11.46 Annual mean concentrations of NO2 and PM10 in 2008 have been modelled at receptors likely to be affected by local air pollution using the DMRB Screening Model (See Operational Impacts).

Construction Impacts

11.47 During construction the main potential effects are dust annoyance and locally elevated concentrations of PM10. The suspension of particles in the air is dependent on the surface characteristics, weather conditions and on-site activities. Dust effects will be greatest during dry windy weather, and least during wet calm conditions.

11.48 The potential for dust effects during construction is also dependent on the proximity of sensitive receptors. Large dust particles (greater than 30µm) will largely deposit within 100m of sources. Intermediate particles (10-30µm) can travel 200-500m. Smaller particles (less than 10µm) are deposited slowly and may travel up to 1km. Concentrations decrease rapidly with distance from the source due to dispersion and deposition and therefore significant dust annoyed is usually limited to within 200m of a major construction site. The effect on short-term PM10 concentrations occurs over a shorter distance from construction activity.

11.49 This assessment uses the dust sensitive receptors as illustrated in MPS2:
- High sensitivity – hospitals/clinics, retirement homes, hi-tech industries, painting and furnishing, food processing
- Medium sensitivity – schools, residential areas, food retailers, greenhouses and nurseries, horticultural land, offices
- Low sensitivity – farms, light and heavy industry, outdoor storage

11.50 Hospitals, schools and residential areas were identified from the OS map of the area. The latter have been defined in terms of the number of dwellings.

11.51 The presence of clinics, retirement homes, doctor’s surgeries and highly sensitive industry (hi-tech industry, painting and furnishing, and food processing) were searched for using scoot.co.uk, the Internet business directory.

11.52 The potential for dust annoyance and locally elevated PM\textsubscript{10} concentrations during construction were assessed by analysing long-term wind and rainfall data. An 8-year wind rose from the weather station at Wittering (see ES Volume 2, Figure 11.2) for the years 1993 to 2000 provided by ADM Ltd was used, along with data for the annual average number of days when rainfall is greater than 0.2mm (1971-2000) for the area, obtained from the Met Office website, www.metoffice.gov.uk.

11.53 The construction impacts have been assessed against the short-term NAQO for PM\textsubscript{10}, the risk of there being of complaints about dust from the sites, and significant impact on the designated conservation sites.

**Operational Impacts**

*Traffic Impact*

*Human Health*

11.54 The effect of the operation of the proposed development on human health was assessed by modelling concentrations of NO\textsubscript{2} and PM\textsubscript{10} at the front façade of the following receptors (the receptor number in brackets is shown on Figure 11.3):

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\(^2\) Searched on 18th March 2009
The receptors were chosen to represent those locations most likely to be affected by emissions from traffic using the application sites.

Concentrations were estimated for the following years and scenarios:

- 2008 – baseline conditions
- 2011 – future assessment year without and with the proposed development
- 2026 – future assessment year without and with the proposed development

The Design Manual for Roads and Bridges (DMRB) screening model (v1.03c, 2007) was used to estimate concentrations of NO₂ and PM₁₀. This model has been widely used in the UK for this type of assessment.

Data from the pollutant concentration maps referred to in LAQM.TG(09) were used to determine the background concentrations. The motorway and trunk A and primary A road contributions were removed from the background concentrations as emissions from these sources were explicitly modelled. The background concentrations used are shown in ES Volume 3 (Appendix 11.4). As background concentrations are only available up to 2020, the 2026 background concentrations were assumed to be the same as those in 2020.

Annual average daily traffic (AADT) and percentage of heavy duty vehicles (HDVs), defined as vehicles over 3.5 tonnes, were provided by PBA’s transport department.
and are shown in Volume 3 (Appendix 11.5). It was assumed that the average speed of the traffic was the same as the speed limit. The traffic from the proposed development was modelled for a 2026 assessment year only. Therefore, in order to assess a worst case assumption in terms of air quality, the predicted development traffic from 2026 was added to the 2011 baseline traffic flow for a 2011 with development scenario.

11.60 Predicted NO\textsubscript{x} concentrations were converted to NO\textsubscript{2} using the NO\textsubscript{x} to NO\textsubscript{2} conversion spreadsheet (v1.1) available from www.airquality.co.uk.

11.61 Verification of the modelled results was carried out by comparing the modelled road contribution of NO\textsubscript{x} with that derived from the concentrations measured at PCC’s diffusion tubes on Fletton Parkway using the methodology recommended in the Government’s Technical Guidance LAQM.TG(09). Details of the model verification calculations are shown in Table 11.2. The verification factor used for NO\textsubscript{x} was 1.9.

Table 11.2: Verification factor calculations

<table>
<thead>
<tr>
<th>Diffusion Tube</th>
<th>Year</th>
<th>Background NO\textsubscript{2}</th>
<th>Monitored NO\textsubscript{2} (total)</th>
<th>Monitored NO\textsubscript{x} (road)(a)</th>
<th>Modelled NO\textsubscript{x} (road)</th>
<th>Adjustment factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>2TA Par</td>
<td>2006</td>
<td>23.96</td>
<td>41.0</td>
<td>67.9</td>
<td>52.4</td>
<td>1.3</td>
</tr>
<tr>
<td>2TA Par2</td>
<td>2006</td>
<td>23.96</td>
<td>45.0</td>
<td>84.6</td>
<td>53.7</td>
<td>1.6</td>
</tr>
<tr>
<td>2TA Par</td>
<td>2007</td>
<td>22.97</td>
<td>49.6</td>
<td>107.7</td>
<td>50.4</td>
<td>2.1</td>
</tr>
<tr>
<td>2TA Par2</td>
<td>2007</td>
<td>22.97</td>
<td>53.2</td>
<td>126.7</td>
<td>51.7</td>
<td>2.5</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.9</td>
</tr>
</tbody>
</table>

Notes: (a) Calculated from monitored annual mean NO\textsubscript{2} using the NO\textsubscript{x} to NO\textsubscript{2} conversion spreadsheet (v1.1)

11.62 As no local monitoring for PM\textsubscript{10} is carried out a default factor of 5 was applied to the modelled data.

District Centre CHP Facility

11.63 Concentrations of NO\textsubscript{2} and PM\textsubscript{10} due to emissions from the proposed CHP facility in the District Centre were predicted at the same receptors as used for the traffic impacts using the ADMS-4 dispersion model (version 4.1). The location with the maximum predicted concentrations was also established.

11.64 The modelling is based on outline proposals for sustainable energy provision, as detailed in the Great Haddon Energy Strategy submitted in support of this application. At the time of this assessment a preferred option for the provision of sustainable energy had not been selected, therefore the option of a single 2MW gas CHP providing centralised heat and energy for the whole site has been assumed.
11.65 The parameters used in the model were obtained from test data available from Caterpillar for their G3520C (DM5838) gas engine. The parameters are shown in Table 11.3.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Cat G3520C (DM5838)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhaust exit temperature (°C)</td>
<td>458</td>
</tr>
<tr>
<td>Exhaust volume flow rate (Nm³/s)</td>
<td>2.6</td>
</tr>
<tr>
<td>Stack height (m)</td>
<td>18</td>
</tr>
<tr>
<td>Stack diameter (m)</td>
<td>0.33</td>
</tr>
<tr>
<td>NOx emission rate (g/s)</td>
<td>1.3</td>
</tr>
</tbody>
</table>

11.66 As a worst case assumption the CHP was assumed to operate 24 hours/day, 365 days/year.

11.67 The CHP facility was assumed to be located within a building at the proposed District Centre, with the location of the exhaust stack shown in (Figure 11.3, see ES Volume 2).

11.68 The building where the CHP facility is located will affect the dispersion of emissions from the exhaust stack. Wind blowing around buildings distorts the air flow and creates zones of turbulence. Increased turbulence causes greater plume mixing. The rise and trajectory of the plume may be depressed by the flow distortion, leading to higher ground level concentrations closer to the stack than those obtained if the building was not there. The ADMS model incorporates algorithms to account for these building downwash effects. To allow for these effects the District Centre building was assumed to have the dimensions shown in Table 11.4. These assumptions are based on the Development Framework Plan and land use budget available at the time of the assessment (which are not substantively different from the submitted version).

<table>
<thead>
<tr>
<th>Building</th>
<th>Length (m)</th>
<th>Width (m)</th>
<th>Height (m)</th>
<th>Angle from north (°)</th>
</tr>
</thead>
<tbody>
<tr>
<td>District Centre</td>
<td>85</td>
<td>85</td>
<td>15</td>
<td>90</td>
</tr>
</tbody>
</table>

11.69 As a conservative assumption all NOx emissions were assumed to be NO₂.

11.70 As the proposed CHP is likely to be using natural gas as a fuel, the PM₁₀ emissions will be negligible.
Designated Special Area for Conservation

11.71 NO\textsubscript{x} emitted from road transport and CHP plant is deposited onto the ground through dry and wet deposition. High nitrogen deposition can lead to eutrophication of the nutrient poor waters of the Orton Pit SAC.

11.72 The ecology assessment (see Chapter 6) has identified the potential for NO\textsubscript{x} emissions to affect stonewort in the ponds within the Orton Pit SAC.

11.73 The impact from NO\textsubscript{x} can be assessed by comparing predicted concentrations at the Orton Pit SAC with the annual objective set out in the Air Quality Strategy (Table 11.1). The annual objective for NO\textsubscript{x} is the same as the critical level at the Orton Pit SAC i.e. the concentration above which there may be a direct adverse effect on vegetation or ecosystems. Also the N deposition rate can be derived from the predicted NO\textsubscript{x} concentration and compared with the critical load for the Orton Pit SAC (Table 11.5 below).

11.74 Critical loads represent the exposure below which there should be no significant harmful effects on sensitive elements of an ecosystem. Critical loads for nitrogen deposition have been established for different habitats.

11.75 A critical load for nitrogen for the hard oligo-mesotrophic waters as found within the Orton Pit SAC cannot be given established as quantitative relationships between biology and nitrogen concentrations are poorly understood.

11.76 Therefore, critical loads are given for alkaline fens and reed-beds (rich fens) which are present within the ponds at Orton Pit and can also be affected by eutrophication leading to the growth of emergent plants that can compete with stonewort growth.

11.77 Critical loads for rich fens are shown in Table 11.5.

<table>
<thead>
<tr>
<th>Vegetation sub-class</th>
<th>N deposition (kg/ha/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum</td>
</tr>
<tr>
<td>Rich Fen</td>
<td>15</td>
</tr>
</tbody>
</table>

11.78 Where a range of critical loads is available it is recommended that a conservative assumption is applied, and the minimum is used.

11.79 The methodology set out in Annex F (Assessment of Designated Sites) in DMRB was used for the calculation of dry N deposition rates from predicted NO\textsubscript{x} concentrations.

11.80 Wet deposition of pollution is expected to be negligible close to the emission source and therefore has not been included in the estimations.
11.81 It should be noted that, as a conservative assumption, the loss of pollutants through deposition has not been included in the estimation of ground level concentrations.

11.82 This assessment considers concentrations at points in the designated areas of conservation closest to the road and forms conclusions based on concentrations predicted at these locations.

11.83 The potential operational impacts on vegetation and ecosystems was assessed by modelling NO\textsubscript{x} concentrations and N deposition at the following locations (receptors shown in Volume 2 (Figure 11.3):

- Orton Pit SAC boundary (SAC1)
- 5m from Orton Pit SAC boundary (SAC2)
- Jones Covert (SAC3)
- Haddon Lake (SAC4)

11.84 The potential effect from the predicted NO\textsubscript{x} concentrations has been assessed against the NAQO for NO\textsubscript{x} for the protection of vegetation and ecosystems (Table 11.1), and the N deposition critical load (Table 11.5).

Assumptions, Limitations and Technical Difficulties

11.85 The modelling of future concentrations requires a number of assumptions to be made. The most significant in this assessment are as follows:

- That the traffic data, particularly for future years, is sufficiently accurate for this assessment

- Local background concentrations have been assumed to change as indicated in the background concentrations referred to in LAQM.TG(09). This assumes that the national trends will be followed in Peterborough, and that there are no ‘atypical’ local conditions. Background concentrations in 2020 have been assumed in 2026

- Vehicle emissions have been assumed to fall in line with the information currently available, based on the impact of up to Euro IV standards for light duty vehicles (LDVs) and Euro V standards for HDVs. New emission limits to be introduced for light duty vehicles in 2009 (Euro V) and 2014 (Euro VI) have not been included,

- This assessment assumes that the DMRB screening tool adequately estimates concentrations at the receptors selected. Predicted pollutant concentrations have been compared with measured data to verify the results
The relationship between NO\textsubscript{x} and NO\textsubscript{2} concentrations used applies in the future assessment years

That a single centrally located CHP will be commissioned to provide heat and power for the whole of the application sites

**Impact Assessment Criteria**

11.86 There are no standard significance criteria for air quality. In this assessment the definitions set out below were used. Due to the different types of effects different criteria have been used for the effects on dust annoyance, and the effect on air quality from construction (24-hour PM\textsubscript{10} objective) and the development traffic.

11.87 These significance criteria are based on expert judgement gained through working in the air quality field for over 25 years and the research/Government policy documents outlined in the following paragraphs.

11.88 The significance criteria for the assessment of the impact of the proposed development on vegetation and ecological systems due to NO\textsubscript{x} and N deposition are provided in Chapter 6.

11.89 The significance criteria are based on:

- Dust sensitivity categories in Mineral Planning Statement 2, 2005
- The Environmental Effects of Dust from Surface Mineral Workings, DoE 1995
- Particulate Matter in the United Kingdom, Air Quality Expert Group, 2005
- The National Air Quality Strategy, 2007
- The Air Quality (England) Regulations, 2000
- The Air Quality Standards Regulations, 2007
- Development Control: Planning for Air Quality, NSCA, 2006

11.90 The significance criteria take account of the effect magnitude (i.e. the possible number of complaints or the predicted increase in concentrations) and the sensitivity of the receptors. The sensitivity of dust receptors is dependent on the dust sensitivity categories in MPS2. The sensitivity of air quality receptors is dependent on existing air quality and the potential for the proposed development to cause an exceedence of the NAQO/EU limit values. The descriptors for effect magnitude and receptor sensitivity are shown in Table 11.6 and Table 11.7 respectively.
Table 11.6: Descriptors for magnitude

<table>
<thead>
<tr>
<th>Magnitude of change</th>
<th>NAQOs/EU limit values</th>
<th>Dust annoyance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual mean NO₂/PM₁₀</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(a)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Days PM₁₀ &gt;50µg/m³</td>
<td></td>
</tr>
<tr>
<td>Very large</td>
<td>Increase &gt;25%</td>
<td>Large number of complaints likely</td>
</tr>
<tr>
<td>Large</td>
<td>Increase 15-25%</td>
<td>Large number of complaints possible</td>
</tr>
<tr>
<td>Medium</td>
<td>Increase 10-15%</td>
<td>Modest number of complaints possible</td>
</tr>
<tr>
<td>Small</td>
<td>Increase 2-10%</td>
<td>Small number of complaints possible</td>
</tr>
<tr>
<td>Very small</td>
<td>Increase &lt;2%</td>
<td>Complaints unlikely</td>
</tr>
</tbody>
</table>

Notes: (a) % change in annual mean concentration in relation to the baseline. (b) For the effect from construction it is not possible to quantify PM₁₀ emissions, therefore the likelihood of an increase in PM₁₀ leading to an exceedence of the 24-hour objective is used.

Table 11.7: Descriptors for sensitivity

<table>
<thead>
<tr>
<th>Sensitivity of receptor</th>
<th>NAQOs/EU limit values (a)</th>
<th>Dust annoyance (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Below NAQO/EU limit value without scheme, above with scheme</td>
<td>More than one highly sensitive receptor within effect zone</td>
</tr>
<tr>
<td>Medium</td>
<td>Above NAQO/EU limit value without scheme</td>
<td>One or more medium sensitivity receptors, and one highly sensitive receptor within effect zone</td>
</tr>
<tr>
<td>Low</td>
<td>Below NAQO/EU limit value with scheme, but not well below</td>
<td>One or more medium sensitivity receptors within effect zone, but no highly sensitive</td>
</tr>
<tr>
<td>Very low</td>
<td>Well below NAQO/EU limit value with scheme</td>
<td>No medium or highly sensitive receptors within effect zone</td>
</tr>
</tbody>
</table>

Notes: (a) Where there is relevant exposure. (b) The effect zone is assumed to be 200m around the planning application boundary, reducing to 100m with mitigation.

11.91 Table 11.8 shows the significance criteria developed for assessing the effect on dust annoyance from the construction phase of the proposed development. As the effect on dust annoyance cannot be robustly quantified a risk based approach has been used to define the significance. It has been assumed that, due to the local and short-term effect on dust annoyance there can be no severe effect.

Table 11.8: Significance criteria: dust annoyance

<table>
<thead>
<tr>
<th>Dust annoyance</th>
<th>Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very low</td>
</tr>
<tr>
<td>Magnitude</td>
<td>Very small</td>
</tr>
<tr>
<td>Small</td>
<td>Not significant</td>
</tr>
<tr>
<td>Medium</td>
<td>Not significant</td>
</tr>
</tbody>
</table>
11.92 Table 11.9 shows the significance criteria developed for assessing the effect on the NAQOs/EU limit values as a result of the construction phase i.e. the effect on 24-hour PM$_{10}$ concentrations; and the operational phase i.e. the traffic generated by the proposed development.

<table>
<thead>
<tr>
<th>NAQOs/EU limit values</th>
<th>Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very low</td>
</tr>
<tr>
<td>Very small</td>
<td>Not significant</td>
</tr>
<tr>
<td>Small</td>
<td>Minor</td>
</tr>
<tr>
<td>Medium</td>
<td>Minor</td>
</tr>
<tr>
<td>Large</td>
<td>Minor</td>
</tr>
<tr>
<td>Very large</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

11.93 Long term monitoring, where road traffic is the primary source of pollution, shows that the short term NO$_2$ objective is unlikely to be exceeded unless the annual mean concentration exceeds 60µg/m$^3$. This concentration has been used to assess the potential for exceedence of the short term objective.

11.94 Due to the uncertainties in the modelling it has been assumed that there is a risk that the annual mean objective may be exceeded if the predicted concentration is within 10% of the objective value i.e. greater than 36µg/m$^3$.

**Baseline Ground Conditions**

**Dust**

11.95 Dust deposition is not typically monitored on a routine basis and there is no data available for the sites.

**Nitrogen Dioxide (NO$_2$)**

11.96 PCC’s LAQM review and assessments conclude that the annual NAQO for NO$_2$ should be achieved at all locations where there is relevant exposure within the City, however further monitoring continues at various locations to demonstrate compliance with the objective.

11.97 The annual mean concentrations of NO$_2$ measured using diffusion tubes at the three urban background and two roadside monitoring sites, for between 2001 and 2008 are shown in Table 11.10.
Table 11.10: NO2 diffusion tube data

<table>
<thead>
<tr>
<th>Year</th>
<th>Hampton Vale (B)</th>
<th>Copeland (UB)</th>
<th>Lythmere (UB)</th>
<th>Stanground (UB)</th>
<th>Fletton Parkway (1) (R)</th>
<th>Fletton Parkway (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>-</td>
<td>26</td>
<td>24</td>
<td>33</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2002</td>
<td>-</td>
<td>25</td>
<td>20</td>
<td>29</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2003</td>
<td>-</td>
<td>24</td>
<td>22</td>
<td>28</td>
<td>35</td>
<td>36</td>
</tr>
<tr>
<td>2004</td>
<td>-</td>
<td>18</td>
<td>17</td>
<td>24</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>2005</td>
<td>-</td>
<td>17</td>
<td>15</td>
<td>23</td>
<td>34</td>
<td>42</td>
</tr>
<tr>
<td>2006</td>
<td>-</td>
<td>19</td>
<td>18</td>
<td>22</td>
<td>41</td>
<td>45</td>
</tr>
<tr>
<td>2007</td>
<td>-</td>
<td>21</td>
<td>18</td>
<td>29</td>
<td>50</td>
<td>53</td>
</tr>
<tr>
<td>2008</td>
<td>21</td>
<td>20</td>
<td>19</td>
<td>26</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Notes: B = background, UB = urban background, R = roadside

11.98 Annual mean background NO2 concentrations in Peterborough ranged from 15-29µg/m³ between 2001 and 2008, well below the annual objective. Analysis of the long term trend in annual mean background concentrations suggests an overall decrease of approximately 0.7-0.9µg/m³ per year.

11.99 The annual mean NO2 concentration at the Hampton Vale site in 2008 was 21µg/m³, well below the annual objective.

11.100 NO2 concentrations at the Fletton Parkway roadside were below the annual objective in 2003 and 2004, but it has been exceeded since then from 2005 to 2007. However there is no relevant exposure at this location.

11.101 The modelled background NO2 concentration from data referred to in LAQM.TG(09) ranges between 13-20µg/m³ across the modelled area.

11.102 The data for ten months of monitoring and an estimate of the annual mean concentrations from PBA's NO2 diffusion tube monitoring programme are shown in Table 11.11.

Table 11.11: Results from diffusion tube monitoring

<table>
<thead>
<tr>
<th>Diffusion tube (number on Figure 11.2)</th>
<th>Data capture (%)</th>
<th>Ten month mean NO2 concentration (µg/m³)</th>
<th>Equivalent annual mean NO2 concentration (µg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broadway, Yaxley (4)</td>
<td>80%</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>London Road 1 (1m) (5)</td>
<td>100%</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td>London Road 2</td>
<td>100%</td>
<td>23</td>
<td>24</td>
</tr>
<tr>
<td>Diffusion tube (number on Figure 11.2)</td>
<td>Data capture (%)</td>
<td>Ten month mean NO$_2$ concentration ($\mu$g/m$^3$)</td>
<td>Equivalent annual mean NO$_2$ concentration ($\mu$g/m$^3$)</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>------------------</td>
<td>---------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unadjusted</td>
<td>Bias adjusted (1.03)</td>
</tr>
<tr>
<td>(30m) (6)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>London Road 3 (80m) (7)</td>
<td>100%</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>London Road 4 (100m) (8)</td>
<td>100%</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Yaxley Lodge Farm, A15 (9)</td>
<td>100%</td>
<td>32</td>
<td>33</td>
</tr>
<tr>
<td>Public Footpath of A15 (10)</td>
<td>100%</td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>Folly Close, on footpath (11)</td>
<td>60%</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>Folly Close next to house, on footpath (12)</td>
<td>90%</td>
<td>21</td>
<td>22</td>
</tr>
<tr>
<td>Folly Close, adjacent to A15 (13)</td>
<td>70%</td>
<td>28</td>
<td>29</td>
</tr>
<tr>
<td>A15, near Norton Brickworks (14)</td>
<td>90%</td>
<td>41</td>
<td>42</td>
</tr>
<tr>
<td>A1(M) 1 Transect 1 (1m) (15)</td>
<td>90%</td>
<td>51</td>
<td>53</td>
</tr>
<tr>
<td>A1(M) 2 Transect 1 (7m) (16)</td>
<td>90%</td>
<td>39</td>
<td>40</td>
</tr>
<tr>
<td>A1(M) 3 Transect 1 (20m) (17)</td>
<td>100%</td>
<td>45</td>
<td>46</td>
</tr>
<tr>
<td>A1 (M) 4 Transect 1 (70m) (18)</td>
<td>100%</td>
<td>36</td>
<td>37</td>
</tr>
<tr>
<td>A1(M) 1 Transect 2 (1m) (19)</td>
<td>90%</td>
<td>49</td>
<td>50</td>
</tr>
<tr>
<td>A1(M) 2 Transect 2 (5m) (20)</td>
<td>90%</td>
<td>35</td>
<td>36</td>
</tr>
<tr>
<td>A1(M) 3 Transect 2 (100m) (21)</td>
<td>90%</td>
<td>34</td>
<td>35</td>
</tr>
<tr>
<td>A1(M) 4 Transect 2 (22)</td>
<td>60%</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>Fletton Parkway, off Junction 1 (23)</td>
<td>90%</td>
<td>55</td>
<td>56</td>
</tr>
<tr>
<td>Orton Pit SAC (24)</td>
<td>60%</td>
<td>23</td>
<td>24</td>
</tr>
<tr>
<td>Fletton Parkway, off Junction 2 (25)</td>
<td>90%</td>
<td>39</td>
<td>40</td>
</tr>
<tr>
<td>Spendelow’s Farm (26)</td>
<td>80%</td>
<td>27</td>
<td>28</td>
</tr>
</tbody>
</table>

11.103 Monitored NO$_2$ concentrations are high at some locations close to local roads, and the annual objective may be exceeded close to the Broadway, Yaxley (location 4), and London Road near the A1(M) (location 14). However, at other locations along these roads NO$_2$ concentrations are below the annual objective (locations 5, 9, 12 and 13).
NO$_2$ concentrations decrease rapidly with distance from source, and concentrations at building facades will be lower.

11.104 Monitored NO$_2$ concentrations are below the annual objective at a distance of approximately 5m from the edge of the A1(M) at Transect 2 (location 20). However, at Transect 1 the annual objective is exceeded at 20m from the edge of the A1(M). By 70m from the edge of the A1(M) the annual objective is achieved (location 18). This difference is likely to be due to uncertainties associated with diffusion tube monitoring. The Development Framework Plan (PST021/DFP/01 rev I) shows there are no relevant receptors within 70m of the edge of the A1(M).

11.105 Table 11.12 shows predicted annual average NO$_2$ concentrations for the baseline year of 2008.

Table 11.12: Modelled annual mean NO$_2$ concentrations for 2008.

<table>
<thead>
<tr>
<th>Receptor Name (number on Figure 11.3)</th>
<th>Predicted annual NO$_2$ concentrations (µg/m$^3$).</th>
</tr>
</thead>
<tbody>
<tr>
<td>96 Brudenell (R1)</td>
<td>25</td>
</tr>
<tr>
<td>154 Wingfield (R2)</td>
<td>29</td>
</tr>
<tr>
<td>6 Thuro Grove (R3)</td>
<td>27</td>
</tr>
<tr>
<td>89 Medeswell (R4)</td>
<td>26</td>
</tr>
<tr>
<td>66 Leighton (R5)</td>
<td>23</td>
</tr>
<tr>
<td>42 Buckthorn Rd (R6)</td>
<td>28</td>
</tr>
<tr>
<td>Hampton Vale site boundary 1 (R7)</td>
<td>24</td>
</tr>
<tr>
<td>6 The Ridge (R8)</td>
<td>26</td>
</tr>
<tr>
<td>Hampton Vale site boundary 2 (R9)</td>
<td>28</td>
</tr>
<tr>
<td>52 London Rd (R10)</td>
<td>24</td>
</tr>
<tr>
<td>2 London Rd (R11)</td>
<td>30</td>
</tr>
<tr>
<td>Barrack Masters Lodge (R12)</td>
<td>25</td>
</tr>
<tr>
<td>Mole End (R13)</td>
<td>24</td>
</tr>
<tr>
<td>The Bungalow (R14)</td>
<td>31</td>
</tr>
<tr>
<td>6 Folksworth Rd (R15)</td>
<td>33</td>
</tr>
<tr>
<td>15 Folksworth Rd (R16)</td>
<td>15</td>
</tr>
<tr>
<td>101 North Rd (R17)</td>
<td>20</td>
</tr>
<tr>
<td>162 Broadway (R18)</td>
<td>23</td>
</tr>
<tr>
<td>7 Dovecote Lane (R19)</td>
<td>29</td>
</tr>
<tr>
<td>7 London Rd (R20)</td>
<td>16</td>
</tr>
<tr>
<td>26 North St (R21)</td>
<td>15</td>
</tr>
<tr>
<td>10 Folksworth Rd (R22)</td>
<td>32</td>
</tr>
<tr>
<td>The Cottage (R23)</td>
<td>38</td>
</tr>
<tr>
<td>2 to 18 Clayburn Rd (R24)</td>
<td>18</td>
</tr>
<tr>
<td>4 road off Fen St (R25)</td>
<td>39</td>
</tr>
<tr>
<td>Hampton Vale site boundary 3 (R26)</td>
<td>14</td>
</tr>
</tbody>
</table>

11.106 The results in Table 11.12 show that annual mean NO$_2$ concentrations are predicted to be below the annual objective at all modelled receptors in 2008.
**Particulate Matter (PM$_{10}$)**

11.107 PCC’s LAQM review and assessments conclude that the NAQOs for PM$_{10}$ should be achieved at locations within the district.

11.108 The modelled background PM$_{10}$ concentration from data referred to in LAQM.TG(09) ranges from 17-20µg/m$^3$ across the modelled area.

11.109 Annual mean PM$_{10}$ concentrations are not monitored by PCC.

11.110 Table 11.13 shows the predicted annual mean PM$_{10}$ concentrations and the number of days when the 24-hour concentration is likely to exceeded 50µg/m$^3$ in 2008.

**Table 11.13: Modelled PM$_{10}$ concentrations for 2008**

<table>
<thead>
<tr>
<th>Receptor Name (number on Figure 11.3)</th>
<th>Predicted annual mean PM$_{10}$ concentrations (µg/m$^3$)</th>
<th>Predicted number of days when PM$_{10}$&gt;50µg/m$^3$</th>
</tr>
</thead>
<tbody>
<tr>
<td>96 Brudenell (R1)</td>
<td>24</td>
<td>10</td>
</tr>
<tr>
<td>154 Wingfield (R2)</td>
<td>28</td>
<td>20</td>
</tr>
<tr>
<td>6 Thuro Grove (R3)</td>
<td>26</td>
<td>15</td>
</tr>
<tr>
<td>89 Medeswell (R4)</td>
<td>27</td>
<td>17</td>
</tr>
<tr>
<td>66 Leighton (R5)</td>
<td>26</td>
<td>14</td>
</tr>
<tr>
<td>42 Buckthorn Rd (R6)</td>
<td>30</td>
<td>29</td>
</tr>
<tr>
<td>Hampton Vale site boundary 1 (R7)</td>
<td>24</td>
<td>11</td>
</tr>
<tr>
<td>6 The Ridge (R8)</td>
<td>25</td>
<td>13</td>
</tr>
<tr>
<td>Hampton Vale site boundary 2 (R9)</td>
<td>28</td>
<td>20</td>
</tr>
<tr>
<td>52 London Rd (R10)</td>
<td>24</td>
<td>11</td>
</tr>
<tr>
<td>2 London Rd (R11)</td>
<td>29</td>
<td>23</td>
</tr>
<tr>
<td>Barrack Masters Lodge (R12)</td>
<td>25</td>
<td>13</td>
</tr>
<tr>
<td>Mole End (R13)</td>
<td>25</td>
<td>13</td>
</tr>
<tr>
<td>The Bungalow (R14)</td>
<td>28</td>
<td>21</td>
</tr>
<tr>
<td>6 Folksworth Rd (R15)</td>
<td>30</td>
<td>26</td>
</tr>
<tr>
<td>15 Folksworth Rd (R16)</td>
<td>19</td>
<td>2</td>
</tr>
<tr>
<td>101 North Rd (R17)</td>
<td>22</td>
<td>6</td>
</tr>
<tr>
<td>162 Broadway (R18)</td>
<td>24</td>
<td>10</td>
</tr>
<tr>
<td>7 Dovecote Lane (R19)</td>
<td>27</td>
<td>18</td>
</tr>
<tr>
<td>7 London Rd (R20)</td>
<td>19</td>
<td>3</td>
</tr>
<tr>
<td>26 North St (R21)</td>
<td>19</td>
<td>2</td>
</tr>
<tr>
<td>10 Folksworth Rd (R22)</td>
<td>29</td>
<td>24</td>
</tr>
<tr>
<td>The Cottage (R23)</td>
<td>33</td>
<td>41</td>
</tr>
<tr>
<td>2 to 18 Clayburn Rd (R24)</td>
<td>21</td>
<td>4</td>
</tr>
<tr>
<td>4 road off Fen St (R25)</td>
<td>34</td>
<td>46</td>
</tr>
<tr>
<td>Hampton Vale site boundary 3 (R26)</td>
<td>18</td>
<td>1</td>
</tr>
</tbody>
</table>

11.111 The annual mean objective for PM$_{10}$ is predicted to be achieved at all modelled receptors in 2008. However, there may be an exceedence of the 24-hour objective at locations close to the A1(M) (R23 and R25).
11.112 The background concentration of NOx in 2008 provided by APIS is predicted to be 21-23µg/m³ across the designated SAC. Therefore the NOx annual objective for the protection of vegetation and ecosystems is not exceeded in 2008.

**Nitrogen (N) deposition**

11.113 The background nutrient N deposition rates across the Orton Pit SAC from APIS are shown in Table 11.14.

**Table 11.14: Background nutrient N deposition rate**

<table>
<thead>
<tr>
<th>Vegetation class</th>
<th>Nutrient nitrogen deposition rate (kg/ha/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaline Fens and Reedbeds</td>
<td>17.9 16.8 10.9</td>
</tr>
</tbody>
</table>

Notes: The total average deposition rate for 2008, 2011 and 2026 was calculated from the APIS value for 2004 by reducing the 2004 total average deposition rate by 2% per year using the DMRB methodology.

11.114 The background N deposition rate in 2008 and 2011 exceed the minimum critical load for rich fens (15kgN/ha/yr) but is predicted to be below it by 2026.

**Summary of Baseline Air Quality**

11.115 Air quality at the sites is good. Measured and modelled NO₂ concentrations in Peterborough indicate that the annual mean and short-term NAQOs for NO₂ are likely to be achieved. Predicted annual mean background concentrations of PM₁₀ in the area are low, and modelling indicates that the NAQOs are achieved.

11.116 Background concentrations of NOₓ in 2008 are below the annual objective for the protection of vegetation and ecosystems. However, predicted nutrient N deposition rates exceed the minimum critical load of 15kgN/ha/yr for alkaline fens and reedbeds. By 2026 this critical load is anticipated to be achieved.

**Potential Impacts**

**Construction Impact**

11.117 The main potential effects during construction are dust deposition and elevated PM₁₀ concentrations. The following activities have the potential to cause emissions of dust:

- Site preparation including:
  - demolition
  - delivery of construction material
  - erection of fences, barriers and scaffolding
Great Haddon, Peterborough
Environmental Statement
Great Haddon Consortium

Air Quality

- removal of existing surfaces and structures

- Earthworks including:
  - stripping and relaying topsoil
  - excavation, digging foundations and landscaping
  - Materials handling such as:
    - storage of material in stockpiles
    - spillage

- The construction of temporary roads;

- Movement of construction traffic including haulage, vehicles and plant movements;

- Construction and fabrication of infrastructure and buildings;

- Disposal of waste materials off-site.

11.118 Typically the main cause of unmitigated dust generation on construction sites is from demolition and vehicles using unpaved haul roads, and off-site from the suspension of dust from mud deposited on local roads by construction traffic.

11.119 The main determinants of unmitigated dust nuisance are the weather and the distance to the nearest receptor.

11.120 Figure 11.2 (see ES Volume 2) shows the eight year average wind rose for Wittering (14km north west of the proposed development) from 1993 to 2000.

11.121 The prevailing wind is from the south-south-west through to the west, blowing from this dominant wind direction for 41% of the time.

11.122 Wind speeds of moderate strength or greater are required to suspend dust in the air. Over 28% of the time the wind speed was less than moderate (3m/s), below which dust is unlikely to become suspended in the air.

11.123 A daily rainfall of 0.2mm is considered sufficient to suppress dust. Analysis of rainfall data for the area around the sites shows that over the 30 year period from 1971 to 2000, an annual average in the range 44–47% of days were ‘wet days’ when there will be natural dust suppression.

11.124 For the majority of the time there will be little potential for dust generation even with no mitigation in place because:

- Approximately 44–47% of days the rainfall is greater than 0.2mm when there will be natural dust suppression
In winter months surfaces tend to stay damp for significant periods of time

Over 28% of the time winds typically are less than moderate strength and would not suspend dust in the air

However, there will be periods when sufficient dust may cross the sites’ boundaries and cause annoyance. This is more likely in the summer months, when higher temperatures evaporate surface moisture more readily.

There are no highly sensitive receptors within 200m of the sites’ boundary.

There are approximately 150 dwellings within 200m of the sites' boundary, six of which are within 10m (at The Bungalow, Mole End, The Cottage, Tollgate Farm, Swallowfield and Norman Lodge). The majority of these dwellings are located in Yaxley downwind of the application sites, with regard to the prevailing wind.

Any farms within 200m of the application sites are likely to be less sensitive to dust, given the nature of their work.

Most construction will occur well back from the sites’ boundary. However given the scale of the construction at the application sites, there is a risk that dust annoyance may occur during unfavourable conditions i.e. dry/windy weather.

Typically 15-45% of construction dust is emitted as PM$_{10}$. This may give rise to elevated PM$_{10}$ concentrations within 10m of relatively small sites, extending to 50-100m from major construction sites.

It is likely that elevated concentrations of PM$_{10}$ will occur close to the application sites’ boundary; however as most construction will occur well back from the application sites’ boundary, and given that background concentrations are low, there is unlikely to be any exceedance of the 24-hour objective.

Where ongoing construction takes place close to newly occupied dwellings on the residential plots extra consideration should be given to the recommended mitigation measures discussed later to prevent exposure to elevated PM$_{10}$ concentrations at new receptors. At current background concentrations it is unlikely that the short term objective will be exceeded during construction where there is relevant exposure.

Dust may impact on the water bodies of the designated SAC/SSSI through physical effects, such as shading caused by increased turbidity and film forming at the surface, or by chemical effects, such as the alkalinity of cement dust causing changes in the acidity of the water. This may interfere with primary production, which could have knock-on effects within the ecosystem. The limited research on deposition rates and
threshold values with regard to dust impact on ecosystems means that the construction impact cannot be accurately assessed, but it is likely that, with mitigation, any effects will be very small, localised and short-lived. This is discussed further in Chapter 6.

**Operational Impact on Human Health**

**Nitrogen Dioxide (NO₂)**

11.134 Table 11.15 shows the predicted annual mean NO₂ concentrations in 2011 and 2026.

<table>
<thead>
<tr>
<th>Receptor (number on Figure 11.13)</th>
<th>Predicted annual mean NO₂ concentrations (µg/m³)</th>
<th>2011 without</th>
<th>2011 with</th>
<th>2026 without</th>
<th>2026 with</th>
</tr>
</thead>
<tbody>
<tr>
<td>96 Brudenell (R1)</td>
<td></td>
<td>21</td>
<td>22</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>154 Wingfield (R2)</td>
<td></td>
<td>24</td>
<td>24</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>6 Thuro Grove (R3)</td>
<td></td>
<td>23</td>
<td>23</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>89 Medeswell (R4)</td>
<td></td>
<td>22</td>
<td>22</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>66 Leighton (R5)</td>
<td></td>
<td>20</td>
<td>20</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>42 Buckthorn Rd (R6)</td>
<td></td>
<td>23</td>
<td>23</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Hampton Vale site boundary 1 (R7)</td>
<td></td>
<td>18</td>
<td>17</td>
<td>15</td>
<td>14</td>
</tr>
<tr>
<td>6 The Ridge (R8)</td>
<td></td>
<td>19</td>
<td>19</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>Hampton Vale site boundary 2 (R9)</td>
<td></td>
<td>20</td>
<td>20</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>52 London Rd (R10)</td>
<td></td>
<td>21</td>
<td>19</td>
<td>17</td>
<td>16</td>
</tr>
<tr>
<td>2 London Rd (R11)</td>
<td></td>
<td>22</td>
<td>21</td>
<td>18</td>
<td>17</td>
</tr>
<tr>
<td>Barrack Masters Lodge (R12)</td>
<td></td>
<td>24</td>
<td>20</td>
<td>19</td>
<td>16</td>
</tr>
<tr>
<td>Mole End (R13)</td>
<td></td>
<td>24</td>
<td>19</td>
<td>19</td>
<td>16</td>
</tr>
<tr>
<td>The Bungalow (R14)</td>
<td></td>
<td>25</td>
<td>25</td>
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<tr>
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<tr>
<td>The Cottage (R23)</td>
<td></td>
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<td>2 to 18 Clayburn Rd (R24)</td>
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<tr>
<td>4 road off Fen St (R25)</td>
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<tr>
<td>Proposed dwelling (PR5)</td>
<td></td>
<td>-</td>
<td>16</td>
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<td>12</td>
</tr>
</tbody>
</table>
11.135 Air quality is predicted to improve from 2008 to 2011, and again to 2026 as a result of the implementation of pollution control measures, such as the introduction of cleaner vehicles.

11.136 The annual NO$_2$ objective is predicted to be achieved at all modelled receptors, both without and with the proposed development.

11.137 The maximum increase in annual mean NO$_2$ concentrations between the without and with development scenarios is 2µg/m$^3$ at 101 North Road (R17) in 2011. However, this assumes that the full development is complete in 2011, and the actual impact in this year will be much less. In 2026, when the full development will be complete, no impact is predicted at this receptor.

11.138 Improvements to Fletton Parkway are predicted to draw traffic flows away from the A15 London Road, resulting in a small increase (1µg/m$^3$) in annual mean concentrations at some receptors close to the A1(M) and Fletton Parkway. However, this movement of traffic is predicted to lead to an improvement in air quality at receptors along the A15 London Road, with a decrease in annual mean NO$_2$ concentrations of between 1 and 3µg/m$^3$ at some receptors.

11.139 The point of maximum impact from the proposed CHP facility, using the worst case 2006 met data, is within the District Centre, approximately 150m north-east of the flue (OS grid reference 516646,292402). When the maximum predicted contribution from the energy centre (7µg/m$^3$) is added to the background NO$_2$ concentration at the District Centre in 2011 (11.9µg/m$^3$) the predicted concentration is 19µg/m$^3$, well below the annual objective. Any contribution to the annual mean from development traffic is likely to be minimal at this location and will not cause an exceedence of the annual NO$_2$ objective.

11.140 The contribution to the annual mean NO$_2$ concentration from the energy centre decreases rapidly from source, and is less than 1µg/m$^3$ by approximately 340m north-east of the Energy Centre.

11.141 As annual mean concentrations of NO$_2$ are predicted to remain well below 60µg/m$^3$, the short-term objective/EU limit value is likely to be achieved.

*Particulate Matter (PM$_{10}$)*

11.142 Table 11.16 shows the predicted annual mean PM$_{10}$ concentrations in 2011 and 2026.
<table>
<thead>
<tr>
<th>Receptor (number on Figure 11.13)</th>
<th>Predicted annual mean PM$_{10}$ concentrations (µg/m$^3$)</th>
<th>2011</th>
<th>2026</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>without</td>
<td>with</td>
<td>without</td>
</tr>
<tr>
<td>96 Brudenell (R1)</td>
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<td>23</td>
<td>21</td>
</tr>
<tr>
<td>154 Wingfield (R2)</td>
<td>25</td>
<td>26</td>
<td>23</td>
</tr>
<tr>
<td>6 Thuro Grove (R3)</td>
<td>24</td>
<td>24</td>
<td>22</td>
</tr>
<tr>
<td>89 Medeswell (R4)</td>
<td>25</td>
<td>25</td>
<td>23</td>
</tr>
<tr>
<td>66 Leighton (R5)</td>
<td>24</td>
<td>24</td>
<td>23</td>
</tr>
<tr>
<td>42 Buckthorn Rd (R6)</td>
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<td>28</td>
<td>26</td>
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<tr>
<td>Hampton Vale site boundary 1 (R7)</td>
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<td>20</td>
<td>20</td>
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<tr>
<td>6 The Ridge (R8)</td>
<td>21</td>
<td>21</td>
<td>20</td>
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<tr>
<td>Hampton Vale site boundary 2 (R9)</td>
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<td>22</td>
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<tr>
<td>52 London Rd (R10)</td>
<td>22</td>
<td>21</td>
<td>20</td>
</tr>
<tr>
<td>2 London Rd (R11)</td>
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<tr>
<td>Barrack Masters Lodge (R12)</td>
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<td>21</td>
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<td>Mole End (R13)</td>
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</tr>
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<td>The Bungalow (R14)</td>
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<td>6 Folksworth Rd (R15)</td>
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<td>15 Folksworth Rd (R16)</td>
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<tr>
<td>101 North Rd (R17)</td>
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</tr>
<tr>
<td>162 Broadway (R18)</td>
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<td>20</td>
</tr>
<tr>
<td>7 Dovecote Lane (R19)</td>
<td>21</td>
<td>20</td>
<td>20</td>
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<tr>
<td>7 London Rd (R20)</td>
<td>18</td>
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<td>17</td>
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<tr>
<td>26 North St (R21)</td>
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<td>19</td>
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<tr>
<td>10 Folksworth Rd (R22)</td>
<td>25</td>
<td>25</td>
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<tr>
<td>The Cottage (R23)</td>
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</tr>
<tr>
<td>2 to 18 Clayburn Rd (R24)</td>
<td>19</td>
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<td>18</td>
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<tr>
<td>4 road off Fen St (R25)</td>
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<tr>
<td>Hampton Vale site boundary 3 (R26)</td>
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<td>Proposed dwelling (PR1)</td>
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<td>Proposed dwelling (PR2)</td>
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<tr>
<td>Proposed dwelling (PR4)</td>
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<tr>
<td>Proposed dwelling (PR5)</td>
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<td>18</td>
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</tbody>
</table>

11.143 Table 11.17 shows the number of days when PM$_{10}$ concentrations are predicted to be greater than 50µg/m$^3$ in 2011 and 2026.
### Table 11.17: The number of days when PM$_{10}$ concentrations are predicted to be greater than 50µg/m$^3$ in 2011 and 2026

<table>
<thead>
<tr>
<th>Receptor (number on Figure 11.13)</th>
<th>Predicted number of days PM$_{10}$ &gt;50µg/m$^3$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2011 without</td>
</tr>
<tr>
<td>96 Brudenell (R1)</td>
<td>7</td>
</tr>
<tr>
<td>154 Wingfield (R2)</td>
<td>12</td>
</tr>
<tr>
<td>6 Thuro Grove (R3)</td>
<td>9</td>
</tr>
<tr>
<td>89 Medeswell (R4)</td>
<td>11</td>
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<tr>
<td>66 Leighton (R5)</td>
<td>11</td>
</tr>
<tr>
<td>42 Buckthorn Rd (R6)</td>
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<td>Hampton Vale site boundary 1 (R7)</td>
<td>4</td>
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<tr>
<td>6 The Ridge (R8)</td>
<td>5</td>
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<tr>
<td>Hampton Vale site boundary 2 (R9)</td>
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<tr>
<td>52 London Rd (R10)</td>
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<td>2 London Rd (R11)</td>
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<tr>
<td>Barrack Masters Lodge (R12)</td>
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<td>Mole End (R13)</td>
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<td>The Bungalow (R14)</td>
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<tr>
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<tr>
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<tr>
<td>101 North Rd (R17)</td>
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</tr>
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<tr>
<td>10 Folksworth Rd (R22)</td>
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<tr>
<td>The Cottage (R23)</td>
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<td>2 to 18 Clayburn Rd (R24)</td>
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<td>-</td>
</tr>
<tr>
<td>Proposed dwelling (PR5)</td>
<td>-</td>
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</table>

11.144 The PM$_{10}$ objectives/EU limit values are predicted to be achieved at all modelled receptors both without and with the proposed development.

11.145 The maximum increase in annual mean PM$_{10}$ concentrations as a result of the proposed development at any modelled receptor in 2011 or 2026 is 1µg/m$^3$. There is an improvement in air quality at some receptors along the A15 London Road due to the reduction in traffic.
Operational Impact on Designated Areas of Conservation

11.146 Table 11.18 shows the road contribution of NO$_x$ as a result of the proposed development at ecologically sensitive receptors in the designated SAC for without and with development, for 2011 and 2026.

### Table 11.18: Modelled annual mean NO$_x$ concentrations for 2011 and 2026

<table>
<thead>
<tr>
<th>Receptor (number on Figure 11.13)</th>
<th>Road/CHP increment NO$_x$ (µg/m$^3$)</th>
<th>Total NO$_x$ (µg/m$^3$)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>2011 without</td>
<td>2011 with</td>
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<tr>
<td>Orton Pit (SAC1)</td>
<td>27</td>
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</tr>
<tr>
<td>Orton Pit (5m) (SAC2)</td>
<td>23</td>
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</tr>
<tr>
<td>Jones Covert (SAC3)</td>
<td>23</td>
<td>14</td>
</tr>
<tr>
<td>Haddon Lake (SAC4)</td>
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<td>8</td>
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</tbody>
</table>

11.147 In 2011 annual mean NO$_x$ concentrations are predicted to exceed the 30µg/m$^3$ limit value at the Orton Pit SAC boundary without the proposed development. However, due to changes in traffic movements on the surrounding highway network, the percentage of HDVs on the Western Peripheral Road will reduce significantly (see Appendix 11.4) resulting in much lower NO$_x$ concentrations. By 2026, when the proposed development is complete, the limit value will be achieved.

11.148 Table 11.19 show the nutrient N deposition rates without and with development in 2011 and 2026.

### Table 11.19: Road contribution to nutrient nitrogen dry deposition rates, for 2011 and 2026

<table>
<thead>
<tr>
<th>Receptor (number on Figure 11.13)</th>
<th>Road contribution kgN/ha/yr</th>
<th>Total deposition rate kgN/ha/yr</th>
<th>Road contribution as % of total</th>
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<tbody>
<tr>
<td></td>
<td>2011 wo</td>
<td>2012 w</td>
<td>2011 wo</td>
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<tr>
<td>Orton Pit (SAC1)</td>
<td>1.2</td>
<td>0.8</td>
<td>0.9</td>
</tr>
<tr>
<td>Orton Pit (5m) (SAC2)</td>
<td>1.1</td>
<td>0.7</td>
<td>0.8</td>
</tr>
<tr>
<td>Jones Covert (SAC3)</td>
<td>1.0</td>
<td>0.7</td>
<td>0.8</td>
</tr>
<tr>
<td>Haddon Lake (SAC4)</td>
<td>0.6</td>
<td>0.4</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Compiled by David Lock Associates
November 2009
11.149 The minimum critical load (15kgN/ha/yr) is exceeded in 2011 both without and with the proposed development; however, the reduction in HDV movements on the Western Peripheral Road adjacent to the Orton Pit SAC due to the proposed development is predicted to reduce the nitrogen deposition rate. The minimum critical load is predicted to be achieved by 2026.

11.150 The significance of the impact from air quality on the Orton Pit SAC is considered in Chapter 6.

**Mitigation Measures**

**Construction Mitigation**

11.151 With mitigation dust annoyance may occur within 100m of dust generating activities. The effect on local PM$_{10}$ concentrations is likely to be closer to the sites.

11.152 The construction effects can be minimised through use of the recommended mitigation measures outlined below. The mitigation measures will be included within a Construction Code of Practice (CCoP) to be agreed with the local authority.

11.153 Dust control measures should be rigorously applied when ongoing construction occurs close to completed dwellings to reduce the risk of dust complaints and public exposure to elevated PM$_{10}$ concentrations.

*Site preparation*

11.154 Any particles generated during the erection of boundary fences, barriers and screens should be damped down using water suppression. All land clearing activities should be damped down using water suppression, if necessary

*Earthworks*

11.155 Earthworks should be kept damp or avoided if possible, especially during dry weather. Vegetation should only be removed in discrete sections and not all at once and completed earthworks should be sealed or re-vegetated as quickly as possible

11.156 Soil mounds should be treated with surface binding agents or sealed by seeding or surfacing with vegetation or covered with secured tarpaulins.

*Materials handling and storage*

11.157 Stockpiles should be of the minimum practicable height and should be located away from the site boundaries, if feasible. Stockpiles should be downwind of any sensitive receptors, where practicable, and should be stored only for the minimum period of time possible. Stockpiles should be damped down as necessary.
Haul routes:

11.158 For minimisation of dust, haul routes should be away from sensitive locations such as dwellings and recreational areas wherever possible. Heavily used areas should be paved as well as an area on the exits of the sites. Paved areas should be swept on a regular basis using a vacuum sweeper. Non paved areas should have vehicle speeds limited to 15mph and be damped down during dry windy weather.

Public Highways

11.159 Roads should be swept once per day to remove any visible soil material caused by the demolition/construction activities, if necessary.

Vehicles and plant

11.160 Wheels of all site plant and vehicles should be cleaned so that mud is not spread on surrounding roads. Exhaust emissions should not discharge straight at the ground. Construction plant and vehicles should be well maintained and regularly serviced ensuring MOT emissions standards for vehicles are met at all times. Visible smoke from plant should be avoided. Defective plant should not be used. Engines should be switched off when vehicles are not in use and refuelling areas should be away from areas of public access. Vehicles delivering to the site should be covered.

Construction and fabrication:

11.161 Large quantities of bentonite or concrete slurries should be mixed in enclosed/screened areas and large concrete pours should be kept clean after concrete has set as these can create large quantities of airborne dust.

11.162 Cutting and grinding on site should be minimised. Where cutting or grinding is necessary, equipment and techniques to minimise dust should be used.

Waste

11.163 All waste should be removed from site and disposed to an appropriately licensed waste facility. There should be no burning of any material onsite.

Operational Phase

11.164 As no significant air quality effect is anticipated during the operation of the proposed development, no mitigation is necessary.
Residual Impacts

Construction Impacts

11.165 There are no highly sensitive receptors within 100m of the sites’ boundary. There are approximately 90 dwellings within 100m of the sites’ boundary. All of the 90 dwellings are downwind of proposed construction activities during the prevailing wind; however as most construction will take place well back from the sites’ boundary, the potential impact from dust will be reduced.

11.166 Dwellings that are within 100m of dust generating activities may experience temporary short-term dust annoyance during dry and/or windy conditions and mitigation should be fully implemented in these areas.

11.167 Existing and future on-site receptors may experience short-term elevated PM₁₀ concentrations during construction, however background concentrations are low and it is unlikely that the 24-hour objective will be exceeded.

11.168 Areas of standing open water and canal (which form part of the SAC) which are within 100m of the sites’ boundary may also experience elevated levels of dust, especially those areas which are downwind of the prevailing wind. Consideration should therefore be given to detailed mitigation measures during construction near this area, to reduce the risk of damage to the ecosystems (addressed as part of any Construction Management Plan/Ecological Management Plan for this part of the site).

11.169 The residual impact of the construction of the proposed development will be temporary and of minor significance.

Operational Impacts

11.170 The maximum increase in annual mean pollutant concentrations between the without and with development scenarios will be less than 10% and the NAQOs will be achieved by a wide margin. This would equate to a permanent residual impact from the operation of the proposed development of minor significance according the criteria set out in Table 11.9. However, there is predicted to be an improvement in air quality along the A15 London Road. Therefore the small increase in NO₂ concentrations at some receptors is off-set by a decrease at others and on balance; the residual impact from the operation of the proposed development will not be significant.
Cumulative and Interactive Effects

11.171 The traffic data used in this assessment took account of other major developments in the area (see Chapter 9 for details).

Summary Matrix of all Impacts Before Mitigation

<table>
<thead>
<tr>
<th>Issue</th>
<th>Description of impact</th>
<th>Geographical significance</th>
<th>Impact</th>
<th>Significance</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I</td>
<td>N</td>
<td>R</td>
<td>D</td>
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<tr>
<td>Air Quality</td>
<td></td>
<td></td>
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<tr>
<td>During Construction</td>
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</tr>
<tr>
<td>Dust annoyance</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Elevated PM₁₀ concentrations</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>On Completion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Summary of Mitigation and Enhancement Measures and Residual Effects

<table>
<thead>
<tr>
<th>Issue</th>
<th>Description of impact</th>
<th>Mitigation/enhancement measures</th>
<th>Residual Effects</th>
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</thead>
<tbody>
<tr>
<td>Air Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>During construction</td>
<td></td>
<td>CCoP</td>
<td>Minor, short-term</td>
</tr>
<tr>
<td>Dust annoyance</td>
<td></td>
<td>CCoP</td>
<td>Minor, short-term</td>
</tr>
<tr>
<td>Elevated PM₁₀ concentrations</td>
<td></td>
<td>CCoP</td>
<td>Minor, short-term</td>
</tr>
</tbody>
</table>

Compiled by David Lock Associates
November 2009
<table>
<thead>
<tr>
<th>Issue</th>
<th>Description of impact</th>
<th>Mitigation/enhancement measures</th>
<th>Residual Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>On Completion</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increased NO₂ and PM₁₀ concentrations</td>
<td>None required</td>
<td>Not significant, long-term</td>
</tr>
</tbody>
</table>
12.0 MINERALS AND WASTE

Introduction and Scope of Assessment

12.1 This chapter presents an assessment of the waste management, materials usage and extractive mineral impacts associated with the proposed development of Great Haddon, Peterborough. This chapter has been prepared by Peter Brett Associates LLP.

12.2 The chapter sets out the approach to the assessment and provides estimated quantities of waste arisings generated by the following activities;

- Demolition
- Construction
- Operational waste management

12.3 In addition the chapter assesses the impact of the proposed development on any potentially valuable mineral resources that may be present below the ground at the sites.

Reference Material and Assessment Method

12.4 A review of relevant waste management legislation and policy has been undertaken, including international, national, regional and local waste strategies and plans. This includes:

International and European policy

- EU Waste Framework Directive;
- EU Waste Catalogue;
- EU Landfill Directive;

UK Legislation

- Environmental Protection Act 1990 Part II - Controlled Waste and the Duty of Care;
- Environmental Protection Regulations 1991;
- Waste Management Licensing Regulations 1994;
- Landfill Tax Regulations 1996;
- Aggregates Levy;
• Landfill Regulations 2002;
• Anti Social Behaviour Act 2003;
• Clean Neighbourhoods and Environment Act 2005;
• Hazardous Waste Regulations 2005;
• Environmental Permitting 2008;
• Waste Management Regulations 2006; and
• Planning and Compulsory Purchase Act 2004
• Town and Country Planning Regulations 2004
• UK Sustainable Development Strategy 2005
• National Waste Strategy 2007
• Minerals Policy Statement 1: Planning and Minerals 2006

National policy and guidance:
• National Waste Management Strategy 2000;
• Planning Policy Statement 9: Biodiversity and Geological Conservation
• Planning Policy Statement 10: Planning for Sustainable Waste Management

Regional policy:
• Regional Spatial Strategy for East England (RSS14)
• Regional Environmental Strategy (priority 6) July 2003.

Local policy:
• Cambridgeshire Aggregates (Minerals) Local Plan 1991
• The Cambridgeshire and Peterborough Waste Local Plan 2003
• Cambridgeshire and Peterborough Minerals and Waste Development Plan
  Documents (expected late 2010)
• Minerals and Waste Preferred Options 2 Site Specific Allocations Proposals
  (Cambridgeshire and Peterborough 2008)
• Minerals and Waste Preferred Options 2 Core Strategy (Cambridgeshire and
  Peterborough 2008)
• Joint Municipal Waste Management Strategy for Cambridgeshire and
  Peterborough 2008 – 2022
• Waste Prevention Plan for Cambridgeshire and Peterborough 2008 – 2022
12.5 The EU Waste Framework Directive (EU WFD) provides the overarching legislative framework for the collection, transport, recovery and disposal of waste, and includes a common definition of waste. It encourages the prevention and reduction of harmful waste by requiring that Member States put waste control regimes into place. These waste management authorities and plans should ensure that necessary measures exist to recover or dispose of waste without endangering human health or causing harm to the environment. The requirements include permitting, registration and inspection requirements and should also encourage the development of clean technologies and disposal techniques. The directive also puts an end to co-disposal of waste streams.

12.6 The definition of waste for the UK is governed by the EU WFS as:

“Any substance or object…which the holder discards or intends or is required to discard.”

12.7 It is the responsibility of the holder of a substance or object to decide whether or not they are handling waste. The Environment Agency is the authority responsible for enforcing waste management legislation in England and Wales, but where there is a disagreement as to whether or not something is waste it is ultimately a matter for the courts to decide.

12.8 The European Waste Catalogue was transposed in UK as List of Wastes (England) Regulations 2005 and List of Wastes (Wales) Regulations 2005. It is part of the waste management regulations and falls under the EU waste framework directive where it classifies hazardous and non-hazardous wastes with six digit codes. These codes must be used on Duty of Care documentation, such as transfer notes and influence where contractors recycle/dispose of their waste.

12.9 The European Landfill Directive is in place to reduce the negative effects of land filling on the environment and health. It aims to encourage waste minimisation and increased levels of recycling and recovery; the increased costs of land filling associated with compliance with the Directive will also encourage alternative waste management methods.

12.10 The first requirement of the regulations was a ban on the co-disposal of hazardous waste with nonhazardous waste in landfills. The Directive has also imposed a ban on whole tyres going to landfill since 2003, with this ban extending to shredded tyres from July 2006, while liquid wastes were banned from landfill from October 2007.
12.11 The Directive also brings with it tighter site monitoring and engineering standards. This is supplemented by the European Waste Catalogue, which has extended the range of materials classified as 'hazardous', and the Waste Acceptance Criteria, which has introduced potential pre-treatment requirements.

**UK Legislation**

12.12 Section 33 of the Environmental Protection Act (EPA) deals with the treatment, storage and disposal of waste. It makes it an offence to:

- deposit controlled waste, or knowingly cause or knowingly permit controlled waste to be deposited on land unless it is done in accordance with the provisions of the waste management licence.

- treat, keep or dispose of controlled waste (or knowingly cause or knowingly permit controlled waste to be treated, kept or disposed of) in a manner likely to cause pollution of the environment or harm to human health.

12.13 The Act requires that, while on site, waste must be stored in such a way as to prevent it from causing damage to the environment or posing a risk to human health, i.e. it must be stored in appropriate containers or as a defined stable compound, such as stone (monolithic waste). The licence/permit also requires that the containers be labelled with an accurate and detailed description of their contents to ensure future waste handlers treat them correctly. Further to this the EPA requires that those organisations treating, storing or disposing of waste on specific to the types and quantities of waste to be treated and would specify the general technical requirements and the precautions to be taken by the permit holder. The competent authorities may periodically check that the conditions of the permit are being met.

12.14 There is an additional cost for gaining appropriate permits. Builders must ensure that they only pass waste onto landfill sites/ recycling facilities with the appropriate certification to handle the waste stream. Builders disposing of waste should ask to see a copy of the operating licence/permit and conditions for the site to which they are taking their waste. It is also their responsibility to ensure that the waste is appropriately labelled to ensure that licence/permit conditions are met.

12.15 Breaches of this legislation could result in successful prosecution in criminal courts, followed by civil action for damages caused by the crime. Statutory nuisance could apply if the waste on the building site is prejudicial to health or is a nuisance, e.g. smell. This latter rule is only applicable in England. Builders disposing of their own waste would require a permit. Builders are not allowed to burn waste on behalf of third parties and must obtain a permit from the competent authority.
12.16 Environmental Protection (Duty of Care) Regulations 1991 covers all those who produce or handle wastes from demolition, earthworks and construction activities are now legally obligated to ensure its safe keeping, best practice management, transport and subsequent recovery or disposal. Failure to comply with this can result in a fine. This means that for those who are producing or transporting waste, the following applies:

- To ensure that all waste produced is handled, recovered and disposed of responsibly. Even if you are a subcontractor and the contractor arranges for your waste disposal, you remain responsible under the Duty of Care.

- Only registered waste brokers and carriers can be used for dealing with and transporting waste. You will also need to register as waste carrier if you are taking care of transporting your own waste.

- To keep a record of all waste received or transferred using Waste Transfer Notes.

12.17 One of the aims of the Duty of Care is to stop waste producers from simply handing waste over, without considering where it will be going. On a construction site, the waste producer is the person carrying out the work which gives rise to the waste, not the person who issues instructions or removes a sub-contractors waste, the main contractor is acting as a broker and all three parties are therefore subject to the duty.

12.18 Wherever waste is being stored, it must not be allowed to escape. This means that all containers/skips must be safe and secure, and they should also be labelled accurately. Waste should also be segregated to prevent mixing. It is the employer’s responsibility to make sure that all employees are aware of the location of the containers, and what can go in each.

12.19 The Clean Neighbourhoods and Environment Act 2005 contains a variety of environmental measures, including changes to the system of recycling credits. This legislation also deals with fly-tipping, and introduces tougher penalties for this. Under this, employees are no longer able to use the excuse of working under their employers’ instructions if caught fly tipping. The court may also order the accused to pay for the costs of cleaning the land, and also the Environment Agency’s and waste collection authority’s costs. Any vehicles suspected of being involved in fly tipping may be seized.

12.20 It is the responsibility of everyone working in the construction industry to ensure all waste is disposed of properly. All employees will need to be made aware that if they are tasked with waste disposal this must be carried out in accordance with the law, or they risk being fined and having their vehicles seized.
12.21 The Aggregates Levy introduced in 2002 aims to reduce demand for primary aggregates by increasing their cost, which in turn makes the use of recycled and secondary materials more viable. The Aggregates Levy Sustainability Fund aims to reduce the environmental impacts per ton of aggregates extraction and encouraging the use of alternative materials such as recycled materials and certain waste products.

12.22 As the levy is applied to all new aggregate products, it is in industries best interest to think about using recycled aggregates instead. However, they must ensure that these products are of the same quality as primary aggregates. With increasing tax levis, organisations may have to source new suppliers for recycled materials. This will therefore have an effect on suppliers to the construction industry, with some losing out to those who are able to offer recycled products.

12.23 The Anti-social Behaviour Act 2003 provides the tools for practitioners and agencies to effectively tackle anti-social behaviour. It builds on existing legislation to clarify, streamline and reinforce the powers that are available to practitioners. Measures have been designed to combat:

- Local troublemakers and intimidating groups
- Nuisance neighbours
- Crack houses
- Air weapons and imitation firearms
- Graffiti and vandalism
- Fly-tipping and litter
- Beggars
- Abandoned cars
- Trespassers

12.24 The key element of this legislation that affects the construction industry is the development of “Flycapture”. This is the national database of fly-tipping incidents that has been set up by Defra, the Environment Agency and the Local Government Association to get a better picture of the problem of illegally dumped waste. The information provided will help users develop local enforcement strategies in partnership with key stakeholders. It will report on the nature and scale of fly-tipping, and the vehicles believed to be involved.
12.25 Landfill Tax Regulations 1996 introduced landfill tax, which is levied on the disposal of waste in landfill sites throughout the UK, was introduced on 1 October 1996. This aims to encourage waste producers to produce less waste, recover more value from waste (for example through recycling or composting), and to use more environmentally friendly methods of waste disposal.


12.27 Regulation 19 within the legislation prohibits the mixing of hazardous waste with other classes of hazardous waste, and with non-hazardous waste. Producers of hazardous waste have are obliged to notify their premises to the Environment Agency every 12 months, and a fee is payable. It is an offence to remove waste from premises which are neither notified nor exempt. Exempt premises are still required to ensure that only an authorized person, e.g. a registered carrier, removes waste. When hazardous waste is moved between premises, the producer is responsible giving each consignment of hazardous waste a consignment code. The producer must also keep a record of all hazardous waste that leaves their site, which should include the type, quantity, destination, carrier, origin and the treatment method.

12.28 The Waste Electrical & Electronic Equipment Regulations 2006 aim to reduce the amount of waste electrical and electronic equipment being disposed in landfills by promoting separate collection, treatment and recycling. Applicable to those involved in manufacturing, selling, distributing, recycling or treating electrical and electronic equipment.

12.29 The following items are covered by the Regulations;

- Large household appliances
- Small household appliances
- IT and telecommunications equipment
- Consumer equipment
- Lighting equipment
• Electrical and electronic tools
• Toys, leisure and sports equipment
• Medical devices
• Monitoring and control instruments
• Automatic dispensers

12.30 Planning Policy Statement 9: Biodiversity and Geological Conservation sets out planning policies on protection of biodiversity and geological conservation through the planning system.

12.31 The statement sets out the obligations for regional planning bodies and local planning authorities should adhere to the following key principles to ensure that the potential impacts of planning decisions on biodiversity and geological conservation are fully considered.

12.32 The planning bodies should development plan policies and planning decisions should be based upon up-to-date information about the environmental characteristics of their areas. These characteristics should include the relevant biodiversity and geological resources of the area. In reviewing environmental characteristics local authorities should assess the potential to sustain and enhance those resources.

12.33 Plan policies and planning decisions should aim to maintain, and enhance, restore or add to biodiversity and geological conservation interests. In taking decisions, local planning authorities should ensure that appropriate weight is attached to designated sites of international, national and local importance; protected species; and to biodiversity and geological interests within the wider environment.

12.34 Plan policies on the form and location of development should take a strategic approach to the conservation, enhancement and restoration of biodiversity and geology, and recognise the contributions that sites, areas and features, both individually and in combination, make to conserving these resources.

12.35 Plan policies should promote opportunities for the incorporation of beneficial biodiversity and geological features within the design of development.

12.36 Development proposals where the principal objective is to conserve or enhance biodiversity and geological conservation interests should be permitted.

12.37 The aim of planning decisions should be to prevent harm to biodiversity and geological conservation interests. Where granting planning permission would result in
significant harm to those interests, local planning authorities will need to be satisfied that the development cannot reasonably be located on any alternative sites that would result in less or no harm. In the absence of any such alternatives, local planning authorities should ensure that, before planning permission is granted, adequate mitigation measures are put in place. Where a planning decision would result in significant harm to biodiversity and geological interests which cannot be prevented or adequately mitigated against, appropriate compensation measures should be sought. If that significant harm cannot be prevented, adequately mitigated against, or compensated for, then planning permission should be refused.

12.38 Planning Policy Statement 10: Planning for Sustainable Waste Management is Government policy on how waste should be managed using the land-use planning system. It sets out policy for all waste planning bodies, at both regional and local level, in England.

12.39 PPS10 affects:

- Plan makers at all levels, and the stakeholders they consult and work with when formulating waste management strategies and plans.
- Waste management companies who need to apply for planning permission for waste management facilities.
- Authorities responsible for pollution control.
- Everyone in the community, as producers of waste in their own right, and as consumers of goods and services that rely on processes which themselves generate waste.

12.40 PPS10 promotes the principle of “driving waste management up the hierarchy” which means that waste planning authorities should always try to ensure that waste is managed by the best possible environmental means, represented by the highest levels of the hierarchy i.e. waste reduction, re-use and recycling. Therefore this puts further emphasis on the need for the construction industry to be reusing and recycling as much as possible.

12.41 This will also impact on waste management companies, who need to apply for planning permission for waste management facilities. This could mean it takes longer for them to get up and running.

12.42 Landfill (England & Wales) Regulations 2002 provides amendments to the landfill regulations reclassified landfill sites as ‘hazardous’, non-hazardous’ and ‘inert’ and initiated a ban on the landfill of certain types of waste. These included: non sludge liquid waste (as off 30 October 2007), waste that is explosive, corrosive, oxidising,
flammable, highly flammable or infectious (immediate effect) and whole or shredded tyres (as of July 2006).

12.43 As of July 2005 waste has had to meet certain chemical parameters known as waste acceptance criteria (WAC) or it cannot be land filled. The WAC includes pH and organic content criteria as well as leaching criteria for hazardous substances, for example for toxic metals.

12.44 The regulations also set out Waste Acceptance Procedures (WAPs). These outline the information that waste producers must provide to landfill operators on the characterisation of the waste. Details that must be provided include the origin of the waste, its consistency, e.g. smell, shape, colour, treatments that have been applied to it, the European Waste Catalogue code and whether it can be recovered or recycled.

12.45 Minerals Policy Statement 1: Planning and Minerals (MPS1) 2006 set out the Government's national planning policies for minerals planning in England. These complement, but do not replace or overrule, other national planning policies, and should be read in conjunction with other relevant statements of national planning policy. Annex 2 of MPS1 sets out the Government's key overarching policies and principles which apply to all minerals with specific regard given to brick clay. These policies set out to:

- maintain and enhance the diversity of brick clay produced by making appropriate provision for supply in mineral planning authorities' (MPAs) local development documents;

- provide and make available brick clays at a level that reflects the high initial investment in, and high levels of capital expenditure required to maintain and improve, new and existing brick-making plant and equipment; and

- safeguard and where necessary, stockpile supplies of clays, especially specific “premium” brick clays such as those from the Etruria Formation and fireclay.

12.46 'Environmental Permitting, 2008' is a single environmental permitting and compliance system that simplifies and combines pollution prevention and control (PPC) permitting and waste management licensing (WML). All other regulatory permitting regimes such as discharge consenting, water abstraction, radioactive substance regulation, remain in force.

12.47 Site Waste Management Plan Regulations (SWMP), 2008 create efficiency in waste management planning, on site management, and final disposal. The Regulations state that the SWMP should identify:
• Who will be responsible for resource management
• What types of waste will be generated
• How the waste will be managed – will it be reduced, reused or recycled?
• Which contractors will be used to ensure the waste is correctly recycled or disposed of responsibly and legally; and
• How the quantity of waste generated from the project will be measured.

12.48 The SWMP does not replace the responsibility of contractors to manage their waste responsibilities in line with all waste management, duty of care and environmental regulations. It is the responsibility of the Client and Principal Contractor to meet their obligations under the Site Waste Management Plan Regulations 2008.

Regional Policy

12.49 The Regional Spatial Strategy for the East of England (RSS14) which was published in May 2008 sets out the regional strategy for planning and development in the East of England to the year 2021. It covers economic development, housing, the environment, transport, waste management, culture, sport and recreation, mineral extraction and more.

12.50 The RSS contains the following policies regarding waste and minerals:
• Minimise the impact of new developments on waste management requirements
• Minimise the environmental impact of waste management
• Seek community support and participation in promoting responsible waste behaviour and in determining proposals for planning permission
• Target increase in municipal waste recovery of 50% by 2010 and 70% by 2015
• New landfill development should not compromise proposals for environmental regeneration or housing development and should only be permitted where the waste to be land filled has had maximum practicable value recovered
• Developments should be designed and constructed to minimise the creation of waste, maximise use of recycled and reused materials and facilitate effective management of waste
• Waste collection systems which aim to reduce waste at source should be adopted and separate collections of recyclable and compostable materials introduced.

• Local Development Documents should identify and safeguard mineral resources to ensure that an average level of supply of 2.82 million tonnes/year of sand and gravel (aggregates) and 0.3 million tonnes/year of rock (including limestone, sandstone, chalk and clay) is maintained between 2001 and 2016.

12.51 The Regional Environmental Strategy published in July 2003 sets out a vision for the East of England that “celebrates, protects and enhances our natural, historic and built environment”.

12.52 In 2005 the East of England Regional Assembly (EERA) established an Environment and Resources Panel whose particular responsibility was as guardian of the Region's Environment Strategy. The Panel distilled a series of 6 priorities from the Strategy.

12.53 The sixth priority is “to reduce the amount of waste regionally”.

12.54 This priority refers to strategic aim 13 in the Regional Environmental Strategy, to “reduce the region's global environmental impact”. This involves an aim to “reduce the amount of waste it produces and increase the amount of waste recovered under the waste hierarchy” and a commitment to targets as outlined in the East of England Regional Waste Management Strategy (2002).

**Local Policy**

12.55 The Cambridgeshire and Peterborough Waste Local Plan 2003 covers the period from 1998 to 2011 inclusive, where the overall goal of the local plan is to achieve sustainable waste management within the plan area.

12.56 The plan is implemented through the following strategies:

• Waste Local Plan 1 (WLP1) - Sustainable Waste Management

• Waste Local Plan 2 (WLP2) - Resource Recovery - Materials and Energy

• Waste Local Plan 3 (WLP3) - The Need for Waste Management Development and the Movement of Waste

12.57 When Peterborough became a unitary authority on 1, April 1998 the area was subject to the Cambridgeshire Aggregates (Minerals) Local Plan 1991. This Plan is part of the "old" Statutory Development Plan for Peterborough.
12.58 The *Cambridgeshire Aggregates (Minerals) Local Plan* sets out locations for mineral extraction and the disposal of mineral wastes and detailed planning policies that will apply to new planning applications for minerals development.

12.59 The *Planning and Compulsory Purchase Act 2004* introduced a new system of development plan making. This new system does not include Aggregate (Minerals) Local Plans and their policies will be gradually phased out.

12.60 Many of the policies in the Cambridgeshire Aggregates (Minerals) Local Plan expired on 27 September 2007. However some have been "saved" by the Secretary of State and will continue in force. Saved (non-expired) policies will provide guidance in preparing the Local Development Framework (part of the new system of development plan making).

12.61 In addition to the Local Plan, Peterborough City Council have also developed further mineral and waste management strategies with the main framework set by the Cambridgeshire and Peterborough Minerals and Waste Development Plan Documents including:

- Minerals and Waste Site Specific Proposals DPD Mineral Safeguarding Areas
- Minerals and Waste core strategy DPD Preferred Options 2 (including Development Control Policies);
- Minerals and Waste Site Specific Proposals DPD Preferred Options 2 (including Issues and Options appraisals);
- Earith/Mepal Area Action Plan DPD;
- Location and Design of Major Waste Management Facilities SPD; and
- Peterborough City Council Local Development Plan – Sustainability Appraisal.

12.62 The *Earith and Mepal Area Action Plan* Development Plan Document sets out the preferred options for future minerals extraction and waste management development in the Earith - Mepal area. The application proposals are not within this area and removal of the mineral resource potential at the site will not affect resources based in the Earith/ Mepal area as the area has no viable clay reserves. The Action Plan DPD is only concerned with sand and gravel resources in the Earith and Mepal area and therefore will not be discussed.

12.63 The Mineral and Waste Development Plan is likely to be adopted in late 2010. In light of this further reference will be taken from previous site studies on mineral issues relating to the Peterborough Southern Expansion Area (which included the Great
Haddon sites) prepared for O&H Properties, which have been submitted to Peterborough City Council previously, including:

- *The Orton Brick Clay Reserve, Peterborough, January 2007*, Peter Brett Associates, Reference 15188/005C

12.64 These mineral studies assessed the capacity for the Haddon and Orton reserves to continue as sources of clay extraction in light of a variety of factors, namely quality of reserve; sustainable extraction; proposals for Great Haddon (the ‘Southern Expansion of Peterborough’); and the capacity of the landowner to undertake further excavations. These studies are further discussed in paragraphs 12.103 to 12.114 below.

12.65 The Mineral Safeguarding Areas proposed by PCC in its document *Minerals and Waste Site Specific Proposals DPD Mineral Safeguarding Areas* is based on the protection of all Oxford Clay within their jurisdiction. The methodology used for assigning the mineral safeguarding area was to layer the geological survey known mapping data for the clay over OS mapping for the region. The entire Oxford Clay geological unit was then classified as a mineral safeguarding area.

12.66 The *Cambridgeshire and Peterborough Minerals & Waste Site Specific Proposals Development Plan Preferred Options* identifies potential waste management facilities across the Local Authorities’ jurisdiction. One of the potential areas for a materials recycling facility and waste management facility is ‘somewhere to the west of Peterborough’ (as presented in Figure 12.1 below).

12.67 The sites are recommended for a waste recycling and recovery and indoor household waste recycling facility. The sites are not preferred for an outdoor facility. The site specific proposal plans note that the site formerly has a mineral reserve, although the rights to work the minerals will not be taken up by the current owners and therefore the site is considered suitable by the Local Authority for development of a facility.

12.68 The minerals site specific assessment states that the site references SS2 – 5 Orton is not preferred as a mineral safeguarding area.
12.69 Both the Joint Municipal Waste Management Strategy for Cambridgeshire and Peterborough 2008 – 2022 and the Waste Prevention Plan for Cambridgeshire and Peterborough 2008 – 2022 both set a strategy and plan on how PCC will manage waste over the next 14 years. This includes target setting in line with UK national policy and methods of reaching these targets. Specific mention is made to energy from waste (or “integrated resource recovery facility” as noted in the strategy).

Industry Guidance

12.70 The proposed construction and demolition activities will take into account guidance on best practice for waste management produced by the WRAP (Waste and Resources Action Program) and CIRIA (Construction Industry Research and Information Association):

**WRAP**

12.71 To assist in the re-use/recycling of construction wastes, a national programme, WRAP (Waste and Resources Action Programme) was established in 2001 in
response to the UK Government’s Waste Strategy 2000 to promote sustainable waste management. WRAP has produced a number of references to show how the use of recycled content can be increased when building, including the following; ‘Opportunities to use recycled materials in building - reference guide’ and ‘Opportunities to use recycled materials in house building - reference guide’. WRAP have also developed a Net Waste Tool. The idea of this software programme allows the waste management of a project to realise a value. By understanding the values associated with waste generated in the construction programme, financial saving can be accrued.

**CIRIA**

12.72 CIRIA provides best practice guidance for designers and constructors in an effort to improve the quality, efficiency, cost-effectiveness and safety of both the provision and operation of the modern built environment. CIRIA C528\(^1\) and C529\(^2\) cover issues associated with construction waste and provide guidance of appropriate methods of dealing with waste.

**Methodology for Impact Assessment**

12.73 For waste there is currently no such accepted methodology/thresholds for defining impacts and determining the threshold of significance. Where definitive guidelines are not available and it is not possible to define impacts, qualitative assessment will be carried out, based on available knowledge and professional judgement. In these circumstances the following approach to predicting significance has been developed.

12.74 The assessment of waste management for the development will be reviewed in two phases, as described below. The first phase covers waste impacts relating to construction and demolition, and the second phase assesses the operational waste impacts from the proposed development.

12.75 For both construction and demolition, and operational phases the likely waste streams will be assessed to generate both current on site baseline conditions and likely impacts on the local and national waste management capabilities.

12.76 The impact of the developments on any mineral resources at the sites will be assessed by reviewing the quality and availability of any mineral reserves at the sites against regional demand and allocated resources such as consented reserves and

\(^1\) [http://www.ciria.org/acatalog/C528.html](http://www.ciria.org/acatalog/C528.html)

\(^2\) [http://www.ciria.org/acatalog/C529.html](http://www.ciria.org/acatalog/C529.html)
safeguarded areas. The assessment will consider the Cambridgeshire and Peterborough Minerals & Waste Site Specific Proposals Development Plan Preferred Options, on site capacity and any mineral studies that have been completed for the area.

Demolition and Construction Waste Methodology

12.77 For the purposes of this report “waste” is defined by the EU Waste Framework Directive, as detailed in paragraphs 12.5 above.

12.78 In order to manage waste streams effectively it is important to understand exactly what types of waste are likely to arise on the sites. An assessment of the likely waste streams associated with the development will allow waste management strategies to be developed such as:

- Quantify key construction and demolition materials
- Find and develop local markets for the products
- Identify reuse on site
- Information for the tender/contract
- Minimise journeys
- Quantify environmental impacts
- Feed into Code of Construction practice and Site Waste Management Plan

12.79 There will be a small amount of waste generation from demolition activities associated with the removal of the agricultural outbuildings west of London Road (see paragraph xx below). However, the bulk of the project involves greenfield land with no previous development or infrastructure.

12.80 Construction waste arisings will constitute the main waste impacts for this project prior to the operational phase. The likely construction materials however will not be known until a later design stage. Actual volumes are difficult to assess at this point. Indicative volumes and waste streams have been presented in this report. Once the potential waste streams have been defined, the waste hierarchy of reduce, reuse, recycle and dispose can be assessed.

12.81 Whilst good waste management practice on site should reduce significant volumes of waste generated, off site waste management facilities should also be considered. A comprehensive list of waste management facilities around the sites has been
compared using an interactive geographical information system tool on the Building Research Establishment (BRE) website (www.bremap.co.uk) and from the Waste Recycling Organisation website (www.wasterecycling.org.uk). It is important to define the baseline capacity for waste management around the sites so that mitigation measures can be reviewed for all likely waste streams based on current local capability. For example if a site is likely to present a high volume of hazardous waste streams during operation, if there is not local or regional capacity to accept the hazardous waste streams the resulting impact of the operation is going to be significant. If on the other hand the area has a wide and varied range of waste management operations that can accept the waste stream the impact of the operation is less significant.

12.82 The BRE search tool called BREMAP allows developers to identify the best practical environmental option (BPEO) for their waste. The website provides information on the waste processed and products produced for most waste management facilities. This tool has been considered in developing mitigation measure for the waste streams defined in the Baseline Conditions section.

12.83 Guidance has been taken from the BRE’s SMARTWASTE programme. The BRE are currently carrying out a project funded by the Department for Environment, Food and Rural Affairs (DEFRA) to establish minimum reporting requirements for construction, refurbishment and demolition waste and to generate self-updating performance indicators and benchmark figures. The data for over 100 completed projects has been analysed.

12.84 Using the Smartwaste benchmarks this assessment will generate potential waste volumes arising during the construction of the proposed development. The calculations in generating these volumes assume that minimal regulatory requirements are met and the development is indicative of current general construction projects as benchmarked by the BRE Smartwaste programme.

Operational Waste Methodology

12.85 Baseline conditions are assessed by reviewing the volume of waste streams currently being produced from the activities on site. An assessment of the future waste streams generated from the proposed development has been undertaken through reviewing
the Environment Agency’s National Waste Survey, Benchmark programme\textsuperscript{4}. This programme has been utilised to provide background information on likely waste volumes arisings from different industrial activities. Data of commercial waste streams have been selected and average commercial waste streams for the relevant business sectors associated with the proposed development have been presented.

12.86 Baseline municipal waste generation rates have been estimated using data from Peterborough City Council and Cambridgeshire County Council\textsuperscript{5}. The local authority data presents average waste generation on a per person basis (for 2006-2007). In order to apply this figure to the development and future waste generation a population of 2.3 residents per dwelling has been assumed based on information from the 2001 Census for Peterborough\textsuperscript{6}. [\textit{Note: This is tested as the worst case scenario as household size is forecast to decrease to c.2.2 people by 2021, the date of completion of Great Haddon}]

\textit{Minerals Impact Methodology}

12.87 The baseline conditions for mineral potential at the sites has been assessed using research carried out in support of the \textit{Peterborough Southern Expansion Minerals Study} (Peter Brett Associates 2006), and \textit{Cambridgeshire Aggregates (Minerals) Local Plan} 1991. The \textit{Peterborough and Cambridgeshire Minerals and Waste Development Plan Document - Preferred Options} Documents are currently being agreed in consultation. It is understood that further public consultation will be undertaken in October this year and the final DPD will be issued in Autumn 2009.\textsuperscript{7} The information in these documents has been used in conjunction with formulating an assessment on future impacts of mineral abstraction based on the current DPD preferred option document.

12.88 Impacts on the mineral status of the sites will be discussed with respect to the mineral extraction targets set for the region in the \textit{Regional Spatial Strategy for the East of England} (2008).

\textsuperscript{4} http://www.environment-agency.gov.uk/apps/wastesurvey1/Benchmark.jsp?lang=_e
\textsuperscript{5} http://www.cambridgeshire.gov.uk/NR/rdonlyres/2D087818-AE6A-4046-82B2-B4110514825C/0/CERResources.pdf
\textsuperscript{6}http://neighbourhood.statistics.gov.uk/dissemination/LeadTableView.do?a=7&b=276842&c=peterborough&d=13&e=7&g=404542&i=1001x1003x1004&m=0&n=1&s=1217252843968&enc=1&dsFamilyId=147
\textsuperscript{7} http://eight.peterborough.gov.uk/page-11224
Impact Assessment Criteria

12.89 In order to assess the significance of waste and mineral impacts it is important to first of all assess importance of the resource and the subsequent impact of the proposed development on that resource.

12.90 In order to identify the value or sensitivity of the receptor and resource the following terminology in Table 12.1 will be used:

**Table 12.1 Guidance for Estimating the Importance/Sensitivity of the Resource/Receptor**

<table>
<thead>
<tr>
<th>Importance Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Environment has either very good or very poor management capacity for waste and natural resources</td>
</tr>
<tr>
<td>Medium</td>
<td>Environment has either good or poor management capacity for waste and natural resources</td>
</tr>
<tr>
<td>Low</td>
<td>Environment has manageable capacity for waste and natural resources</td>
</tr>
<tr>
<td>Negligible</td>
<td>No change to existing capacity for waste and natural resources</td>
</tr>
</tbody>
</table>

12.91 Once the importance of the impact has been defined, its magnitude will be defined. The magnitude will reflect the nature and characteristics of the impact. The impact will be quantified and will follow the terminology in Table 12.2 below:

**Table 12.2 Magnitude/Nature of Impact**

<table>
<thead>
<tr>
<th>Magnitude</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major</td>
<td>Considerable impact (by type, duration or volume) of more than local significance in relation to relevant legislation, policy and/or standards</td>
</tr>
<tr>
<td>Moderate</td>
<td>Limited impact (by type, duration or volume) of more than local significance in relation to relevant legislation, policy and/or standards</td>
</tr>
<tr>
<td>Minor</td>
<td>Slight impact (by type, duration or volume) of more than local significance in relation to relevant legislation, policy and/or standards</td>
</tr>
<tr>
<td>Negligible</td>
<td>No change (by type, duration or volume) of more than local significance in relation to relevant legislation, policy and/or standards</td>
</tr>
</tbody>
</table>

12.92 The nature of the impacts will then be expressed as:

a) Adverse – detrimental or negative impact to an environmental resource or receptor; or
b) Neutral – no significant impacts on the environmental resource or receptor; or
c) Beneficial - Advantageous or positive impact to an environmental resource or receptor

12.93 The final assessment of significance is based on the relationship between the magnitude of the impact and its importance. The matrix set out in Table 12.3 below provides the level of significant effect used in this assessment:

### Table 12.3 Significance of the Effect

<table>
<thead>
<tr>
<th>Importance of the Resource</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
<th>Negligible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major adverse</td>
<td>Major significant effect</td>
<td>Moderate significant effect</td>
<td>Minor significant effect</td>
<td>Minor significant effect</td>
</tr>
<tr>
<td>Moderate adverse</td>
<td>Moderate significant effect</td>
<td>Moderate significant effect</td>
<td>Minor significant effect</td>
<td>No significant effect</td>
</tr>
<tr>
<td>Minor adverse</td>
<td>Minor significant effect</td>
<td>Minor significant effect</td>
<td>No significant effect</td>
<td>No significant effect</td>
</tr>
<tr>
<td>Negligible</td>
<td>No significant effect</td>
<td>No significant effect</td>
<td>No significant effect</td>
<td>No significant effect</td>
</tr>
<tr>
<td>Minor beneficial</td>
<td>Minor significant effect</td>
<td>Minor significant effect</td>
<td>No significant effect</td>
<td>No significant effect</td>
</tr>
<tr>
<td>Moderate beneficial</td>
<td>Moderate significant effect</td>
<td>Moderate significant effect</td>
<td>Minor significant effect</td>
<td>No significant effect</td>
</tr>
<tr>
<td>Major beneficial</td>
<td>Major significant effect</td>
<td>Moderate significant effect</td>
<td>Minor significant effect</td>
<td>Minor significant effect</td>
</tr>
</tbody>
</table>

12.94 The levels of significance effect (either beneficial or adverse) are defined as shown in table 12.4 below:
Table 12.4 Definitions of Overall Assessment Scores

<table>
<thead>
<tr>
<th>Effect Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major significant effect</td>
<td>These effects are likely to be important considerations at a local or district scale but, if adverse, are potential concerns to the project and may become key factors in the decision-making process. Mitigation measures and detailed design work are unlikely to remove all of the effects upon the affected communities or interests.</td>
</tr>
<tr>
<td>Moderate significant effect</td>
<td>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. They represent issues where effects will be experienced but mitigation measures and detailed design work may ameliorate or enhance some of the consequences upon affected communities or interests. Some residual effects will still arise.</td>
</tr>
<tr>
<td>Minor significant effect</td>
<td>These effects may be raised as local issues but are unlikely to be of importance in the decision-making process. Nevertheless they are of relevance in enhancing the subsequent design of the project and consideration of mitigation or compensation measures.</td>
</tr>
<tr>
<td>No significant effect</td>
<td>No effect or effect which is beneath the level of perception, within normal bounds of variation or within the margin of forecasting error.</td>
</tr>
</tbody>
</table>

12.95 For the purposes of this assessment, the duration of an impact will be described as: Short term, Medium term, Long term or Permanent.

Baseline Conditions

Demolition and Construction Waste

12.96 In the sites’ current use, the baseline volume of waste being generated from demolition and construction activities is negligible. There are some agricultural outbuildings within the Core Area that will produce a small amount of construction and demolition waste but this is considered negligible as a baseline.

12.97 The rest of the sites are undeveloped greenfield land so have zero generation of construction and demolition waste as a baseline.

12.98 There are 40 waste management facilities identified within a 10 mile radius of the sites. Table 12.5 below indicates the number of each type of waste management facility within the 10 mile radius.
Table 12.5: Waste Management Facilities

<table>
<thead>
<tr>
<th>Waste Activity</th>
<th>Number of Facilities in 10 miles of sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Management</td>
<td>19</td>
</tr>
<tr>
<td>Disposal Sites (inert, non hazardous, and stable non reactive)</td>
<td>4</td>
</tr>
<tr>
<td>Hazardous Disposal Site</td>
<td>1</td>
</tr>
<tr>
<td>Recycling and Recovery</td>
<td>13</td>
</tr>
<tr>
<td>Reclaim and Reuse</td>
<td>1</td>
</tr>
<tr>
<td>Asbestos Disposal</td>
<td>2</td>
</tr>
</tbody>
</table>

12.99 Whilst there are waste management facilities offering reuse, recycling and disposal opportunities for a variety of waste streams in the local area (i.e. within 30km of the sites), there is an obvious need to expand on this provision. The Cambridgeshire and Peterborough Waste and Minerals Development Plan Documents set out the required expansion of waste facilities in the Peterborough area to manage current requirements and future waste requirements. As such the current baseline waste management capacity could be seen as being inadequate to cope with additional needs.

Operational Waste

12.100 There are a small number of existing agricultural farm and outbuildings which currently produce waste through operation. These buildings - Spendelows Farm and several outbuildings, and an additional farm managers’ dwelling close to London Road - are estimated to total no more than 5,700 sq.m of floorspace.

12.101 The Environment Agency’s National Waste Survey, Bench Mark programme\(^8\) shows that commercial farming units with a work force of between 1-10 people would produce in the region of 25.8 tonnes of waste per annum (commercial waste) and around 15.7 tonnes per annum (vegetation waste).

12.102 Cambridgeshire County Council quotes municipal waste production at 481kg per person/year. Based on this figure and the average number of occupants per house

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hold in Peterborough (2001 Census⁹), the proposed residential units would be expected to produce around 1.1 tonnes of mixed household waste per annum. As noted in the Cambridgeshire and Peterborough City Waste Strategy the amount of waste generated per house is likely to be less than this (i.e. current 2009 rates) although actual census statistical figures are not provided for current rates.

Minerals Status

12.103 The development area contains two clay extraction areas known as the Orton Reserve in the Employment Area and the Haddon Reserve within the Core Area, both owned by O&H Properties Ltd.

12.104 The Cambridgeshire and Peterborough Minerals and Waste Core Strategy Development Plan Document (DPD) Preferred Options 2 states in its minerals spatial strategy section, that “with regard to location of new extraction of Brick clay, the Government advises that provision should be made for development contiguous to existing operations, or in satellite pits where these are in environmentally acceptable locations, and where they occur in economic proximity to the relevant manufacturing point.”

12.105 The baseline minerals status of the development sites has been discussed in the Peterborough Southern Expansion: Mineral Study (June 2006 PBA) and The Orton Brick Clay Reserve, Peterborough, Technical Note (January 2007 PBA).

12.106 Currently the Peterborough and Cambridgeshire Minerals and Waste Site Specific Proposals Development Plan Document has the Orton reserve (Site SS2) as being “not preferred as a mineral safeguarding area”.

12.107 The image presented in Appendix D of the site specific proposal documents suggests that the areas of the entirety of the sites are covered by mineral safeguarding. It is understood that the method used to generate the images for Appendix D was to utilise a Geographical Information System to layer the entire Oxford Clay geological formation over the Cambridgeshire and Peterborough area. From this the Council suggested that the entire geological unit is protected. O&H is currently making representations to remove all its land holdings from the Appendix D Site Specific maps on the basis that none of its land holdings will be utilised for clay extraction. This concurs with the Site Specific Proposals made by the DPDs that Orton and Haddon Reserves are not in their proposed safeguarding zones.

⁹ http://neighbourhood.statistics.gov.uk/dissemination/
12.108 It is understood that a Regional Important Geological Site (RIGS) designation is held for part of the Orton reserve site. RIGS do not have formal statutory protection in the same way as SSSIs. However, the RIGS groups notify the local planning authorities of the RIGS which have been declared in their area and encourage the local authority to protect the RIGS through the planning process. For example, RIGS can be listed on local authorities' development plans. As previously discussed the Orton site is not listed as protected in the local authority's development plans.

12.109 The previous owners of the site, Hanson plc, ceased extraction at the site due to lack of economic viability at Orton in 1997. In light of the cessation of clay excavation at the Orton reserve and the closure of the brick manufacturing works at the site, the option for possible future excavation of the Orton reserve will have to be revised.

12.110 In summary, clay extraction at the sites is not considered viable because:

- Planning consent was issued in January 2007 for major clay, sand and gravel extractions at Must Farm and Kings Dyke, Whittlesey (ref: 05/00485/MMFUL). The Regional Spatial Strategy (RSS) for the East of England (2008) outlines a policy commitment to maintain extraction of 0.3 million tonnes of rock (including clay) per annum within Cambridgeshire and Peterborough. The clay reserves at Whittlesey are considered sufficient to meet the needs of the brickworks for significantly more than 20 years, in accordance with the requirements of paragraph 3.4 of MPS1 and RSS. This situation provides compelling evidence that there is not a need for additional clay extraction at Orton;

- Hanson, the previous landowners (and brick manufacturers) at the site identified at Orton, sold the Orton site to O&H Properties in 1997. This action indicates Hanson's informed unwillingness to implement the existing mineral consent;

- Planning permission has recently been granted for development at Alwalton Hill, a site to the west of and incorporating an element of the proposed MCA and existing reserve. This consent is for a major employment development, including warehousing and distribution units. In the light of this recent planning permission, it is apparent that the western extent of the Orton Reserve is unlikely to ever be worked for clay extraction, effectively threatening the viability of the reserve as a whole;

- O&H Properties in its capacity as significant land owner within the southern Peterborough area is promoting these sites through the LDF process as part of the sustainable expansion of Peterborough. O&H as joint applicants for Great Haddon therefore have no intention of working the mineral reserve and intend to
seek the revocation of the existing permission. As it is extremely unlikely that the minerals consent will ever be implemented, inclusion of the reserve on the Proposals Map will unnecessarily restrict alternative development and may prejudice the outline planning consent for development of the area;

- Extraction of clay at the Orton reserve would be unsustainable in so far as it would require the transportation of clay some distance to the two brickworks in the plan area near Whittlesey. These brickworks are better served by the adjacent consented clay extraction reserve at Must Farm which does not require extensive transportation to the brickworks. The transfer of clay from Orton to Whittlesey would inevitably result in significant HGV movements on the local road network which is unsustainable in climate change terms and would result in associated impacts upon traffic.

- The Haddon Reserve has been ruled out for future extraction due to technical difficulties presented by the geological configuration of the sites and its bisection by the Western Peripheral Road and the Yaxley Bypass.

- The previous brickworks at the Orton Reserve was closed in 1997 and is now demolished. It is thought that gradual thinning of the workable clay strata north-westward across the sites made extraction increasingly unviable, forcing the works’ closure.

12.111 Peterborough’s site specific assessment preferred options state that the Orton reserve is not a preferred minerals safeguarding area.

12.112 The volume of mineral abstracted in the proposed development area current is zero. The baseline of mineral abstraction is therefore negligible for the sites.

12.113 Information on the Haddon Mineral Reserves has been presented as part of Peterborough City Council’s Notice of Planning Permission, Reference 05/00485/MMFUL “Extraction of sand, gravel, and clay, export of surplus soils from extraction area, transportation of material from Kings Dyke Brickworks, erection of clay store, sand and gravel processing plant and concrete blockmaking plant at Kings Dyke”, dated 2 January 2007. The information shows that the Haddon Reserve area outlined in “Plan 2” (map laid out after page 21 and table page 24) has been highlighted in ownership of Hanson in 1993. The plan indicates that the land may have been modified so that there shall be no further implementation of rights to win and work minerals. It is therefore possible to summarise that through O&H’s ownership (i.e. purchase from Hanson) that the planning rights to work the Haddon
land or through the extinguishment of planning rights to the area outlined in blue on the plan, there is no prospect of this land being worked.

12.114 It is noted from the Cambridgeshire and Peterborough Mineral and Waste Plan Preferred Options 2008 consultation have evaluated the sites as:

"Initially the site was allocated for mineral safeguarding of clay. However, the site has been recently sold by the mineral operator and it is likely to be promoted for residential and commercial development. As the land has not yet been developed it is suitable for an area of search for waste management development.

The proximity to current and future growth of Peterborough means that its location is optimum for waste management development and associated waste arisings."

Potential Impacts

Demolition

12.115 The mass values for the demolition have been estimated based on available plans and aerial images of the areas. No elevation plans or detailed information about the size or composition of the existing buildings were available.

12.116 Spendelows Farm (house and barns) is proposed for retention in the Development Framework Plan. Table 12.6 below indicates typical mass values of waste from demolition of the other farm buildings, informed by the available plans and images of the farm buildings and values obtained from demolition materials audits performed on similar buildings.

<table>
<thead>
<tr>
<th>Building</th>
<th>Material</th>
<th>Approx. Volume (m3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spendelows Farm (outbuildings)</td>
<td>Bricks</td>
<td>370</td>
</tr>
<tr>
<td></td>
<td>Corrugated Iron</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>Timber</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Glass</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>Concrete</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Aluminium Cladding</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Asbestos Roofing Board</td>
<td>1.2</td>
</tr>
</tbody>
</table>

12.117 Based on the figures above and volume/weight material conversion factors the total amount of demolition waste likely to be generated is in the order of 570 tonnes. These values are approximate and exclude fixtures and fittings: some of the material may also be capable of recycling on or off site. The values are based on the available information accessed at the time.
12.118 It is a certainty that waste will be produced during the earthworks phase for enabling works, and this is assessed to have a minor adverse significant effect before mitigation. The impact of waste produced during the earthworks phase will be limited to effects on the regional waste management infrastructure which has sufficient capacity and waste production. The effects will be short term in duration. The environmental impacts associated with waste management will therefore be limited to local and regional effects and will be dependent on the waste management option employed.

Construction

12.119 On a typical construction site 15-20% of new materials bought on to that site become waste without having been used. This wastage can be due to a number of factors and includes the following:

- a) Packaging
- b) Materials damaged on arrival
- c) Damage due to methods of work
- d) Vandalism
- e) Unused off-cuts
- f) Rework due to own errors
- g) Site office waste
- h) Design information problems
- i) Excess materials
- j) Inappropriate equipment
- k) Inappropriate storage location
- l) Move to new work areas
- m) Decayed materials
- n) Adverse weather conditions

12.120 The composition of potential construction waste arisings is given in Table 12.7 below.

<table>
<thead>
<tr>
<th>Typical Construction waste composition</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timber</td>
<td>19</td>
</tr>
<tr>
<td>Concrete</td>
<td>6</td>
</tr>
<tr>
<td>Inert</td>
<td>11</td>
</tr>
<tr>
<td>Ceramic</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 12.7 Typical Composition of Construction Waste in the UK

---

Typical Construction waste composition

<table>
<thead>
<tr>
<th>Material</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation</td>
<td>3</td>
</tr>
<tr>
<td>Plastic</td>
<td>13</td>
</tr>
<tr>
<td>Packaging</td>
<td>25</td>
</tr>
<tr>
<td>Metal</td>
<td>3</td>
</tr>
<tr>
<td>Plaster &amp; cement</td>
<td>3</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>14</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100</td>
</tr>
</tbody>
</table>

12.121 No detailed quantities of building materials have been drawn up for the development. Assumptions have therefore been made based on the masterplan and benchmark data presented from similar developments.

12.122 The BRE\(^{11}\) are currently carrying out a project funded by DEFRA to establish minimum reporting requirements for construction, refurbishment and demolition waste and to generate self-updating performance indicators and benchmark figures. The data for over 100 completed projects has been analysed. The results of the project have produced benchmarks of waste volume generated based on floor area. Table 12.8 below shows these benchmarks indicators for land use scenarios similar to those proposed in the development.

<table>
<thead>
<tr>
<th>Project Type</th>
<th>m(^3) waste/100 m(^2) floor area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Offices</td>
<td>19.6</td>
</tr>
<tr>
<td>Housing</td>
<td>19.2</td>
</tr>
</tbody>
</table>

12.123 These figures are based on waste management techniques prior to the implementation of the SWMP regulations 2008. The Waste Strategy for England 2007 outlines an aspiration for a 50% reduction in construction waste volumes. This target is not a regulatory requirement and the adoption of this reduction target by industry is yet to be seen. We have therefore considered a business as usual approach to waste management in assessing likely construction waste volumes for

\(^{11}\)\text{http://www.smartwaste.co.uk/page.jsp?id=37}
the development i.e. an approach that does not strategically aim to reduce waste for the baseline assessment.

12.124 Land use budgets have been developed for the planning applications showing the likely division of housing, employment facility, retail and leisure facilities. The land use budgets have been used with the BRE Benchmarking performance indicators to provide an estimate of waste volume likely to be generated during construction. This is presented in Table 12.9 below:

Table 12.9 - Waste Estimate as per Land Use Budget

<table>
<thead>
<tr>
<th>Land Use type (both applications)</th>
<th>BRE m² waste/100 m² floor area</th>
<th>Proposed Budget (m³)</th>
<th>Volume of Waste generated from construction (m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>15.0</td>
<td>428000</td>
<td>64,200</td>
</tr>
<tr>
<td>Employment</td>
<td>19.6</td>
<td>650000</td>
<td>127,400</td>
</tr>
<tr>
<td>Retail</td>
<td>15.3</td>
<td>11500</td>
<td>1,760</td>
</tr>
<tr>
<td>Education</td>
<td>12.6</td>
<td>3x Primary, 1x Secondary (assume primary school site of c.2 Ha and secondary school site of c.8 Ha.) = 140000</td>
<td>17,640</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>211,000</td>
</tr>
</tbody>
</table>

N.B. BRE consider an average residential property is considered to be 80m², the development proposals total 5350 units.

12.125 This suggests that the mixed use development may produce 211,000m³ of waste materials, during construction. This figure does not include material waste from infrastructure development and assumes that all soil materials will be managed and kept on site.

12.126 The “do-nothing” scenario in this case would result in all demolition material being disposed of to landfill and all construction materials (such as aggregate) being sourced from non-recycled sources off site.

12.127 In this scenario there would be an impact on landfill capacity and the natural environment. There would also be an indirect impact from the disposal to landfill of material otherwise suitable for recycling to off site sources; increased vehicle traffic associated with large waste volumes and associated nuisance issues from managing high volume waste streams. The additional waste will have an impact on landfill space at a local level.

12.128 The effects on the main receptor, the waste management infrastructure and the environment will be dependent on the waste management options employed and also
the classification of the waste. If waste is recycled or recovered on the site of production the impacts will be site specific. Recovery/reuse on the site of production during the construction phase is the best environmental option with least environmental impact. If waste is non-hazardous or inert and managed off site the effects may be limited to the regional waste management infrastructure, whereas, if hazardous waste is found on site and it requires disposal, the effects will be National due to the lack of open-gate hazardous waste landfill sites in England. Arisings of construction waste requiring off-site management will have an immediate but temporary and direct effect on the waste management infrastructure over a short duration.

12.129 There would also be profit/losses from the disposal of materials that have a direct value such as materials from the demolition of the buildings and the reuse of construction products.

12.130 If no mitigation measures were employed it is assumed that all construction materials would be imported from between 50-500km away from the sites. This is reflective of a purchasing strategy that acquires cheap materials and allows a certain percentage of wastage due to the “cheapness” of the material. Such cheap materials are likely to come from further afield from nationwide stockist and centralised warehouse depots.

12.131 The demolition and construction phase therefore presents an adverse effect of moderate significance in light of the magnitude of waste materials produced and regional sensitivity.

Operational Activities

12.132 The Environment Agency’s National Waste Production Survey (1999) \(^{12}\) collected data on types and quantities of waste produced, methods of disposal or recovery used, and costs (or income) from 20,000 companies. These companies were a mix of both manufacturing and office based industries. The data shows specific waste streams associated with individual company’s activities, as well as a generic mixed waste stream comprising of standard items such as paper, liquids, and furniture. The data is presented as both the average and maximum commercial or industrial waste volumes generated per annum per company for each specific business sectors.

12.133 A selection of commercial and manufacturing industries from the database were taken as being representative of the likely end use scenarios predicted for the

development. The mixed waste stream was taken from the data set as being generally representative of standard operational waste arisings and therefore we have assumed that there is no business specific waste generated.

12.134 There is a wide variety of data sets representing the volume of household generated waste. With significant investment into curb side recycling over the last 10 years the volume of waste being sent to landfill has been reduced. Peterborough City Council reports, in its recent waste framework, that up to 19% of household waste has been diverted from landfill through basic paper and bottle collection.

12.135 The Government’s waste strategy for England defines targets of: a 20% reduction in commercial and industrial waste by 2012 compared to 2004 levels; household waste to be reduced by 29% by 2010 compared to 2000 levels; and construction waste to be halved by 2010 compared to 2004 levels.

12.136 The most up-to-date quote from Cambridgeshire County Council is that of 481kg of municipal waste per person/year enters landfill. Based on this figure and the average number of occupants per house hold in Peterborough (2.3 people per house, 2001 Census), each residential unit would be expected to produce around 1.1 tonnes of mixed household waste per annum. The use of averages accounts for the likely variations between any single occupancy and family households in waste generation. This is in line with the 2006/2007 waste generation figures presented in PCC recent waste management strategy documentation, which notes over 440,000 tonnes being generated in the region.

12.137 Land use budgets have been provided by David Lock Associates (2009) (see ES Volume 3). This data has been used to quantify the area of the development. Where the number of units for different uses has not been given in this budget (e.g. within the community centre areas and employment areas), an estimate has been made based on data given. An assumption has been made that the area of space designated for the district centre will be c. 56,250m2 and will comprise 20% Retail, 10% Leisure, 10% Health, 10% Community, 20% Residential and 30% Commercial. The split of uses within the district centre (retail, leisure, health, community, residential and commercial) and employment units are an estimate and this land use split within the district centre is therefore an assumption only.

12.138 The Development Framework Plan and land use budgets provide information on an area basis of each land use type rather than the actual number of units/floorspace

\[13\] http://neighbourhood.statistics.gov.uk/dissemination/
being built in any one area. In order to test these areas against the waste benchmarks provided by the EA, we have assumed generic floorspace figures of 1000m² per employment unit, 500m² per retail outlet, 5,000m² per leisure unit, 100,000m² per B8 (warehouse/distribution) unit and 80m² per residential unit. It is acknowledged that these generic floorspace figures are not necessarily related to the size of buildings designed for the development, but are a way of utilising the data, presented in EA database, in relation to the general footprint size of the development at Great Haddon. Table 12.10 below sets out the estimated operational waste volumes.

Table 12.10- Operational Waste Volumes

<table>
<thead>
<tr>
<th>Land Use type</th>
<th>Weight of Waste per company (tonnes/ annum)</th>
<th>Proposed Budget</th>
<th>Weight of Waste generated from operation (tonnes/annum)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>m²</td>
<td>Number of Units</td>
</tr>
<tr>
<td>Housing</td>
<td>1.10</td>
<td>428,000</td>
<td>5350</td>
</tr>
<tr>
<td>Employment (B1, B2)</td>
<td>100.26</td>
<td>50,000</td>
<td>50</td>
</tr>
<tr>
<td>Employment (B8)</td>
<td>103.73</td>
<td>600,000</td>
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<td>Community Centre:</td>
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<tr>
<td>20% Retail</td>
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<tr>
<td>10% Health</td>
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<td>1</td>
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<tr>
<td>10% Community</td>
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<td>5,625</td>
<td>2</td>
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<tr>
<td>20% Residential</td>
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</tr>
<tr>
<td>30% Commercial</td>
<td>100.26</td>
<td>16,875</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td></td>
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</tbody>
</table>

12.139 The Great Haddon development as a whole could generate an approximate 16,438 tonnes of municipal, commercial and industrial waste every year that could be sent to landfill.

12.140 A recent statistical study for the entire Cambridgeshire and Peterborough region by Jacobs\(^4\) suggests that an extra 65,000 tonnes of controlled waste will be generated

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by 2011 compared to 2006 levels and 209,000 tonnes by 2016. Based on these broad assumed figures, if the Great Haddon development were to produce 16,438 tonnes per annum this would potentially represent 8% of additional waste arisings in 2016 year.

12.141 Provision for additional landfill space has been considered within the Minerals and Waste Development Plan Documents to accommodate Peterborough’s need for additional development. The waste from any new development will have an impact on this additional landfill space at a local level if the Minerals and Waste Development Plan is not taken forward. The Minerals and Waste DPD also sets out the requirement for additional waste treatment facilities to meet current waste demands. Additional municipal waste from the development would therefore likely add to these demands if no further waste management facilities are developed.

12.142 It is reasonable to assume that the majority of new developments will aim to meet or increase recycling efficiency (to standards set out in the Waste Strategy for England) and therefore would be integrated into the local authority’s current waste management systems (which includes a recycling efficiency of 40%)\(^5\).\(^6\). Even with a 40% recycling efficiency a significant volume of waste would arise from the operation of the development. Operational waste is considered to have an adverse effect of moderate significance in light of the magnitude of waste materials produced and regional sensitivity. This assumes a scenario whereby the Cambridgeshire and Peterborough Minerals and Waste Development Plan Documents are not adopted in August 2009 prior to the commencement of the development. If the DPDs are adopted the resulting waste management infrastructure is likely to increase recycling efficiencies in the area and drive down the impact of waste from the sites.

**Minerals Impacts**

12.143 The baseline assessment has presented a scenario that there is no intention to extract clay from within the application sites due to the reasons set out in paragraphs 12.102 to 12.112.

\(^5\) http://www.cambridgeshire.gov.uk/NR/rdonlyres/2F34A024-D59E-49BE-A6FA-C1458470080C/0/Appendix3BaselineReport.doc

\(^6\) http://www.recap.co.uk/pdf/headline-strategy.pdf
12.144 In light of this information the development over the Orton and Haddon reserves would not affect mineral abstraction within the Peterborough area. The impact on mineral abstraction is therefore neutral.

Mitigation

Demolition and Construction

12.145 Incorporating mitigation measures will lead to an increase in recycling rates of all demolition and construction waste materials. For example the use of recycled aggregate from the demolition phase, during construction has potential to present a 100% recycle rate and therefore not impact landfill space. Mitigation has the potential to reduce the impacts of demolition and construction waste to a minor magnitude.

12.146 In order to mitigate against waste generation volumes a waste management strategy will be devised for the development. For demolition and construction this waste management strategy will take the form of a site waste management plan. The principles of the waste management strategy for this development have been included in the Construction Waste Management Plan (see Appendix 12.1 in ES Volume 3).

12.147 It is widely considered that recycling levels of 80% and more are achievable on most demolition materials. It is recommended that the ICE (Institute of Civil Engineers) Demolition Protocol be adopted as following this protocol can facilitate the minimisation of waste and recovery of wastes from demolition. It also highlights possibilities and opportunities for the incorporation of recovered materials in new-builds and ensuring best practice methodologies are adopted. Mitigation through the preparation of a Site Waste Management Plan for demolition has the potential to meet and exceed this level resulting in a slight to moderate impact at a local to regional level. Increasing recycling rates and localising waste treatment will reduce this impact to a minor or negligible level.

12.148 It is assumed that some level of earthworks (enabling works) will be required on site if only to allow for the provision of foundations and amenities and therefore waste will definitely arise. Excess arisings from the earthwork phase may include soil (top and sub soils), sands, gravel and foundation debris. CIRIA guides C528 and C529 as detailed above offer best practice for the storage and reuse of materials arisings from earthworks.

12.149 Subject to agreement from the Environment Agency, materials are only normally regarded as waste when they leave the site of production or if they require on-site treatment. Consideration should therefore be given to engaging with the Environment
Agency to obtain a local area agreement. Obtaining such an agreement will mean excess materials on site may not become subject to regulatory controls and therefore vastly broadening options for managing the materials. Re-using and recycling materials on site has a secondary beneficial indirect effect as it prevents the importation of virgin materials. It is therefore recommended that once the quantities and classification of materials are known, the Environment Agency be contacted to discuss such an agreement with a view to ensuring all excess site materials are used on site within for instance, re-grading and re-profiling of the sites or in flexible landscaping. Only materials which have no certainty of use and are surplus should be sent off-site, preferably to a waste management site offering recovery or re-use options as opposed to disposal.

12.150 Furthermore, where top-soil and sub-soil are displaced and kept on site with a view to future use on the site of production, they should be kept clearly segregated to facilitate re-use.

12.151 A Site Waste Management Plan (SWMP) will be produced from the design stage onwards to inform the adoption of good practice waste minimisation in the design. The SWMP will be implemented for all construction site activities. The use of SWMPs along with adopting the good practice contained within CIRIA C528 17.

12.152 The SWMP is required to set targets for waste reduction and recovery based on an assessment of the likely composition and quantity of waste arisings and identification of the most significant cost effective options for improvement. This will be supplemented by information on how the targets will be achieved during construction activities and how the actual levels of waste reduction and recovery will be monitored for comparison with the targets set. The Government Waste Strategy for England 2007 sets waste reduction targets at 50%. Targets greater than this are often achieved where investment into waste management strategies are high.

12.153 The SWMP will also set standards for quality control and resource management to control and minimise waste through ensuring that over-ordering, materials spoilage and disposal of significant off cuts do not contribute to waste arisings.

12.154 It is recommended that the principles of MMC (Modern Methods of Construction) 18 are adhered to. Such methods include supply chain specifications, prefabrication and

17 CIRIA – Environmental Handbook for building and civil engineering projects – Part 2 – the construction phase.

18 http://www.englishpartnerships.co.uk/mmc.htm
off-site assembly. MMC can make more effective use of materials, enables high standards of design quality and can help reduce resource consumption. Local procurement initiatives can be set up to enable buy back of surplus produce and “supply when needed” strategies. Such initiatives will remove the cheap material wastage mentality in the construction process. The reduction in waste materials will reduce the need to buy surplus stock, saving money. This will have an indirect effect on longer distance supply requirement reducing road traffic impacts. In order to consider a reduction in waste traffic movement a materials logistic plan could facilitate the management of vehicle movement.

12.155 It is recommended that there is at least one ‘waste champion’ on site whose responsibilities shall include all aspects of on-site waste management and who will also be responsible for on site waste awareness activities such as tool box talks.

Operational Waste

12.156 The increase in municipal waste generation from the development will impact upon the local and regional waste management infrastructure and landfill capacity. This is recognised through the Cambridgeshire and Peterborough Minerals and Waste Development Plan Documents and as such the process of mitigating against the impact of future development within the Peterborough region has already started to commence.

12.157 Mitigation through implementation of an operational waste strategy, outlining provision of improved recycling infrastructure and localisation of waste treatment would reduce the impacts on landfill capacity and current waste management facilities. As such this would result in a significance of only slight magnitude.

12.158 An outline of the principles that will be adopted in this Waste Management Strategy are provided in Appendix 12.2 (see ES Volume 3). This will provide a framework of mitigation measures to enable more effective reduction, reuse and recycling of municipal and commercial waste for the occupiers of the development.

12.159 From this outline stage, detailed waste management strategies should set out procedures to deal with waste arisings in conjunction with local networks of waste management facilities to enable best practice reuse and recycling of different waste streams. The plan will also suggest site-wide initiatives and strategies to manage waste more effectively.

12.160 Currently the Cambridgeshire and Peterborough Minerals & Waste Site Specific Proposals Development Plan Preferred Options outlines the potential for a waste management facility to be built and developed in the region of South Peterborough.
Two locations are suggested: namely Hampton and London Road. The Mineral and Waste Development Plan Documents note that either a commercial waste material recycling facility or a household waste material recycling facility should be considered for the area.

12.161 Within the Employment Area application, land for B8 uses is proposed. The Employment Area application site is located on the south western edge of Peterborough and therefore naturally sits within the Waste Site Specific Proposals Development Plan Area of Search. The Development Framework Plan for Great Haddon (PST021/DFP/01/Rev I) includes an annotation within the employment area indicating a suitable location for a household waste management facility to serve the development and/or the wider area. Such a facility may also be able to service the additional operational waste generated from both the residential and commercial end use. In addition the facility could also service additional regional waste arisings. With innovative design the facility may not necessarily impact on the wider surroundings, although environmental issues such as noise, air quality, odour and traffic would be addressed at the time a detailed application was submitted for such a facility.

12.162 The Waste Core Strategy DPD states that “provision (of materials recycling facilities) will be made close to the source of waste arising in accordance with the principles of sustainability and proximity, and wherever possible this will take the form of site specific allocations.”

12.163 Typically a household waste material recycling facility will vary in size depending on the volume of waste being generated in the region. Examples across the UK show that a facility of approximately 2ha footprint with a sorting shed of 5000m2 would be sufficient size to recycle 93,000 tonnes of waste per annum. A smaller facility of approximately 2000m2 can be considered to manage around approximately 23,000 tonnes per annum.

12.164 Based on the size of the development proposed at Great Haddon and the potential for addition waste to be imported from the surround land uses a smaller facility would be potentially viable for the sites. The final size and requirement of a household material recycling facility would need to be agreed with the local authority. The size

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19 http://www.hills-group.co.uk

20 http://www.milton-keynes.gov.uk

21 http://www.greenstar.co.uk
of a private commercial recycling facility would be dependent on the company willing to operate within the region. Depending on a company’s profile and specialism in certain recyclates a facility’s size can vary greatly; for example a metal recycling merchant can operate within a shed of 1000m² compared to bulk commercial paper waste recycling operation requiring 20,000m². The final size of a commercial recycling facility should be considered alongside the local authority’s requirements and the range of materials that could be recycled within the region.

12.165 Sustainable energy production is a major issue when planning new developments. For a development of the scale produced at Great Haddon, with the appropriate infrastructure in place to process waste streams (commercial or residential), waste potentially could be used to produce energy and fed either to the grid or the local development. In addition to the energy benefits, such a facility will help reduce the volume of waste being sent to landfill from the local area. Decentralised energy from waste production reduces impacts associated with the transport of waste to a centralised plant and transmission losses associated with import of electricity from off site. Further consideration of these issues is set out in the Great Haddon Energy Strategy submitted in support of the applications.

Minerals Status

12.166 The impact of the development on local and regional mineral resources is considered to be neutral. Therefore, no mitigation measures are considered to be necessary.

Residual Impacts

12.167 It is considered likely that with the mitigation measures in place the impacts will be reduced substantially, with the residual effect in terms of reuse/recycling of the demolition and construction waste reducing to ‘minor to negligible’ adverse effect.

12.168 With the backing of appropriate infrastructure and a waste management strategy the waste arising from the operational phase of the sites is likely to be reduced to ‘minor to negligible’ adverse effect.

12.169 In light of the research undertaken on the clay reserves within the application sites it is considered that the development is likely to have a ‘neutral’ effect on mineral deposits in the area.

12.170 The assessment is considered to have a medium certainty. The assessment has used published Environment Agency data and parameters set out in the design of the development. The certainty has though used assumptions with regard to the methods of construction and the materials to be used. However, the procedures will
be put in place to ensure that the performance is monitored as the project progresses.

Cumulative and Interactive Effects

12.171 After mitigation the cumulative impacts on waste and minerals will be minimal. Waste with a residual impact of minor to negligible adverse effect is unlikely to add environmental impacts at the sites. However, waste will add to a wider Peterborough waste collection process, and is seen as a potentially valuable resource which can be used to contribute to the city’s energy from waste facility(ies).

Summary Matrix of all Impacts Before Mitigation

<table>
<thead>
<tr>
<th>Issue</th>
<th>Description of impact</th>
<th>Geographical significance</th>
<th>Impact</th>
<th>Significance</th>
<th>Duration</th>
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<tr>
<td>Minerals and Waste</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Increase waste volumes</td>
<td>During Construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Increase waste volumes</td>
<td>On Completion</td>
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Summary of Mitigation and Enhancement Measures and Residual Effects

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<th>Issue</th>
<th>Description of impact</th>
<th>Mitigation/enhancement measures</th>
<th>Residual Effects</th>
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<td>Negligible adverse effect</td>
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<tr>
<td>Increase waste volumes</td>
<td>On Completion</td>
<td>Management and appropriate</td>
<td>Negligible adverse effect</td>
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13.0 ENERGY AND UTILITIES

Introduction and Scope of Assessment

13.1 This Chapter of the ES discusses the environmental impacts associated with utilities, services and energy generation associated with the development. The assessment identifies potential diversions and upgrading works required to accommodate the proposed development. Information on these utilities and services was obtained through consultation with the relevant utilities and service providers and a review of their plans of the sites, where these were available. The plans which were reviewed are assumed to be up-to-date and show the general location of utilities/services.

13.2 Further, paragraphs 13.117 to 13.153 of this chapter explore the potential integration of renewable energy and low carbon solutions into the proposed development. Although this chapter of the ES demonstrates that any adverse impacts on utilities can be mitigated by 'traditional' measures, the ability of the development to provide energy/utilities through the adoption of renewable energy and low carbon solutions is also explored.

13.3 The integration of renewable energy and low carbon solutions into the development would also contribute towards meeting Code for Sustainable Homes Levels, BREEAM targets and Government targets.

Reference Material and Assessment Method

National Policy

Government’s Sustainable Development Agenda - Securing the Future.

13.4 The UK Government has four priority areas for sustainable development; these are:

- Sustainable consumption and production
- Climate change and energy
- Natural resource protection and environmental enhancement
- Sustainable communities

13.5 The Government recognises that encouraging a change in behaviour is a key to promoting their sustainability priorities. The principles and approaches are covered in Securing the Future - the UK Government's Sustainable Development Strategy (2005).
Planning Policy Statement 1 (PPS1) - Planning for sustainable development

13.6 The Government’s Sustainable Communities Plan was published in February 2003 and established a key planning policy context for growth and regeneration. The aspirations of the Communities Plan are being continually reinforced by emerging policy guidance including that in PPS 1: Delivering Sustainable Development, published in January 2005. The Statement sets out the Government's overarching planning policies on the delivery of sustainable development through the planning system. Paragraph 5 of PPS1 sets out the framework for sustainable planning which should:

- “make suitable land available for development in line with economic, social and environmental objectives to improve people’s quality of life;
- contribute to sustainable economic development;
- protect and enhance the natural and historic environment, the quality and character of the countryside, and existing communities;
- ensure high quality development through good and inclusive design, and the efficient use of resources; and,
- ensure that development supports existing communities and contributes to the creation of safe, sustainable, liveable and mixed communities with good access to jobs and key services for all members of the community. “

Supplement to PPS1 (Planning and Climate Change)

13.7 PPS1 Supplement Planning and Climate Change (published December 2007) sets out how planning, in providing for the new homes, jobs and infrastructure needed by communities, should help shape places with lower carbon emissions and resilient to the climate change now accepted as inevitable.

Planning Policy Statement 22 (PPS22) - Renewable Energy

13.8 PPS22 (2004) gives guidance on the various types of renewable energy sources and how planning authorities should consider the opportunity for incorporating renewable energy projects in all new developments. It promotes the use of “solar panels, biomass heating, small scale wind turbines, photovoltaic cells and combined heat and power schemes”. It states that local planning authorities may include policies in local development documents that require a percentage of the energy to be used in new development to come from on-site renewables.
Climate Change and Energy Bill

13.9 The use of energy has become a subject of global geopolitical importance in recent times. Energy supply and demand has therefore needed to be regulated by the Government. The main legislative driver for managing and implementing the control of energy issues is the Climate Change Bill 2008 and Energy Bill 2008.

13.10 The Energy Bill implements the legislative aspects of the 2007 Energy White Paper: “meeting the energy challenge”. It provides the basis of regulatory change to meet the needs for energy generations, energy infrastructure and promotion of low carbon technologies.

13.11 The Climate Change Bill puts into statute the UK’s targets to reduce Carbon Dioxide emissions through domestic and international action by at least 60% by 2050 and at least 26% by 2020 (against 1990 baseline).

Regional Policy


13.12 The RSS or East of England Plan sets out the regional strategy for planning and development in the East of England to the year 2021. Policy ENG1 ‘Carbon Dioxide Emissions and Energy Performance’ states:

“Working with regional partners, EERA should consider the performance of the spatial strategy on mitigating and adapting to climate change through its monitoring framework and develop clear yardsticks against which future trends can be measured, which should inform the review of the RSS and the preparation of Local Development Documents. To meet regional and national targets for reducing climate change emissions, new development should be located and designed to optimise its carbon performance. Local authorities should:

- encourage the supply of energy from decentralised, renewable and low carbon energy sources and through Development Plan Documents set ambitious but viable proportions of the energy supply of new development to be secured from such sources and the development thresholds to which such targets would apply. In the interim, before targets are set in Development Plan Documents, new development of more than 10 dwellings or 1000m2 of non-residential floor space should secure at least 10% of their energy from decentralised and renewable or low-carbon sources, unless this is not feasible or viable; and

- promote innovation through incentivisation, master planning and development briefs which, particularly in key centres for development and change, seek to
maximise opportunities for developments to achieve, and where possible exceed national targets for the consumption of energy. To help realise higher levels of ambition local authorities should encourage energy service companies (ESCOs) and similar energy saving initiatives."

13.13 Policy ENG2 ‘Renewable Energy Targets’ states:

“The development of new facilities for renewable power generation should be supported, with the aim that by 2010 10% of the region’s energy and by 2020 17% of the region’s energy should to come from renewable sources. These targets exclude energy from offshore wind, and are subject to meeting European and international obligations to protect wildlife, including migratory birds, and to revision and development through the review of this RSS.

Local Policy

Cambridgeshire and Peterborough Structure Plan 2003

13.14 After the approval of the East of England Plan in May 2008 all but 13 of the policies in the Plan have been superseded. Following the approval of the East of England Plan by the Secretary of State on the 12 May 2008, 13 policies from the Cambridgeshire and Peterborough Structure Plan 2003 remain in force. Of these only Policy P9/8 ‘Infrastructure Provision’ is considered relevant here. It states that

“A comprehensive approach will be adopted to secure infrastructure needed to support the development strategy for the Cambridge Sub-Region. Sources of funding and land holdings will be brought together within a co-ordinated infrastructure programme to be delivered by a partnership constituted by the local authorities and other key stakeholders. The programme will encompass:

- other utilities and telecommunications.

All development likely to have a definable impact on infrastructure requirements will be expected to make provision for infrastructure accommodating local impacts and also contribution to the needs of the Sub-Region as a whole. This provision is to be delivered through the joint partnership mechanism on the basis of Supplementary Planning Guidance which will set out a transparent and equitable method for the collection of contributions towards the Sub-Region infrastructure requirements. Local plans will indicate major infrastructure requirements and any implications for the phasing of development. A commitment to the provision of associated infrastructure will be required before development is permitted”. 
**Peterborough Local Plan (First Replacement) (2005): Saved Policies**

13.15 The Planning and Compulsory Purchase Act 2004 includes transitional arrangements from the “old” Local Plan system to the “new” LDF plan preparing system. During this transitional period policies from the statutory development plan (under the provisions of the Town and Country Act 1990) remain in force for a period of time. This can be extended and the Secretary of State (SoS) has the power to make a Direction to extend the period for saved policies beyond their normal expiry date in certain circumstances.

13.16 The SoS agreed in July 2008 that Peterborough City Council could to save all but 20 of the previously saved policies until further notice or until they are replaced by policies in the LDF. The relevant saved policies are:

13.17 Policy U1 ‘Water Supply, Sewage Disposal and Surface Water Drainage’ states that “development which increases the demand for off or on site water supply, sewage disposal or surface water infrastructure will only be permitted if facilities of adequate capacity and design are available, or will be provided without detriment to the environment, prior to the occupation of the development. Where improvements in off-site infrastructure are programmed, the commencement of development will be co-ordinated with their provision”.

13.18 Policy U15 ‘Site for Renewable Energy Production’ refers to a specific site in Peterborough, (5.0 ha site to the south of Storey’s Bar Road) that is not near this development so does not apply.

**Local Development Framework Core Strategy Preferred Options (March 2008)**

13.19 The Policies contained within the Peterborough Core Strategy Preferred Options Report are included although these policies are currently in draft form and are subject to the outcome of the latest consultation and also the EiP likely to take place in mid 2010.

13.20 The relevant policies in terms of energy are the Preferred Options CS3, CS9 and CS10. Policy CS3 ‘Urban Extensions’ states that:

“Development of each new urban extension must be planned and implemented in a comprehensive way that is linked to the delivery of key infrastructure. Each area (other than Red Brick Farm) should provide for…

- design solutions that maximise the use of energy from on-site renewable and/or decentralised renewable or low carbon energy sources; maximise energy efficiency; …”
13.21 Policy CS9 'Resource Efficiency' states that with regard to large scale development:

"Proposals for large residential development and all major non-residential development must demonstrate that:

Each residential unit to be delivered meets Code for Sustainable Homes Level 4 (CfSH4) from the adoption of this Core Strategy to 2013; meets CfSH5 from 2013 to 2015; and meets CfSH6 from 2015 onwards as a minimum; and

Non-residential development will be compliant with a BREEAM/Eco-building assessment rating of at least ‘Excellent’ from the adoption of this Core Strategy; and

At least 15% of the demand for energy will be met from on-site provision and by renewable means, and/or from a decentralised renewable or low-carbon energy supply, from adoption of the Core Strategy; rising to at least 40% from 2016 and at least 50% from 2020."

13.22 Policy CS10 'Renewable Energy' states that:

"Permission will only be granted if the developer has satisfactorily addressed the following on an individual case by case basis:

- use of the most appropriate technology for the site;
- measures to mitigate any adverse effects on the amenities of occupiers of nearby properties during the construction, operational lifespan and decommissioning of the equipment/infrastructure;
- provision for the protection, preservation and/or mitigation for any features of strategic, cultural, agricultural, ecological, historic and/or archaeological importance, including landscape character - where relevant (as described in detail within other policies in the development plan)."

13.23 Although it is understood that in response to representations, these two policies are to be reviewed prior to the submission of the Core Strategy to government, Policies CS9 and CS10 do set out the Council’s aspirations for integration of renewable and low carbon technologies as part of proposals for large scale growth.

Building Regulations Part L

13.24 The build out for this development is expected to commence in 2011 and run until 2026 approximately. The build-out will be phased and Part L of the building regulations is currently scheduled to be revised for residential buildings in 2010, 2013 and 2016. In addition, for residential buildings, the "Dwelling Emission Rating" will have to be decreased in this time frame from the "Target Emissions Rating" as
follows; 25% in 2010; 44% in 2013, and zero carbon by 2016. This is measured against current building regulations (2006). Building regulations are also expected to change for non-residential buildings such that they are zero carbon by 2019. As such the low carbon and renewable technologies integrated into this development will need to reflect these changes.

13.25 It should be noted that the current definition and timescale for zero carbon is under review.

Assessment Method

13.26 Predictive utility/energy demands for the proposed developments have been calculated.

13.27 Information on the utilities and services was obtained through consultation with the relevant utilities and service providers and a review of their plans of the sites, where these were available. For the purposes of this ES these have been assumed to be the “Baseline Ground Condition” for the sites. The plans which were reviewed are assumed to be up-to-date and show the general location of utilities/services including:

- Electricity
- Gas
- Portable Water
- Foul Water Drainage
- Surface Water Drainage
- Telecommunications

13.28 For each service the utility provider has given an assessment of the likely reinforcement and/or upgrades to their networks and potential diversions and for the purposes of the ES this is reported as the potential impact for the sites.

13.29 Again for the purposes of this ES, “Mitigation Measures” have been reported in this section in terms of providing these reinforcements, upgrades and potential diversions.

Assessment Method - Renewables

13.30 Alternative long term measures for providing the energy and utility requirements for the proposed development have been explored by investigation of on-site renewable energy and low carbon solutions (see paragraphs 13.117 to 13.153 for details).
13.31 The potential ‘additional mitigation’ which might be achieved through these measures has been assessed by calculating the Carbon Dioxide emission reductions using the predictive energy demands for the electrical and gas usage.

13.32 Carbon Dioxide emission reductions have been chosen as a way to “measure the mitigation” rather than “energy reductions” because for most of the renewable energy solutions there are no reductions in energy demand as such; the benefit comes from the reductions in Carbon Dioxide emissions. The Carbon Dioxide emission reductions that could be made by integrating renewables have been reported on.

13.33 Low carbon and renewable technologies have been investigated as to the suitability for the sites. These include:

- Combined Heat and Power (CHP)
  - Gas fuelled CHP
  - Renewably fuelled CHP
- Wind (small, medium and large scale)
- Biomass Boilers
- Energy from Waste
- Solar Thermal Panels
- Photovoltaic Panels
- Ground Source Heat Pumps and Pond Source Heat Pumps
- Air Source Heat Pumps
- Energy Efficiency Measures

13.34 Other renewable solutions such as wave and hydro are not a possibility at the sites due to the absence of a suitable water source.

Assumptions, Limitations and Technical Difficulty

13.35 The predictive utility/energy demands for the sites were calculated at a high level in terms of the electrical (instantaneous and annual loads), gas (peak hourly and annual loads), potable water (daily and peak loads) and foul water loads. This was based on information provided within the Great Haddon Summary Land Use Budget rev A (dated 2-10-08) (see Appendix 1 of Energy Strategy document submitted in support of the outline applications).
13.36 The Predicative Energy/Utility demands are based on the current Development Framework Plan (PST021/DFP/01 rev I). If the Development Framework Plan is revised as part of the determination of the outline applications, then an updated predictive energy/utility design should be carried out. Any figures given at this time are therefore indicative only.

13.37 For each utility a loading factor has been used based on recognised loading units used in the utility industries and energy industry. For each utility the acceptable level of service set by their regulator has been used e.g. for water pressure and flow rate.

13.38 As stated earlier, for each service the utility provider has given an assessment of the likely reinforcement and/or upgrades to their network infrastructure and PBA LLP through consultation with the incumbent utility providers (electricity, foul drainage, gas, potable water and telecommunications) have established the likely points of connection to supply the proposed development.

13.39 As a note, ‘Onsite apparatus’ refers to the infrastructure present within the boundaries of the sites. ‘Offsite apparatus’ refers to the infrastructure present in the vicinity of the proposed development but outside of the application site boundaries as shown on Figure 13.1 (plan ref: 15188/08, Revision A) (see ES Volume 2).

Impact Assessment Criteria

13.40 The assessment of the significance of the impact of the utility/energy strategy of the sites comes from the impact of the strategy in meeting required levels of sustainable use.

13.41 The reality of the importance of energy and its influence on climate change will inevitably mean the importance and therefore sensitivity of energy will always be high. An additional assessment of energy impacts has therefore been provided.

13.42 The magnitude of the impact influences the significance assessment. The magnitude will reflect the nature and characteristics of the impact. The impact will be quantified and will follow the terminology in Table 13.1 below:

Table 13.1 Magnitude/Nature of Impact

<table>
<thead>
<tr>
<th>Major</th>
<th>Considerable impact of more than local significance in relation to relevant legislation, policy and/or standards.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate</td>
<td>Limited impact of more than local significance in relation to relevant legislation, policy and/or standards.</td>
</tr>
</tbody>
</table>
Minor | Slight impact of more than local significance in relation to relevant legislation, policy and/or standards.
---|---
Negligible | No change of more than local significance in relation to relevant legislation, policy and/or standards.

13.43 The nature of the impacts will then be expressed as:

- **Adverse** – detrimental or negative impact to an environmental resource or receptor; or

- **Neutral** – no significant impacts on the environmental resource or receptor; or

- **Beneficial** - advantageous or positive impact to an environmental resource or receptor

13.44 The final assessment of significance is based on the relationship between the magnitude of the impact and its importance. The levels of significance effect (either beneficial or adverse) are defined as shown in Table 13.2.

13.45 For the purposes of this assessment, the duration of an impact will be described as: *Short term, Medium term, Long term or Permanent*

<table>
<thead>
<tr>
<th>Table 13.2 Definitions of Overall Assessment Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Major significant effect</strong></td>
</tr>
<tr>
<td><strong>Moderate significant effect</strong></td>
</tr>
</tbody>
</table>
Minor significant effect

These effects may be raised as local issues but are unlikely to be of importance in the decision-making process. Nevertheless they are of relevance in enhancing the subsequent design of the project and consideration of mitigation or compensation measures.

No significant effect

No effect or effect which is beneath the level of perception, within normal bounds of variation or within the margin of forecasting error.

Baseline Conditions

**Electricity**

13.46 Existing electricity infrastructure on and offsite is shown on Figure 13.1 (plan ref: 15188/08 Rev A) (see ES Volume 2) and is summarised below:

13.47 The application sites have a number of High Voltage (HV) cables on or about their boundaries. However, EDF Energy, the incumbent provider for the area, has advised that there is currently little spare capacity within its existing local network and offsite reinforcement will be required to supply the proposed development. Specific details with regard to potential electricity supply options are discussed below under mitigation measures.

13.48 On site generally, the existing HV network is located on or about the boundaries of the sites; however, at the following locations HV cables/lines intrude on to the site:

- Adjacent to the A1(M) there are HV lines underground
- Overhead HV cables in a track off New Road close to Toll Gate House
- Off A1139 Fletton Parkway and close to the New Road junction.

13.49 Off site there are underground HV cables generally bordering the sites, but notably in the verge of the A1(M); within the carriageway of the A15 London Road; in Yaxley and the A1139 Fletton Parkway. However, as stated above there is little spare capacity within this infrastructure.

**Gas**

13.50 Existing gas infrastructure is illustrated on Figure 13.1 (plan ref: 15188/08 Rev A) (see ES Volume 2) and is summarised below:

13.51 On site: from a review of both National Grid and Envoy records there are no gas mains within the areas currently outlined for the development.
13.52 Off site: the sites have Low Pressure (LP) gas mains close to their boundaries, north of Fletton Parkway and in the carriageway of the A15 London Road and in and around Yaxley. Generally the size and Low Pressure rating of these mains make it likely that these are at the limits of the existing gas distribution system and therefore unlikely to be suitable as a source of connection and supply to the proposed development.

13.53 However, it is known that there are Medium Pressure (MP) and Intermediate Pressure (IP) gas mains in the vicinity of the proposed development sites and capacity enquiries made to National Grid and Envoy (both companies manage and own gas infrastructure within the area) has identified two potential points of connection onto the above infrastructure to supply the proposed development. Further information is provided within mitigation measures below.

**Potable Water**

13.54 Existing potable water supply infrastructure on and off site is shown on Figure 13.1 (plan ref: 15188/08 Rev A) (see ES Volume 2) and is summarised below.

13.55 There are generally potable water mains surrounding the sites but only the existing 1000mm diameter ductile iron (DI) watermain to the north of the Employment Area site has spare capacity to supply the proposed development.

13.56 On site: the existing 1000mm DI trunk watermain mentioned above is protected by a minimum of a 12 metres easement. This easement impinges slightly on the northern boundary of the Employment Area adjacent to the A1139 Fletton Parkway. However, it is anticipated that the existing trunk main and its easement will be protected and accommodated within detailed development layouts.

13.57 There will be benefits in accurately locating the existing 1000mm diameter DI trunk watermain prior to detailed design by hand dug trial holes as AWS advise that record drawings are an approximate position only.

13.58 Off site: there are other watermains at or close to the boundaries of the application sites; the most notable of these is the 12” diameter AC watermain situated within the A15 London Road.

**Foul Water Drainage**

13.59 Existing public foul water sewers on and off site are shown on Figure 13.1 (plan ref: 15188/08 Rev A) (see ES Volume 2) and are summarised below:
13.60 There are generally public foul water sewers within the residential areas surrounding the sites and within the A15 London Road. However, none have any significant available capacity and it is likely that only elements of the early phases of development can be accommodated by the existing infrastructure and then dependant on phasing. AWS’ interim proposals are discussed below in Mitigation measures.

13.61 On site: there are no existing public foul water sewers within the areas identified for the proposed development.

13.62 Off site: AWS’ public sewer records show a number of foul sewers close to the sites.

13.63 A foul water drainage strategy has been developed in conjunction with Anglian Water Services which is shown on Figure 13.2 (plan ref: 15188/400/07) (see ES Volume 2) and summarised below:

- The northern parts of the Employment Area located in the north west of the development area will drain by gravity sewers to a small foul water pumping station, located in the south east corner of employment area E3, with a rising main routed eastwards and discharging to new gravity sewer to be constructed in the access road;

- The gravity sewer from the north western parts of the Employment Area together with those serving the Core Area will drain by gravity sewers to a new foul water pumping station, located to the north of Stanground Lode with a rising main routed, via the committed Hampton Western Peripheral Road (WPR), to a new discharge manhole constructed on the existing public sewer in Goldhay Way north of the A1139 Fletton Parkway.

**Surface Water Drainage**

13.64 From a review from AWS’ records no public surface water sewers are present within or adjacent to the application sites.

13.65 Although no public surface water sewers have been identified on site it is reasonable to assume that field drains and ditches will drain to the existing ponds on site. The more substantial of these, especially where a flow of water can be identified, are likely to be the assets of the Environment Agency (EA).

13.66 It is assumed that liaison with the EA will be ongoing throughout the development. The substantial water courses have been accommodated within the design of development as shown on the Development Framework Plan (PST021/DFP/01 rev I).
13.67 Off site there is no known off-site surface water drainage infrastructure affected by the proposed development.

**Highway Drainage**

13.68 Highway drainage infrastructure is present along the A15 London Road, the A1139 Fletton Parkway and the A1(M).

**Telecommunications**

13.69 Existing telecommunications infrastructure on and off-site is shown on Figure 13.1 (plan ref: 15188/08 Rev A) (see *ES Volume 2*) and is summarised below. There are generally telecommunications cables/lines in and around the sites and these are described below.

13.70 **British Telecom (BT):** On site. A BT overhead line has been identified running the length of New Road from the old A1 to a point approximately 50 metres from the site boundary with Fletton Parkway: at this point the cable turns 90° to New Road before appearing to terminate at Upper Lodge Farm. It is assumed at this stage that this will be decommissioned as part of proposed development in this location.

13.71 **British Telecom (BT):** Off site. BTs’ records also indicate a number of cables surrounding the sites in the A15 London Road, the old A1 and the north side of the A1139 Fletton Parkway. Further liaison with BT will be required during the detailed design stages to accurately locate those cables which may be affected and require protection and/or diversions at the locations of the proposed new access roads.

13.72 **Kingston Telecommunications Ltd:** Kingston Telecommunications have confirmed that they do not have any apparatus in close proximity to the proposed development areas and are therefore not affected.

13.73 **Cable & Wireless:** Cable & Wireless have confirmed that they do not have any apparatus in close proximity to the proposed development areas and are therefore not affected.

13.74 **Telewest - Virgin Media / Easynet / NTL:** On site: Virgin Media (Telewest) records show that they do not have any apparatus in close proximity to the proposed development areas and are therefore not affected.

13.75 **Telewest - Virgin Media / Easynet / NTL:** Off site: Virgin Media (Telewest) have confirmed that they have fibre-optic cables within the A15 London Road and also within the A1139 Fletton Parkway. Further liaison will be required during the detailed...
design stages to accurately locate those cables which may be affected and require protection and/or diversions at the locations of the proposed new access roads.

**Pipelines**

13.76 British Pipeline Agency (BPA) & Government Pipelines and Storage Systems (GPSS): A decommissioned government pipeline has been identified lying generally in a northeasterly direction from the Barrack ground to Yaxley. Fisher German, (appointed Land Agent to the GPSS) has confirmed that this pipe is no longer in use and that all protection granted by the Land Powers Act (Defence) 1958 was extinguished when this section of pipeline was abandoned. However it could not be confirmed how the pipe was left after it was decommissioned. It is common for abandoned oil pipelines to be capped at each end and flooded with water; alternatively an inert gas is sometimes used instead of water. Less commonly pipes are simply capped and left.

13.77 When this section of pipeline was abandoned the ownership of the pipe was passed to the land owner. Decisions regarding the removal or grouting of this pipe rest with the land owner. The GPSS and its agent have no further interest in this pipe.

13.78 It is expected that sections of this pipeline will be removed from the site to facilitate the enabling works for the proposed development in this area. In consultation with Fisher German a list of approved contractors has been obtained who specialise in removal of such pipelines and such removals or making safe of the redundant pipeline will be agreed and necessary procedures implemented at the detailed design stages.

**Private Services**

13.79 Private services are not normally shown on the utility company records: however, individual water, gas, electricity and telecom services are likely to be present serving those properties and businesses within the existing site boundaries. Cess pits and septic tanks are also likely to be present within the confines of the site boundaries for the existing farm dwellings. All services will be maintained, where necessary, during the phased construction of the proposed development and it is assumed redundant services will be terminated and removed at an appropriate time during the proposed development construction phases.
Potential Impacts

Electricity

13.80 Although the site has a number of High Voltage (HV) cables on or about its boundaries, EDF Energy, the incumbent electricity provider, has advised that offsite reinforcement will be required to supply the proposed development.

13.81 Diversion of Electrical Cables, On site: Any diversionary works necessary as a result of the proposed development (for example the deepening of underground cables at proposed new access roads or diverting overhead lines) will be progressed further with EDF Energy at detailed design stages.

13.82 Diversionary works associated with the above overhead HV lines will involve the undergrounding of the HV cables within the proposed new road layouts and require advance outage planning, which may require notifying affected local customers of temporary interruption to supplies to carry out connections and decommissioning works. Again this will be agreed and fully assessed with EDF Energy during the detailed design stages.

13.83 It is considered likely electricity cable diversions will be required at each access point off the A15 London Road and at the access point off of the old A1, south of New Road.

13.84 Diversion of Electrical Cables, Off site: No diversions have been identified off site. New supplies and off site reinforcement are discussed below in Mitigation Measures.

Gas

13.85 Diversion of Gas Mains: Diversionary works have only been identified at the locations of the proposed new access road, off the A15 London Road at the junction of the B1091 where a 63mm Low Pressure gas main belonging to National Grid may need to be diverted or protected. This will be confirmed with National Grid during the design stages.

Potable Water

13.86 Anglian Water Services (AWS) have advised that potable water mains are generally laid at a nominal depth of cover of 900mm; however, the actual depth and location of the water mains at the locations of the proposed new access roads will need to be confirmed by trial holes and the full extent of the works agreed with AWS at the detailed design stages.
13.87 **Diversion of Potable Water Mains:** Diversionary works may be required at the locations of the proposed new access roads and trial holes will be required to identify the location and depth of the watermain infrastructure at these locations. Extra care will be needed with access points off the A15 London Road and off the old A1 where asbestos cement AC watermains have been identified. Hand dug trial holes and close liaison with AWS inspectors will be required to avoid damage to these water mains.

13.88 The 1000 mm diameter DI watermain adjacent to the A1139 Fletton Parkway to the north of the Employment Area is protected by an easement and is not affected by the proposed development.

**Foul Water Drainage**

13.89 **Diversion of Foul Sewers:** There is potential for diversionary works at each of the proposed new access roads off the A15 London Road and requirements for diversion or protection will be confirmed with AWS during the design stage for highway access.

13.90 Potential sources of impact on the baseline ground conditions from the foul water drainage regime include:

a) The increase in foul effluent from the proposed development will increase the load on the sewage treatment works;

b) The proposed regime relies on a pumped outfall which could in the event of failure impact on the adjacent development parcels.

13.91 This is addressed further below under Mitigation Measures.

**Highway Drainage**

13.92 **Diversion of Highway Drains:** It is likely that the highway drains will require localised diversion and/or protection to accommodate the proposed highway access roads at each location.

**Telecommunications**

13.93 **Diversions to Telecommunications Cables:** Diversionary works are likely at the proposed new access roads. The full extent of fibre optics contained within the existing infrastructure will be determined with the relevant telecommunication companies during the detailed design stages of the proposed development. However, as described above (see paragraph 13.75), a BT fibre optic cable is located in the eastern carriageway of the A15 London Road and this will be carefully considered when the new access roads are at the detail design stage.
13.94 Cables have been identified in the A1139 Fletton Parkway, the A15 London Road and the old A1 adjacent to the western boundaries of the sites. There are numerous joint boxes, man holes and other chambers that may require relocation or protection and this will be addressed at the detailed design stage.

Mitigation Measures

Electricity

13.95 Future Requirements: Consultation with EDF Energy, the incumbent electricity provider, has identified that there is insufficient capacity available in close proximity to supply the proposed development.

13.96 EDF Energy has advised that there are currently two aspects of supplying the proposed development which are:

a) upgrading at Peterborough Central 132kV/33kV Grid situated approximately 7km to the northeast of the proposed developments, with approximately 7km of 33kV underground cabling infrastructure and the establishment of a new Primary 33kV/11kV substation within the proposed development, location to be confirmed and agreed with EDF Energy during the detailed design stages; and

b) if the phasing requires an interim solution, upgrading and reinforcement of Orton 33kV/11kV Primary substation, situated approximately 1.5km to the north of the development area, and supplying parts of the proposed developments via 11kV underground cabling infrastructure.

Combined Heat and Power (CHP)

13.97 The Regional Spatial Strategy for the East of England advises that, “before targets are set in Development Plan Documents by the Local Authorities, new development of more than 10 dwellings or 1000m2 of non-residential floor space should secure at least 10% of their energy from decentralised and renewable or low-carbon sources, unless this is not feasible or viable”.

13.98 Combined Heat and Power (CHP) has the potential to reduce Carbon Dioxide emissions at the application sites. The most common fuel supply for CHP in the UK is natural gas.

13.99 The Core Area application and Development Framework Plan make provision for a CHP facility within the District Centre. It is proposed that CHP will produce on-site electricity which will augment the electricity supplied by ‘traditional’ means set out in paragraph 13.96 above, thereby increasing the ability of the development to deliver
energy through renewable technologies. There is not an extensive gas supply at either site, but gas CHP may be viable subject to discussions with gas service providers. Renewable fuel can also be used in the CHP facility (bio-diesel, biomass etc).

13.100 The CHP facility will need regular maintenance to operate efficiently, and will also require district heating networks to supply the heat to the buildings on the sites. A full feasibility assessment will be required into the technical and economical case for CHP as part of the detailed design of the development: however, the impact of providing a CHP facility within the District Centre at Great Haddon has been assessed – particularly in terms of noise and air quality – as part of this Environmental Assessment (see Chapters 10 and 11 respectively).

**Gas fuelled CHP**

13.101 Initial investigations show that Gas CHP modelled to meet the baseline demand only could contribute to the Carbon Dioxide reductions by approximately 5-15%.

13.102 The inclusion of gas CHP for both residential and non-residential units would contribute moderately in the long term towards meeting local/district/government targets for renewable energy and meeting CfSH/BREEAM requirements. Using such technology would likely be of moderate beneficial effect to meeting energy generation requirements.

**Gas**

13.103 Consultation with National Grid and Envoy, the existing gas providers within this area of Peterborough, have confirmed that two potential points of connection are available to supply the proposed development which are:

a) onto the existing 180mm diameter intermediate pressure (IP) gas main situated approximately 2km to the north east of the sites; and

b) onto an existing 8” diameter Intermediate Pressure (IP) gas main situated approximately 1km north of the sites, at the junction of Goldhay Way and Winyates Road, Peterborough.

13.104 Supply to the proposed development via either option will require the extension of an IP gas main to the proposed development boundaries and the establishment of a gas governor(s) (IP to MP gas pressure reduction) and distribution into the development area with further gas governors (MP to LP gas pressure reduction) to distribute the gas network at low pressure. The location of this infrastructure will be confirmed at detailed design stages.
Potable Water

13.105 Anglian Water Services have advised that the existing 1000mm DI watermain to the north of the sites currently has sufficient spare capacity to feed the proposed development and supplies are likely to be via 2 no. connections and new distribution supply mains in the order of a nominal 200mm diameter and a nominal 450mm diameter watermain into the proposed development area with a cross connection onto the existing 12" AC watermain in the A15 London Rd.

Foul Water Drainage

13.106 Consultation with AWS has confirmed that the existing 525mm diameter trunk sewer, situated in Clayton, Orton Mere to the north of the application sites has been identified as the point of connection for the proposed development which will require a pumped solution and approximately 2.2km of rising main from a proposed onsite pumping station to the outfall and connection point.

13.107 AWS have also advised that some upsizing of the local public sewers will also be required within the vicinity of the Orton Mere trunk main to provide additional storage and prevent the possibility of the sewers surcharging due to the increased flows from the proposed developments. An element of improvement works will also be required at Orton Mere pumping station.

13.108 The design of the foul sewerage system will be in accordance with Sewers for Adoption (6th Edition) and the requirements of Anglian Water Services.

13.109 For the development proposals a pumped foul water drainage regime will be required. The risk of a pump failure is mitigated by the provision of duty/standby pumps to maximise the operational life of the pumps. Telemetric systems would be installed to provide warning to Anglian Water Services of a pump failure together with the provision of the required volume of emergency storage within the drainage system such that the risk of flooding by effluent in the event of a pump failure is reduced.

Surface Water Drainage

13.110 Details of the proposals for the provision of surface water drainage for the development are set out in more detail in Chapter 5.

13.111 Sustainable Urban Drainage Systems (SUDS) have been included in the Development Framework Plan to ensure adequate drainage of the sites which at the same time does not lead to increased flood risk on or off site. Detailed proposals for SuDS will be progressed as part of the development brief for each phase.
Telecommunications

13.112 Proposals for telecommunications within the development area will be confirmed during the detailed development design stage. Individual schemes for telecommunications infrastructure will be subject to separate detailed planning applications.

Residual Impacts

13.113 There is no significant residual impact remaining once the mitigation measures outlined above have been implemented.

Summary Matrix of all Impacts Before Mitigation

13.114 It is likely that reinforcements and diversions will be required for electricity, gas, potable water, foul water drainage, highway drains, and telecommunications (see Table 13.3 below):

<table>
<thead>
<tr>
<th>Issue</th>
<th>Description of impact</th>
<th>Geographical significance</th>
<th>Impact, Significance</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I</td>
<td>N</td>
<td>R</td>
</tr>
<tr>
<td>Utilities and Energy</td>
<td>On Completion</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity Consumption</td>
<td></td>
<td></td>
<td>major</td>
<td>adverse</td>
</tr>
<tr>
<td>Gas Consumption</td>
<td></td>
<td></td>
<td>major</td>
<td>adverse</td>
</tr>
<tr>
<td>Potable Water Consumption</td>
<td></td>
<td></td>
<td>moderate</td>
<td>adverse</td>
</tr>
<tr>
<td>Foul Water Drainage Capacity</td>
<td></td>
<td></td>
<td>Moderate</td>
<td>adverse</td>
</tr>
<tr>
<td>Telecommunications</td>
<td></td>
<td></td>
<td>Moderate</td>
<td>adverse</td>
</tr>
</tbody>
</table>

Summary of Mitigation and Enhancement Measures and Residual Effects

13.115 The required reinforcement for the above utilities/services will be implemented and the necessary diversions made.
13.116 Table 13.4 below shows a summary of the mitigation potential of the utilities and services at these sites. The assessments are all long term solutions.

**Table 13.4 Summary of Mitigation and Enhancement Measures and Residual Effects**

<table>
<thead>
<tr>
<th>Issue</th>
<th>Description of impact</th>
<th>Mitigation/enhancement measures</th>
<th>Residual Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energy and Utilities</strong></td>
<td></td>
<td>On Completion</td>
<td></td>
</tr>
<tr>
<td>Electricity Consumption</td>
<td>Improved electrical infrastructure.</td>
<td>Beneficial effect of moderate significance</td>
<td></td>
</tr>
<tr>
<td>Gas Consumption</td>
<td>Utilising existing gas infrastructure network</td>
<td>Adverse effect of moderate significance</td>
<td></td>
</tr>
<tr>
<td>Potable Water Consumption</td>
<td>Utilising existing water infrastructure network</td>
<td>Adverse effect of moderate significance</td>
<td></td>
</tr>
<tr>
<td>Foul Water Drainage Capacity</td>
<td>Improved foul drainage network</td>
<td>Beneficial effect of moderate significance</td>
<td></td>
</tr>
<tr>
<td>Telecommunications</td>
<td>Implementation telecommunication systems</td>
<td>Beneficial effect of moderate significance</td>
<td></td>
</tr>
</tbody>
</table>

**Renewable and Low Carbon Mitigation Solutions**

13.117 The potential for incorporating other renewable energy solutions at Great Haddon has also been investigated as part of the drawing up of development proposals. The *Great Haddon Energy Strategy* submitted in support of the applications sets out the findings of these investigations in detail.

13.118 The CHP facility proposed within the district centre (together with provision for district heating networks) is the only renewable source of energy generation proposed as part of the two outline applications and therefore tested in the Environmental Assessment.

13.119 Other measures are not proposed at this stage but could be incorporated into the proposals (approved through separate full applications) at later stages of the project in response to changes in renewables targets and/or changing technologies. As such, these measures are not assessed as part of the EA, but a summary of their potential contribution to meeting current and future renewable energy targets is set out below for information.
Renewably fuelled CHP

13.120 Bio-fuel supplies will need to be investigated further. According to regional data, biomass may be a possibility but, in terms of its efficiency, may not be a preferred fuel.

13.121 Initial investigations show that bio-fuel CHP, again modelled to meet baseline demand only, could contribute to the Carbon Dioxide reductions by approximately 30-50%.

13.122 There are a number of issues associated with running CHP units on bio-fuel, which include concerns over air quality, noise and fuel supply. A full technical feasibility would need to be carried out for any detailed CHP proposal using bio-fuel and this should include the appropriate mitigations carried out to comply with current legislation.

13.123 The inclusion of renewable-fuelled CHP for the development as a whole would contribute significantly in the long term towards meeting local/district/government targets for renewable energy and meeting CSH/BREEAM requirements. This would present a likely major beneficial effect to meeting energy requirements.

13.124 The inclusion of CHP in specific parts of the sites, (examples of good applications for small scale CHP are hotels, swimming pools/leisure centres, nursing homes etc) would present a likely minor beneficial effect to meeting energy requirements.

Energy from Waste

13.125 Energy from Waste (EfW) has been considered at the sites. It can come in many forms and depends on what waste streams are available: for example; poultry litter, wood and forest wastes, animal wastes/sewage sludge, municipal waste etc.

13.126 The type of technology employed to generate energy from waste depends upon the fuel source. For example poultry litter, wood and forest wastes can be combusted to generate heat, or they can be gasified or undergo pyrolysis to produce electricity and/or heat. Waste from animal/sewage sludge can undergo anaerobic digestion and the methane produced can be used in a gas turbine to generate electricity. Municipal waste can be incinerated and electricity and heat can be produced.

13.127 Waste from the development of homes at Great Haddon (in terms of municipal waste and foul water from c.5000 homes) could generate approximately 158,000m3 of municipal waste arisings a year. There is also the potential of waste streams generated by industrial/commercial buildings within Great Haddon (the amount and type of waste generated will be confirmed when it is known what industries and occupiers will be present on site).
13.128 Waste is now viewed as a commercial resource. Any proposals for on-site EfW at Great Haddon will thus need to consider the centralised EfW plants being proposed in the Fengate area of Peterborough which will serve the city as a whole. Such centralised plants reduce the viability of decentralised EfW generation due to the availability of waste, and may mean that an on-site facility to deal with waste from the development alone is not viable at Great Haddon.

**Wind**

13.129 Wind also has potential at these sites to reduce Carbon Emissions. The average wind speed is 6.2 m/s (taken from the Government's ETSU NOABL wind speed database), which could support large turbines (1 – 3.5 MW) and provide 20% renewable energy and more.

13.130 There is potential for wind turbines in Peterborough with several other sites having already been exploited for wind power. In June 2008 McCain Foods started operating three 2MW wind turbines near Whittlesey (approximately 6 miles East of Peterborough Centre); 8 turbines of total capacity of 16 MW were constructed in 2005 at Glassmoor Bank in Pondersbridge (some 7 miles South East of Peterborough).

13.131 Two wind farms have been refused planning permission in the Peterborough area due to MOD objections. The proposals comprised seven wind turbines at Nutsgrove Farm, near Thorney, and a further six wind turbines at Wrydecroft, also near Thorney. Both applications were North East of Peterborough.

13.132 The location of any potential wind turbines is important. There are a number of basic parameters that can be used to assess a site’s potential for renewable energy, which include proximity to housing, grid connection, nature and heritage considerations, as well as infrastructure capacity.

13.133 Rules of thumb based on British Wind Energy Association guidance have been used to undertake a wind prospecting analysis for large scale wind turbines to serve the development. The results of the analysis are presented in Figure 13.3 (below):
13.134 The analysis shows that the north western part of the Employment Area would have the least number of constraints likely to be affected by the development of turbines.

13.135 Micro wind generation is also capable of supplying specific developments with private energy (for example small 15 kW turbines could be located in school grounds).

13.136 A summary of initial investigations indicate that wind could contribute to the Carbon Dioxide reductions by up to approximately 60% and could provide a maximum energy reduction by approximately 25%. For example one 2 MW Wind Turbine could provide 12% CO2 reductions and could be sited within the Employment Area site. There is a
possibility that more than one turbine of this size could be sited here but the location and spacing of the turbines would need to be considered carefully.

- 1 No of 2MW turbine = 12% CO2 reductions and 5% energy reductions.
- 3 No of 2MW turbine = 36% CO2 reductions and 15% energy reductions.
- 5 No of 2MW turbine = 60% CO2 reductions and 25% energy reductions

13.137 By reducing the energy demand by 25%, wind turbines could reduce the burden of additional energy supply from off site.

13.138 Large turbines could be installed early on in the project and the excess electricity generated can be sold back to the grid and used to help finance the turbines. This would have to be investigated as part of the economic assessment for wind-generated energy.

13.139 The inclusion of three or more large wind turbines would contribute significantly in the long term towards meeting local/district/government targets for renewable energy and meeting CfSH/BREEAM requirements. This would present an additional major beneficial effect to meeting energy requirements.

**Photovoltaic Panels**

13.140 Initial investigations show that solar photovoltaic panels (PV) could contribute to the Carbon Dioxide reductions by approximately 25 - 30 % and could provide energy reduction by 20 - 25%.

13.141 This would depend on the roof area available for the panels and it may be found that there is not enough roof space that could be utilised. With further analysis, PV may only be able to contribute to 1-5% Carbon Dioxide reductions especially when financial implications are considered. This would mean that it would only be feasible to include PV in certain elements of the development.

13.142 The inclusion of PV for certain types of use (i.e. solely in the offices or in some residential units) would give a minor benefit in the long term towards meeting local/district/government targets for renewable energy and meeting CfSH/BREEAM requirements. This would present a likely minor beneficial effect to meeting energy requirements.

**Energy Efficiencies**

13.143 Considerable energy savings can be made using a range of energy efficient techniques such as including energy efficient light fittings for both internal and
external lights; using sensors; using energy labelled white goods; and education and guidance for new home owners in terms of energy efficiency measures and behaviour.

13.144 The inclusion of some of the above techniques across the development as a whole would give a minor/moderate benefit in the long term towards meeting local/district/government targets for renewable energy and meeting CfSH/BREEAM requirements. The inclusion of energy efficient measures will reduce the overall energy demand of the development. Energy efficiency measures can account for up to 80% reduction in energy requirements and therefore present a likely major beneficial effect on energy requirements.

Gas Consumption Efficiencies

13.145 As previously stated considerable energy savings can be made using a range of energy efficient techniques to reduce space heat and water heating requirements such as reducing the Heat Loss Parameter to below 1.3 or 1.1.

13.146 The inclusion of some of the above techniques across the development area as a whole would give a moderate/major benefit in the long term towards meeting local/district/government targets for renewable energy and meeting CfSH/BREEAM requirements. This would be of moderate/major beneficial effect on gas consumption.

Potable Water Efficiencies

13.147 Reducing the water demand on site would reduce the water demand for the development as a whole and both save energy and reduce Carbon Dioxide emissions.

13.148 For residential homes, water demand can be reduced considerably by incorporating on site measures such as; low flow/flow restrictors; low flush toilets; rainwater and grey water collection systems etc. These measures can also be incorporated in non-residential buildings.

13.149 The inclusion of some of the above techniques across the development area as a whole would give a minor/moderate benefit in the long term towards meeting local/district/government targets for renewable energy and meeting CfSH/BREEAM requirements. This would be of minor/moderate beneficial effect on water consumption.
Foul Water Efficiencies

13.150 Ultimately, the introduction of efficiency measures to reduce potable water in accordance with Building Regulations revisions during the detailed design stage will reduce the overall potable water consumption and hence foul drainage discharge, which has not been taken into account through the consultation with AWS to date. Therefore the estimated foul flows from the proposed development, which formed the basis of the consultation and confirmations from AWS to date, may reduce during the detailed design stage depending on the level of efficiency measures proposed. The foul water flows could also be reduced (and therefore mitigated) using the foul waste in Energy from Waste schemes.

13.151 By adopting the proposed reductions in water use set out in the Code for Sustainable Homes (CfSH) it is anticipated that the Great Haddon development could achieve an approximate 50% reduction in peak potable water demand.

13.152 Anglian Water Services assume that generally 90% of potable water supply will be returned to the foul water sewer system. By incorporating measures to reduce the total volume of water required the Great Haddon development could also reduce demands on foul water conveyance and treatment infrastructure.

13.153 It is generally accepted that some form of either rainwater harvesting or grey water recycling will be required in order to meet the water requirements of CfSH Levels 5 and 6, and this could be applied in the later phases of development. Additional measures - including grey water recycling and water usage reduction through the implementation of water efficient fittings - will be included as plot by plot development proposals are defined in detail.

Residual Impacts

13.154 There are no significant residential impacts as a result of implementing the necessary improvement works to utilities and services identified in paragraphs 13.95 to 13.113 above.

13.155 However, significant Carbon Dioxide emissions can be reduced through the use of low and zero carbon technologies such as wind, biomass boilers and CHP. Solar thermal, PV panels and heat pumps can also provide small reduction in Carbon Dioxide emissions. Ideally a combination of the above technologies would achieve the best results. Further investigation is required for the above technologies and will be undertaken as each phase comes forward. The use of low and zero carbon technologies for energy production would offer a beneficial effect of major significance to the environment.
13.156 For completeness, table 13.5 below summarises the potential for Carbon Dioxide reduction of each energy generation solution for Great Haddon:

<table>
<thead>
<tr>
<th>Renewable/Low Carbon Technology</th>
<th>% of Carbon Dioxide Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHP(base heat load only): Gas</td>
<td>5-15%</td>
</tr>
<tr>
<td>CHP(base heat load only): Renewable</td>
<td>30-50%</td>
</tr>
<tr>
<td>Wind*</td>
<td>12 - 60%</td>
</tr>
<tr>
<td>Biomass Boilers</td>
<td>40 - 50%</td>
</tr>
<tr>
<td>Solar Thermal Hot Water</td>
<td>1 - 5%</td>
</tr>
<tr>
<td>Solar PV**</td>
<td>1 - 5 %</td>
</tr>
<tr>
<td>Ground/Pond Source Heat Pumps</td>
<td>10%</td>
</tr>
<tr>
<td>Air Source Heat Pumps</td>
<td>5%</td>
</tr>
<tr>
<td>Energy Efficiencies</td>
<td>25%-80%</td>
</tr>
</tbody>
</table>

*Depends on the number of the turbines

**Cost constraint

13.157 Further details of potential renewable energy solutions – and the way in which these will be investigated further through the life of the project - are set out in the Energy Strategy submitted with the applications.
14.0 SOCIO-ECONOMIC ISSUES

Introduction

14.1 This section of the Environmental Statement has been prepared by David Lock Associates (DLA) with assistance from EFM Ltd (education issues) and BBP Regeneration Ltd and Segal Quince Wicksteed (SQW) Ltd (background reports on demographic, social and economic issues).

14.2 As part of the consultation process undertaken to support the allocation of the Great Haddon sites within the Core Strategy (by both the applicants and the City Council), potential socio-economic issues have already been recognised and addressed as part of the drafting of the master plan design. This is fully documented in the Great Haddon Statement of Community Involvement (GHSCI).

14.3 This chapter discusses the baseline conditions within the assessment area and any likely significant effects arising from the proposed development along with any proposed mitigation. For the purposes of this chapter of the ES the assessment area includes the Hampton Township and Orton (within Peterborough City Council’s administrative boundary); and the rural villages of Yaxley, Stilton and Folksworth (within Huntingdonshire).

Scope of the Assessment

14.4 The issues which are addressed as part of this chapter comprise:

- any impacts on the characteristics of the local population as a result of the proposed development and the population that will be generated;
- any impacts arising from the employment provision within the application sites and the number of jobs likely to be generated;
- any impacts arising from the proposed retail, leisure, community and health facilities on the existing centres in the surrounding area;
- any impacts on education provision as a result of the proposed development;
- any impacts on the provision of open space for play, sport and recreation as a result of the proposed development; and
- how facilities and services will be phased as part of the delivery.
Cross Border Issues

14.5 Originally south Peterborough lay within two administrative boundaries; Peterborough and Huntingdonshire. However, statutory boundary changes brought forward in 1998 resulted in PCC becoming the sole administrative authority for Hampton (the majority of new development in south Peterborough).

14.6 However, several settlements within Huntingdonshire District lie in close proximity to the application sites. It is therefore necessary to consider any socio-economic impacts of the development on these smaller settlements outside Peterborough district as well as the adjacent urban areas of Peterborough.

Reference Material and Assessment Method

14.7 The baseline information provided in this chapter has been sourced from the Office of National Statistics and relevant studies undertaken by or on behalf of the local authorities. This includes the Peterborough Integrated Growth Study (Arup on behalf of PCC, 2008) and the Annual Monitoring Reports (2007) of both PCC and HDC. The emerging Peterborough Local Development Framework including the Core Strategy Preferred Options (PCC) and the adopted Local Plan provide essential information on the main established and emerging issues and objectives facing the local area.

14.8 In order to inform the applicants’ emerging proposals, BBP Regeneration Ltd (BBP) and Segal Quince Wicksteed Ltd (SQW) prepared a series of background reports, outlining ideas and options for securing a socially and economically sustainable development at Great Haddon. The work consisted of three modules:

- Module One: Social and Demographic Context July 2008 (Appendix 14.1);
- Module Two: Economic and Employment Context July 2008 (Appendix 14.2); and

14.9 These Reports are included as Appendices to the ES (see Environmental Assessment Volume 3: Chapter 14).

Assumptions and Limitations

14.10 In the context of the analysis below, it is important to note the following assumptions:

a) the application proposals are for up to 5350 dwellings and a range of house types and sizes which are likely to attract a range of occupiers from both the local and from the wider area;
b) the 65 ha of employment land included in the Employment Area application assumes a mix of B1, B2, and B8 uses – for the purposes of the EIA the percentages of each use is assumed as follows: 15% B1, 40% B2 and 45% B8.

c) the District Centre and two mixed use neighbourhood centres are designed to accommodate a mix of uses, to be delivered over the life of the project, and to be flexible in terms of land use within the parameters set within the description of development in the Core Area application: namely, up to 9,200 sq.m of retail floorspace (A1-A5) in the district centre, up to 2,300 sq.m of retail floorspace (A1-A5) in each neighbourhood centre), plus other district/ neighbourhood centre uses (community and health (C2, D1), leisure (D2), residential (C3) and commercial employment (B1) uses);

d) the District Centre has been designed to accommodate the quantum of development commensurate with the day to day needs of the Great Haddon population. It is anticipated and assumed that some use of the facilities will be made by those in adjacent settlements (Yaxley, Stilton and Hampton) as part of increasing the choice of local facilities;

e) it is anticipated that the neighbourhood centre retail facilities will serve the daily shopping/service needs of residents in each catchment area, rather than providing larger scale retail units designed to serve a wider population. There may be some scope for specialist retail facilities within Great Haddon, but this will be determined by the local demand at the time these sites are marketed;

f) the retail impact assessment prepared in support of the Core Area application sets out the retail aspects of the application proposal in more detail. It has been prepared by King Sturge with reference to the recently published Peterborough Retail Study 2009 (GVA Grimley on behalf of the City Council) which supports the provision of a new District Centre for Great Haddon;

g) Provision is made for education facilities on site through the identification of sites for three primary schools including an allowance for early years (at 2.2 ha each) and a secondary school (8.9ha). Any further contributions to the delivery of these facilities will be negotiated through the s106 agreement.

Significance Criteria

14.11 Published EIA guidance does not define significance criteria for assessing socio-economic impacts. The significance of potential socio-economic effects has therefore been assessed using professional judgement. The following section documents the
baseline conditions, proposed effects and any necessary mitigation measures in relation to each socio-economic parameter:

- Population
- Employment
- Local Facilities
- Community
- Education
- Open Space

Population

*Baseline Conditions - General*

14.12 The revised (ONS) mid 2001 population estimate for Peterborough is 157,300 which equates to a population growth of 16.6% in the period from 1981 – 2001 and for Huntingdonshire the population estimate is 156,950 (25.3% growth). This compares with a growth rate for Cambridgeshire of 21.3%, and a national population growth rate of 4.3% over the same period.

14.13 The population of Peterborough is characterised by:

- a young resident population, with 24.5% of the population aged 16 or under, compared with a national average of 20.4%;
- 6.6% of the population under the age of 5, compared with a national average of 5.7%;
- around 30% of single person households, in line with the national average of 30.1%;
- over 26% of households not owning a car, compared with a national average of 27.4%;
- a current average household size of 2.37 persons per household, compared with the national average of 2.36 persons per household.

14.14 Peterborough City Council’s *Local Development Framework Annual Monitoring Report 2007* (PCC AMR) forecasts the population of Peterborough to reach 203,300

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1 2001 Census Data ([www.cambridgeshire.gov.uk](http://www.cambridgeshire.gov.uk))

2 The above statistics sourced from the 2001 Census ([www.statistics.gov.uk](http://www.statistics.gov.uk))
by 2021, an increase of almost 46,000 people. Huntingdonshire’s growth is forecast to be less with a population prediction increase to 166,000 by 2026.

14.15 Peterborough currently benefits from having a younger population profile compared to national figures and although this may act as a ‘cushion’ the main trend is towards an ageing population. Increased life expectancy and the “aging through” of the baby boom generation means that the number of people in Peterborough aged over 65 is likely to increase dramatically (from 22,200 to 37,600) over the period 2001-2021, a 69% increase. In 2001, the over 65 age group accounted for 14% of the overall population. This is likely to rise to 18.5% by 2021. In Huntingdonshire 23% of the population are predicted to be over 65 by 2026.

14.16 Table 14.1 below shows how these trends are likely to affect the average household size within the East of England in comparison with the national average.

<table>
<thead>
<tr>
<th>Year</th>
<th>2011</th>
<th>2016</th>
<th>2021</th>
<th>2026</th>
<th>2031</th>
</tr>
</thead>
<tbody>
<tr>
<td>England</td>
<td>2.28</td>
<td>2.23</td>
<td>2.19</td>
<td>2.16</td>
<td>2.13</td>
</tr>
<tr>
<td>East of England</td>
<td>2.28</td>
<td>2.24</td>
<td>2.20</td>
<td>2.17</td>
<td>2.14</td>
</tr>
</tbody>
</table>


**Baseline Conditions – Local**

14.17 The background report on *Social and Demographic Context* July 2008 (see *ES Volume 3: Appendix 14.1*) examined the population characteristics of the neighbouring wards to the proposed Great Haddon development area; namely Orton with Hampton, Orton Longueville and Orton Waterville.

14.18 Orton with Hampton Ward – within which both application sites are located - exhibits significantly different characteristics from the surrounding wards. For example;

(i) in contrast to the more established wards of Orton Waterville and Orton Longueville to the north where populations declined, the population increased between 1991 and 2001 in Orton with Hampton, due in part to the effects of the development of new housing at Hampton;
(ii) in 2001 just above 23% of the population of Orton with Hampton were in the age range 30-39 whereas, by contrast, the figure was about 16% in both Orton Longueville and Orton Waterville;

(iii) a smaller proportion of people have low-level occupations in Orton with Hampton and a much higher proportion of people have high-level occupations (31%) than in the other areas. This is especially pertinent considering that the proportion of high-level occupations declined nationally between 1991 and 2001. The figure for Peterborough shows that only about 17% of the population is in high-level occupations and this proportion is even lower in Orton Longueville (13%).

14.19 The higher proportion of people in higher level occupations in Orton with Hampton in 2001 is consistent with the higher proportion of its population who have higher level qualifications (see Tables 3 and 4 of Appendix 14.1). In 2001 nearly 25% of the population of Orton with Hampton had Level 4/5 qualifications whereas the figure is just about 22% in Orton Waterville and much lower, at 11%, in Orton Longueville. Orton Waterville has increased the proportion of its population with Level 4/5 qualifications considerably between 1991 and 2001 whereas the proportion has remained relatively unchanged in Orton Longueville.

14.20 Orton with Hampton had a much higher proportion of owner-occupier households in 2001 in comparison with surrounding wards and Huntingdonshire. Correspondingly, it had a small percentage of households in social rented housing and privately rented housing. For example, more than 30% of all households are in council or other social rented housing in the neighbouring ward of Orton Longueville compared with 4% in Orton with Hampton (see Appendix 14.1 Table 5).

14.21 A high proportion of “household reference persons” in Orton with Hampton in 2001 are economically active as employees or as self-employed, while unemployment is relatively low. This reflects the age structure of the population (few retired persons), the higher level of qualifications and, probably, the weighting of housing tenure towards owner-occupiers.

14.22 Of the three wards considered, Orton Longueville shows the most similarity to Peterborough as a whole, Orton with Hampton is quite different from Peterborough and Orton with Waterville falls between the two.
Characteristics of urban extensions/ new townships

14.23 The Joseph Rowntree Foundation has carried out several studies into what makes a socially sustainable community. The main conclusion to emerge from these studies is the importance of promoting a variety of social groups within a community. In cases where each community is formed of largely the same social group, the tendency is for polarisation of communities to develop and for social problems to be concentrated, and exacerbated, within the areas that house disadvantaged communities (as highlighted in the Ward characteristics noted above).

14.24 The design of a new urban extension can contribute towards a tendency of homogeneity or variation among social groups within the community, by determining:

- the mix of tenures
- the mix of dwelling sizes
- the distribution of different tenures/dwelling sizes within the development

14.25 In addition, the Housing Market Assessment (HMA) will typically identify the gaps between the characteristics of the existing housing stock of the wider area and the expected needs of the community (for example, the needs of an aging demographic profile).

14.26 However, if all the required adjustment is loaded onto a new development, there is a risk that their design will be unbalanced with regard to their own needs from the perspective of social sustainability. For example, demographic trends (including aging) typically point to growth in the number of one or two-person households in the future, and it may be that the existing stock of dwellings in the wider area is not well matched to meet this need. However, it would not be socially sustainable to design a community which consisted only of dwellings for such households.

14.27 The background research reports also note that there is some concern about the lack of community cohesion within the new Hampton community, which may be due in part to the relatively high proportion of privately-rented housing. This could be repeated at Great Haddon with a over dominance of any one type of dwellings. Social cohesion would be promoted if there were the prospect that at least some of those moving up the property ladder could find the next step available within the local community. This

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3 Joseph Rowntree Foundation, Sustainable Communities Commission Housing Sub-group, Memorandum.

is particularly important in the first decade or so of the new development when a high proportion of those settling there will be young adults and young families, as this is the group whose accommodation needs change most rapidly.

14.28 This pattern of larger household size in the early years of a new planned development seems to be supported by anecdotal experience at Hampton, but the extent to which this is a long term characteristic or simply a short term ‘peak’ before the population broadens out is not yet known or proven (see table 14.2 below). Initial resident populations are often disproportionately made up of young adults and young families, which can result in disproportionate needs for certain types of facilities in the early years of a scheme (such as pre-school places, youth facilities and antenatal care).

Table 14.2  Household Size in Hampton as a Percentage of Total Occupied Dwellings to January 2006

<table>
<thead>
<tr>
<th>Household Size (people per household)</th>
<th>% of Hampton Households</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>33</td>
</tr>
<tr>
<td>3</td>
<td>23</td>
</tr>
<tr>
<td>4</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>6+</td>
<td>4</td>
</tr>
</tbody>
</table>

(Source: Resident Survey, O&H Properties (Hampton) Ltd)

Assessment of Development Framework Plan

14.29 The Development Framework Plan for Great Haddon (PST021/DFP/01 Rev I) proposes up to 5350 dwellings, including a proportion of affordable dwellings. The three background papers highlight that the establishment of a strong community dynamic improves the living experience of residents. In contrast, settlements which lack a community dynamic offer no encouragement to residents to put down roots, and the resulting high turnover of population further undermines community and the effectiveness of other public assets (for example, it makes the task of developing a successful school much more challenging).

14.30 Experience gained from other new settlements also highlights that the availability of an appropriate range of community facilities early on is a key element in the quality of life of residents. The availability of local employment opportunities presents choices to residents about the location of their work and contributes to a lively day-time social environment. The availability of a range of dwelling sizes and tenure presents
choices to residents about where they can live without forcing them to leave the community when their housing requirements change. It also promotes social integration and cohesion, thereby mitigating the problems that can emerge in highly polarised communities.

14.31 This supports the application proposals to provide residential units of a mix of types, including flats/apartments (to a maximum of 20%), townhouses and family houses (up to 80%). The mix will encourage the creation of a balanced population, the ability for people to move from small to larger properties (or vice versa) whilst remaining within the new community, and ultimately to support a sustainable development.

14.32 In addition, because of the scale of development at Great Haddon, other ‘niche’ housing is also proposed. For example, Peterborough has a recognised shortage of large executive homes which will appeal to those professionals heading up companies or seeking to relocate companies to the city. The trend towards people building their own homes – be it self-build or eco-friendly housing – continues, and this will be supported in the interests of Great Haddon facilitating entrepreneurial activity. In recognising the needs of an aging population, a percentage of bungalows can be delivered on site as part of /in lieu of the affordable housing contribution.

**Employment**

**Baseline Conditions**

14.33 The *Economic and Employment Context* background report prepared by SQW (see ES Volume 3, Appendix 14.2) assessed the characteristics of the local population in terms of economic activity. According to the Annual Population Survey in 2006, Peterborough had 163,300 residents, of which 63% (102,500) were of working age (defined as ages 16 to 59 for women and 16 to 64 for men). The employment rate in Peterborough (75%) is somewhat below that of Huntingdonshire (82%), South Cambridgeshire (81%) and the East of England (77%) region as a whole but above that of Cambridge (69%).

14.34 In Peterborough, 20% of the working age population are economically inactive; of whom 4% are looking for work. Compared to Huntingdonshire and South

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4 The employment rate of Cambridge will, however, be artificially low due to the presence of large numbers of economically inactive students living in Cambridge City.
Cambridgeshire, Peterborough has a higher proportion of its working age population inactive; although levels are similar to the East of England as a whole.

14.35 Despite a relatively high jobs density compared with its surrounding areas, Peterborough had an unemployment rate of 5.4% compared to 4.5% for the East of England (April 2006-March 2007), with a total of 4,400 people of working age unemployed. Over recent years, unemployment rates in Peterborough have fluctuated but shown an overall increase: 4.5% (2004-05), 5.1% (2005-06) and 5.7% (2005-06).

14.36 In February 2008, there were 2,994 working age Peterborough residents claiming Job Seekers Allowance. This accounts for 2.9% of resident working-age people, a significantly higher proportion compared to Huntingdonshire (1.1%), Cambridge (1.4%), South Cambridgeshire (0.8%) and the East of England (1.7%).

14.37 In terms of income, Peterborough’s average household income was higher than the UK average, but lower than the regional average. Household income over a three year average (2003 to 2005) was 97 for Peterborough compared to 107 for the East of England, relative to a UK benchmark figure of 100.

14.38 Anecdotally, there are a significant number of migrant workers living in Peterborough\(^5\), and working in surrounding rural areas in the agricultural sector.

14.39 Compared to the working age population of the East of England and the other comparator areas, the working population of Peterborough are less well qualified and a greater proportion holds no qualifications (see ES Volume 3, Appendix 14.2, Table 1 for details). The exception is in “other qualifications”, which includes trade apprentices; here Peterborough’s working population is better qualified than the comparator areas, with the exception of Cambridge.

14.40 According to the latest available figures (2005), Peterborough has approximately the same number of jobs as its working age resident population. This job density (jobs per working age resident) is higher than Huntingdonshire, South Cambridgeshire and the East of England, but lower than Cambridge.

14.41 Compared to the comparator areas and the East of England as a whole, Peterborough has a lower level occupational profile (i.e. a low proportion of managers, professional occupations), and is relatively better represented in the lower

\(^5\) The Census showed over 10,000 Peterborough residents were born outside of the British Isles in 2001, around a tenth of the population
occupation codes (sales and customer services, process plant and machine operatives, elementary occupations) (see ES Volume 3, Appendix 14.2, Table 2).

Peterborough’s Commuting Profile

14.42 Travel to work data derived from the 2001 Census suggested that whilst over 62,000 residents (81%) live and work in Peterborough, another 15,000 (19%) commute to workplaces outside of the City, notably to locations in Huntingdonshire, South Kesteven and Fenland. Regarding in-commuting, the data suggest that over 30,100 workers were commuting to jobs in Peterborough in 2001 equating to approximately 37% of the total workforce. Of particular concern to Peterborough is that this in-commuting is biased towards high earners (see ES Volume 3, Appendix 14.2, Table 5).

14.43 There is a general recognition that high-end / top-band housing is needed to retain those who are in high-level occupations to live in Peterborough, and hence avoid leakage. When observing trends in net-commuting by sector, it suggests that net (in-) commuting is highest in the banking and financial services sector.

Type of Employment Growth

14.44 Historically, Peterborough has showed a strong reliance on the manufacturing sector. In recent years, as seen across many parts of the country, this sector has experienced decline and by contrast there has been a substantial increase in employment in the service sector, in particular in distribution, hotels and restaurants, banking, finance and insurance and public administration, health and education. ABI data indicate that the banking and financial sector has become of increasing importance for employment in the city, demonstrated also by the percentage of net commuting, which was approximately 35% compared to other sectors where for all net commuting was recorded as below 14%.

14.45 In considering options for employment provision at Great Haddon, the following key documents relating to economic development in Peterborough have been reviewed:

- Regional Spatial Strategy (RSS);
- Local Development Framework (LDF) – in particular the Core Strategy Preferred Options;
- Peterborough Integrated Growth Study (IGS);
- Regional Economic Strategy (RES) – draft 2008-2031; and
- Peterborough Sub-Regional Economic Strategy (SRES) 2008-2031
14.46 The RSS earmarks Peterborough as a location for significant employment growth and proposals for Great Haddon seek to conform with Section 5: Sub-regional and Sub-area Policies, which outlines plans for the Greater Peterborough sub-region, consistent with the findings of the Peterborough Sub-Regional Study (November 2003).

14.47 With regard to the economic focus on Peterborough itself, the RSS outlines a partnership approach to support and development of the Peterborough economy, with a particular focus on developing policy to:

- support the traditional and rural based sectors of the economy such as food production and processing;

- attract investment in sectors of the economy that have particular scope for expansion such as further development of knowledge based sectors, public administration, retail and leisure services and environmental cluster;

- improve access to locally based further and higher education facilities through a strategy to establish and expand the provision of higher education and work towards the provision of a university; and

- harness opportunities for attracting investment presented by its location in the London-Stansted-Cambridge-Peterborough growth area and adjoining the Milton Keynes/South Midlands sub-region.

14.48 The RSS draws on the Peterborough Sub-Regional Study which highlighted its ‘distinctive economy’ (with a strong representation of traditional sectors, e.g. engineering and agricultural services) and the developing cluster of environmental businesses, but also the need for economic diversification. In particular, the study suggested that the city is failing to meet its potential for developing knowledge-based industries, such as capturing potential spin-offs in high-tech manufacturing from Cambridge, despite having a “higher proportion of workers employed in businesses operating in knowledge-based activities (e.g. IT materials and software, aerospace, mechanical engineering and research in telecommunications) than the UK average”.

14.49 Overall, the aim is to enable Peterborough to grow in a sustainable manner and retain its role as a key sub-regional centre (notably serving communities within the neighbouring East Midlands area also), and Great Haddon is identified within Peterborough City Council’s Core Strategy Preferred Options for the provision of 35ha of employment land (along with the delivery of “approximately 6,000 dwellings”), recognising that Great Haddon can help to broaden Peterborough’s ‘offer’ in terms of supporting the development of a more sustainable economy in the city as a whole.
Assessment of the Development Framework Plan

14.50 The Great Haddon proposals make provision for a range of employment development. The Employment Area application proposes up to 65ha of strategic employment land - an additional 30ha to that proposed as part of the Core Strategy\(^6\) - plus a range of smaller scale employment opportunities within the Core Area application.

14.51 Within the Employment Area application, a mix of B2 (general industrial) and B8 (storage and distribution) is proposed, with ancillary B1 office uses if required. This area will provide employment opportunities for residents throughout the urban area of Peterborough and opportunities for local businesses to expand and develop on less constrained sites. This part of the scheme also includes provision of a site for a household recycling centre in a location shown on the DFP (precise site size will be determined through the s106 negotiations).

14.52 Employment uses have been positively positioned in this part of the site to benefit from direct access to the A1 and Fletton Parkway, to provide a robust boundary to the western edge of the Special Area for Conservation (SAC) where restricted public access is sought by Natural England, and to concentrate residential development in the central and southern parts of the site, capable of delivering walkable neighbourhoods and supporting the proposed public transport routes and interchange.

14.53 Smaller scale sites for office and commercial development are proposed within the mixed use district and neighbourhood centres (Core Area Application). Employment sites are of a scale and type which help meet the requirements for delivering local jobs in the area and contribute to achieving a balance between housing and jobs in a sustainable manner, but will also seek to contribute to the aspiration of Peterborough as a whole to grow its skills base through attracting entrepreneurial and knowledge-based businesses and professional and managerial households to locate - and thereby contribute to investment - in the city. This will allow Great Haddon to support the “distinctive offer” of Peterborough and thereby help meet the aims of the RSS, RES and SRES for the city.

14.54 There is also capacity within Great Haddon to adapt to future needs, and although the delivery of economic business “clusters” cannot be secured through land use

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\(^6\) It is understood that in response to representations on the Core Strategy Preferred Options (2008), the policy relating to employment land at Great Haddon is currently being redrafted to increase the total allocation to c. 65 ha.
planning alone, the provision of a range of employment sites in one location could facilitate the formation of local business clusters in response to market needs and the aspirations of the city.

14.55 These options have been explored more fully in full in the background research reports (see ES Volume 3, Appendices 14.1, 14.2 and 14.3).

**Estimated Number of Jobs Generated**

14.56 Based on the assumptions made in the Great Haddon Summary Land Use Budget (set out in ES Volume 2: Chapter 2), it is estimated that the Great Haddon development will create approximately 10,700 jobs in total. The indicative split of jobs is shown in Table 14.3 below.

<table>
<thead>
<tr>
<th>Jobs Generated (estimate)</th>
<th>Total (% of total jobs)</th>
<th>B1</th>
<th>B2</th>
<th>B8</th>
<th>Retail</th>
<th>Community/Education</th>
<th>Other district centre uses*</th>
<th>Site Area (Ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment Area Application</td>
<td>8,205 (76.7%)</td>
<td>2,562</td>
<td>3,818</td>
<td>1,825</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>64.9</td>
</tr>
<tr>
<td>District Centre (Core Area Application)</td>
<td>1,738 (16.2%)</td>
<td>691*</td>
<td>0</td>
<td>0</td>
<td>460</td>
<td>0</td>
<td>588</td>
<td>5.76</td>
</tr>
<tr>
<td>Neighbourhood Centre (Core Area Application)</td>
<td>261 (2.4%)</td>
<td>80</td>
<td>0</td>
<td>0</td>
<td>115</td>
<td>67</td>
<td>0</td>
<td>1.27</td>
</tr>
<tr>
<td>Community Sites (Core Area Application)</td>
<td>182 (1.7%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>182</td>
<td>0</td>
<td>1.38</td>
</tr>
<tr>
<td>Schools (Core Area Application)</td>
<td>300 (2.8%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>300</td>
<td>0</td>
<td>15.56</td>
</tr>
<tr>
<td>Total (Core and Employment Area)</td>
<td>10,686 (100%)</td>
<td>3,332 (31%)</td>
<td>3,818 (36%)</td>
<td>1,825 (17%)</td>
<td>575 (5.4%)</td>
<td>548 (5.1%)</td>
<td>588 (5.5%)</td>
<td>88.87 (73.31 ha commercial floorspace)</td>
</tr>
</tbody>
</table>

* Note: ‘other uses’ to be determined through market assessment

**Local Facilities**

**Baseline Conditions**

*Hampton*

14.57 The Hampton township consists of four neighbourhoods, and together with Yaxley, currently provides the closest facilities to the application sites.
14.58 The neighbourhoods of Hampton Hargate, Hampton Vale and Hampton Centre are well under way, with the fourth neighbourhood of Hampton Leys (to the east of the A15) at the initial stage of development. Two ‘new neighbourhood centres (classified as ‘local centres’ in the City Council’s Retail Hierarchy Study (2008) and emerging LDF) have been constructed to serve the needs of residents in Hampton Hargate and Hampton Vale, and comprise a mix of local retail, office, community and residential uses.

14.59 Serpentine Green Shopping Centre lies in the northern part of Hampton Centre, the District Centre designed to serve the wider needs of Hampton as a whole. Serpentine Green currently serves the wider catchment of south Peterborough (due to its location, planning and early implementation of the shopping centre relative to the completion of the township).

14.60 Other facilities in Hampton Centre include a doctors surgery, hotel, pub and restaurant, a drive-through fast food restaurant and a petrol filling station.

Orton

14.61 Orton was designated the second township in the New Town expansion of Peterborough in 1967. It is composed of the ancient villages of Orton Waterville and Orton Longueville, together with the newer developments of Orton Brimbles, Orton Goldhay, Orton Malborne, Orton Southgate, Orton Wistow and most recently Orton Northgate. The area is largely residential but contains the District Centre known as Orton Centre.

14.62 Orton Centre is currently undergoing redevelopment. Originally comprising 9,087 sq.m of A1-A5 uses, the new centre will contain an additional 8,010 sq.m of A1-A5 use. The district centre serves the wards of Orton Waterville and Orton Longueville.

Other District Centres

14.63 Three other district centres are listed in the Retail Hierarchy Study. Their size is related to the surrounding catchment area and population (see Table 14.4 below for details).

Surrounding Villages within Huntingdonshire

14.64 The majority of the facilities within Yaxley are focused on the Broadway Shopping Centre, comprising 24 small units including: two convenience stores, a Post Office, off licence, pharmacy, café, estate agent, hairdressers, veterinary surgery, bank, community centre, bookmakers and a number of take-away outlets. Adjacent to the Broadway Shopping Centre is a health centre and library. A new supermarket is
located within the new Co-op Farm housing development. Additional shops and facilities are located along the main street in the older part of the village, including a butcher, mini market, opticians, gift shop, dentist, fire station, two public houses and churches.

14.65 Stilton village has a good range of local amenities including a primary school, shops, Post Office, village hall, sports ground and pavilion and a golf course. Folksworth is a smaller village with limited facilities.

14.66 Table 14.4 summarises the facilities available within the three adjacent rural settlements.

<table>
<thead>
<tr>
<th>FACILITIES</th>
<th>Yaxley</th>
<th>Stilton</th>
<th>Folksworth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail food outlets</td>
<td>9</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Retail Non-food outlets</td>
<td>9</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Service outlets</td>
<td>17</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Food and Drink</td>
<td>13</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Post Office</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Bank</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Library</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary School</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Secondary Education</td>
<td>Stanground</td>
<td>Sawtry</td>
<td>Sawtry</td>
</tr>
<tr>
<td>Doctors Surgery</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Hall</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Bus service</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

Source: Hunts DC AMR 2007.

**Assessment of Development Framework Plan**

14.67 Great Haddon has been designed with its own district centre to serve its resident and employee population, coupled with two smaller neighbourhood centres to serve daily needs (in much the same way as the neighbourhood centres at Hampton Hargate and Hampton Vale currently operate). This provision is one of the key elements underpinning the sustainability of the Great Haddon proposal, in that the development is of a sufficient scale to support its own services and facilities and therefore reduce the need for regular longer trips to destinations elsewhere in the city.

14.68 The inter-relationship between Great Haddon, Hampton and Yaxley (which although in Huntingdonshire District, currently looks to Hampton and will look to Great Haddon for some of its daily needs) is complex. The early development concept for Great Haddon recognised this interrelationship, and focused on these three centres operating in a complementary rather than competitive manner, providing a network of
facilities which together to serve South Peterborough and the villages in north Huntingdonshire (see Great Haddon Design and Access Statement for further details).

14.69 Provision has been made in the Core Area application and Development Framework Plan for a new district centre which includes a supermarket (4,200 sqm) and a series of smaller retail uses, interspersed with community facilities and other commercial activities. The total amount of retail uses proposed is 11,500 sqm.

14.70 In terms of retail provision in particular, the district centre proposals for Great Haddon could be achieved without any detrimental impact on the commercial viability of these and other centres in the area. An assessment of the likely retail impact of the Great Haddon proposal on the surrounding settlements – including the justification for a new ‘district centre’ and for the scale of retail development proposed - is addressed fully in the Great Haddon Retail Impact Assessment prepared by King Sturge and submitted in support of the Core Area application.

14.71 It should be noted that the principle of a new district centre for Great Haddon is also supported by the recently-published Peterborough Retail Study prepared by GVA Grimley (2009).

14.72 The provision of two neighbourhood centres will encourage day to day self-sufficiency and support principles of sustainable communities, and together with the mixed use district centre will benefit both the Great Haddon population (by the provision of easily accessible facilities) and the existing population of the surrounding area (by increasing the choice of local facilities and services within close range).

14.73 An Enterprise Hub or similar facility is also proposed as part of the District Centre, designed to provide a central support facility for local business, community activity and those working from home and encourage an ‘enterprise culture’ at Great Haddon. This facility is proposed to be provided at an early stage of the development by the applicant, subject to negotiation of the s106 agreement.

14.74 The neighbourhood centres are designed to provide for the daily needs of Great Haddon residents and workers. They are located at points within the development which maximise the proportion of residential properties within 400m or 5 minutes’ walk, and to maximise the opportunities for effective public transport.

14.75 Within each of the two neighbourhood centres, small scale retail, community and commercial uses (such as small offices, a pub or restaurant) to serve the immediate needs of the development will be provided at ground floor level, with residential uses above (see Great Haddon Design and Access Statement for further details).
precise mix of uses for the district and neighbourhood centres will be determined through Development Briefs and Reserved Matters applications.

**Community/ Health Facilities**

**Baseline Conditions**

14.76 A range of community facilities are provided within south Peterborough and north Huntingdonshire (see Tables 14.5 and Table 14.6 above), which serve their immediate residential catchments, including a library within the two district centres (Hampton and Orton).

14.77 Police services are provided by the Cambridgeshire Constabulary, with Peterborough falling within the county’s northern division. Bridge Street Police Station is the principal police station covering the southern part of Peterborough, with a new sector police station within Hampton Centre and a smaller station at Yaxley.

14.78 Fire services are provided by the Cambridgeshire Fire and Rescue Service. South Peterborough is served by fire stations at Stanground, which has a 24-hour crew, Yaxley, which has a retained crew, and Peterborough’s volunteer fire brigade at Bourges Boulevard. There are no plans for any further facilities in the area.

14.79 A 24-hour emergency ambulance service is provided by the East Anglia Ambulance NHS Trust. The Peterborough crews are based at the Edith Cavell Hospital.

14.80 Peterborough Primary Care Trust (PCT) or ‘NHS Peterborough’ is responsible for commissioning health and adult social care for local people and delivering local community health and adult social care services (including GPs, dentists, pharmacies opticians etc). Yaxley Health Centre also provides primary health care resources to the surrounding catchment area. Hampton Health Doctors’ Surgery is located within Serpentine Green Shopping Centre. There are also dental and other health facilities located at Hampton Vale and Hampton Hargate.

**New Community /Health Facilities planned or under construction**

14.81 The s106 agreement for Hampton included the provision of a range of community facilities to serve the township’s residents. Following a review of how best to deliver these facilities, proposals for a Hampton ‘Joint Service Centre’ (JSC) were brought forward, whereby the various uses would be accommodated under one roof, which some sharing of reception areas/meeting rooms to deliver a better facility. Proposals for the JSC are currently being drawn up, and are likely to include a four-court sports hall, 40 station fitness suite, dance studio, crèche, library and learning facility,
comprehensive primary health care facilities including GP surgery and dentist; a church/community hall with capacity for 200 people and a dedicated place of worship for 50 people; and shared facilities, including a café, meeting rooms, reception and changing areas.

14.82 The delivery of the facility is ongoing and involves partnership working between Peterborough City Council, the Church of England, the Methodist Church, the Peterborough Primary Health Care Trust, Cambridgeshire and Peterborough Mental Health Partnership NHS Trust, O & H Hampton and professional advisors to establish the likely needs of the growing Hampton community over the coming years. The catchment for some of the facilities within the JSC may well extend to Great Haddon, and this will be discussed further as part of the negotiations on any s106 agreement for Great Haddon.

14.83 Secondary health care is provided by the Peterborough and Stamford NHS Foundation Trust, and consists of 3 hospitals: the Edith Cavell in Bretton; the Peterborough District Hospital in Thorpe Road; and Stamford Hospital in Lincolnshire. A new 612-bed hospital is under construction at the Edith Cavell site which will enable most of the Thorpe Road site to be redeveloped and a new Integrated Care Centre is nearing completion on part of this site.

14.84 The new hospital will include an emergency care centre, a high-tech diagnostics unit, women and children’s unit, cancer unit, specialist rehabilitation unit, renal dialysis and a multi-disciplinary training centre. It is due to open in late 2010.

14.85 The Integrated Care Centre, run by Peterborough Primary Care Trust, will include 34 specialist rehabilitation beds, a pharmacy, outpatient diagnostic and treatment centre, general rehabilitation services and children’s care centre. It is due to open in 2009.

14.86 A new 102-bed mental health unit on the Thorpe Road site will include adult acute psychiatric wards, a psychiatric intensive care unit, older people’s mental health unit and a specialist service for people with learning disabilities. It will be run by Cambridgeshire and Peterborough Mental Health Partnership NHS Trust.

14.87 Each of these facilities serves a city wide catchment, which will include the population of Great Haddon.

Assessment of Development Framework Plan

14.88 Sites allocated for community use have been provided within the District Centre (of a size sufficient to accommodate several separate or linked facilities, totalling 1.38 ha), and there is additional capacity for local community uses within the two
neighbourhood centres. In addition, the flexible ground floor accommodation proposed within the mixed use district centre could accommodate individual community service providers as needs are identified.

14.89 It is expected that the character and nature of development at the district and each neighbourhood centre will vary depending on local circumstances and the time these sites are marketed for development. However, the level and type of provision of community facilities for Great Haddon will be negotiated through the s106 agreement for the applications. Community uses such as a doctors’ surgery, community centre, dentist, veterinary practice or crèche are all appropriate uses which could be accommodated, dependent upon need and Peterborough City Council’s requirements.

14.90 There are clear lessons from the experience of Hampton with regard to the timing and responsibility for provision of community facilities. The difficulty experienced by service providers in committing to long term provision of services (due largely to frequent changes in priorities and funding arrangements) makes the co-ordinated and long term planning of community facilities problematic.

14.91 In attempting to address this problem – given the importance of early delivery of community uses to creating community cohesion – it is suggested that provision could be made through the s106 agreement for service providers to occupy floorspace within the Enterprise Hub and elsewhere within the district and neighbourhood centres to deliver services on a temporary or short term basis until such time as a permanent facility (either on or off site) is delivered as part of the city wide provision of services.

14.92 The design of Great Haddon also incorporates informal meeting places and hubs of activity such as community urban parks and covered seating areas, and is seeking to secure the shared use of public buildings (such as school buildings) through the s106 agreement, so that the community is provided with space to meet and facilities to use at weekends and in the evenings. Within each of the two Neighbourhood Centres, small scale retail and commercial uses - such as small offices, cafés and coffee shops, pubs or restaurants - will be interspersed with community uses to help increase the opportunity for the community to meet informally.
Leisure

Baseline Conditions

14.93 Peterborough City Centre provides the principal focus for commercial leisure development in the area. City centre facilities include a theatre, bowling alley, restaurants, pubs and clubs, complemented by a multiplex cinema complex which is situated off Fletton Parkway (around 9 km from the application sites). A number of health and fitness facilities are located around the city, each serving their residential catchment areas and a wider area.

14.94 No commercial leisure facilities have been constructed to date at Hampton, although planning permission exists for a David Lloyd Centre (38,000 sq ft health and fitness facility) within Hampton Centre, designed to serve its residential catchment and the immediate surroundings (this consent is currently unimplemented).

14.95 The closest indoor facilities to Great Haddon are at the Bushfield Sports Centre at Orton Centre and the Stanground Sports Centre located on the Peterborough Road, which includes a range of fitness studios and a swimming pool. Outdoor facilities are available at Hampton College, Hampton Hargate Sports Centre and Stanground Sports Centre.

Assessment of Development Framework Plan

14.96 Outline consent for commercial leisure facilities is not sought as part of the outline applications as there is currently no market demand, and any facility which may seek to locate at Great Haddon would need to be tested against the 'sequential test' (with preference given to the city centre) as set out in Planning Policy Statement 6.

14.97 However, sites within the Great Haddon district centre could accommodate commercial leisure uses should this be deemed appropriate by the City Council at some point in the future. Proposals for such facilities are likely to come forward for consideration by the City Council as full applications once development at Great Haddon is underway.

14.98 A comprehensive formal and informal sports and recreation strategy for Great Haddon is proposed as part of the wider landscape framework, comprising a network of equipped and unequipped play areas, informal open space, allotments, community orchards, ‘wilder’ areas for play and a variety of sports pitches, courts and greens, including 2ha of all weather pitches at the new secondary school (see paragraph xx below).
14.99 It is envisaged that shared use of school leisure facilities would be secured as part of any s106 agreement for the Great Haddon applications.

**Education**

**Baseline Conditions**

14.100 Responsibility for provision of education facilities rests with Peterborough City Council as the local education authority although, due to the close proximity of the site to Yaxley, pre-application discussions regarding education provision have also taken place with Cambridgeshire County Council.

**Primary Education**

14.101 There are 7 primary schools located within the assessment area (see Table 14.4 above for details). There are currently 3 primary schools at Yaxley, one in Stilton and one in Folksworth. In addition there are 2 primary schools in Hampton (at Hampton Hargate and Hampton Vale neighbourhood centres respectively). Two further schools are planned at Hampton (Hampton Leys) and will be built in tandem with the residential neighbourhoods they are each designed to serve.

**Secondary Education**

14.102 Pupils from the Peterborough assessment area can apply for admission to any of the PCC Secondary Schools subject to each individual schools’ entrance requirements. The nearest secondary school is Hampton College. Pupils from Huntingdonshire are provided for at Sawtry College (Huntingdonshire) and Stanground College (Peterborough), although some pupils from Huntingdonshire have been admitted to Hampton College.

**Early Years Provision**

14.103 There are two pre-school facilities at Hampton (Cygnets Pre–School and Leapfrog Day Nursery). In addition there is the Little Acorns Kindergarten in Yaxley.

**Assessment of Development Framework Plan**

14.104 The Development Framework Plan makes provision for sites for three 2 form entry primary schools with ‘early years’ facilities (3 x 2.2 ha), and a secondary school (8.96 ha) with capacity for between 6 and 8 forms of entry. This provision is designed to meet the education needs generated by the Great Haddon development.
14.105 As with the provision of local retail facilities, provision for local education facilities is a key element of encouraging sustainable patterns of activity for developments of this scale.

14.106 The way in which school places are chosen and allocated does not necessarily mean that every child will go to school locally. It is therefore important that the timing of school provision is carefully considered to encourage and facilitate as many local children to attend as possible.

14.107 The school sites are positioned adjacent to each neighbourhood/district centre, so as to maximise ‘linked trips’ to be made by parents and children (visiting the shops or playground before or after school, for example). This model has worked well at Hampton, and will ensure that each school forms an integral part of community activity within the site.

14.108 An assessment of the capacity of local schools and the proposed scale and phasing of education provision is set out in the *Great Haddon Planning Statement* submitted in support of the planning applications.

**Open Space Provision**

*Baseline Conditions*

14.109 There is no formal open space provision currently on site and as the majority of the site is in agricultural use, there is little public access to open spaces.

*Peterborough Green Wheel and Public Footpaths*

14.110 The Peterborough Green Wheel bridleway travels east-west through the centre of the Great Haddon development area (running through the northern part of the Core Area application site), linking land to the west of the A1(M) with the Stanground Lode Corridor and Crown Lakes Country Park to the east, as part of a wider circular route around Peterborough.

14.111 A ‘spoke’ from the Green Wheel (Bridleway No.1) runs north from the Green Wheel itself through the proposed Employment Area to Junction 1 of the Parkway and beyond.

14.112 In addition, there are two public footpaths linking the Green Wheel to the surrounding area: from Yaxley to the east (footpath No. 12) and the Old north Road to the west (footpath No. 14). The Old North Road is identified as part of the Sustrans National Cycle Network (Route 12) which continues to the west and south of the site.
14.113 The location of the public rights of way within the application sites is shown in Figure 8.2 and Figure 8.13 (see ES Volume 2 and Chapter 8 of this document).

Adjacent Open Spaces

14.114 Norman Cross Scheduled Ancient Monument adjacent to the southern boundary of the Core Area contains no physical remains or buildings and is not open to public access. The Livery Stables located off London Road in Yaxley border the Core Area application site but are privately owned and do not currently have any direct access into the application sites.

Existing Woodland

14.115 The application sites contain two significant areas of woodland, one in the northern part of the Core Area (Madam Whites Covert) and the other at the eastern edge of the Core Area adjacent to the urban edge of Yaxley.

14.116 Woodland at Jones’s Covert lies outside the application sites (to the north of the Core Area) and is included within the Orton Pit SAC managed by O&H Hampton under agreement with Natural England. Woodland at Chambers Dole and Two Pond Coppice is in private ownership and lies outside the application sites. This woodland is designated a County Wildlife site but has no public access. Further details of the impact of the proposed development on these areas of woodland are provided in Chapter 8 of this Volume.

Stanground Lode Corridor and Long Lake

14.117 The Stanground Lode is a relatively narrow watercourse flanked in parts by dense tree and scrub vegetation. The Lode flows north east through the Core Area, running east close to its northern boundary before passing under London Road and continuing through Hampton (Hampton Leys).

14.118 A number of balancing ponds related to the A1(M) are located adjacent to the western boundary of the sites. The pond areas are fenced from public access and surrounded by tree and shrub vegetation. A number of agricultural drainage ditches occur along field edges and approximately 16 small field ponds occur across the sites within field edges and woodland. Long Lake, a water body lying adjacent to the A15, has no public access.

South Peterborough Open Space Initiatives

14.119 Peterborough City Council has completed a citywide study of green infrastructure, the conclusions of which are set out in the Peterborough Green Grid Strategy (2007).
The strategy sets out a broad spatial framework and vision for green infrastructure provision and considers ways in which the implementation of the Green Grid (including land within the application sites) could be achieved.

14.120 The Green Grid Strategy has not currently been adopted as a Supplementary Planning Document. However, Preferred Option CS18 of the Core Strategy includes reference to the Green Grid concept and is intended to ensure that new development makes adequate provision of open space and green infrastructure within the context of the overall strategy.

14.121 The strategic proposals for the south of Peterborough proposed by the Green Grid indicate a local Green Infrastructure (GI) corridor (No. 11) running east to west along the course of Stanground Lode through Great Haddon to link Yaxley with the landscape to the west of the A1(M). The objective for this corridor is to “protect, enhance and extend the mosaic of lakes, water features and woodland within the former brick pits to the south and east of Peterborough”. In addition, the Great Haddon development area is included as part of a larger area referred to as the ‘South Peterborough Green Parks.’ (See Chapter 8).

14.122 Cambridgeshire Horizons has published a Green Infrastructure Strategy for Cambridgeshire. This strategy indicates the desire to promote a green corridor link between the Great Fen Project area and the South Peterborough Green Parks initiative which is also referenced in the Huntingdonshire District Council Core Strategy (see Chapter 8).

Open Space within surrounding settlements

14.123 Yaxley has significant open space provision: the main recreation ground is located in the centre of the village. The recreation ground comprises various types of play equipment for both juniors and toddlers, although these facilities vary in quality and whilst some appear new, others are old and in need of replacement. In addition to these facilities there is a cricket pitch and an associated cricket pavilion. There is also an all weather five-a-side football pitch/tennis courts, a skate ramp; and a basketball hoop (Middleton Road). The remainder of the recreation ground is informal open space.

14.124 To the south of the village, beyond Main Street, there is a football pitch with an associated temporary day care facility and hospitality suite which is the current home of Yaxley Football Club. Adjacent to the football club there are a number of allotment pitches, the provision of which is managed by the Parish Council.
Assessment of Development Framework Plan

14.125 The characteristics of the landscape within the sites, coupled with their open nature, means that a significant proportion of the site is proposed for open space and recreational uses within an enhanced landscaped setting. An extensive open space framework is proposed, creating visual and functional links between the SAC, existing woodland and lakes in the north of the site with the Fens to the south, and centred around the Stanground Lode corridor which runs in an east-west direction through the site. New woodlands and lakes will be established, together with measures to protect and enhance existing trees, hedgerows, water courses and areas of ecological significance.

14.126 A comprehensive formal and informal sports and recreation strategy is proposed as part of the wider landscape framework, comprising a network of equipped and unequipped play areas, informal open space, allotments, community orchards, and a variety of sports pitches, courts and greens. Recreation facilities are integrated within the linear parks and green links throughout the site, but with a focus on outdoor recreation and community activity on the Town Common, the strategic open space which acts as a physical separator but functional integrator between the two communities of Great Haddon and Yaxley.

14.127 The key elements of the proposed landscape and open space strategy for the outline applications are set out in Parameter Plans PST021-DFP-07B and PST021-DFP-08A (see ES Volume 2, Chapter 2) and in the Great Haddon Design and Access Statement accompanying the applications. The landscape strategy proposals will be developed to a greater level of detail in consultation with PCC and other relevant stakeholders through preparation and approval of future Development Briefs and Reserved Matters applications.

Formal Open Space Provision at Great Haddon

14.128 Within the Great Haddon development area, the Development Framework Plan makes provision for a total of around 156.78 ha of open space (equating to around 40% of the total site area). Table 14.7 below shows the open space and recreation provision that would be expected by Peterborough City Council based on adopted local plan standards (PCC Minimum Standards for Open Space - Appendix VII Peterborough Local Plan 2005) and the provision that is proposed by virtue of this outline application.

14.129 This is based on the construction of up to 5,350 dwellings and an average household size of 2.2 (Table 14.1, 2021 prediction) generating an end population of around 11,800 people. The assessment shows that there will be an overprovision of
approximately 100 ha of amenity open space within the development area (excluding the water bodies).

**Table 14.5  Open Space and Recreation Provision**

<table>
<thead>
<tr>
<th>Type of Open Space</th>
<th>PCC Standard</th>
<th>Proposed Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Playing Fields, Pitches, Courts &amp; Greens @ 1.2ha/1000 population</td>
<td>14.16 ha</td>
<td>14.68 ha</td>
</tr>
<tr>
<td>Allotments @ 0.1Ha per 1000 population</td>
<td>1.18 ha</td>
<td>}</td>
</tr>
<tr>
<td>Informal Parkland &amp; Amenity Open Space @ 1.4Ha/1000 population</td>
<td>16.52 ha</td>
<td>}</td>
</tr>
<tr>
<td>Ball Games @ 0.15Ha per 1000 population</td>
<td>1.77 ha</td>
<td>103.75 ha</td>
</tr>
<tr>
<td>Neighbourhood Play Grounds @ 0.1Ha per 1000 population</td>
<td>1.18 ha</td>
<td>}</td>
</tr>
<tr>
<td>Adventure Play Ground or Play Centre @ 0.1Ha/1000 population</td>
<td>1.18 ha</td>
<td>}</td>
</tr>
<tr>
<td>Play Space / Open Space within Housing @ 0.6Ha/1000 population</td>
<td>7.08 ha</td>
<td>}</td>
</tr>
<tr>
<td>Existing Woodland (Publicly Accessible) N/A</td>
<td>N/A</td>
<td>8.70 ha</td>
</tr>
<tr>
<td>Proposed Woodland</td>
<td>N/A</td>
<td>6.76 ha</td>
</tr>
<tr>
<td>Planting buffer to SAC</td>
<td>N/A</td>
<td>11.80 ha</td>
</tr>
<tr>
<td>Surface Water Attenuation Lakes</td>
<td>N/A</td>
<td>11.06 ha</td>
</tr>
<tr>
<td><strong>Total (overall application area of 390.03 ha)</strong></td>
<td><strong>43.07 ha (11%)</strong></td>
<td><strong>156.75 ha (40.2%)</strong></td>
</tr>
</tbody>
</table>

14.130 Further details of formal open space and recreation provision are provided in the Landscape Parameter Plan PST021-DFP-08A and Open Space Parameter Plan PST021-DFP-07B (see ES Volume 2: Chapter 2) and the Design and Access Statement accompanying the outline applications.

**Wider Access to Open Space and Public Rights of Way**

14.131 A network of access routes are proposed within areas of strategic open space linking with designated routes and the wider environment to the west and north east, the principles of which are shown on Figure 8.13 (ES Volume 2: Chapter 8).

14.132 This proposed network will provide access for existing and new communities to significant areas of public open space, nature conservation sites, woodland, informal and formal recreation facilities and new community facilities including schools. In
addition, in response to public consultation, a dedicated equestrian access route is proposed to link the existing livery yard at Yaxley with the Green Wheel to the north. These proposals will have a significant beneficial impact on overall access to the outdoor environment and promote healthy and active lifestyles.

14.133 In order to provide a comprehensive and effective green network for Great Haddon, it is proposed to divert part of the existing Green Wheel bridleway within the Core Area. A partial diversion of the Bridleway 2/11 to the south of the Stanground Lode is proposed in order to minimise ecological impacts on the SAC through increased access and disturbance, and to provide an underpass crossing of the western peripheral road at a location which minimises environmental impacts. The new route and existing route are clearly shown on Figure 8.13 (see ES Volume 2), and the environmental impacts associated with these proposals are discussed more fully in Chapters 6 and 8.

14.134 In addition, Public Footpaths No. 12 and 14 are proposed for partial diversion so they can be incorporated into proposed open space corridors through the development area. The principle of these proposed diversions has been agreed with Peterborough City Council. Should outline consents be granted for Great Haddon, then it will be necessary to apply for formal Rights of Way Diversion Orders to implement these changes.

14.135 Existing landscape features, the Green Wheel and public footpaths are fully incorporated into an active and attractive open space network including new additional access routes and incorporating areas of grassland, tree and woodland planting, new ponds and watercourses, and areas for community and outdoor activity and formal and informal recreation. The opportunities provided for landscape and biodiversity enhancement along access routes, and the creation of a more accessible strategic open space network, will provide long term benefits to both the Great Haddon population and the wider local communities.

Cumulative and Interactive Effects

14.136 The south of the city within the urban area of Peterborough has experienced considerable population growth since 2001 due largely to the Hampton township development, where around 3,300 new homes are now occupied (April 2009). The village of Yaxley (a Key Service Centre in Huntingdonshire’s settlement hierarchy), has also accommodated significant housing growth over the past decade, including land at Co-op Farm where 612 new homes were occupied by mid-2007.
14.137 Local facilities, schools, shops and recreation facilities of the appropriate scale to serve the resident population are committed at Hampton, but have been slow in being delivered.

14.138 Yaxley has accommodated significant levels of new residential development but in a piecemeal way which has not enabled the delivery of commensurate new facilities to serve the growing population, and some existing facilities are at capacity and/or in need of renewal.

14.139 The surrounding rural settlements are not generally well served by facilities in their immediate catchment but do have access to new and existing facilities at Hampton and Yaxley.

14.140 The socio-economic needs that are generated as a result of the proposed development at Great Haddon are generally met on site. Consequently, no specific mitigating measures to minimise the impact on existing or planned services are required as a result of these application proposals.

14.141 No significant adverse impacts on the existing socio-economic characteristics of the area and/or local social and community facilities are anticipated as a result of the implementation of development as proposed.

14.142 It is not intended to ‘overprovide’ facilities at Great Haddon to meet existing shortfalls. However, the introduction of new usable open space and recreation facilities, new district and neighbourhood centres and better connections to the wider area will result in beneficial impacts for residents of the wider area as well as Great Haddon. It is recognised that careful consideration of phasing - and commitment to funding and timing of the delivery of community facilities by the private and public sector - will be necessary in order to maximise these beneficial impacts.