



LOTMEAD FARM VILLAGES

Environmental Statement

Volume 1 - Main Report

April 2019

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Environmental Statement

Land at Lotmead Farm, Swindon

April 2019

Turley

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Client

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Our reference

AINA3007

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Document Availability

Copies of the Environmental Statement, including technical figures (Volume 2) and appendices (Volume 3) are available by contacting:

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A charge will be applied (POA) for hard (paper) or soft (CD/USB drive) copies of the ES.

Additional copies of the Non-Technical Summary (NTS) may also be requested and provided free of charge using the contact details above.

Comment on the planning application and Environmental Statement should be issued to:

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At a time when the planning submission is validated, copies of the Environmental Statement will be available to view, download and comment upon online using Swindon Borough Council's Planning Portal:

https://www.swindon.gov.uk/info/20030/planning_and_regeneration/380/view_or_make_comment_on_a_planning_application

1. Introduction

- 1.1 This Environmental Statement (ES) has been prepared on behalf of Ainscough Strategic Land ('the Applicant'). The Applicant has worked with a project team to design a residential-led mixed-use scheme on land at Lotmead Farm, East of Swindon. The project is known as 'Lotmead Farm' (hereafter referred to as 'the Site'). The scheme for development is referred to as the 'Proposed Development'. The Site falls within the administrative area of Swindon Borough Council (SBC).
- 1.2 An Environmental Impact Assessment (EIA) has been undertaken for the Proposed Development. The assessment has been carried out in accordance with the *Town and Country Planning (Environmental Impact Assessment) Regulations 2017* (the 'EIA Regulations 2017'). In accordance with the EIA Regulations 2017 the aspects of the environment likely to be significantly affected by the Proposed Development are assessed in this ES.
- 1.3 A plan of the site that forms the basis for the EIA for the Proposed Development is provided at **Figure 1.1**.

Site and Project Overview

- 1.4 The Site is located to the east of Swindon, east of the A419 and south of the A420. The Site's existing access is from Wanborough Road. The Site is an area of land totalling approximately 168.7ha (including primary road corridors) and is largely formed of pastoral farmland and agricultural buildings associated with the dairy farm. Other existing uses include a 'Pick Your Own' enterprise, 4 no. residential properties known as Lotmead Cottages adjacent to Wanborough Road and Lotmead Business Village, a renovated farm building providing circa 1,500 sq m of business floorspace.
- 1.5 The Site forms part of the New Eastern Villages (NEV), an adopted land allocation within the Swindon Local Plan under Policy NC3 for residential-led mixed-use development. The NEV is divided into a number of villages with the site falling within 'Lotmead Village' and 'Lower Lotmead Village'. Land to the north of the site, beyond the River Cole, forms part of the wider NEV development known as 'Great Stall East', 'Upper Lotmead Village' and 'Great Stall West'. Land to the south of the site also forms part of the NEV and includes 'Redland Village' and 'Foxbridge Village'.
- 1.6 Further details of the Site and its surroundings, are provided at **Chapter 3** and within the subsequent technical chapters.
- 1.7 The Applicant wishes to secure outline planning permission (with all matters reserved with the exception of detailed access off Wanborough Road) for the demolition and/or conversion of the existing buildings on the land and development of a residential-led scheme comprising:

"An outline application (with all matters reserved save the detailed access off Wanborough Road) for demolition and/or conversion of the existing buildings on site, and redevelopment to provide:

- Up to 2, 500 residential units (Use Class C3);

- Up to 1,780 sq m of community/retail uses (Use Classes D1/D2/A1/A2/A3/A4);
- Up to 2,500 sq m of business/employment use (Use Class B1) (comprising the retention of Lotmead Business Village and a net increase of c. 1,000 sq m of Use Class B1);
- A Sports Hub with playing pitches and changing facilities;
- 2 no. 2 Form Entry Primary Schools (2.2 ha per school);
- Open space, strategic landscaping and other green infrastructure (including SUDs and areas for nature conservation);
- Other associated road and drainage infrastructure;
- Indicative primary access road corridors to the A420 and alignment with the Southern Connector Road; and
- Improvements and widening along Wanborough Road for pedestrian, cycle and bus access.”

1.8 Further details of the proposed development are provided at **Chapter 4** and within the subsequent technical chapters.

Background to EIA

1.9 The term ‘EIA’ describes a procedure that must be followed as a means of drawing together, in a systematic way, an assessment of a project's likely significant environmental effects. This helps to ensure that the importance of the predicted effects and the scope for reducing them are properly understood by the public and the relevant local planning authority before it makes its decision. The aim of EIA is to:

‘protect the environment by ensuring that a local planning authority when deciding to grant planning permission for a project, which is likely to have significant effects on the environment, does so in the full knowledge of the likely significant effects, and takes this into account in the decision making process.... The aim is also to ensure that the public are given early and effective opportunities to participate in the decision making procedures.’¹

1.10 The Proposed Development falls within Schedule 2 part 10 (b) ‘urban development’ of the EIA Regulations 2017. The thresholds and location within a ‘sensitive area’ do not determine the requirement for EIA, but require a subsequent stage to determine ‘likely significant effects’. In this case a number of likely significant effects were identified through the EIA Scoping process, carried out in advance of the original Lotmead submission in 2014. The EIA process is therefore being used as a tool to identify environmental effects and where possible avoid, reduce or offset them.

1.11 The criteria for assessment of potential effects are set out at Schedule 3 of the EIA Regulations 2017 and can be broadly summarised as follows:

¹ NPPG, Reference ID: 4-002-20140306

- The characteristics of the development (*i.e.* the size of the development and its cumulation with other development, the use of natural resources, production of waste, pollution and nuisances, and the risk of accidents, having regard in particular to substances or technologies used);
- The location of the development (*i.e.* the existing land use, the relative abundance, quality and regenerative capacity of natural resources in the area, and the absorption capacity of the natural environment); and
- Characteristics of the potential impacts of development (*i.e.* extent of any impact, its magnitude and complexity, the probability of the impact and its duration or frequency).

Structure of the Environmental Statement (ES)

1.12 This ES is structured as follows:

- Volume 1: Environmental Statement Chapters
- Volume 2: Figures
- Volume 3: Technical Appendices
- Non-Technical Summary (the ES is accompanied by a separate Non-technical Summary (NTS) that describes each ES chapter and its conclusions in a succinct manner, using plain, non-technical language).

Table 1.1: ES Chapters

Chapter 1. Introduction (this chapter)
Chapter 2. EIA Assessment Methodology
Chapter 3. Background to the Development
Chapter 4. The Proposed Development
Chapter 5. Reasonable Alternatives
Chapter 6. Planning Policy Context
Chapter 7. Land Use and Agriculture
Chapter 8. Socio-economics and Human Health
Chapter 9. Water Resources
Chapter 10. Ground Conditions
Chapter 11. Transportation
Chapter 12. Ecology and Conservation
Chapter 13. Landscape and Visual
Chapter 14. Noise

Chapter 15. Air Quality

Chapter 16. Archaeology and Cultural Heritage

Chapter 17. Summary & Conclusions

Table 1.2: Figures

1.1.	Site Location Plan
2.1.	Other NEV Development
4.1.	Wanborough Road Access Plan
4.2.	Land Use Parameter Plan
4.3.	Movement Parameter Plan
4.4.	Green Infrastructure Parameter Plan
4.5.	Building Heights Parameter Plan
4.6.	Density Parameter Plan
8.1.	Local and Wider Impact Areas
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8.3.	Income to Swindon Borough Council from Council Tax and Business Rates
8.4.	Extract from Swindon Borough Council's Statement of Accounts (2017/2018)
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10.1.	Geology - Superficial Deposits
10.2.	Bedrock Geology
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11.5.	Wanborough Road Traffic Calming Measures (27970/011/008 Rev E)
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12.3.	Extended Phase 1 Survey Plan 2017
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14.7.	Redlands Airfield
14.8.	Daytime Sound Levels Associated with Redlands Airfield at Height of 1.5 m - East Take-Off, dB $L_{Aeq,16hours}$
14.9.	Daytime Sound Levels Associated with Redlands Airfield at Height of 1.5 m - West Take-Off, dB $L_{Aeq,16hours}$
15.1.	Air Quality Monitoring and Receptor Locations
16.1.	Location of Designated and Non-Designated Heritage Assets (Wiltshire HER) (April 2017)
16.2.	Figure Illustrating the Results of Geophysical Survey (After AS 2014) (April 2017)
16.3.	Figure Showing Development of Buildings within the Masterplan Application Site (April 2017)

Table 1.3: Technical Appendices

1.1.	Informal Scoping Note to Swindon Borough Council (7 th November 2018)
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1.2.	Informal Scoping Response (Swindon Borough Council - 11th December 2018)
7.1.	Agricultural Land Classification and Soil Resources (May 2014)
9.1.	Flood Risk Assessment (March 2019)
9.2.	Utilities Statement (March 2019)
10.1.	Phase 1 Ground Contamination Assessment (January 2019)
11.1.	Transport Assessment
11.2.	Travel Plan
12.1.	Ecology Baseline Report (June 2017)
12.2.	Phase 2 Ecology Surveys Report (November 2017)
12.3.	Arboricultural Impact Assessment (2019)
12.4.	Outline Landscape, Ecology and Arboricultural Management Plan (February 2019)
12.5.	Ecology Consultee Correspondence (2018)
13.1.	Viewpoint Assessment Tables
13.2.	Statement of Competence (The Urbanists)
14.1.	Traffic Data
14.2.	Sound Survey Results
14.3.	Construction Noise Activities
15.1.	Verification (Nitrogen Dioxide, NO ₂)
15.2.	Model Inputs and Results Processing Tools
15.3.	Traffic Data
15.4.	Future Year Modelling – Road Transport Emission Factors
16.1.	Archaeological Desk-based Assessment ('Version G') June 2017
16.2.	Heritage Setting Assessment (April 2017)
16.3.	Heritage Management Plan (April 2017)
16.4.	Outline Mitigation Strategy (May 2017)

1.13 In light of the above, and in accordance with Regulation 18(3), this ES provides information in relation to the following matters:

- A description of the Proposed Development (**Chapter 4**, and **Chapters 7-16**);
- A description of the likely significant effects of the proposed development on the environment (**Chapters 7-16**);

- A description of any features of the proposed development, or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment (**Chapters 7-16**);
- A description of the reasonable alternatives considered, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment (**Chapter 5**);
- A standalone **Non-Technical Summary** of the information referred to in the four points above; and
- Any additional information specified in Schedule 4 relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected.

Overview of Consultation

- 1.14 Consultation is an important process which extends beyond EIA and, in the case of Land at Lotmead, began in 2012 in advance of a planning application which was submitted in 2015. During the determination period, and indeed during the appeal process subsequent to the application being refused in 2016, extensive consultation took place with statutory consultees and interested parties particularly in respect of design progression.
- 1.15 The Site's extensive planning history and comments received from statutory consultees, local residents, groups, and other interested parties in respect of the previous submission have been used to guide the updated design and layout of the proposed development. Additionally, the Applicant carried out a public consultation event on 28th November 2018, including an additional Members Briefing that took place on 7th February 2019, to discuss the proposed and amended layout with statutory consultees, local Councillors and members of the community prior to submission. Please refer to the Statement of Community Involvement for full details of the public consultation, including the Applicant's consideration and response to consultation feedback.
- 1.16 Prior to submission of the application, the Applicant entered into a Planning Performance Agreement with Swindon Borough Council (SBC) and attended a number of pre-application meetings with various technical officers from the Council. During these meetings various iterations of the draft layout, including consideration of detailed neighbourhood character areas formed a key part of discussions.
- 1.17 An informal scoping exercise was also carried out as part of the pre-application, seeking advice from the Council in respect of the refreshed baseline and methodology of technical chapters. The purpose of the Informal Scoping Note (**Appendix 1.1**, issued to the Council during a pre-application meeting held on 9th November 2018) was to set out the Applicant's proposed approach to the ES, taking into consideration the extensive amount of baseline data and consultation with statutory bodies that has taken place to date, including how the ES will ensure compliance with the latest EIA Regulations. SBC issued its Informal Scoping Response on 11th December 2018 (**Appendix 1.2**).

- 1.18 Technical consultations undertaken with Council Officers' and other statutory consultees are summarised within each of the technical chapters.

List of topics 'scoped out'

- 1.19 Following on from (or consistent with) the topics included within the previous Environmental Statement, and as agreed by Swindon Borough Council during pre-application discussions, the following topics have been 'scoped out' of the ES:
- Decommissioning - There is no expectation that the project will be 'decommissioned'.
 - Major Accidents/Disasters – With the exception of hydrological hazards relating to flood events and climate change (assessed in Chapter 9), there is a low likelihood of major accidents or disasters deriving from geophysical; climatological; biological or man-made hazards and therefore falls outside the remit of the EIA process.
 - Light Pollution, Wind, Infrastructure, Sunlight, daylight and overshadowing - These topics were scoped out of the 2015 ES on the basis that associated impacts were not likely to cause significant environmental effects upon sensitive receptors. Given that the quantum of development has decreased from the 2015 proposals, it remains applicable that these topics to be scoped out.

Statement of Competence

- 1.20 In preparing the ES, the Applicant has instructed a comprehensive consultant team to provide technical input and advice on environmental issues.
- 1.21 Part 5, 18 (5) (a) of the EIA Regulations 2017 confirms that an ES must be prepared by 'competent experts'. All contributors to the EIA are competent experts in EIA and a schedule setting out the qualifications and professional accreditations of those contributing to the ES is provided below.
- 1.22 The EIA has been led by Turley. The Institute of Environmental Management and Assessment (IEMA) has awarded Turley the EIA Quality Mark in recognition of our technical quality and commitment to improvement in practice.

Table 1.4: Competent Experts

Chapter (s)	Consultant	Professional Accreditations (Lead consultants)
EIA coordination; Chapter 1. Introduction; Chapter 2. EIA Assessment Methodology; Chapter 3. Background to the Development; Chapter 4. The Proposed Development; Chapter 5. Reasonable	Turley (IEMA Quality Mark accredited)	Amy Hickson: BA (Hons) Town & Country Planning, MPLAN, MRTPI Laura Eimermann: BSc (Hons) Real Estate (RICS accredited), MSc Urban Planning and Development (RTPI accredited)

<p>Alternatives;</p> <p>Chapter 6. Planning Policy Context;</p> <p>Chapter 17. Conclusions & Summary</p>		
Chapter 7. Land Use & Agriculture	Reading Agricultural Consultants Ltd.	Alastair Field: BA (Hons) Geography, PG Dip Agricultural Economics, MSc Agricultural Economics.
Chapter 8. Socio-Economics and Human Health	Turley (IEMA Quality Mark accredited)	<p>Amy Gilham: MSc Urban Regeneration, BA (Hons) Human Geography</p> <p>Amber Morley: BA (Hons) Geography, MSc Spatial Planning (sustainability specialism)</p>
Chapter 9. Water Resources	Peter Brett Associates (PBA) (part of Stantec)	<p>Amy Hensler: Bsc (Hons), MSc, C.WEM, CEnv, MCIWEM</p> <p>Edward Turner: MRes, BEng, CEng, MICE</p>
Chapter 10. Ground Conditions	Peter Brett Associates (PBA) (part of Stantec)	<p>Robert Foster Meng, MSc</p> <p>Richard Thomas BSc, MSc, CGeol</p>
Chapter 11. Transportation	PBA	<p>Sarah Matthews Meng (Hons), MSc, MCIHT</p>
Chapter 12. Ecology and Conversation	Environmental Dimension Partnerships Ltd. (EDP)	<p>Graham Morgan: BSc (Hons) Environmental Biology, MSc Habitat Creation and Management, CEnv, MCIEEM</p> <p>Rob Forbes: BSc (Hons) Ecology, MSc Environmental Assessment and Management, MCIEEM</p>
Chapter 13. Landscape/Visual	The Urbanists	<p>James Brown: Chartered Town Planner and Affiliate of The Landscape Institute</p> <p>David McQuitty: Chartered Landscape Architect and</p>

		Associate of the Landscape Institute
		(See Appendix 13.2 for full statements of competence)
Chapter 14. Noise	PBA	Matthew Barlow: BSc, MSc, MIOA
Chapter 15. Air Quality	PBA	Philip Branchflower: BSc, MIAQM
		Ana Gomes: BSc, MSc
Chapter 16. Archaeology and Cultural Heritage	EDP	Jo Vallender: MA Archaeology and Heritage Management; MCIfA.
		Eddy Stratford: BA (Hons) Archaeology; MCIFA

2. EIA Assessment Methodology

2.1 This chapter summarises the approach to EIA assessment methodology. The key issues to be addressed within the ES are those impacts where the project could have likely significant effects.

2.2 Schedule 4, Part 7, of the EIA Regulations states that an ES should include:

‘a description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases’.

2.3 The detailed format of assessment within each ES technical chapter is dependent upon the characteristics of each topic; however, to enable a consistent ES format (as far as practical), all technical chapters (**Chapters 7-16**) are structured broadly in accordance with the following sub-headings and are specific to the topic being assessed. Topic-specific details relating to assessment methodologies adopted are provided within each topic chapter. This is particularly relevant to some topics which must deviate from the stated methodology in order to adhere to relevant guidance and practice.

- Purpose & Parameters of the Assessment;
- Legislative and Policy Framework;
- Consultation;
- Study Area;
- Baseline Conditions;
- Scope and Methodology;
- Limitations & Assumptions;
- Environmental Assessment: Construction Phase;
- Environmental Assessment: Operation Phase;
- Environmental Assessment: Cumulative Effects;
- Mitigation and Monitoring;
- Summary of Residual Effects; and
- References and Glossary.

2.4 The EIA Regulations require the identification of the likely adverse or beneficial significant environmental effects of the project. This includes consideration of the likely effects during

the construction and operation phases of the project. This is based on consideration of the likely magnitude of the predicted impact and the sensitivity of the affected receptor. The process by which effects have been identified and their significance evaluated is set out below.

2.5 Various actions may result in impacts and these impacts have consequent effects upon receptors. The impact assessment process considers the following:

- The magnitude and complexity of the impact;
- Sensitivity/value/importance of the receptor/receiving environment;
- The probability/likelihood that the impact on the receptor will result in a given effect;
- The significance of the resulting likely environmental effect; and
- The level of certainty in the assessment.

2.6 The methodology for assessing significance of effects varies between environmental topics but, in principle, will be based on the environmental sensitivity (or value/importance) of a receptor and the magnitude of change from the baseline conditions.

2.7 In all cases each assessment identifies the reasonable worst case scenario that would have the greatest impact (for example the largest footprint or the tallest dimensions, depending on the topic under consideration). If the assessment shows that no significant effect is anticipated, then it can be assumed that other (lesser) options would also have no significant effect (provided their characteristics are similar). This approach allows for flexibility in design and construction within certain maximum extents and ranges that are fully assessed in the ES.

2.8 The magnitude of an impact provides a measure of the environmental effect arising.

2.9 Magnitude includes consideration of:

- Extent – the geographical area/extent over which an impact occurs;
- Duration – the time for which the impact occurs (generally, short – up to 1 year; medium – 1 to 10 years; or long-term – over 10 years);
- Frequency – how often the impact occurs; and
- Severity – the degree of change relative to the baseline level.

2.10 The sensitivity of the receptor is a function of its capacity to accommodate change and reflects its ability to recover if it is affected. The sensitivity of the receptor includes consideration of:

- Adaptability – the degree to which a receptor can avoid or adapt to an impact;
- Tolerance – the ability of a receptor to accommodate temporary or permanent change without a significant adverse impact;

- Recoverability – the temporal scale over and extent to which a receptor will recover following an impact; and
 - Value – a measure of the receptor’s importance, rarity and worth.
- 2.11 The assessment of the significance of an effect is therefore determined with reference to the overall magnitude of impact and sensitivity of the resource/ receptor.
- 2.12 Effects may be:
- Beneficial or adverse;
 - Negligible, minor, moderate, or major;
 - Short, medium or long-term;
 - Temporary or permanent; and
 - Local, district, regional, national or international level.
- 2.13 In determining significance, relevant legislation, international, national, regional and local standards/guidance, and the inter-relationship between effects (both cumulatively and in terms of potential effect interactions) are also relevant.
- 2.14 Assessments of the significance of environmental effects carry a degree of subjectivity, but are based on experienced professional judgement of the impact-receptor interaction that occurs and the data available.
- 2.15 The assignment of significance in this ES is generally informed by a matrix-based approach to assist with the process. The matrix guides the competent expert. A definitive assessment of significance is provided for each effect. A conclusion is provided as to the threshold of a significant effect, again based on professional judgement.
- 2.16 Moderate and Major effects would generally be ‘significant’.
- 2.17 For some specific topic assessments, guidance on the nature of the effect requires that differing criteria or scales for determining significance are to be used, however, wherever possible there is consistency of terminology and conclusions. This is to ensure that the conclusions of the different effects can be compared during the decision-making process and be robustly considered cumulatively.
- 2.18 Where the assessment concludes that impacts remain that are deemed to be significant in EIA terms, further mitigation may be required. The measures proposed to avoid, reduce and, if possible, remedy significant adverse effects are described (e.g. management controls, physical or compensation measures).
- 2.19 Summary of effect tables that summarise the likely significant effects associated with each of the environmental topics is provided at the end of each Chapter. These tables outline sensitive receptors, mitigation measures and residual effects.

Cumulative Effects

- 2.20 Cumulative effects are an intrinsic part of EIA and form part of the methodology above. For ease of understanding, however, the detail of the method for this element is set out separately below.
- 2.21 The Cumulative Effects section of each ES chapter has assessed the likelihood for significant cumulative environmental effects as a result of the Proposed Development. To accord with the EIA Regulations and best practice guidance, the following types of cumulative effects have been considered.
- Effect interactions: the interaction and combination of environmental effects of the Proposed Development affecting the same receptor either within the Site or in the local area. These are described as 'Intra-Project' cumulatives; and
 - In-combination interactions: the interaction and combination of environmental effects of the Proposed Development with a committed project (or projects) affecting the same receptor. These are described as 'Inter-Project' cumulatives.
- 2.22 A qualitative cumulative effects assessment has been undertaken for the majority of environmental topics considered. However, partially quantitative assessments have been undertaken for traffic-related effects (informing the transportation, noise and air quality technical chapters).
- 2.23 At present, there is no widely accepted methodology or best practice for the assessment of cumulative effects although there are a number of guidance documents available. The following approach is based on professional experience and judgement, the types of receptors being assessed, and the nature of the Proposed Development being considered. Where information is not available, assumptions have been made based on professional judgement and are clearly stated alongside any uncertainty as part of the assessment.

Effect Interactions (Intra-Project Cumulatives)

- 2.24 The approach to the assessment of effect interactions considers the changes in baseline conditions at common sensitive receptors and a summary of residual effect interactions is formulated corresponding to the construction and operational phase of the Proposed Development. An overall qualitative assessment of the cumulative effect on the common sensitive receptors identified is made using professional judgement and informed by the technical information provided in the ES and supporting appendices.

In-combination effects (Inter-Project Cumulatives)

- 2.25 Assessment of potential in-combination effects will be undertaken using the methodology outlined below.

Step 1: Identification of Projects for Consideration

- 2.26 In order to inform potential committed developments, a high level review of planning applications submitted (and other sources as required) in the last 5 years has undertaken in order to identify potential projects that could give rise to in-combination interactions with the Proposed Development.

2.27 Applicable projects for consideration of in-combination effects as part of the ES are determined using the following criterion:

- Projects that are under construction;
- Permitted application(s) not yet implemented;
- Submitted applications(s) not yet determined but have the potential to be determined prior to the determination of the proposed development; and
- All refusals subject to appeal procedures not yet determined.

2.28 This will produce a list of projects for further evaluation.

Step 2: Evaluation of Projects for Assessment

2.29 Each of the projects identified have been evaluated to determine whether the following criterion is met:

- A concurrent construction or operational phase with the Proposed Development;
- A relevant scale – for example, other projects which in their own right have been subjected to EIA as a result of ‘likely significant effects’; and
- A relevant geographical boundary and common sensitive receptors to the Proposed Development.

2.30 This produced a ‘short list’ of projects for assessment. Any assessment will depend on available documentation in support of the projects.

Step 3 – Assessment of In-combination Effects

2.31 Once the receptors for assessment have been defined, consideration, where possible, is given to their tolerance to effects. The sources of construction or and operational activities in-combination with the Proposed Development are then assessed. In order for there to be a potential in-combination effect, there needs to be a potential effect on the same receptor for a similar duration within the overall programme. There may be effects at the project level which require due consideration and management but these effects will not be reconsidered as part of the assessment.

2.32 The qualitative evaluation at the receptor level will consider the following:

- Combined magnitude of change;
- Sensitivity/value/importance of the receptor/receiving environment to change; or/and
- Duration and reversibility of effect.

2.33 Through a combination of the qualitative evaluation and mitigation presented in the ES, conclusions are drawn as to the likelihood for significant in-combination environmental effects.

NC3 Allocation and Applications

- 2.34 The key cumulative projects are the planning applications submitted by Hallam / Hannick / Taylor Wimpey for Rowborough and South Marston Villages, the Capital Land EDA application for the Great Stall East Village and the Barberry Swindon Ltd application for the Redlands Village all comprising character areas which contribute to the NC3 policy allocation.
- 2.35 Details of the projects for assessment are set out at **Table 2.1** below and correspond with the Other NEV Development Plan at **Figure 2.1**.

Table 2.1: Projects for Assessment

Site Name/ Address	Description/Development Type	Distance from Site (from centre point)	Application Reference	Status
Planning Permissions (Committed)				
The Hub / Symmetry Park	Employment development including Use Classes B1b, B1c, B2, B8 and new landscaping and junction to A420 (means of access not reserved).	c. 0.8km NE	S/OUT/14/0 253	Outline application approved 24 th October 2016.
			S/RES/15/15 22 (Phases 1-4 and 7)	Reserved matters approved 8 th April 2016 and 24 th Oct 2016.
			S/RES/16/12 33 (Phase 5, Unit 1)	
South Marston Hotel	Outline application for up to 70 dwellings and associated ancillary works.	c. 2km NW	S/OUT/1985	Outline permission was granted 27 th October 2017.
			S/RES/18/11 45	Reserved Matters (for 69 dwellings) approved on 19 th March 2019.
Planning Applications (Pending)				
Rowborough / South Marston	Up to 2,380 dwellings, local centre, community uses, sheltered accommodation, up to 2 primary schools, green infrastructure including open space, play space, sports facilities, Engineering works inc. drainage, ground remodelling and demolition. New accesses from the A420. Old Vicarage Lane and Thornhill	c. 1.8km N	S/OUT/13/1 555	Resolution to grant at Committee 14 th November 2017 (subject to S106 agreement).

Road.

Great Stall East	Up to 1,800 dwellings, 10 FE Secondary School and 2FE Primary School with sports pitches, sports hub and open space, a local centre (up to 1,000 sqm – Use Classes A1, A2, A3, A4, A5 and D1), public open space / green infrastructure and recreation spaces, and access from A420.	c. 1km N	S/OUT/17/1990	Pending determination- Revised Plans submitted in March 2019. An extension of time until 30 th June 2019 has been agreed.
Redlands	Up to 370 dwellings, a local convenience store, community facility, primary school, open space, landscaping and access points to and from Wanborough Road and northern site boundary and eastern boundaries.	c. 1.2km S	S/OUT/16/0021	Resolution to grant at Committee 10 th April 2018 (subject to S106 Agreement).

Assumptions and Limitations

2.36 The principal assumptions that have been made, and any limitations that have been identified, in undertaking the EIA are set out below. Assumptions specifically relevant to each topic have been set out in each chapter.

- The assessments contained within each of the technical chapters are based upon the parameter plans and Wanborough Road access plan (**Figures 4.1 to 4.6**), for which planning approval is sought.
- Baseline conditions have been established from a variety of sources and have been collated at various dates. A number of reports appended to the ES (Volume 3) were prepared prior to the submission of this planning application and as such, may refer to the former 'Masterplan' and 'Phase 1' proposals that were previously considered by SBC and Secretary of State at appeal. Whilst the reports may refer to the previous proposals, the assessments made were based upon a higher quantum of development (e.g. 2,600 homes and 3,000 sq m of employment floorspace). The reports therefore assess the worst case and remain applicable to the proposed development as described in Chapter 4 of the ES.
- Due to the dynamic nature of the environment, conditions may change during the construction and operation of the development.

- For the purposes of this ES, the likely construction completion year of c.2040 is applied. Where an alternative assumption is made, the reasoning for this is provided within the relevant ES technical chapter. For example, the model assessment informing Chapter 11 (Transportation) as a completion year of 2036, as agreed with the Highways Authority.
- Construction activities will be carried out in accordance with a phasing plan and pre-determined schedule which are likely to be conditioned as part of any planning permission.
- A commitment is made to the delivery of a Construction Environmental Management Plan (CEMP) which will be conditioned as part of any planning permission.
- Prior to submission of this application, the third party applicant for the Great Stall East proposals submitted a revised layout for their proposed development. As a result, the Application Boundary (shown on **Figure 1.1**) has been updated to correspond with the latest road alignment presented by the Great Stall East proposals. It is possible that some plans contained within this ES figures and appendices illustrate an earlier alignment however, this has no bearing on the assessment chapters.
- Due to access limitations for surveying purposes, it has not been possible to undertake detailed environmental surveys for the two indicative A420 road links extending north of the Application Site. Where appropriate, reference has been made to, and information drawn upon, existing published sources of data and information in relation to these two sections of land.

3. The Site and its Surroundings

- 3.1 The following provides an overview only of the site and surroundings; further details are provided subsequently, within the technical information contained at **Chapters 6-16**.

Overview

- 3.2 The site extends to approximately 168.7ha and is located to the east of the A419(T) and south of the A420, East of Swindon.
- 3.3 The site comprises the Lotmead Village and Lower Lotmead Village of the New Eastern Villages (NEV) Strategic Allocation.
- 3.4 The Site predominately comprises agricultural land in pastoral use, interspersed with a network of hedgerows, trees, waterbodies (ditches and ponds) and is bounded by watercourses.
- 3.5 The southwestern area of the site comprises numerous buildings including:
- Lotmead Farmstead, including two farmhouses and dairy farm buildings;
 - Lotmead 'Pick Your Own', which comprises areas for growing various fruit and vegetables, a farmshop/café with outside seating area, animal and bird sanctuary/farm and childrens play area;
 - Lotmead Business Village, a renovated Victorian farm building offering approximately 1,500 sqm of business accommodation (in B1(a) and Sui Generis Use), and
 - Lotmead Cottages (in residential use).
- 3.6 The site is predominantly flat and open, gently falling from c.94-95m Above Ordnance Datum (AOD) towards the River Cole on the northern site boundaries where the levels are around 90-91 AOD.

Statutory & Non-Statutory Designations and Other Features

- 3.7 The following are present on or near the site:
- The adopted Swindon Local Plan 2011-2026 allocates land east of Swindon as a strategic mixed use urban extension, including some 8,000 dwellings. This strategic allocation is known as the New Eastern Villages ("NEV"). The Site comprises a part of the NEV allocation.
 - The site is not subject to any landscape or environmental designations.
 - There is a single designated heritage asset within the site boundary of the site. In the south west corner of the Site lies a Scheduled Monument (SM), which comprises a former Roman settlement known as *Durocornovium*, a below ground feature. The SM covers an area of c.25ha, of which approximately 8.4ha falls within the south west part of the Application Site.

- 3.8 There are no conservation areas, Registered Parks and Gardens or listed buildings within the Site, although there are five Grade II listed buildings within the vicinity:
- Lower Earls court Farmhouse (LB1023277), located c.200m to the east;
 - Marston Farmhouse (LB 299721), located c.780m to the north west;
 - The outhouse to the north of Nythe Farmhouse (LB1023430), located c. 340m to the north west;
 - Longleaze Farm House (LB1299729), located c.200m north of the eastern access route;
 - Lock Keepers Cottage (LB1355939), located c.50m to the east of the western access route; and
 - Earls court Manor (LB1023276), located c.680m to the south east.
- 3.9 No part of the site is covered by any statutory designations of European / International value and there are none within a 10km radius. Accordingly such designations are not considered further in the Assessment.
- 3.10 There are seven statutory designations within 5km of the site, three of which are designated for their geological interest and therefore are not considered further. The remaining four Sites of Special Scientific Interest (SSSIs) are:
- The Coombes, Hinton Pava - 3km to the south east;
 - Coate Water – 3.1km to the south west;
 - Tuckhill Meadows – 4km to the north east; and
 - Burderop Wood – 4.7km to the south west.
- 3.11 With regard to non-statutory ecological designations of County Value or less, there are 5 no. Local Wildlife Sites (or equivalent) located within 2km of the site including:
- Broow Meadow LWS is approximately 800m to the north east, Wanborough Meadows LWS is 1.6km to the south of the site, St Julian's Community Woodland Wiltshire Wildlife Trust Reserve is circa 1.8km to the north west and Warneage Wood Trust Reserve is approximately 1.8km to the south of the site.
 - An arboricultural survey of the site recorded a total of 128 trees on site, 101 groups of trees and 50 hedgerows, totalling 279 items in total. There are three veteran trees within the site.
 - The majority of the agricultural land on site is Subgrade 3b (moderate quality), with Grade 4 (poor quality) also present.
 - In terms of topography, the Site is predominantly flat open landscape. A network of watercourses traverse and border the site including Dorcan Stream, Liden Brook, River Cole and a number of ditches and ponds. The Site lies within all three flood zones, as indicated on the Environment Agency's flood maps.

- The field pattern is typical of the wider landscape and area, being generally irregular in shape and bordered by mature hedgerows and trees and some wet and dry ditches.
- The Site is bordered to the north by open countryside and the River Cole, to the south and east by open countryside and to the west by Wanborough Road, from which both existing pedestrian and vehicular access is obtained. The Pick Your Own is served by a separate access further along Wanborough Road towards the Swindon urban edge.
- One public right of way crosses the Site in the far western corner linking Wanborough Road to the A420 in the north.

Planning History

- 3.12 The most relevant planning history is the planning application (S/OUT/15/0753) and subsequent appeal (APP/U3935/W/16/3154437) for the a residential led scheme described as follows:

“Outline Planning Application (with means of access off Wanborough Road not reserved) for the demolition and/or conversion of the existing buildings on site, and redevelopment to provide up to 2,600 dwellings, up to 1,765 sqm of community/retail uses (Use Class D1/D2/A1/A3/A4), up to 3,000 sqm of business/employment use (Use Class B1), a primary school, open space, strategic landscaping and other green infrastructure (including SUDs and areas for nature conservation), other associated road and drainage infrastructure, indicative primary access road corridors to the A420 and improvements and widening of existing route off Wanborough Road to provide pedestrian, cycle and bus access.”

- 3.13 The planning application was refused by SBC in June 2016 and was subsequently dismissed at appeal (by the Secretary of State) in June 2018 for three reasons: (1) the proximity of development to the Scheduled Monument and ‘less than significant’ impacts arising from it; (2) the movement hierarchy for the proposed development identified the Southern Connector Road (SCR) as a secondary route however, this should have been considered as a primary movement route given its strategic function to accommodate the wider NEV development; and (3) the location and quality of open space did not meet local requirements.
- 3.14 During the appeal process the appellant submitted revised plans in the endeavour to overcome a number of reasons for refusal. The revised plans primarily included a second primary school, rerouting of the safeguarded canal alignment to accord with the NEV Illustrative Masterplan SPD (adopted in October 2016) and an update of the proposed internal movements parameters to ensure a number of TPO trees could be retained at the access track which currently serves Lotmead Business Village. To ensure these changes were suitably assessed, an Addendum to the Environmental Statement was also submitted.
- 3.15 Whilst the Inspector (and SoS) concluded that they could not accept the changes made to the plans during the appeal process, it was acknowledged that a number of refusal reasons were resolved from such changes. In light of this, the Applicant has incorporated these changes into this planning application and has focussed its attentions on updating the parameter plans which overcome the remaining issues identified above.

4. The Proposed Development

- 4.1 The Proposed Development site area is shown by the plan provided at **Figure 1.1**, and measures approximately 168.7 ha. The proposed development comprises approximately 71.7ha of developable land (including retained buildings and road infrastructure) and the provision of 97ha of Green Infrastructure.

“An outline application (with all matters reserved save the detailed access off Wanborough Road) for demolition and/or conversion of the existing buildings on site, and redevelopment to provide:

- Up to 2, 500 residential units (Use Class C3);*
- Up to 1,780 sq m of community/retail uses (Use Classes D1/D2/A1/A2/A3/A4);*
- Up to 2,500 sq m of business/employment use (Use Class B1) (comprising the retention of Lotmead Business Village and a net increase of c. 1,000 sq m of Use Class B1);*
- A Sports Hub with playing pitches and changing facilities (approximately 10.6ha);*
- 2 no. 2 Form Entry Primary Schools (2.2 ha per school);*
- Open space, strategic landscaping and other green infrastructure (including SUDs and areas for nature conservation);*
- Other associated road and drainage infrastructure;*
- Indicative primary access road corridors to the A420 and alignment with the Southern Connector Road; and*
- Improvements and widening along Wanborough Road for pedestrian, cycle and bus access.”*

- 4.2 The existing ‘Pick Your Own’ Facility and Lotmead Business Village (comprising c. 1,500 sq m of B1 and sui generis uses) will be retained as part of the development. There will be opportunity at detailed design to enhance access to and integrate the pick your own facility into the wider development through the provision of footpath and cycle links. Similarly, the Lotmead Business Village will be retained and enhanced by virtue of its proposed location within one of the local centres.

- 4.3 The design process has been informed by baseline surveys and desktop reviews so that effects are well understood and primary mitigation developed (i.e. mitigation inherent to the design of the Proposed Development). Examples of primary mitigation measures, and contained in this Project Description, include restriction of building heights and densities near sensitive receptors, ensuring the Scheduled Monument remains unaffected by the proposal, providing an open space strategy which seeks to retain existing trees and where practicable, agreed landscape design / planting, surface water management strategy and

biodiversity enhancements. The proposed off-site highway improvements along Wanborough Road also comprise primary mitigation.

Parameter Plans

- 4.4 The Parameter Plans (land use, green infrastructure, movement, building heights and density) at **Figures 4.2 to 4.6** have formed the basis of the EIA for the application and inform the Illustrative Masterplan which accompanies the planning submission. Appropriate conditions attached to any planning permission would ensure that the detailed design of the development would be in general conformity with these parameter plan principles.
- 4.5 The anticipated maximum proposed developed areas and building heights (for the purposes of this EIA Scoping Report, in order to ensure a robust assessment/position in EIA terms) are as follows, and will be subject to further refinement through the ongoing iterative design process.

Land Use & Quantum

- 4.6 **Table 4.1** identifies the maximum proposed developable areas:

Land Use	Hectares
New Residential	54.39
Lower Lotmead Local Centre	2.92
Lotmead Local Centre	1.35
Primary Schools	4.3
Green Infrastructure (exc. Sports Hub)	86.4
Sports Hub	10.6
Existing Plots to be retained	1.27
Primary Vehicular Route within ownership	7.36
TOTAL	168.7

Table 4.1: Land Use & Quantum

Scale

- 4.7 The scale of the Proposed Development has had regard to the sites opportunities and constraints, including the existing context of the Site and its relationship to the local and wider landscape.
- 4.8 The Proposed Development includes a variety of residential densities from 10 to 55 dph. Lower densities are generally located around the periphery of the residential area or near sensitive receptors such as the Scheduled Monument where sensitive boundary treatment will be applied at detailed design.
- 4.9 Assuming an average maximum density of 45dph across the site's developable areas, up to 2,500 dwellings are considered deliverable.

- 4.10 In terms of proposed building heights, the majority of buildings across the Site will be 2 to 3 storeys (up to a maximum ridge height of 12m AOD). An allowance is made for 'Potential Marker Buildings' of up to 5 storeys (up to a maximum ridge height of 18m AOD). Such buildings will be sited within or near the local centre and/or the primary access route and are considered suitable in design terms, providing points of interest and assisting with site legibility.

Movement

- 4.11 Planning approval is sought for detailed access onto Wanborough Road. The detail of which are illustrated by the Wanborough Road Access Plan at **Figure 1.7**. This access point will be restricted for use by buses, cyclists, pedestrians and vehicle movements associated with a maximum of 200 new dwellings.
- 4.12 The Movement Strategy has been designed to accord with the overall NEV access strategy. It also takes into consideration the latest primary access route for the eastern A420 access which is currently put forward by the Great Stall East proposals.
- 4.13 Primary Access into the site will be via the Southern Connector Road, the eastern A420 access via Great Stall East and the western A420 access via The Hub/DB Symmetry Park and/or other third party land. A secondary access is proposed from Wanborough Road.
- 4.14 The Movement Hierarchy is summarised as follows:
- **Primary Access Routes** – The primary routes illustrated on the Movements Parameter Plan (**Figure 4.3**) illustrate connectivity to the A420 access roads and aligns with the proposed entry point of the Southern Connector Road south of the site. These roads will comprise a minimum road width of 7.3m and a minimum of 3.5m pedestrian/cycle lanes on both sides of the carriageway.
 - **Secondary Access Routes** – This includes the access road onto Wanborough Road where onsite highway restrictions form part of the Proposed Development to ensure that no more than 200 dwellings, including buses, cycles and pedestrians are able to access this route. These roads will comprise a minimum road width of 6.75m and 3.5m pedestrian/cycle lanes on both sides of the carriageway.
 - **Pedestrian Priority Zones** – The proposed Local Centres are anticipated to comprise a shared area of movement for pedestrians, vehicles and cyclists. Similarly, shared surfaces will be utilised within residential areas.
 - **Greenways** – These comprise a network of footpath and cycle routes, predominantly located within the proposed Green Infrastructure and provide connectivity throughout the Proposed Development.
- 4.15 Further detail in respect of the movement hierarchy is contained within the Design and Access Statement which accompanies the planning application.
- 4.16 The operation of the Proposed Development is not anticipated to be unusual or atypical of a mixed-use residential-led development. During the operation of the Proposed Development activities associated with maintenance and routine servicing can be expected.

Development Programme/Timescales

- 4.17 Timescales for the Proposed Development are not fixed at this time. The below comments are based on an estimate of the typical timescales for a development of this type to come forwards and are provided as a guideline to inform the EIA, against which professional judgement has been used in the subsequent technical assessments.
- 4.18 Construction and operation of the proposed road and buildings could occur in tandem for some periods, and the timescales for this cannot be guaranteed. It is possible that the Proposed Development could be phased and different parts of the development may be brought forwards by different parties. As a result, it is possible that construction could take place alongside occupation/operation of completed parts of the development.
- 4.19 As the Outline elements of the scheme will be subject to future Reserved Matters applications, the timings for construction and subsequent operation could vary, but construction could theoretically commence during the latter part 2020, although early 2021 would be likely to be a more realistic commencement year.
- 4.20 It is broadly expected that construction of all elements of the scheme would have commenced by 2021 and the construction phase will continue for several years thereafter.
- 4.21 It is anticipated that the development will progress at an average delivery rate of 150 dwellings per annum. Based on the development of 2500 dwellings, assuming the first 200 dwellings will be constructed at a slower rate of 50 dwellings per annum and assuming construction will commence in 2021, the completion of development can be expected in circa 2040 (c. 19 years).

5. Reasonable Alternatives

- 5.1 Paragraph 2, Schedule 4, of the EIA Regulations 2017 states that an ES should include:

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

- 5.2 This chapter briefly considers the reasonable main alternatives studied, with a focus on alternative scheme options and scheme design iterations.
- 5.3 The separate Design and Access Statement that accompanies the planning application provides a visual representation of the design evolution of the Proposed Development.

Alternative Sites and Uses

- 5.4 The Site is allocated for residential-led mixed-use development in the adopted Swindon Borough Local Plan. As part of Local Plan preparations, alternative sites and strategies to accommodate growth were considered and the NEV allocation was identified as preferable area for future growth. As such, alternative sites are not considered further.
- 5.5 The amount and location of the residential properties, employment uses and local centres, green infrastructure and vehicular access align with the principles of the Local Plan allocation and consider the layout for the wider NEV as illustrated by the NEV Illustrative Masterplan (adopted October 2016). The indicative parameter plans have been adapted in line with relevant considerations, including the spatial matters that were raised during the previous planning application and subsequent appeal.
- 5.6 Alternative design options (for example, in relation to the quantum and location of uses within the site) have been developed through an iterative design process, particularly during pre-application discussions with the Local Planning Authority. This has enabled early consideration of potential alternatives to the Proposed Development to ensure minimisation of risks and to help to avoid likely significant environmental effects, whilst enabling the delivery an allocated strategic development site.

Evolution of Development Design

- 5.7 Various design options for the Site have been presented prior to the submission of this application, including the proposals of the previous outline application and the amended proposals subsequently considered at Appeal.
- 5.8 Amendments made to the proposed layout during the appeal process were made following additional consultation with the Council and statutory consultees. In summary, this included an additional primary school, rerouting of the safeguarded canal alignment to accord with the Wilts and Berks Canal Trust’s latest preferred alignment, as illustrated by the NEV Illustrative Masterplan SPD (adopted in October 2016) and an update of the proposed internal movements framework (including use of the existing access track to Lotmead Business Village as a greenway to ensure a number of TPO trees could be retained).

- 5.9 These amendments were acknowledged by SBC and the Secretary of State (SoS) (the decision maker for the previous appeal on the Site) to address a number of refusal reasons attached to the original decision notice. As such, these design solutions have been carried forward into the current proposals.
- 5.10 Further design iterations have been considered in the lead up to the submission of this planning application which focus on resolving the three remaining areas of concern expressed by SBC and the SoS (see Chapter 3; Planning History and the Planning Statement accompanying the planning submission); and take into account the latest policy and contextual considerations which could influence design.
- 5.11 The key design improvements which have been incorporated into the Proposed Development (see Chapter 4) include:
- Inclusion of a **Sports Hub** which incorporates playing pitches, outdoor sports facilities, a sports pavilion with parking and changing facilities, areas of play and recreational space in one central location. The rationale for one sports hub in a central location is to enhance accessibility and the long term maintenance (viability) of these facilities;
 - Identification of the **Southern Connector Road** as a Primary Access Route, ensuring suitable space is allocated onsite for its delivery, and alignment with the section of the SCR which is to be delivered by SBC;
 - Alterations to the Proposed Development in proximity to the Scheduled Monument (SM), including the removal of residential units which were originally proposed adjacent to Dorcan Stream and commitment to **low density development** and appropriate boundary treatment within the southernmost area of the Site, **nearest to the SM**.
- 5.12 Alongside pre-application discussions, the guiding Supplementary Planning Documents (see Chapter 6) which seek to deliver improved development on the allocated site (but were adopted after the submission of the original planning application) have been taken into account.

Size and scale

- 5.13 A number of iterations have been made to the quantum of the development, in terms of the number of homes and extent of the developable area to be assessed, including the level of education provision. These iterations have been subject to extensive discussion and dialogue with consultees, including pre-application discussions with the Local Planning Authority.
- 5.14 The Land Use Parameter Plan (**Figure 4.2**) reflects discussions with consultees at pre-application, including the accepted utilisation of land to the east of the site for residential use.

‘Do Nothing’ Scenario

- 5.15 Schedule 4(3) of the EIA regulations requires the ES to include a description of baseline conditions as they are predicated to obtain in the ‘do-nothing’ scenario.

- 5.16 Each of the following topic chapters (Chapters 7 to 16) identify the current state of the environment (i.e. the baseline scenario) and as far as practicable, consider the likely evolution of these baseline conditions in the event that the development did not proceed.
- 5.17 By virtue of the Application Site being allocated within the Local Plan for development, there is a strong likelihood that development in some form will take place. The 'do nothing' scenario is therefore a hypothetical alternative.

6. Planning Policy Context

- 6.1 A detailed overview of the national and local planning policy and guidance relevant to the proposed development is set out in the Planning Statement prepared by Turley in support of the application. A summary of relevant planning policy is provided below.

National Planning Policy Framework

- 6.2 The Revised National Planning Policy Framework (NPPF) was published in February 2019 and has replaced all previous central government Planning Policy.
- 6.3 The NPPF sets out the Government's planning policies for England and how these are expected to be applied in decision-taking and plan making. It does not form part of the statutory development plan but does provide a framework of policy guidance for local authorities. A short summary of relevant NPPF policy is set out below however please refer to the Planning Statement for a full review of policy relevant to the proposed development.
- 6.4 The Government has made clear its expectation, through the Framework, that the planning system should positively embrace sustainable development to deliver the economic growth necessary and the housing needed to create inclusive and mixed communities. Local planning authorities are encouraged in the Framework to approach decisions on proposed development in a positive and creative way, and should seek to approve applications for sustainable development where possible (**Paragraph 38**).
- 6.5 **Paragraph 11** guides how decision-making should apply a presumption in favour of sustainable development, approving development proposals that accord with an up-to-date development plan without delay.
- 6.6 **Chapter 5** focuses on meeting the Government's goal of significantly boosting the supply of housing through the planning system and ensuring that a range of homes are provided, including a mix of size, type and tenure and ensuring provision for affordable housing where there is an identified need.
- 6.7 **Chapter 6** includes national policy towards building a strong and competitive economy, helping to create conditions where businesses can invest, expand and adapt.
- 6.8 **Chapter 7** seeks to ensure the vitality of town centres through a positive approach which defines a hierarchy and network of centres, and prioritises town centre uses firstly in designated centres and then at edge of centre location, and seeks to ensure development outside of these locations passes the sequential test and where applicable an impact assessment.
- 6.9 **Chapter 8** seeks to ensure the planning system contributes to achieving healthy, inclusive and safe places and provides social, recreational and cultural facilities which meet community needs. The NPPF seeks to ensure a network of high quality open space is maintained and Public Rights of Way (PROW) are protected.
- 6.10 **Chapter 9** sets out the principles and guidance for promoting sustainable transport, prioritising early engagement in the plan-making or development proposals to identify and mitigate arising impacts. Development proposals should only be refused on highway grounds

where there is an unacceptable impact on highway safety or where residual cumulative impacts on the road network would be severe. Chapter 9 guides development generating significant amounts of movement to be supported by a travel plan and a transport statement or transport assessment where applicable.

- 6.11 **Chapter 11** seeks to ensure that the planning system promotes an effective use of land in meeting homes and other needs whilst safeguarding and improving the environment, and ensuring safe and healthy living conditions.
- 6.12 **Chapter 12** promotes good design as a key part of sustainable development which should seek to ensure development is designed to function well and add to the quality of an area, be visually attractive and sympathetic to local character, establish a strong sense of place, optimise the site and provide a mix of uses and create safe and accessible places.
- 6.13 **Chapter 14** guides how the planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change.
- 6.14 **Chapter 15** seeks to conserve and enhance the natural environment through a number of measures including by protecting and enhancing valued landscapes, minimising impacts on and seeking net gains for biodiversity, and preventing new and existing development from contributing to or being at unacceptable risk of pollution or land instability.
- 6.15 **Chapter 16** guides the conservation and enhancement of the historic environment, setting out the planning system should conserve and enhance the significance of heritage assets and putting them into viable uses consistent with their conservation. Applicants of development are required to identify and describe the significance of any affected heritage assets and their settings and the NPPF guides how decisions should be made with regard to weighing up the impact on designated heritage assets alongside the public benefits arising from development.

National Planning Practice Guidance (PPG)

- 6.16 The National Planning Practice Guidance is a web-based resource that was launched 6th March 2014. It refreshes and streamlines previous national planning guidance under 42 different headings, including Design, Conserving and Enhancing the Historic Environment, Environmental Impact Assessment, Flood Risk and Coastal Changes, Health and Wellbeing, Natural Environment, Open Spaces, Sports and Recreation, and guidance on Transport and Travel Plans.
- 6.17 PPG sets out the importance of understanding the significance of heritage assets in assessing the impact of new development. Of particular relevance to this development is guidance in relation to the setting of heritage assets, which states that assessment of the impact on setting needs to take into account, and be proportionate to, the significance of the heritage asset under consideration and the degree to which proposed changes enhance or detract from that significance and the ability to appreciate it. When assessing any application for development which may affect the setting of a heritage asset, local planning authorities may also need to consider the implications of cumulative change.
- 6.18 The PPG also sets out guidance for travel plans and transport assessments or statements, as ways to assess and mitigate negative transport impacts in order to promote sustainable development.

- 6.19 When required, Travel Plans should identify the specific required outcomes, targets and measures, and set out clear future monitoring and management arrangements all of which should be proportionate. They should also consider what additional measures may be required to offset unacceptable impacts if the targets should not be met.
- 6.20 At paragraph 015 (ref. ID: 42-015-20140306), the PPG sets out the scope and level of detail which will be need to be included within a Transport Statement.
- 6.21 Guidance on Environmental Impact Assessment (EIA) is set out, with details of the overall process of EIA governed by the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 which apply to development under Part III of the Town and Country Planning Act 1990. Details of guidance to the overall process is set out, from screening opinion to what is required within each section of an Environmental Statement.
- 6.22 The PPG advises how risks associated with flooding should be accounted for and addressed in the planning process, as well as guidance on coastal change.
- 6.23 The PPG guides how development proposals can support strong, vibrant and healthy communities including through encouraging community engagement and making physical activity easy to do, promoting opportunities for healthy lifestyles and addressing potential pollution and other environmental hazards.
- 6.24 The PPG includes guidance on implementing policy relating to the natural environment covering the topics including protecting important landscape and biodiversity features, delivering and protecting green infrastructure, and guidance on brownfield land, soils and agricultural land.
- 6.25 The importance of design quality as set out in the NPPF is reiterated in the PPG.

The Adopted Development Plan

- 6.26 Section 38(6) of the Planning and Compulsory Purchase Act 2004 states that:
- “If regard is to be had to the development plan for the purpose of any determination to be made under the Planning Acts the determination must be made in accordance with the plan unless material considerations indicate otherwise.”*
- 6.27 With respect to the proposed development site the ‘development plan’ currently comprises the adopted **Swindon Borough Local Plan (2026)** and the **Wiltshire and Swindon Waste Core Strategy 2006-2026 (2009)**.
- 6.28 **Policy NC3 - New Eastern Villages Allocation (New Eastern Villages (NEV)** – including Rowborough and South Marston Village Expansion) provides the policy context for a mixed use development on land east of the A419 comprising a series of new distinct villages and an expanded South Marston Village (which comprises the Application Site). The Policy sets out the largest allocation within the Local Plan.
- 6.29 **Policy NC3 (b)** sets out indicative provisions for the NEV comprising the following land uses:
- Around 6,000 homes;

- Sustainable transport links;
- A green infrastructure network;
- Sports and leisure facilities;
- Retail development including a District Centre and a network of Local Centres;
- Educational development including primary and secondary provision;
- Community facilities;
- A Health Care facility, dentist and pharmacy at the District Centre;
- Safeguarded land for a fire station towards the southern part of the site, and;
- A sewage treatment works if required.

6.30 **Policy NC3 (c)** requires development to ensure the following:

- Landscape context and views to and from the North Wessex Downs AONB are respected, including potential off-site mitigation;
- the risk of flooding from the development is minimised, within the development site and at existing neighbouring communities in accordance with Policy EN6;
- biodiversity shall be protected, integrated and enhanced;
- the historic environment, including the Scheduled Monument Earls court Manor, Great Moorleaze Farm and other listed buildings are protected, acknowledged and enhanced.

6.31 The site considered by this Environmental Statement comprises the Lotmead and Lower Lotmead villages of the NC3 allocation.

Swindon Borough Local Plan (2026) - Development Management Policies

6.32 Please refer to the Planning Statement for full details of adopted development management policies in the Local Plan.

NEV Supplementary Planning Documents

6.33 A number of supplementary planning documents (SPDs) have been adopted by Swindon Borough Council which set out guidance and development principles for the New Eastern Villages including specific information relating to each of the Villages. The adopted SPDs include:

- NEV Planning Obligations SPD, including the NEV Illustrative Masterplan (October 2016);
- NEV Framework Travel Plan SPD (October 2016);

- NEV Green Infrastructure SPD (July 2017);
- NEV Bridge Vision SPD (June 2017); and
- Sustainable Drainage Systems (SuDS) Vision for NEV SPD (Feb 2017).

6.34 Details of the guidance set out in the NEV SPDs can be found in the Planning Statement submitted in support of this application.

7. Land Use & Agriculture

Purpose and Parameters of the Assessment

- 7.1 This chapter of the ES assesses the likely significant effects of the Proposed Development on land use and agriculture.
- 7.2 The chapter describes the legislative and planning policy context; the assessment methodology; the current baseline conditions at the site; the likely significant environmental effects; the mitigation methods required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed.
- 7.3 The assessment is based on the premise that all the agricultural land within the Application Site will be removed from agricultural production at the start of construction activities.
- 7.4 This chapter has been prepared by Reading Agricultural Consultants Ltd (RAC) and should be read in conjunction with Technical **Appendix 7.1** describing the results of the survey of agricultural land quality.

Legislative and Policy Framework

European Governance

- 7.5 The European Union (EU) Thematic Strategy for Soil Protection (**Ref 7.1**) outlines the condition of soils in Europe and aims to ensure their protection and sustainable use. The overarching aims are to prevent further soil degradation, preserve soil functions, and restore degraded soils to a standard appropriate to their intended use.
- 7.6 The Strategy included a proposal for an EU Soil Framework Directive which promoted the sustainable use of soil and its protection as a natural and non-renewable resource. However, the proposed Directive was withdrawn in April 2014 as it could not be agreed by a qualified majority. In taking its decision, the European Commission stated that it remains committed to the objective of the protection of soil and will examine options on how best to achieve this.

National Strategy

- 7.7 The inherent quality of soil is recognised in the Government's 'Soil Strategy for England - Safeguarding our Soils' (**Ref 7.2**) which seeks to encourage the more sustainable management of soil resources. There is a general imperative which seeks to ensure the proper consideration of soil implications during the planning and development process, and to reduce the effect of the construction and development sectors on the long-term functioning of soils.
- 7.8 The Government's White Paper, 'The Natural Choice: securing the value of nature' (**Ref 7.3**), repeats the aim of the Soil Strategy that by 2030, England's soils will be managed sustainably and that degradation threats will be tackled successfully in order to improve the quality of soils, and to safeguard their ability to provide essential ecosystem services and functions for future generations. Existing action includes Environmental Stewardship and the cross-

compliance conditions that claimants of direct payments have to meet under the Common Agricultural Policy.

National Planning Policies

- 7.9 Paragraph 170 of the revised National Planning Policy Framework (**Ref 7.4**) identifies the protection and enhancement of soils as a priority in the conservation and enhancement of the natural and local environment.
- 7.10 Paragraph 170 goes on to state that planning policies and decisions should take into account the economic and other benefits of best and most versatile (BMV) agricultural land which is land classified as Grades 1, 2 and 3a in the Agricultural Land Classification (ALC) system of England and Wales.
- 7.11 Paragraph 171 of the NPPF advises in footnote 53 that, where significant development of agricultural land is demonstrated to be necessary, local planning authorities should seek to use areas of poorer quality land in preference to that of a higher quality.

Planning Practice Guidance

- 7.12 Paragraph 025 Reference ID 8-025-20140306 of the Planning Practice Guidance (**Ref 7.5**) reiterates that the planning system should protect and enhance valued soils and prevent the adverse effects of unacceptable levels of pollution, as soil is an essential finite resource that provides important ecosystem services. These services include a growing medium for food, timber and other crops, a store for carbon and water, a reservoir of biodiversity and a buffer against pollution.
- 7.13 Paragraph 026 Reference ID: 8-026-20140306 (**Ref 7.6**) indicates that the ALC provides a method for assessing the quality of farmland to enable informed choices to be made about its future use within the planning system, with direction given to Natural England for further information on ALC. The guidance also confirms that Natural England has a statutory role in advising local planning authorities about agricultural land quality issues.

Local Planning Policies

- 7.14 The adopted Swindon Borough Local Plan (2011-2026) (**Ref 7.7**) does not contain any policies relating to the development of agricultural land and soil. Policy NC3 allocates predominantly agricultural land to the east of the A419 for a mixed-use development, comprising a series of new inter-connected distinct villages defined by a network of green infrastructure corridors.

Other Guidance

- 7.15 Natural England's Technical Information Note (TIN) 049 (**Ref 7.8**) states that the ALC is a basis for assessing how development proposals affect agricultural land within the planning system but indicates that it is not the sole consideration, with planning authorities guided by the NPPF to protect and enhance soils more widely. This includes conserving soil resources during construction.
- 7.16 Best practice guidance on soil handling and management during the construction phase, to minimise potential adverse impacts on the soil resource, is found in MAFF's 'Good Practice

Guide for Handling Soils' (**Ref 7.9**) and DEFRA's 'Code of Practice for the Sustainable Use of Soils on Construction Sites' (**Ref 7.10**), which encourages the consideration of the protection, use and movement of soil throughout the planning, design, construction and maintenance phases of development projects.

Consultation

- 7.17 Consultation has occurred with the agricultural landowner of the Site as part of the farm impact assessment that has been undertaken. The initial farm impact assessment was carried out with the landowner's agent in March 2015. The information collected during this discussion was verified in a conversation with the landowner in January 2019, during which the landowner confirmed that there has been no change in the agricultural circumstances of the Site.
- 7.18 In addition, an informal scoping exercise was carried out in collaboration with the LPA, with an Informal Scoping Note being provided to the LPA on 7th November 2018 covering the proposed ES Structure and methodologies for the technical chapters (**Appendix 1.1**).
- 7.19 A response on each topic chapter was provided by the LPA on 11th December 2018 (**Appendix 1.2**), confirming that the proposed methodology for this Land Use and Agriculture Chapter and use of existing baseline data from the agricultural land surveys, carried out in 1996 and 2014, was acceptable.

Study Area

- 7.20 As the effects on the agricultural resource are concerned with the permanent loss of agricultural land to the Proposed Development, and the temporary and permanent impacts on the undisturbed agricultural soil resources, the study area for this assessment is confined to the agricultural land within the red line boundary (**Figure 1.1**).

Baseline Conditions

Soils and Agricultural Land Quality

- 7.21 The Site extends to approximately 169ha (including access corridors) of predominantly agricultural land which is mostly in permanent pasture. Approximately 12ha in the west of the Site is horticultural, growing soft fruit (berries and currants) and vegetables as part of a 'Pick Your Own' enterprise. The Site is largely level and lies at an altitude of about 90m above Ordnance Datum (AOD). Several drainage ditches traverse the Site, with the outlet being the River Cole.
- 7.22 Agro-climatic conditions on the site are moderately warm with moderate rainfall. Crop moisture deficits are moderate to moderately large, and the number of Field Capacity Days is slightly higher than is typical for lowland England which is slightly unfavourable for providing opportunities for agricultural field work.
- 7.23 The underlying geology comprises undifferentiated Ampthill Clay Formation and Kimmeridge Clay Formation. Ampthill Clay comprises pale to medium grey mudstone with limestone nodules. The Kimmeridge Clay Formation comprises mudstone with thin siltstone and cementstone beds. Locally some sands and silts may be found. Superficial deposits of alluvium are mapped in conjunction with the River Cole to the north of the Site.

- 7.24 The Soil Survey of England and Wales soil association mapping (1:250,000 scale) shows the Denchworth association to cover most of the Site. Denchworth soils are characterised by stoneless clay profiles. Permeability is moderate to poor in the topsoils and poorly permeable at depth. Prolonged waterlogging in the growing season results in Denchworth soils commonly being assessed as Wetness Class (WC) IV or V.
- 7.25 Fladbury 1 association soils are associated with the River Cole. Typical profiles comprise stoneless clayey soils which are variably calcareous and affected by groundwater. These soils also are typically of WC IV or V.
- 7.26 The main factors affecting the quality of agricultural land at the Site are soil wetness and workability, due to poor drainage and clay topsoil textures. Most of the Site is limited to no better than Subgrade 3b, with Grade 4 also present.
- 7.27 The soil profile typically comprises brown or very dark brown clay or heavy clay loam stoneless topsoil of 25cm average depth. This lies over a gleyed and mottled clay subsoil. Subsoil structure is weakly developed with very coarse, subangular blocky peds; commonly, the clay subsoil also has a very plastic consistency. Drainage is therefore restricted such that profiles are of WC IV. In combination with heavy clay loam or clay topsoil textures under the climatic conditions of the Site, this results in a Subgrade 3b limitation.
- 7.28 Those areas of the Site where the organic matter content is greater than 10% are classed as 'organic mineral soils' in terms of the MAFF ALC guidelines and are classified as Grade 4. The quality of agricultural land is shown in **Technical Appendix 7.1** and in **Table 7.1**.

Table 7.1: Agricultural Land Classification

Grade	Description	Area (ha)	% of agricultural land
Subgrade 3b	Moderate quality	121.4	75
Grade 4	Poor quality	40.1	25
Total Agricultural		161.5	100
Non-agricultural		7.2	-

Farm Holdings

- 7.29 The Site comprises Lotmead Farm, which extends to approximately 160ha owned by a family trust and managed by a family farming company. There are three main enterprises associated with the farm: a dairy business, a Pick Your Own (PYO) enterprise and the commercial letting of farm buildings (known as Lotmead Business Village).
- 7.30 Most of the land is in permanent pasture and comprises the grazing and forage for a dairy herd of about 240 milking cows, run as a contract farming business with a neighbouring dairy farmer. Most of the dairy buildings are located in the main building complex at Lotmead Farm and include cubicle sheds, milking parlour and dairy, as well as workshops, forage storage (silage and hay) and various waste storage (slurry tanks and pits). There is also a set of young stock buildings in the eastern part of the farm. There is an extensive network of cow and machinery tracks around the farm to enable movement between grazing pastures and the parlour without poaching the land.

- 7.31 The PYO enterprise occupies about 12ha of land in the south-western part of the farm, and is accessed separately from Wanborough Road. The PYO grows soft fruit (strawberries (grown on table tops), raspberries, currants, gooseberries) and vegetables (potatoes, courgettes, beans, sweet corn, spinach, asparagus, beetroot), with produce sold from a farm store. The enterprise has been established since the mid-1980s and attracts approximately 60-70,000 visitors a year.
- 7.32 Lotmead Business Village occupies the Victorian former farm buildings located at the southern end of the main farm complex, between the dairy buildings and a number of residential properties associated with the farm to the south. It comprises a courtyard development of small office units that are let out and shares the main farm access with the dairy enterprise and the residential properties at the farm.

Scope and Methodology

- 7.33 The methodology for classifying agricultural land is contained in 'Agricultural Land Classification of England and Wales, Revised guidelines and criteria for grading the quality of agricultural land', prepared by MAFF in 1988 (**Ref 7.11**) and summarised in Natural England's TIN 049.
- 7.34 Agricultural land in England and Wales is graded between 1 and 5, depending on the extent to which physical or chemical characteristics impose long-term limitations on agricultural use. Grade 1 land is excellent quality agricultural land with very minor or no limitations to agricultural use, and Grade 5 is very poor-quality land, with severe limitations due to adverse soil, relief, climate or a combination of these. Grade 3 land is subdivided into Subgrade 3a (good quality land) and Subgrade 3b (moderate quality land). The best and most versatile agricultural land comprises Grades 1, 2 and 3a.
- 7.35 The Site was subject to a semi-detailed ALC survey by ADAS on behalf of MAFF in 1996 as part of a wider study area in excess of 850ha. The survey found all the agricultural land within the Site to be of moderate quality Subgrade 3b, although the number of observations made within the Site area was limited.
- 7.36 RAC therefore sought to verify the existing findings on agricultural land quality and surveyed the Site in 2014 in accordance with the MAFF ALC guidelines. These baseline survey results have been used in the updated assessment on the basis that soil conditions are unlikely to have changed.
- 7.37 Forty-three soil profiles were examined using 7cm diameter Edelman (Dutch) augers at an approximate density of one per 4ha of agricultural land. At each observation point the following characteristics were assessed for each soil horizon up to a maximum of 120cm or any impenetrable layer: texture; stoniness; colour (including local gley and mottle colours); moisture and consistency; free carbonates; and horizon depths. In addition, small soil pits were dug to examine subsoil structure, pores, roots and consistency. Three soil samples were subject to laboratory determination of particle size distribution, pH, organic matter content and major nutrients (phosphorus, potassium and magnesium).
- 7.38 The observations and results were analysed in terms of the guidelines and criteria for grading agricultural land, with the grading assigned to each observation amalgamated across the Site.

Significance Criteria

- 7.39 The ALC survey provides a statement of the amount and quality of the agricultural land on the Site. The weight and significance to be placed on the loss of the best and most versatile agricultural land should be viewed in light of: the need for the development of agricultural land, and the opportunities for using poorer quality agricultural land in preference to higher quality land;
- 7.40 The continued availability of the basic soil resources for a potentially wide variety of uses for future generations).
- 7.41 The sensitivity of agricultural land is assessed according to its grade within the ALC, as set out in **Table 7.2**. The sensitivity of the soil resource reflects its textural characteristics and its susceptibility to the effects of handling during construction and the re-instatement of land.

Table 7.2: Sensitivity of Agricultural Land and Soil Resources

Receptor sensitivity	Agricultural Land	Soil Resources
High	Grade 1	Soils with high clay and silt fractions (clays, silty clays, sandy clays, heavy silty clay loams and heavy clay loams)
Medium	Grade 2 and Subgrade 3a	Silty loams, medium silty clay loams, medium clay loams and sandy clay loams
Low	Subgrade 3b and Grade 4	Soils with high sand fractions (loamy sands, sandy loams and sandy silt loams)
Very Low	Grade 5	Sands

- 7.42 The thresholds for determining the magnitude of change have been derived taking into account the statutory consultation procedures with Natural England for development involving the loss of agricultural land. These require specific consultation with Natural England for non-agricultural development proposals that are not consistent with an adopted local plan and involve the loss of 20ha or more of BMV land (**Ref. 7.8**). **Table 7.3** sets out the magnitude of change for agricultural land resources.
- 7.43 The magnitude of change on soil resources takes into account the continued ability of a soil to fulfil its primary functions, as set out in **Table 7.3**. These definitions have been derived from good practice guidance on handling soils, particularly the Defra 'Construction Code of Practice for the Sustainable Use of Soils' (**Ref. 7.10**).

Table 7.3: Magnitude of Impact on Agricultural Land and Soil Resources

Receptor sensitivity	Agricultural Land	Soil Resources
High	Development would directly lead to the loss of over 50ha of agricultural land	The soil displaced from development is unable to fulfil one or more of the primary soils functions
Medium	Development would directly lead to the loss of between 20 and 50ha of agricultural land	The soil displaced from development mostly fulfils the primary soil functions off-site or has a reduced capacity to fulfil the primary functions on site
Low	Development would directly lead to the loss of between 5 and 20ha of agricultural land	The soil displaced from development mostly fulfils the primary soil functions on-site
Very Low	Development would directly lead to the loss of less than 5ha of agricultural land	The soil retains its existing functions on-site

7.44 The impacts on farm holdings relate primarily to the loss of land and other key farm infrastructure (dwellings, buildings and other structures such as irrigation reservoirs and slurry pits) and the fragmentation of land from the residually farmed area.

7.45 The sensitivity of farm holdings is determined by the extent to which they have the capacity to absorb or adapt to effects, which will be determined primarily by their nature and scale. In general terms, larger farm holdings will have a greater capacity to absorb effects and will be less sensitive. However, the scale of the land holding is reflected in the magnitude of change and the percentage land-take from the farm. For example, the loss of 100ha from a 400ha farm would be a high impact (25%) whereas the same land-take from a 1,000ha farm would be low (10%). The sensitivity criteria therefore concentrate on the nature of the receptor in order to avoid giving undue weight to the scale of operations. They are presented in **Table 7.4**.

Table 7.4: Sensitivity of Farm Holdings

Receptor sensitivity	Agricultural Land
High	Farm types in which the operation of the enterprise is dependent on the spatial relationship of land to key infrastructure, and where there is a requirement for frequent and regular access between the two, or dependent on the existence of the infrastructure itself, e.g. dairying, irrigated arable cropping and field-scale horticulture, and intensive livestock or horticultural production
Medium	Farm types in which there is a degree of flexibility in the normal course of operations, e.g. combinable arable farms and grazing livestock farms (other than dairying)
Low	Non-commercial farm types

Very Low	Isolated non-commercial land uses
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7.46 Guideline criteria for determining the magnitude of change are presented in Table 7.5.

Table 7.5: Magnitude of Impact on Farm Holdings

Receptor sensitivity	Loss of Agricultural Land	Loss of Farm Infrastructure
High	Loss of 20% or more of all land farmed	Direct loss of farm dwelling, building or structure
Medium	Between 10% and less than 20% of all land farmed	Loss of or damage to infrastructure affecting land use
Low	Between 5% and less than 10% of all land farmed	Infrastructure loss/damage does not affect land use
Very Low	Less than 5% of all land farmed	No impact on farm infrastructure

7.47 The significance of effect is then assessed based on the sensitivity of the resource and the magnitude of impact, as shown below in **Table 7.6**.

Table 7.6: Significance of Potential Effects

Sensitivity/value	Magnitude of Impact			
	High	Medium	Low	Very Low
High	Major	Moderate	Minor	Negligible
Medium	Moderate	Moderate	Minor	Negligible
Low	Minor	Minor	Negligible	Negligible
Very Low	Minor	Negligible	Negligible	Negligible

7.48 Whilst the matrix provides ranges, only effects which are above minor (i.e. moderate, or major) are deemed to be '**Significant**' and will be considered further within the assessment section of this Chapter.

Limitation and Assumptions

7.49 No assumptions were made, or limitations experienced in respect of the collection of baseline soils, agricultural land quality and agricultural holding information. Although the two road corridors were not surveyed as part of this assessment, the land required for the road corridors has been subject to ALC survey undertaken by the former Ministry of Agriculture, Fisheries and Food, and full confidence can be had in the available results. Full access to the landholding was granted to all land sufficient to undertake the surveys to the recommended methodology.

Environmental Assessment: Construction Phase

Agricultural Land Quality

- 7.50 Impacts on agricultural land will occur during the construction phase and will relate to the progressive loss of agricultural land within the Site.
- 7.51 The Proposed Development will involve the loss to agriculture of over 160 hectares, but all will be of moderate or poor quality land. The Proposed Development will not involve the loss of any best and most versatile agricultural land.
- 7.52 The agricultural land resource is assessed as being of low sensitivity in **Table 7.2**. The magnitude of impact is high (**Table 7.3**) so that, from **Table 7.5**, the Proposed Development will have a direct, permanent, minor adverse effect on agricultural land, and no effect on BMV agricultural land.

Soil Resources

- 7.53 As soil is a finite resource that fulfils many important functions and services for society in addition to the production of food and fibre, it is important that soil resources are protected and used sustainably. The construction phase will disrupt and displace the soil resources over the area of built development on the Site. During this phase, damage to, and loss of, topsoil could occur if other dissimilar materials such as subsoil or other materials were stockpiled directly on it without a separating layer or possibly by poor work causing mixing of topsoil, subsoil and other materials during stockpile placement or removal.
- 7.54 There is also a risk to long-term damage to soil structure, and the loss of potentially valuable soil, if there is uncontrolled trafficking of land and soil by heavy machinery, especially wheeled machinery.
- 7.55 Biodegradation of topsoil would occur if it is compacted in storage, stockpiled when wet, if stockpiled in the medium- to long-term, or covered by soil stores for significant periods.
- 7.56 Permanent, direct, adverse impacts may arise, therefore, from disposing of soil or re-using it for inappropriate purposes that do not meet the many beneficial functions of soil; by mixing incompatible soil resources; and by poor management of the soil resource.
- 7.57 Most of the soils on the Site are of high sensitivity to movements and handling because of their clay and heavy clay loam textures which are prone to smearing and compaction, and the quantum of soils and therefore the magnitude involved would also be high. The development would therefore have a major adverse effect prior to the implementation of mitigation measures.

Farm Holding

- 7.58 The Proposed Development will remove all the land associated with the dairy enterprise, which will be a high magnitude of impact on the holding, leading to a direct, permanent major adverse effect prior to the implementation of mitigation measures.
- 7.59 The PYO enterprise will remain within the Green Space within the Proposed Development.

Environmental Assessment: Operational Phase

- 7.60 No adverse effects on agricultural interests are anticipated to arise during the operation of the Proposed Development. The continuation of the PYO enterprise as Green Space within the Proposed Development could benefit the market prospects for that enterprise.

Environmental Assessment: Cumulative Effects

- 7.61 The substantive agricultural issue to be considered in terms of cumulative impacts is the loss of the agricultural land resource. As the land holdings affected by the wider Eastern Villages allocation are not common with those affected by the Proposed Development, there are no cumulative effects to consider for farm holdings. The re-use of soil resources will be a matter of detail for the construction of the development within each particular site and allocation, and will not lead to any cumulative effects.
- 7.62 Reconnaissance level ALC data, based on surveys undertaken by MAFF, is available for the wider Eastern Villages allocation and shows that virtually all of the land involved in the allocation is of moderate quality Subgrade 3b land. There are three smaller areas of Subgrade 3a land shown to the north of the A420 which amount to less than 40 hectares. The cumulative impacts on agricultural land of the Proposed Development with the wider Eastern Villages allocation will result in an **moderate adverse effect**, which is significant.

Mitigation and Monitoring

Agricultural Land Quality

- 7.63 There are no universally applicable measures available to mitigate the direct loss of agricultural land. The loss of agricultural land should be viewed in the context of policy within the NPPF directing necessary development to areas of poorer quality agricultural land, such as found on the Site.

Soil Resources

- 7.64 The primary measures to mitigate the loss of soil resources will be set out in a Soil Resources and Management Plan (SRMP), to be prepared at the detailed design stage. The plan would confirm the different soil types (based on the soil surveys already undertaken); the most appropriate re-use for the different types of soils; and proposed methods for handling, storing and replacing soils on-site.
- 7.65 The aim of the SRMP will be to re-use as much of the surplus soil resources on-site in the detailed design of open spaces and green infrastructure. Any surplus soils will be disposed of in a sustainable manner (i.e. as close to the site as possible and to an after-use appropriate to the soil's quality) in accordance with Defra's Construction Code of Practice for the Sustainable Use of Soils on Construction Sites.
- 7.66 The SRMP will also aim to ensure that the quality of soils retained on-site and disposed off-site (if required) is maintained by following good practice guidance on soil handling and storage, particularly to avoid compaction and biodegradation of soils that are to be retained on site. The soil resources will therefore be able to retain their other primary functions of carbon and water storage, and support for biodiversity.

Farm holding

- 7.67 There are few measures available to mitigate the impact of land loss, in particular, on farm holdings. In reality, the landowners will acquire funds which may or may not be reinvested in

agricultural land and businesses outside the Site. However, there can be no certainty as to the decisions to be taken by others.

Summary of Residual Effects

- 7.68 The Proposed Development will involve the loss to agriculture of over 160 hectares of moderate to poor quality land in Subgrade 3b and Grade 4. There will be no loss of the best and most versatile agricultural land.
- 7.69 The loss of agricultural land is assessed as a direct, permanent **minor adverse** effect which is not significant.
- 7.70 The clay and heavy clay loam soils on the Site are sensitive to handling and storage, as they are prone to smearing and compaction. A Soil Resources and Management Plan will need to be implemented to ensure that the soils are handled in appropriate conditions, and that the displaced soils from areas of built development are used as required in the green infrastructure on the Site. With this mitigation in place, the residual effect on the soil resource will reduce to **minor adverse**, which is not significant.
- 7.71 The Proposed Development will remove all the land associated with the dairy enterprise, such that it will cease to operate, incurring a **major adverse** effect on the farm holding.
- 7.72 No effects on agricultural resources are anticipated during the operation of the Proposed Development.

Table 7.7: Summary of Residual Effects

Description of impact	Stage (C /O)	Significant effect	Mitigation	Residual Effect
Loss of BMV agricultural land	C	No effect	None required	No effect
Loss of agricultural land	C	Minor adverse – not significant	None available or required	Minor adverse – not significant
Loss of or reduction in quality of soil resource	C	Major adverse – significant	Implementation of a Soil resources and Management Plan	Minor adverse – not significant
Loss of farm holding	C	Major adverse – significant	None available within the Proposed Development	Major adverse – significant

8. Socio-economics and Human Health

Purpose & Parameters of the Assessment

Introduction the Topic

- 8.1 This Chapter assesses the potential socio-economic and human health effects of the Proposed Development on the local and future population during the construction and operational phases of the development.
- 8.2 The impact of the Proposed Development on socio-economics and human health (focussing on the social determinants of health) includes the consideration of: the economy, homes, social infrastructure (including primary and secondary schools, GP surgeries, community facilities), community cohesion and open space. The full list of potential effects is guided by the Healthy Urban Development Unit (HUDU) Rapid Health Impact Assessment framework (**Ref 8.1**), which includes 11 topics¹, plus information published by IEMA (**Ref 8.2**) and previous professional experience.
- 8.3 The assessment incorporates an understanding of current (2018/19) and future baseline conditions over the next 20 year period, from which the significance of effects can be established.

Parameters of the Assessment

- 8.4 It is important to establish the parameters and outline the components of the Proposed Development which have been included in the assessment.
- 8.5 Once complete up to 2,500 residential units will be provided on site (Use Class C3). The application is for outline permission and therefore an accommodation schedule is not available at this stage. For the purposes of undertaking this assessment, an indicative mix is applied as per **Table 8.1** based local market demand. It is assumed that the development will comprise up to 30% affordable units, as outlined by Swindon Borough Council in Local Plan 'Policy HA2: Affordable Housing'² (**Ref 8.3**)

¹ The 11 topics are: Housing quality and design; Access to healthcare services and other social infrastructure; Access to open space and nature; Air quality, noise and neighbourhood amenity; Accessibility and active travel; Crime reduction and community safety; Access to healthy food; Access to work and training; Social cohesion and lifetime neighbourhoods; Minimising the use of resources and Climate change.

² The exact proportion of affordable housing will be subject to negotiation with the Local Planning Authority during the application determination period.

Table 8.1: Illustrative Accommodation Schedule

	Total Number of Dwellings	%
1 bed	250	10%
2 bed	575	23%
3 bed	575	23%
4 bed	950	38%
5 bed	150	6%
Total	2,500	100%

Source: Turley Economics, 2019

- 8.7 The assessment also considers the employment impact of the Proposed Development also comprises a wider mix of community, education, retail and business uses.
- 8.8 The exact parameters of the employment space are not yet confirmed. Therefore for the purposes of this assessment the employment mix is chosen based on the likely 'worst case' scenario for employment generation, informed by established densities for different employment generating uses set out in the HCA Employment Densities Guide (**Ref 8.4**). The parameters are outlined in **Table 8.2**.

Table 8.2: 'Worst case' for employment use

Description	Development Description	Assumption made for assessment (likely 'worst case' scenario)
Employment	Up to 2,500 sqm of business/employment (Use Class B1) <i>(includes retention of 1,500 sq m Lotmead Business Village)</i>	1,000 sqm of additional employment space which is 100% B1c (light industrial)
Community / Retail uses	Up to 1,780 sq m of community/retail uses (Use Classes D1/D2/A1/A2/A3/A4)	680 sqm of early years space 600 sqm of retail (A1) 500 sqm of café / Restaurant (A3/A4)
Education	No. 2 Form Entry Primary Schools (2.2 ha per school)	No. 2 Form Entry Primary Schools (2.2 ha per school)
Sports	A Sports Hub with playing pitches and changing facilities	A Sports Hub with playing pitches and changing facilities

Source: Turley Economics, 2019

Scope of the Assessment

- 8.9 Before undertaking the main assessment, a scoping exercise was carried by Turley Economics to identify the 'likely insignificant effects' which could be omitted from the assessment. The results are summarised in **Table 8.3**.

Table 8.3: Summary of Scoping Exercise

Theme	Potential Effect	Scoped into ES?
Economy	Creation of direct, indirect and induced employment during construction and operational phase	Yes
	Economic productivity generated (measured as Gross Value Added) during construction and operational phase	Yes
	Increased population and expenditure of new residents in the local and wider economy	Yes
	Revenue to Local Authority (business rates, Council Tax and New Homes bonus)	Yes
Housing	Increased number of affordable and market homes (assessment includes consideration of accessible housing)	Yes
Social Infrastructure	Increased demand for early years provision	No
	Increased demand for primary school provision	No
	Increased demand for secondary school provision	No
	Increased demand for health care infrastructure (GPs, dentists, urgent care)	No
Wider Determinants of Health	Change in access to healthy food	No
	Access to open space and nature	Yes
	Change in crime levels and community safety	No
	Change in social and neighbourhood cohesion	No
	Active travel and public transport connections	Yes

Source: Turley Economics, 2019

- 8.10 The scope of the assessment informs the baseline and subsequent assessment. A more detailed justification of potential insignificant effects which are scoped out is provided in the 'Scope and Methodology' section of this Chapter.

Legislative and Policy Framework

- 8.11 There is no formal legislation relating to the assessment of effects within this Chapter. The assessment of socio-economics and the social determinants of human health are instead informed by best practice and industry guidance.

8.12 The following policy has been used to inform the assessment of socio-economic and human health impacts:

- **National Planning Policy Framework (NPPF)** and accompanying **Planning Practice Guidance (PPG)** set out the Government's statutory planning policies for England. Both are built around a policy commitment to sustainable development. The NPPF details how the planning system can play both a social and economic role (**Ref 8.5 & Ref 8.6**); and
- **Swindon Local Plan (2011 - 2026)** planning policy supports a number of the topics assessed in this chapter (**Ref 8.3**). Primarily 'Theme 6: Healthy & Supported Communities' prioritises active, healthy and safe lifestyles and 'Theme 3: Housing & Accommodation' shows the importance of delivery cohesive and integrated communities.

Relevant Guidance

8.13 The following guidance has informed the assessment of effects within this Chapter:

- Homes and Communities Agency (HCA) Additionality Guide (2014) 4th Ed. (**Ref 8.7**);
- HCA Employment Densities Guide (2015) 3rd Ed. (**Ref 8.4**);
- Public Health England - Health and environmental impact assessment: a briefing for public health teams in England (**Ref 8.8**); and
- IEMA Primer for Human Health (**Ref 8.2**).

Consultation

8.14 Informal consultation was undertaken with Swindon Borough Council and documented in an Informal Scoping Note (11th December 2018) (**Appendix 1.1**). Typically a socio-economic and human health assessment requires more detailed consultation to determine education and healthcare infrastructure requirements for a site. However, in the case of this site, there is a strong guide in Swindon Borough's Policy NEV SPD and Infrastructure Delivery Plan (IDP) (**Ref 8.9**) regarding infrastructure requirements. On this basis no further consultation was required on social infrastructure.

Study Area

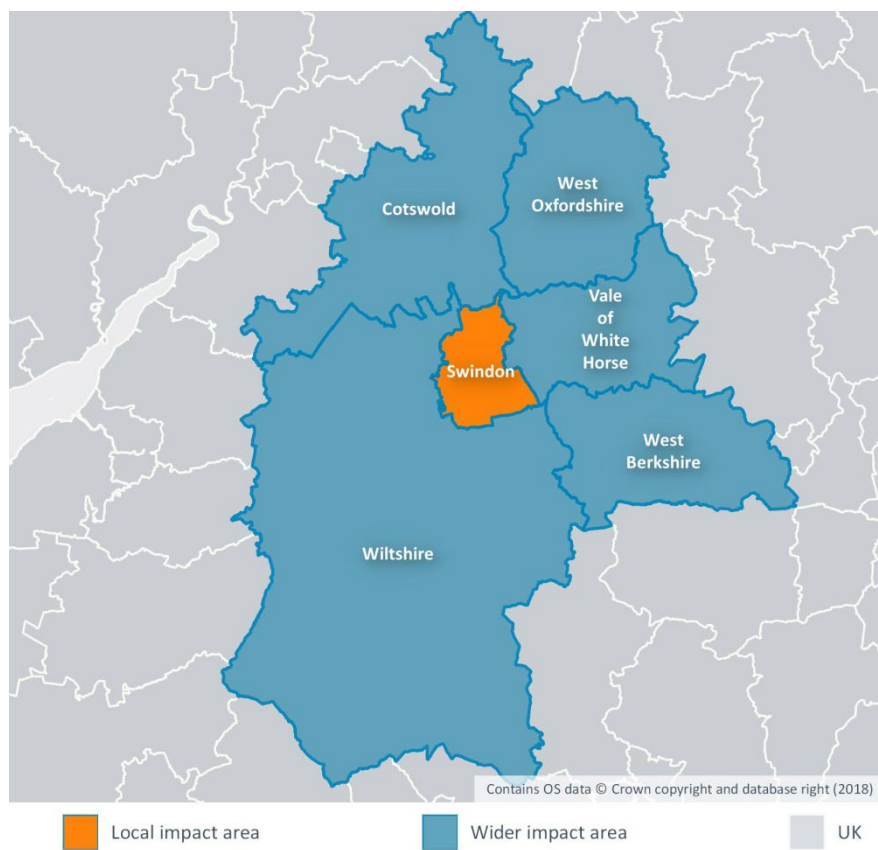
8.15 In the absence of guidance or policy available to inform the definition of appropriate study areas, it is reasonable to define study areas based on an understanding of relevant local and wider economic geographies, and the extent to which socio-economic and human health (social determinants) effects are likely to be contained within these geographies. The impact areas are defined as:

- A **local impact area** based on the administrative area of Swindon. The 2011 Census indicates that 74.0%, of people working in Swindon also lived in this area, indicating a need to allow for a level of leakage from this area (**Ref 8.10**).
- A **wider impact area** is a bespoke geography defined by the commuting catchment area of Swindon. The 2011 Census found that the majority (90.3%) of people working

in Swindon live in Swindon, Wiltshire, Cotswold, Vale of White Horse, West Berkshire, South Gloucestershire and West Oxfordshire (Ref 8.10). This suggests a reasonable level of labour force containment within this geography. It is considered, therefore, that the majority of socio-economic effects would be concentrated within the wider impact area.

8.16 The impact areas are illustrated in **Figure 8.1**.

Figure 8.1: Local and Wider Impact Areas



Source: Turley Economics, 2019

Baseline Conditions

8.17 The following aspects of the baseline environment are considered for the assessment of socio-economic and human health effects. Only those related directly to the potential significant effects are explored:

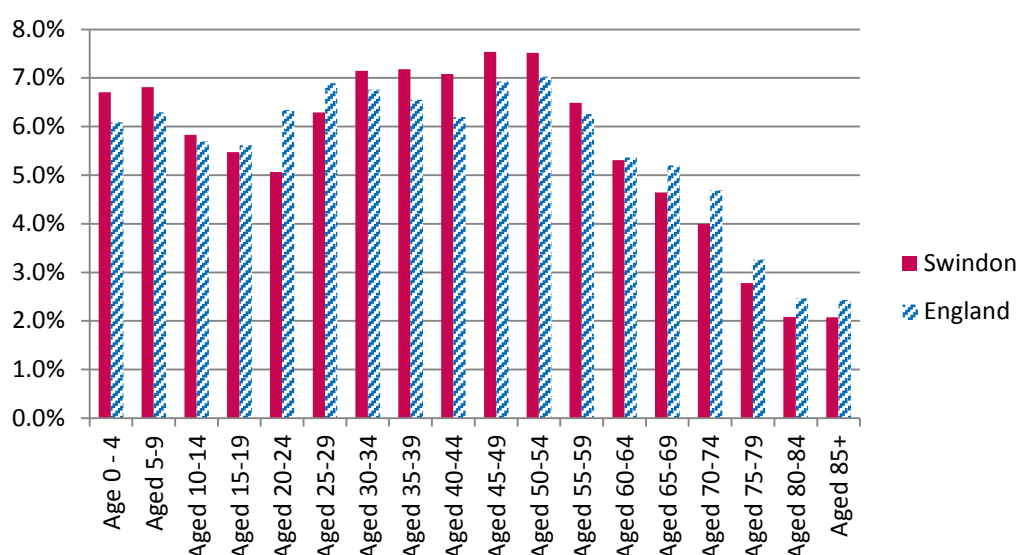
Population and Age Profile	Public Health Profile	Economic Activity and Employment Rates	Employment Market and Industry
Economic Output (Gross Value Added)	Local Authority Revenue	Local Housing Market	Other Wider Determinants of Health

Population and Age Profile

- 8.18 In 2011 there were 15,428 residents living in the neighbourhood impact area and 209,156 living in the local impact area of Swindon which accounts for 18.3% of the population living in the wider impact area (Ref 8.10).
- 8.19 The most recent population estimates from 2017 show that the population in Swindon has now increased to 220,363 in the local impact area, demonstrating growth of 5.4% period from 2011 – 2017. This is higher than the level of growth seen across England (4.9%) (Ref 8.11)

Figure 8.2 demonstrates the population profile in Swindon compared to England. The latest population estimates show that in Swindon there is a younger population compared to the UK average. In Swindon the population aged between 30 and 55 years old accounts for 36.5% of the resident population, compared to 33.4% across the UK (Ref 8.11).

Figure 8.2: Age Profile (2017)



Source: Ref 8.11

Public Health Profile

- 8.20 The Joint Strategic Needs Assessment (JSNA) for Swindon provides an overview of the health and wellbeing needs of the population of the area (Ref 8.12). The JSNA identifies a number of challenges for the borough, including:
- **Inequalities in health amongst the population still remain** despite average life expectancy, smoking rates and physical activity levels improving;
 - **The impact of unhealthy lifestyles** characterised by obesity, physical inactivity, poor diet and alcohol misuse.
 - **Wider determinants of the health remain important.** There are concerns around traffic related air quality, higher rates of recorded crime and challenges in getting more young people, especially from deprived areas, to continue to higher education.

Economic Activity and Employment Rates

- 8.21 When assessing the strength of an area's labour force, it is important to not just quantify the working age population but analyse the economically active segment of that population (those in or available for work). This highlights the size of latent labour force either currently employed or available to start work immediately.
- 8.22 Of those who live in Swindon, around 75.0% also work in the local impact area (i.e. within the borough of Swindon). Amongst the resident population of Swindon, the economic activity rate (76.0%) is higher than the average for the wider impact area (74.8%). The proportion of residents in employment (68.9%) is similar to the average across the wider impact area (69.2%), suggesting that there are good employment opportunities locally (**Ref 8.10**).
- 8.23 More in-depth analysis reveals that overall there are 495 Job Seekers Allowance (JSA) claimants in the local impact area and 1,295 in the wider impact area seeking employment. Of which, 5 JSA claimants in the local impact area and 25 residents across the wider impact area are seeking work in construction trades (**Ref 8.13**)

Employment Market and Industry

- 8.24 The companies which generate the highest proportion of jobs in Swindon are in the wholesale and retail trade, accounting for 16.4% of available employment jobs. Compared to the national average, this is a higher concentration of jobs in Swindon in administration, financial and insurance activities and transportation and storage. This reflects Swindon's strategic location on the M4 and in the Thames Valley corridor.
- 8.25 Construction employment in Swindon currently accounts for 3.9% of all employment available. This is lower than the wider impact area (5.4%) and national (4.8%) average (**Ref 8.12**). However, there has been significant investment in this sector. The third round of Local Growth Funding awarded to Swindon and Wiltshire LEP was £22.03m to construct two new facilities at Wiltshire College, including a new Construction, Life Sciences, Engineering and Higher Education facility (**Ref 8.14**).
- 8.26 The Economic Strategy published by Swindon Borough Council highlights the issues that the local economy has recently faced (**Ref 8.15**). Over the past 10 years there have been employment losses, during a period when many comparator locations saw growth. This is despite a growth in working age population over the same period. The Council identify that new jobs are therefore needed to enable Swindon to provide opportunities for residents who may currently have to work outside the Borough (**Ref 8.15**).
- 8.27 The latest commuting estimates from ONS show the substantial movement in the labour market to jobs outside of the borough. While Swindon attracts 23,905 workers living outside the borough, 24,708 Swindon residents are leaving the borough to work elsewhere (**Ref 8.10**)

Economic Productivity and Output

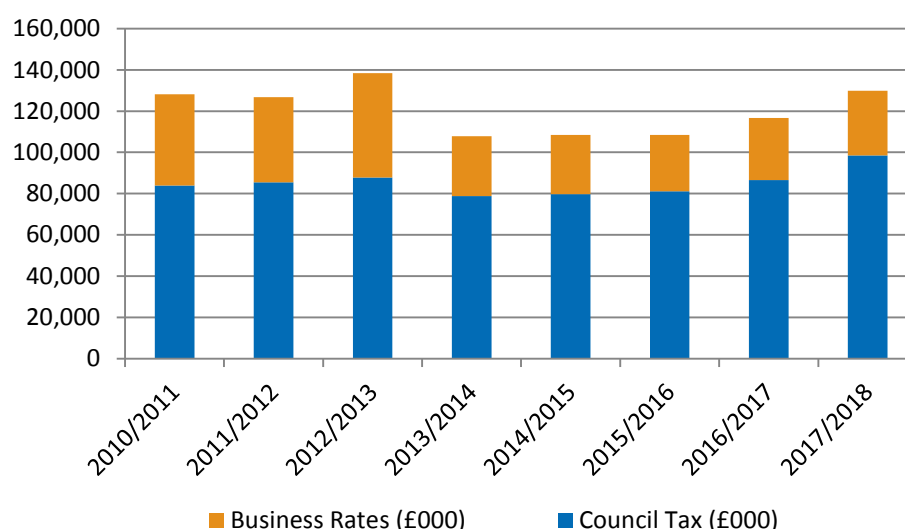
- 8.28 The Swindon Economic Strategy recognises that the borough now has strong productivity per capita, after a period of low productivity between 1998 and 2009 (**Ref 8.15**).
- 8.29 Total economic output (measured as Gross Value Added) generated in the Swindon economy totalled £6.5 billion in 2018. This equates to £66,889 per full-time employee, which is higher compared to the South West regional average (£57,750 per employees) (**Ref 8.16**).

- 8.30 The construction sector specifically produces an output of £100,276 per FTE (compared to £64,527 across the South West) (Ref 8.16). This is important context for assessing the construction phase of the Proposed Development.

Local Authority Revenue

- 8.31 For this financial year (2017-2018), income from Council Tax and Business Rates was £129.8 million for Swindon Borough Council, which is up slightly from £116.6 million in the previous year (2016-2017). This is in the context of a slightly increased surplus in this financial year of £37.7 million, up from £32.6 million in the previous year (2016-2017) (Ref 8.18).
- 8.32 Since 2010, the total income from Council Tax and Business Rates has fluctuated, with the lowest collection in 2013/2014 (£107.9 million), as shown in Figure 8.3.

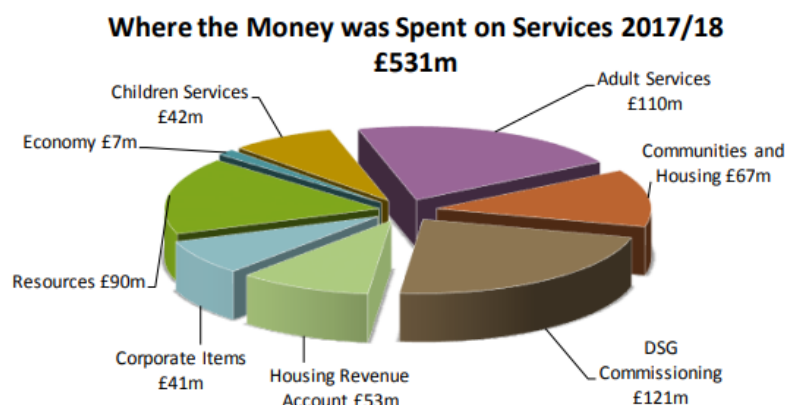
Figure 8.3: Income to Swindon Borough Council from Council Tax and Business Rates



Source: Ref 8.17

- 8.33 Together with other sources of income, such as the central government grant, the local authority funds services such as adult social care and communities and housing. Figure 8.4 shows how total local government spending is divided between local services.

Figure 8.4: Extract from Swindon Borough Council's Statement of Accounts (2017/2018)



Source: Ref 8.17

Local Housing Market

- 8.34 Swindon has a higher proportion of terraced housing (31.9%), compared to the South West region (23.2%) and England (24.5%). There is a lower proportion of detached houses in Swindon (21.1%) compared to the South West region (29.8%) and England (22.3%) (**Ref 8.10**)
- 8.35 According to the Swindon and Wiltshire Strategic Housing Market Assessment (SHMA) there are a number of challenges in the local housing market. There are growing number of concealed families living within households and more instances of overcrowding. For example, across Swindon and Wiltshire (geography of the SHMA), overcrowding increased from 10,811 to 14,947 households (an increase of 4,136) over the 10-year period 2001-11 (**Ref 8.18**)
- 8.36 According to the JSNA, in September 2017, there were 2,421 households on the waiting list for Council or Housing Association properties, 317 of who are considered in urgent need of housing. It has been found that 340 new affordable homes are needed each year in Swindon to meet demand (**Ref 8.12**).

Other Wider Determinants of Health

Open Natural Space

- 8.37 The Swindon Open Space Audit and Assessment (**Ref 8.19**) provides the most robust assessment of access to open natural space for existing residents. The Proposed Development is located on the boundary between Ridgeway ward (more rural) and Covingham and Dorcan (within the settlement boundary of Swindon). The following conclusions are drawn from the assessment regarding the quantity, quality and accessibility of open space:
- **Ridgeway** – “The rural nature of this ward means open space is generally contained within the villages, a majority of which is semi-natural in character and located at Wanborough village. The area is well provided for in terms of allotments and outdoor sports facilities; however there is a lack of playspace available for the residents” (**Ref 8.19**); and
 - **Covingham and Dorcan** – “There is a slight surplus of total open space in Covingham and Dorcan. A high proportion of the total amount of open space consists of general recreational spaces, resulting in a lack of playspaces, outdoor sports facilities and allotments”. “Accessibility is generally fairly good throughout the ward, although access to allotments remains poor” (**Ref 8.19**).

Access to active travel options

- 8.38 Across Swindon the levels of active travel are similar to or slightly better than the national average. In Swindon 23.0% of adults walking for travel at least three days per week (20.7% across England). The equivalent figure for cycling is 4.3% (4.0% across England) (**Ref 8.12**)

Future Baseline

- 8.39 The following estimations have been made regarding how each aspect of the baseline environment will likely change in the future over the next 10 years:

- **Population** - Swindon Council projections estimate that Swindon's population could increase by 14% from 2011 to 2021, and a further 10% from 2021 to 2031. It is cited that population increases are driven by people living longer and more people coming to live in Swindon than are leaving (**Ref 8.12; Ref 8.20**).
- **Employment opportunities** - Total Full-Time Equivalent (FTE) employment is expected to increase but at a higher rate in the local impact area (9.1%) as compared to the wider impact area (8.0%) (**Ref 8.16**).
- **Economic output (GVA)** - GVA generated in Swindon totalled £6.5 billion in 2018 (**Ref 8.16**). GVA generation is expected to increase at a similar level, although slightly higher, in the local impact area (25.7%) as compared to the wider impact area (22.8%).
- **Local authority revenue** - The government is currently trialling a pilot whereby some Local Authorities are retaining 100% of business rates revenue. The government aims to increase the level of business rates retained by local government from the current 50% to 75% in April 2020. It is expected that TDC will receive a proportional uplift in business rates revenue in line with the policy change. Council Tax revenue is expected to increase in line with housing prices and housing delivery.

Scope and Methodology

Scope of the Assessment

Likely Insignificant Effects

- 8.40 The full list of potential human health effects is guided by the Healthy Urban Development Unit (HUDU) framework (**Ref 8.1**), which includes 11 topics, plus information published by IEMA (**Ref 8.2**) and previous professional experience.
- 8.41 The initial scoping exercise also considered the evidence on primary, secondary and tertiary mitigation in order to reach an initial conclusion as to whether the socio-economic and human health effect is likely to be significant. In the absence of evidence regarding mitigation the effect is scoped in.
- 8.42 Following a scoping exercise the following were identified as generating potentially insignificant effects on the local and future population:
- **Early Years provision** – The provision of early years infrastructure has been considered in the design and delivery of the Proposed Development (referred to as *primary mitigation*). There is a developer obligation to provide an early years facility in both of the local centres within the scheme, plus early years provision in each of the two primary schools provided on site. The assessors assume that the Local Education Authority has correctly assessed the demand and that this is being met through S106 contributions (i.e. onsite provision). This means that there will be a negligible effect on existing and future residents.
 - **Primary School provision** - The provision of primary school infrastructure has been considered in the design and delivery of the Proposed Development (referred to as *primary mitigation*). Two 2FE primary schools will be provided on site. The developer will be gifting 100% of the land for both schools and will make a full financial contribution (via S106) towards the build and fit out of both schools (relative to the

pupil yield arising from the development). This requirement for primary school infrastructure is also considered in detail within the Swindon Borough Council NEV Infrastructure Delivery Plan (**Ref 8.XX**). This means that there will be a negligible effect on existing residents.

- **Secondary School provision** – The provision of secondary school infrastructure has been considered in the wider NEV allocation within which the Proposed Development is located. A 10FE Secondary School within the New Eastern Villages at Great Stall East Village is indicatively shown on the published Swindon Borough Council NEV Illustrative Masterplan. This is also outlined in the NEV Infrastructure Delivery Plan (**Ref 8.9**). It is understood that the developer is likely to pay a proportionate contribution to the cost of the land and construction of the school. This means that there will be a negligible effect on existing residents.
- **Health care infrastructure (e.g. GPs, dentists, urgent care)** - The provision of healthcare infrastructure has been considered in the wider NEV allocation within which the Proposed Development is located (referred to as *tertiary mitigation*). To accommodate the future residents at the NEV, Healthcare will be provided within the District Centre of the NEV. It is understood that the developer is likely to pay a proportionate contribution to this provision. This means that there will be a negligible effect on existing residents.
- **Access to healthy food** – A healthy food environment is one factor which can reduce the incidence of obesity³. Public Health England cited that “living in an obesogenic environment where less than healthier choices are the default, encourages excess weight gain and obesity” (**Ref 8.21**). Both local centres will be provided comprising of up to 1,100 sqm of retail and/or café/restaurant floorspace. There is potential for flexibility for local shopping and community facilities (for example, Class D and Class A uses) which may provide future employees and residents with food choices within walking distance. This will benefit less able residents moving to the development. There is also a good selection of supermarkets close to the development within Swindon which will also offer options for food delivery. Allotments will also be provided on site which will allow residents the opportunity to eat home grown food. Given the current level food provision, the provision of a food shop on site and allotment food growing opportunities is considered beneficial but not ‘significant’ in EIA terms.
- **Sports and leisure facilities** – A number of indoor and outdoor sports and leisure facilities will be provided on site to support the future population (referred to as *primary mitigation*). These facilities include: six adult sports pitches which can be used flexibly throughout the year, other sports provision (e.g. tennis courts, bowling green etc.), 1,300 sq m sports pavilion, a NEAP and LEAP, walking/running trails around the hub and allotments. As well as supporting future residents this will support future residents looking to access these sports and leisure services. Therefore the Proposed Development will have a negligible effect on the provision of Sports and leisure facilities.

³ Food environments are the collective physical, economic, policy and sociocultural surroundings, opportunities and conditions that influence people’s food choices and nutritional status.

- **Crime reduction and community safety** - The Proposed Development, in both the construction and the operational phases, is likely to be secure and include measures such as the use of CCTV cameras (referred to as *primary mitigation*). Therefore, the Proposed Development is not likely to generate opportunities to commit crime. Therefore the Proposed Development will have a negligible effect on crime and safety.
- **Social and neighbourhood cohesion** – Significant pre-app discussions with the Local Planning Authority have taken place on the finer design detail of the proposed neighbourhoods. Section 5 of the Design and Access Statement (submitted with the application) identifies the key characteristics and guiding principles for each neighbourhood. The key matters considered include natural surveillance of the sports hub and play areas and strong local centres (with pedestrian priority areas). These features are identified as key design principles which should be considered at the detailed design stage. Therefore it is considered that any adverse effects on social and neighbourhood cohesion will be mitigated at the detailed design stage.

Likely Significant Effects

8.43 Following a scoping exercise, the following socio-economic effects during the **construction period** are likely to be significant:

- Creation of direct, indirect and induced employment during construction
- Economic productivity generated (measured as Gross Value Added)

8.44 The following effects during the **operational period** were also identified as likely to be significant:

- Creation of direct, indirect and induced employment during construction
- Economic productivity generated (measured as Gross Value Added)
- Expenditure of new residents in the economy
- Revenue to Local Authority (business rates, Council Tax and New Homes bonus)
- Increased number of affordable and market homes (assessment includes consideration of accessible housing)
- Access to open space and nature
- Active travel and public transport connections

8.45 As discussed later in the chapter, the social determinants of health will be considered explicitly in this chapter. The environmental risks to health (such as air quality and noise) will be addressed elsewhere in the Environment Statement to ensure the assessment remains concise. Therefore to minimise the duplication of information, the environment health risks are considered elsewhere in the ES as follows:

- The loss of land to farm holdings, affecting future farm viability or loss and damage to farm infrastructure including buildings and access tracks are considered in **Chapter 7: Land Use and Agriculture**;

- Potential exposure to contamination and ground gas migration are considered in **Chapter 10: Ground Conditions**;
- Nuisance, disruption and increased journey times to users of the Public Rights of Way; and changes to pedestrian amenity (either increased severance and pedestrian delay or increased connectivity) are considered in **Chapter 11: Transportation**;
- Creation of new access routes and public open space are considered in **Chapter 13: Landscape and Visual**;
- Noise and vibration during construction and operation are considered in **Chapter 14: Noise and Vibration**; and
- Dust and particulate matter during construction; generation of odour and changes to pollutant concentrations resulting from generated traffic and considered in **Chapter 15: Air Quality**;

Sensitive Receptors

8.46 The following sensitive receptors have been identified and assessed within the ES:

- Construction workforce in the local and wider impact areas (including those seeking employment in the construction industry)
- The economy the local impact area and the wider impact area
- The workforce in the local and wider impact areas, across all industries (including those who are unemployed seeking employment)
- The economy in the local and wider impact area
- Retail and leisure businesses operating in the local and wider impact area
- Local population who access and are supported by services funded by Swindon Borough Council
- Local residents requiring affordable homes and private rented accommodation
- Local residents living in Ridgeway or Covingham and Dorcan wards
- Local population who undertake low levels of physical activity

Approach to the Assessment

8.47 As outlined above, there is no overarching guidance for the preparation of assessment of socio-economic and human health effects. However, several established methodological guides have been published which deal with key elements of the assessment. These will be drawn upon as appropriate within the assessment, with the HCA Additionality Guide and the HCA Employment Densities Guide being of particular relevance (**Ref 8.7 & Ref 8.4**). The economic impacts of the Proposed Development will be presented as net figures, discounting for leakage and displacement as well as accounting for multipliers to present indirect and induced impacts.

- 8.48 In terms of Human Health, the HUDU Rapid Health Impact Assessment Tool (**Ref 8.1**) offers a framework for categorising characteristics of the built environment which can affect human health. The HUDU tool outlines eleven topics (or ‘determinants of health’) which are the social, economic and environmental conditions which can govern health and wellbeing.
- 8.49 The sensitivity of receptors is determined through comparison with wider regional and national trends. Through observation of a receptors capacity for change relative to wider comparator areas and/or national standards, the sensitivity of receptors locally can be observed. Consideration is also given to the priority placed on specific receptors in strategy and policy terms, particularly in the case of more qualitatively based receptors and those where there may be a shortage of quantitative evidence. The assessment is based on professional judgement.
- 8.50 Once the sensitivity of the receptor has been identified, the absolute impact attributable to the Proposed Development is benchmarked against the average annual rate of change in the corresponding social or economic characteristics or baseline. This enables a relative assessment of the magnitude of impact that is attributable to the Proposed Development to be undertaken.
- 8.51 The assessment of potentially significant effects on sensitive receptors will consider the sensitivity of the receptor and the magnitude of change to determine significance, on a scale of very high, high, moderate, low or very low (for sensitivity) and high, moderate, low or negligible (for magnitude).
- 8.52 The level of effect will be concluded as negligible, minor, moderate or major, with significant effects determined through professional judgement.
- 8.53 The impacts, will be described in reference to the following terms:
- ‘Temporary’ or ‘permanent’; and
 - ‘Short’, ‘medium’ or ‘long-term (short – up to 1 year, medium – 1 to 10 years, or long-term – over 10 years) of effect;
 - ‘Beneficial’, ‘negligible’ or ‘adverse’;
 - ‘Local’ (i.e. contained within local impact area), ‘wider’ (i.e. contained within wider impact area)
 - For effects define the significance level as ‘minor’, ‘moderate’ or ‘major’.

Approach to Calculating the Effect

Assessment of Construction Phase

- 8.54 The construction phase impacts within the assessment include construction expenditure, Full Time Equivalent (FTE) construction jobs and Gross Value Added (GVA) (productivity) impacts. In order to calculate these impacts the following methodology has been used:

Table 8.4: Assessment of Construction Phase

Topic	Method of Assessment
Employment	The estimated construction cost uses data from BCIS and is divided by the average employee turnover in the construction sector for South West England (Ref 8.22) in order to calculate the likely direct employment. The total number of employees generated directly by the construction programme is then divided by the number of years over which the construction of the project is envisaged ⁴ , to give gross FTE jobs. Allowances for leakage and displacement are then made in order to calculate net FTE jobs generated by the development, and a multiplier is applied to estimate indirect and induced employment.
Economic Productivity	The average GVA per FTE worker is calculated using Experian local market forecasts (Ref 8.16). This is applied to the net FTE construction jobs estimated to be generated by the Proposed Development.

Assessment of Operational Phase

- 8.56 Operational impacts refer impacts that will be generated during the 'lifetime' of the Proposed Development. The following indicators have been assessed:

Table 8.5: Assessment of Operational Phase

Topic	Method of Assessment
Employment	In order to calculate the direct gross FTE jobs generated through the commercial use operational phase, appropriate employment densities are applied to the relevant floor spaces, in line with national guidance. For the estimate of early years and primary school staff the DfE workforce was used. Considerations of appropriate allowances for leakage and displacement are made in line with national guidance (Ref 8.7) in order to calculate a net figure of FTE job creation. A multiplier is also applied to allow for employment generated through indirect and induced effects to be factored in to the assessment.
Economic Productivity	The average GVA per FTE worker is calculated for relevant sectors using Experian local market forecasts (Ref 8.16). This is applied to the net FTE jobs estimated to be generated by the Proposed Development.
Incomes and Enhanced Local Spending Power	Additional household income is estimated by multiplying the total additional economically active population in employment by median earnings in South West England, utilising the Annual Survey of Hours and Earnings (ASHE) for 2017 (Ref 8.23). This is disaggregated and weighted by occupational group, drawing upon evidence from the APS on the occupational profile of existing residents in Swindon. Additional spending power is calculated by multiplying the total number of new homes proposed by household expenditure for

⁴ Estimated construction period of 20 years based on previous project experience

	leisure, convenience and comparison goods, utilising expenditure data published by Oxford Economics sourced from Pitney Bowes.
Business Rate Revenue	In order to calculate the uplift in non-domestic rates (known as business rates) through the operational phase of the Proposed Development, the net additional floorspace is disaggregated by use. The Valuation Office Agency (VOA) business rates valuation tool is utilised to run comparable analysis of similar units and uses. The derived indicative rates are subsequently applied to estimated rateable floorspace elements within the Proposed Development, with a national multiplier applied to derive an estimated total business rate payable per annum.
Council Tax Revenue	Council Tax revenues potentially attributable to the Proposed Development once occupied are estimated based on an assessment of the likely average current market value of dwellings included within the Proposed Development. These are rebased to the last valuation date of Q2 1991 in order to assign dwellings to a valuation band. Council Tax revenues accruing from the Proposed Development annually are then calculated, with reference to the latest Swindon.
New Homes Bonus	The New Homes Bonus payments are calculated using an online tool provided by DCLG (Ref 8.24). This generates a total resulting payment over a 1 year and a 4 year period.
Open Space	Swindon Borough Council's Open Space Audit (Ref 8.19) will be reviewed to determine the surplus / deficit of existing open space (according to a number of different categories)
Active travel and public transport connections	The proposals for active travel are reviewed against secondary literature on the benefits of sustainable travel and local data on the propensity for residents to travel by walking or cycling.

Defining Sensitivity, Magnitude and Significance of Effect

- 8.57 The assessment of likely significant environmental effects as a result of the Proposed Development has taken into account the construction and operational phases.

Determining Sensitivity of Receptor

- 8.58 The sensitivity of affected receptors has been considered on a scale of **very high, high, medium, low** or **very low**. **Table 8.6** defines the levels of sensitivity in more detail.

Table 8.6: Defining Sensitivity of Receptor

Sensitivity	Definition
Very High	Receptor of national importance, with very little ability to absorb, adapt to or recover from change.
High	Receptor of national importance, with little ability to absorb, adapt to or recover from change.

Medium	Receptor of regional or local importance, with medium ability to absorb, adapt to or recover from change.
Low	Receptor of local importance, with some ability to absorb, adapt to or recover from change.
Very Low	Receptor of local importance, with ability to absorb, adapt to or recover from change.

Determining the Magnitude of Change

- 8.59 The magnitude of change has been considered as the change experienced from the baseline conditions at the sensitive receptor and has been considered on a scale of **very high, high, medium, low** or **very low**. **Table 8.7** defines the levels of sensitivity in more detail.

Table 8.7: Defining Magnitude of Change

Level of Magnitude	Definition
Very High	The change will dominate over baseline conditions, or will be highly likely to affect very large numbers of people and/or businesses over the long term. Considered to be a very important consideration, and likely to be material in the decision-making process.
High	The change will result in significant changes to baseline conditions, or will be highly likely to affect large numbers of people and/or businesses over the long term. Considered to be a very important consideration, and likely to be material in the decision-making process.
Medium	The change can be demonstrated to baseline conditions, and is likely to affect a moderate number of people and/or businesses over a medium duration. The change may be important, but is not likely to be a key decision-making factor unless the cumulative effects of such factors lead to an increase in the overall effect on a particular socio-economic resource or receptor.
Low	The change will result in a perceptible difference from baseline conditions, and is likely to affect to a small number of people and/or businesses over a short duration. The change may be raised as a local factor, but is unlikely to be critical in decision-making process.
Very Low	The change does not result in variation beyond baseline conditions, and is unlikely to measurably affect people and/or businesses.

Determining the Level of Effect

- 8.60 The level attributed to each effect has been assessed based on the magnitude of change due to the Proposed Development and the sensitivity of the affected receptor. The level of effect has been based on professional judgement. The matrix below has been used as a tool to assist with this process.

Table 8.8: Matrix to Support Determining the Level of Effect

Receptor sensitivity	Magnitude of Impact					
		Very High	High	Medium	Low	Very Low
	Very High	Major	Major	Moderate	Minor	Minor
	High	Major	Moderate	Minor	Minor	Negligible
	Medium	Moderate	Minor	Minor	Negligible	Negligible
	Low	Minor	Minor	Negligible	Negligible	Negligible
	Very Low	Minor	Negligible	Negligible	Negligible	Negligible

8.61 Whilst the matrix provides ranges, the level of effect is confirmed as a single level and not a range, informed for professional judgement. For each effect, it has been concluded whether the effect is '*beneficial*' or '*adverse*'. Any effect which is above minor (i.e. minor to moderate, moderate, moderate to major, major) is deemed to be '**Significant**', again based on professional judgement.

8.62 The following terms have been used to define the significance of the effects identified and these can be '*beneficial*' or '*adverse*':

- **Major effect:** where the Proposed Development is likely to cause a considerable change from the baseline conditions and the receptor has limited adaptability, tolerance or recoverability or is of the highest sensitivity. This effect is considered to be '*Significant*';
- **Moderate effect:** where the Proposed Development is likely to cause either a considerable change from the baseline conditions at a receptor which has a degree of adaptability, tolerance or recoverability or a less than considerable change at a receptor that has limited adaptability, tolerance or recoverability. This effect is considered more likely to be '*Significant*' but will be subject to professional judgement;
- **Minor effect:** where the Proposed Development is likely to cause a small, but noticeable change from the baseline conditions on a receptor which has limited adaptability, tolerance or recoverability or is of the highest sensitivity or a considerable change from the baseline conditions at a receptor which can adapt, is tolerant of the change or/and can recover from the change. This effect is considered less likely to be '*Significant*' but will be subject to professional judgement; and
- **Negligible:** where the Proposed Development is unlikely to cause a noticeable change at a receptor, despite its level of sensitivity or there is a considerable change at a receptor which is not considered sensitive to a change. This effect is '*Insignificant*'.

Limitations & Assumptions

8.63 To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- The assessment relies on secondary survey data such as the Census (2011), Annual Population Survey (2018) and Business Register and Employment Survey (2017). Each data source has methodological limitations related to data collection and surveys only represent the socio-economic context at a specific point in time; and
- The future baseline and assessment of future effects relies on population and employment forecast data. There are known uncertainties related to using trend based analysis, however, this is the best available data for drawing conclusions about how the economy and labour market is likely to change in the future.

Environmental Assessment: Construction Phase

Creation of direct, indirect and induced employment opportunities

- 8.64 It is estimated that once construction of the Proposed Development commences it will complete take 20 years plus to complete. This investment has the capacity to support approximately 3,530 person-years of direct employment with the construction sector⁵. This equates to an average of 180 full-time equivalent (FTE) construction jobs on and off-site annually over the construction period (based on a construction period of 20 years).
- 8.65 Of the new construction jobs created on site not all will be additional to the local and wider impact area. A proportion of jobs will be taken by those living outside of Swindon or the wider impact area (referred to as 'leakage') and a proportion of jobs be taken by those already working on construction projects locally (referred to as 'displacement')⁶. After assumptions regarding leakage and displacement have been applied, the number of direct jobs supported is estimated to be 140 FTE jobs per annum across the wider impact area, of which 100 FTE jobs are likely to be taken by those living in Swindon local authority.
- 8.66 The positive economic impacts of the Proposed Development will extend beyond construction employment to include the generation of indirect benefits for the local economy. By investing in the development, there will be considerable expenditure on construction materials, goods and other services that will be purchased from a wide range of suppliers. This expenditure has far-ranging benefits both locally and further afield as it filters down the supply chain, and via the induced impacts of employment, through onward expenditure.
- 8.67 The result is that the initial investment in the Proposed Development is amplified in an economic 'multiplier' effect with linked benefits in terms of generated expenditure spent locally on goods and services. This will bring indirect employment and financial benefits for local individuals and firms involved in the skilled construction trades and associated professions. It could also help to sustain employment within this sector across the local and wider economy.
- 8.68 The construction of the Proposed Development could be expected to support a further 70 FTE jobs (per annum) within the wider impact area via indirect and induced effects, including contracts within the supply chain, salaries and onward expenditure, inclusive of 20 FTE jobs in the local impact area.

⁵ The estimation of construction employment is based on an investment of approximately £280 million into materials and £80 million on infrastructure costs.

⁶ Assumptions regarding leakage and displacement are in line with the HCA Additionality Guide 4th Ed. (2014)

- 8.69 The net additional impact describes the total economic impact. It is the sum of the direct and indirect employment impacts. The assessment finds that a total of 220 net additional FTE positions per annum could be generated across the wider impact area during the construction period. This is inclusive of 120 jobs in Swindon which reflects the labour market dynamics typical of this area.

Table 8.9: Construction Phase Net FTE Employment Generation (per annum)

Net FTE Employment Generation	Local Impact Area	Wider Impact Area
Person-years of Employment	3,530	
Gross FTE Employment ¹	180	
Direct FTE Employment ²	100	140
Indirect / Induced FTE Employment ³	20	70
Net Additional Employment (Total)	120	220

¹ Number of jobs directly generated by construction activity on and off site.

² Not all jobs will be 'additional' to the local or wider impact areas. Some jobs will be taken by those living further away (referred to as 'leakage') or by those already working on a construction project (referred to as 'displacement'). The 'direct employment' accounts for these assumptions.

³ Additional jobs can be created indirectly through supply-chain expenditure; referred to as a 'multiplier effect'.

Figures may not appear to sum due to rounding

Source: Turley Economics, 2019

- 8.70 For this effect the receptor is the construction workforce in the local and wider impact areas (including those seeking employment in the construction industry). The sensitivity of this receptor is considered to be medium; the smaller construction labour market makes the receptor more sensitive to change.
- 8.71 The magnitude of change is considered to be medium, as there will be some change to the baseline. The 3,530 person years of employment are likely to equate to 140 full time roles per annum over 20 years. There are currently circa 10 residents seeking work in this sector across Swindon. Therefore, there is likely to be a temporary, medium-term, beneficial effect in the local and wider impact areas which is considered to be **minor**.

Generation of economic productivity (measured as Gross Value Added)

- 8.72 The construction phase of the Proposed Development will generate a significant increase in GVA. GVA measures the value of output created (i.e. turnover) net of inputs purchased, and is used to produce a good or service (i.e. production of the output). This provides a measure of economic productivity.
- 8.73 The estimated construction capital expenditure associated with the Proposed Development could deliver a net additional £18.8 million GVA per annum contribution to the wider economy during construction, of which circa £11.4 million per year is estimated to contribute to the growth of the Swindon economy during the construction period. This is summarised in the following table overleaf.

Table 8.10: Construction Phase Net GVA Generation (Per Year of Construction)

Net GVA Generation	Local Impact Area	Wider Impact Area
Direct GVA Impact	£9.8 million	£14.4 million
Indirect / Induced GVA Impact	£1.6 million	£4.4 million
Net Additional Impact (total per annum)	£11.4 million	£18.8 million

Figures may not appear to sum due to rounding

Source: Turley Economics, 2019

- 8.74 The effect is considered to impact the receptor of the local and wider impact area economies. The sensitivity of the receptor is considered to be medium given the local importance of employment generation and economic productivity in the Swindon Local Plan. The magnitude of change is considered to be medium. Therefore, there is likely to be a temporary, medium-term, beneficial effect in the local and wider impact areas which is considered to be **minor**.

Environmental Assessment: Operational Phase

Creation of direct, indirect and induced employment once operational

- 8.75 The Proposed Development will deliver additional employment space on site. In total there will 1,000 sqm GIA additional employment space (Use Class B1) provided on site which will provide space for new businesses and existing business looking to relocate or expand. Once complete the number of gross jobs supported by the new premises is estimated to be 20 jobs, based on the worst case scenario of 100% of the floorspace being occupied for light industrial use (Use Class B1c)⁷.
- 8.76 The community and retail space provided at both local centres will also support those seeking employment in the hospitality or education sectors. The local centres will include 2 no. early years facilities, retail (A1) and a café / restaurant (A3/A4). Together all three uses are estimated to generate 90 gross FTE jobs.
- 8.77 The two 2FE primary schools and a sports hub will also generate employment opportunities onsite. The sports hub will include six adult sports pitches and a c.1,300 sq m sports pavilion which are likely to require maintenance and repair teams and a premises manager. The primary schools will require teachers and non-academic staff such as cleaners and catering teams. Together the two schools and sports hub are estimated to support 80 gross FTEs directly on site.
- 8.78 There are a number of existing businesses already located on the site. Lotmead Business Village and Lotmead Pick Your Own will be retained throughout the development. The Dairy Farm will close and will result in a loss of employment of three full-time members of staff⁸. This loss of employment has been deducted from the total employment figure subsequently quoted in the assessment.
- 8.79 The number of FTE employee jobs supported directly on site are summarised in **Table 8.10**.

⁷ Worst case scenario is defined as the space being occupied by Use Class B1c businesses. This use class has a lower employment density compared to B1a (office) and B1b (R&D).

⁸ Confirmed by the landowner

Table 8.11: Net full-time employment (after accounting for employment loss)

	Component	Number of FTE jobs
Additional Employment	Employment Space	20
	Early Years	35
	Retail	30
	Café / Restaurant	25
	Two 2 FE Primary Schools	75
	Sports Hub	5
Loss of Employment	Dairy Farm	3
Net Employment		177

Source: Turley Economics, 2019

- 8.80 Of the new jobs created on site not all will generate additional benefits to the local and wider impact area. A proportion of jobs will be taken by employees living outside of Swindon or the wider impact area (referred to as 'leakage') and a proportion of jobs be taken by those moving from local businesses or working for companies relocating to the Business Village (referred to as 'displacement')⁹. Assumption regarding leakage and displacement are in line with the HCA Additional Guide (**Ref 8.XX**)
- 8.81 After assumptions regarding leakage and displacement have been applied, as per HCA Guidance, it is estimated that 120 FTE jobs would be generated across the wider impact area, inclusive of 70 FTE jobs that are likely to be taken by those living in the Swindon local authority area.
- 8.82 The operation of the Proposed Development will have indirect / induced effects through supply chain spending and procurement. For example, food supplies to the local centre café / restaurant or stationary to the primary schools. Therefore the direct effect is amplified, resulting in a multiplier effect. It is estimated that an additional 65 indirect / induced FTE jobs would be generated across the wider impact area, of which 15 are likely to be taken by those living in Swindon.
- 8.83 The net additional impact (total of direct and indirect / induced effects) is the creation of 185 FTE jobs in the wider impact area, of which 85 FTE jobs are likely to be taken by those living in Swindon.

⁹ Assumptions regarding leakage and displacement are in line with the HCA Additionality Guide 4th Ed. (2014)

Table 8.12: Operational Phase – Employment Generation

	Local Impact Area	Wider Impact Area
Gross FTE Employment (on site)	177	
Direct FTE Employment (FTE)	70	120
Indirect / Induced FTE Employment	15	65
Total Net Additional FTE Employment	85	185

Figures may not appear to sum due to rounding

Source: Turley Economics, 2019

- 8.85 The sensitivity of the receptor (workforce in the local and wider impact areas) is considered to be high due to the recent decline in employment in local labour force and higher levels of out commuting. The magnitude of change is considered to be low, given the scale of new employment on one site as a proportion of jobs in the local economy. Therefore, there is likely to be a permanent, long-term, beneficial effect in the local and wider impact areas which is considered to be **minor**.

Economic productivity generated (measured as Gross Value Added)

- 8.86 The operational phase of the Proposed Development will positively contribute to the economic productivity of Swindon and the wider impact area economy. Through its operation, the Proposed Development could deliver an annual uplift in productivity – measured in GVA contribution – of circa £7.6 million to the wider impact area economy, of which £3.2 million could be local to Swindon.
- 8.87 This is summarised in Table 8.12.

Table 8.13: Operational Phase - GVA Generation Per Annum

GVA Generation	Local Impact Area	Wider Impact Area
Direct GVA Impact	£2.4 million	£4.5 million
Indirect / Induced GVA Impact	£0.8 million	£3.1 million
Total Net Additional GVA Impact	£3.2 million	£7.6 million

Figures may not appear to sum due to rounding

Source: Turley Economics, 2019

- 8.88 The sensitivity of the receptor (local economy of Swindon) is considered to be medium. The magnitude of change is considered to be low, given the relative contribution of the development to total economic output in Swindon. Therefore, there is likely to be a permanent, long-term, beneficial effect in the local and wider impact areas which is considered to be **negligible**.

Increased population and associated expenditure

Increased population

- 8.89 Based on the average number of residents per household by number of bedrooms – drawn from the 2011 Census – the Proposed Development of up to 2,500 new homes could grow the local population by circa **5,960 residents**, once fully occupied.
- 8.90 The occupation of new housing by a range of households can also deliver further benefits, with new housing making an important contribution to the competitiveness of cities, towns and villages by providing accommodation that will appeal to – and attract – new skilled people to live in the area. New homes will sustain the local labour force and ensure that the long-term economic competitiveness of Swindon and the wider impact area is enhanced. It will also contribute to the economic resilience of the area by enhancing the supply of resident labour and thereby making the area attractive to employers.
- 8.91 The latest evidence suggests that 64.0% of Swindon residents are of working age (16+) and economically active. Assuming that the delivery of up to 2,500 new homes will grow the population in line with the existing resident profile suggests that the Proposed Development could attract circa **3,820 additional economically active residents** of working age¹⁰.
- 8.92 Based on current employment rates, the Proposed Development could accommodate 3,100 employed residents, of which circa 30%, or 960 residents, could work in management and professional occupations – with higher skills and earnings – based on the existing occupational profile of Swindon residents¹¹. This is demonstrated in the following table.

Table 8.14: Breakdown of Population and Labour Force

Population and Labour Force	No. Residents
Total residents on site	5,960
Economically active residents of working age (16 – 64 years)	3,820
Employed residents	3,100
Residents employed in higher paid management and professional occupations	960

Source: Turley Economics, 2019

Increased expenditure by new residents

- 8.93 The Proposed Development could therefore directly contribute towards the ongoing competitiveness of Swindon and the wider impact area, by contributing towards maintaining the size of the labour force and the supply of skilled labour available to local businesses and prospective business investors.
- 8.94 An occupied new home also represents a net gain to the local economy, as household income and expenditure in the local economy will occur over a long period in which the home is occupied. The Annual Survey of Hours and Earnings (ASHE) provides income data by

¹⁰ This accounts for circa 260 residents being aged between 3 and 18 years old, calculated as per the Devon County Council multipliers included in the Infrastructure Plan (2016)

¹¹ NOMIS (2017) Annual Population Survey (October 20165 – September 20176)

occupational group. Applying this to the estimated occupational profile of new residents indicates that employed residents of the Proposed Development could receive a collective income of circa **£65.9 million per annum**.

- 8.95 This income will be used to meet housing and other fixed household costs, although a considerable proportion will be available for discretionary expenditure within the local economy. Expenditure from new residents living on the Proposed Development will make a significant contribution towards sustaining local shops and businesses in Swindon and the wider economy, which in turn provide an important source of local employment.
- 8.96 Oxford Economics estimate that households in the local area spend an average of £12,900 annually per household on convenience and comparison retail goods and services (**Ref 8.25**). On this basis, the Proposed Development could generate total retail expenditure of circa **£5.8 million on convenience and comparison goods and services**.
- 8.97 In addition, it is estimated that households in the local area spend an average of £7,500 annually on leisure goods and services (**Ref 8.25**). The Proposed Development could therefore generate further expenditure of **£3.4 million per annum on leisure goods and services**.
- 8.98 Further evidence published by the HBF estimates that households spend an average of £5,000 on furnishing and decorating supplies to 'make a house feel like a home' when they move (**Ref 8.26**). Therefore, the residents of the Proposed Development also have the potential to generate one off **expenditure of circa £12.5 million upon first occupation**. Nevertheless, this level of expenditure is considered to be a conservative estimate when reflecting on further evidence relating to a Barratt development in Middlesbrough, included within the HBF report, which indicates new homes generate higher levels of average 'first occupation' expenditure.
- 8.99 Table 8.14 summarises the increased levels of expenditure by new residents. It is important to note that these categories of expenditure will overlap and therefore are not mutually exclusive.

Table 8.15: Summary of expenditure associated with new residential population

Category of Expenditure	Amount (£) per annum
Collective income of new employed population living on site	£65.9 million
Expenditure per household on convenience and comparison goods and services	£5.8 million
Expenditure per household on convenience and comparison goods and services	£3.4 million
Expenditure per household on 'making a housing feel like a home'	£12.5 million

Source: Turley Economics, 2019

- 8.100 The sensitivity of the receptor (retail businesses operating in the local and wider economies) is considered to be medium given the higher than average contribution of the retail sector to

local economic output (measured in GVA), balanced with the challenges faced by the sector on a national level. The magnitude of the impact is considered to be high given the level of expenditure estimated. Therefore, there is likely to be a permanent, long-term, beneficial effect in the local and wider impact areas which is considered to be moderate. This is **significant for the purposes of EIA.**

Increased revenue to Local Authority

Council Tax Revenue

- 8.101 Development and occupation of new housing can also increase Council Tax revenue to Swindon District Council. Although the mix of homes to be delivered is unconfirmed at the current point in time, this assessment assumes the delivery of a range of homes. The eventual mix of homes delivered will directly impact upon the scale of Council Tax accrued.
- 8.102 On this basis, the Proposed Development is expected to generate **circa £3.1 million in additional Council Tax payments annually** to Swindon Council once fully occupied, equating to **circa £31.2 million over 10 years** at anticipated 2018/19 rates. This could provide an important source of revenue funding for Swindon Council in order to deliver public services as well as investing in maintaining and enhancing infrastructure within the locality.

New Homes Bonus Payments

- 8.103 The NHB was introduced in 2010 by the Government as an incentive-based financial tool to encourage the delivery of new homes by providing additional funds to local authorities for every new home built. This financial mechanism available to local authorities is subject to ongoing review. And therefore the figures presented are indicative and reflect the latest policy position (Ref 8.29).
- 8.104 NHB payments are not ring-fenced, which provides local authorities with the opportunity to reinvest this additional revenue in supporting and enhancing public services and infrastructure as it is most needed – and often in the local area where new homes are built to the benefit of existing local communities.
- 8.105 Based on the estimated sales revenues of the new homes to be delivered, the Proposed Development is expected to generate an additional **circa £13.4 million of revenue for Swindon Borough Council** in total over a 4 year period, under the current New Homes Bonus system¹².

Business Rate Revenue

- 8.106 Businesses pay non-domestic rates (known as business rates) to contribute to the cost of the local authority providing public services within which the business property is situated. The Government has introduced a Business Rate Retention Scheme (BRRS), which became operational in April 2013. It provides a direct link between business rates growth and the amount of money local authorities have to spend on local people and local services.
- 8.107 Local authorities are now able to keep at least 50% of the growth in business rates revenue that is generated in their administrative area. The Government's intention is that this will provide a strong financial incentive for local authorities to promote economic growth, as well as providing a greater degree of discretion in terms of how this additional revenue is spent.

¹² This assessment assumes that the NHB system continues to operate over the 20 year development period under current arrangements. This is subject to change and dependent on Government policy.

In December 2017, the government announced the aim of increasing the level of business rates retained by local government from the current 50% to the equivalent of 75% in April 2020. This is being piloted in a selection of local authorities (**Ref 8.27**).

- 8.108 It is estimated that the Proposed Development would generate up to approximately £100,000 in business rate revenue per annum, of which at least 50% – or circa £50,00 – could be retained by Swindon District Council each year until 2020. Thereafter up to 100% (£100,000) uplift can be retained.

Total Local Authority Revenue

- 8.109 The total impact of the Proposed Development on local authority revenue is initially £3.4 million per annum until year four, when New Homes Bonus payment cease. **Table 8.15** shows the likely revenue generated for the local authority over a five year period.

Table 8.16: Total Local Authority Revenue (Y1 – Y5 post completion)

	Y1	Y2	Y3	Y4	Y5
Council Tax	£3.1m	£3.1m	£3.1m	£3.1m	£3.1m
Business Rates ¹	£0.07m	£0.07m	£0.07m	£0.07m	£0.07m
New Homes Bonus	£3.4m	£3.4m	£3.4m	£3.4m	£0.0m
Total	£6.6m	£6.6m	£6.6m	£6.6m	£3.2m

¹ Assuming 50% retention continues (worst case scenario)

Source: Turley Economics, 2019

- 8.110 Increased local authority revenue will be important for expenditure on local services funded by Swindon Borough Council, such as children's services, adult social services and communities and housing.
- 8.111 The sensitivity of services funded by local government is considered to be medium given that the local authority's financial surplus has been decreasing over the last five years (2012/13 – 2017/18). The magnitude of change is considered to be medium given that the development will generate an annual increase of £6.6 million in revenue to the local authority for the first four years. Therefore, there is likely to be a permanent, long-term, beneficial effect in the local impact areas which is considered to be **minor**.

Increased number of affordable and market homes

- 8.112 The Proposed Development would deliver up to 2,500 new homes, with a mix of sizes and types catering for a range of accommodation needs. The housing target for the Local Plan (2011-2026) is 1,625 per annum from 2016 to 2026 or circa 16,250 homes in total over a 10 year period (quoted as an annual figure in the policy). The Proposed Development delivers circa 15.4% of the 10 year housing target (2016-2026).
- 8.113 Of these homes, it is likely that (as per policy) 30% of dwellings (or up to 750 homes) would be affordable dwellings, further helping to both alleviate affordability issues and house

those who are unable to afford market housing¹³. As highlighted in the JSNA and SHMA, overcrowding, concealed families and social housing waiting lists are becoming more of a challenge in Swindon. This is reflective of a national housing shortage as well.

- 8.114 The sensitivity of the receptor (those requiring market and affordable homes in Swindon) is considered to be high. The magnitude of change is considered to be high when benchmarked against targets for housing delivery and historic delivery rates in the local impact area. Therefore, there is likely to be a permanent, long-term, beneficial effect in the local impact area which is considered to be **major**. This is **significant for the purposes of EIA**.

Access to public amenity space and open natural space

- 8.115 The *“development of physical, green and social and community infrastructure to support increases in population, employment and housing” (Ref 8.12)* is one of the key issues identified in the JSNA by the Health and Wellbeing Board. This is addressed as part of the Proposed Development.
- 8.116 Once complete the development will provide outdoor public amenity space such as allotments (c.2.6 ha) and walking trails. The site area (excluding the primary road infrastructure to the A420) is c.160ha and green infrastructure (GI) will cover c.97 ha. This is in line with local plan policy.
- 8.117 This provision will positively impact the local community. The baseline assessment highlighted that there is a lack of playspace available for the residents in Ridgeway and Covingham and Dorcan wards and a deficit of sports facilities and allotments.
- 8.118 The sensitivity of the receptor (local population, all demographic profiles) is considered to be medium given the currently availability of green space locally. The magnitude of change is considered to be medium given the level of green infrastructure provided on site. Therefore, there is likely to be a permanent, long-term, beneficial effect in the local impact areas which is considered to be **minor**.

Change in Active Travel and Transport Connections

- 8.119 The reduction of *“unnecessary short trips by car (which are the most polluting) and encourage active travel, alternatives to vehicle use and sustainable travel” (Ref 8.12)* is one of the key housing issues identified in the JSNA by the Health and Wellbeing Board. Organisations such as Sustrans have identified that active travel to school can make children more alert (**Ref 8.28**), while other evidence finds a strong relationship between walking and cycle and reducing the risk of obesity (**Ref 8.29**).
- 8.120 The proposals will incorporate a cycle friendly design. In accordance with the NEV Bridge Vision SPD and NEV Framework Travel Plan SPD (**Ref 8.9**), the primary roads will include a segregated cycle/pedestrian land of 4m on both sides of the carriageway. Similarly, the secondary roads will include a segregated cycle/pedestrian land of 3m on both sides of the carriageway. As part of the proposals the developer is committing to carry out works along Wanborough Road to improve the cycle/footpath connectivity from our site access to Covingham. The Movements Parameter also shows a number of green routes, comprising a network of traffic free cycling and walking routes.

¹³ It is important to note that the exact proportion of affordable housing is subject to negotiation with the LPA during the determination period.

- 8.121 The sensitivity of the receptor (local population, all demographic profiles) is considered to be medium given the current propensity of residents to walk or cycle on regular basis and current levels of physical activity. The magnitude of change is considered to be medium given the level of green infrastructure provided on site. Therefore, there is likely to be a permanent, long-term, beneficial effect in the local impact areas which is considered to be **minor**.

Environment Assessment: Cumulative Effects

Effect interactions (intra-project)

- 8.122 The socio-economic and human health receptors will be affected by a number of other effects considered throughout the Environment Statement. For example, the increase in movement of people will be associated with an increase in employees. This could result in intra-project effects associated with an increase in traffic, although these effects are considered as a direct impact in the Transport chapter.
- 8.123 **Table 17.1** outlines the effect interactions during the construction phase and operational phase across all the disciplines. The table outlines the effect interactions between population and human health receptors and effects associated with: traffic and access; noise and vibration; ground conditions and agriculture and air quality.

In-combination effects (inter-project)

- 8.124 The construction phases of all other schemes identified will have in-combination effects with the Proposed Development. All projects will generate additional construction employment opportunities and economic output to the local and wider economies. This will create a larger beneficial effect affecting the following common receptors of the Proposed Development: construction workforce in the local and wider impact areas and the economy of the local and wider impact areas. As a result there will be a change in magnitude at the receptors and therefore the level of effect will increase from minor beneficial to **moderate beneficial. This is significant in EIA terms.**
- 8.125 During the operational phase, all cumulative schemes which include employment uses are considered to have in combination effects with the Proposed Development. The identified cumulative schemes are likely to generate additional employment opportunities in the long term within the economies of Swindon Borough and the wider impact area. This beneficial effect will affect the following receptors which are common with the Proposed Development: the economy of the local and wider impact areas and the workforce in the local and wider impact areas. As a result there will be a change in magnitude at the receptor and therefore the level of effect will increase from minor beneficial to **moderate beneficial. This is significant in EIA terms.**
- 8.126 During the operational phase, the cumulative schemes which include a residential component are also considered to have in combination effects with the Proposed Development. These schemes are likely to generate the following in combination effects:
- **Revenue to local authority** (e.g. Council Tax, New Homes Bonus) will increase in line with additional dwellings. This will increase the significance of the effect from minor beneficial to **moderate beneficial. This is significant in EIA terms.**

- **Provision of new housing** (market and affordable) will increase in line with additional dwellings built. This significance of the effect will remain as **major beneficial. This is significant in EIA terms.**

Mitigation & Monitoring

8.127 There are no significant adverse effects, therefore no mitigation is needed.

Summary of Residual Effects

8.128 The following table sets out the residual effects

Table 8.17: Summary of Residual Effects

Description of impact	Sensitive Receptors	Stage (C /O)	Significant effect	Mitigation	Residual Effect
Creation of temporary construction employment (direct, indirect, net additional)	Construction workforce in the local and wider impact areas (including those seeking employment in the construction industry)	C	Minor Beneficial	No mitigation required	Minor Beneficial
Generation of economic productivity (Gross Value Added, GVA)	The economy the local impact area and the wider impact area	C	Minor Beneficial	No mitigation required	Minor Beneficial
Creation of permanent employment (direct, indirect, net additional) once development is complete	The workforce in the local and wider impact areas, across all industries (including those who are unemployed seeking employment)	O	Minor Beneficial	No mitigation required	Minor Beneficial
Generation of economic productivity (Gross Value Added, GVA)	The economy in the local and wider impact area	O	Negligible	No mitigation required	Negligible
Expenditure of new local residents	Retail and leisure businesses operating in the local and wider impact area	O	Moderate Beneficial	No mitigation required	Moderate Beneficial
Increased revenue to local authority (e.g. business rates, Council Tax)	Local population who access and are supported by services funded by Swindon Borough Council	O	Minor Beneficial	No mitigation required	Minor Beneficial
Increased access to affordable housing and market homes	Local residents requiring affordable homes and private rented accommodation	O	Major Beneficial	No mitigation required	Major Beneficial
Access to public amenity and	Local residents living in Ridgeway or	O	Minor Beneficial	No mitigation	Minor Beneficial

natural open space	Covingham and Dorcan wards			required	
Active travel and public transport connections	Local population who undertake low levels of physical activity	O	Minor Beneficial	No mitigation required	Minor Beneficial

9. Water Resources

Purpose and Parameters of the Assessment

- 9.1 This chapter of the ES assesses the environmental impact of the Development on flood risk from fluvial and surface water sources, water quality and water supply and sewerage capacity.
- 9.2 This chapter has been prepared by Peter Brett Associates LLP, now part of Stantec, (PBA) and should be read in conjunction with the Flood Risk Assessment (FRA) (PBA, December 2018) (**Appendix 9.1**) and Surface Water Management Strategy Plan (**Figure 9.1**) for the Lotmead Farm Villages.
- 9.3 The assessment has been undertaken in consultation with the Environment Agency and the Council, including the Local Lead Flood Authority.
- 9.4 This Chapter aims to:
- Provide a summary of relevant legislation and planning policies against which the development will be considered;
 - Describe the existing hydrological environment;
 - Describe the existing water infrastructure;
 - Provide an overview of the baseline conditions currently present at the Site;
 - Provide details of the mitigation measures required to prevent, reduce, or offset the impacts of the Proposed Development on flood risk and drainage.

Legislative and Policy Framework

- 9.5 This section of the ES discusses the context of the development with regards to the relevant International, National, Regional and Local planning policy and legislation.

The Water Framework Directive (2000)

- 9.6 The Water Environment (Water Framework Directive (WFD)) (England and Wales Regulation (**Ref 9.1**) transposes the European Union Water Framework Directive (**Ref 9.2**) into national law. It establishes a framework for a Europe-wide approach to action in the field of water policy. Its ultimate aim is to ensure all inland and near shore watercourses and water bodies (including groundwater) are of 'Good' status or better, in terms of ecology, chemical, biological and physical parameters, by the year 2015. Although this date has now passed, the legislation requiring all waterbodies to be of a 'Good' status remains with extensions to 2021 and 2027 for meeting this objective. Therefore, any activities or developments that could cause detriment to a nearby water resource, or prevent the future ability of a water resource to reach its potential status, must be mitigated so as to reduce the potential for harm and allow the aims of the Directive to be realised.

The European Floods Directive (2007)

- 9.7 The European Floods Directive (EFD) (2007/60/EC) (Commission of the European Communities 2007) (**Ref 9.2**) requires Member States to assess flood risk for all watercourses and coastlines. This required the mapping of flood extents and to take measures to reduce this flood risk.

Water Resources Act (1991)

- 9.8 The Water Resources Act (WRA) (**Ref 9.3**) relates to the control of the water environment. Aspects of the Act which are relevant to the Development include provisions concerning land drainage.

Water Industry Act (1991)

- 9.9 The Water Industry Act (WIA) (**Ref 9.4**) covers a wide-range of the activities of the privatised Water Companies that were created in 1989. The relevant provisions relate to trade effluent discharges made to sewers for which the privatised companies act as the regulatory authorities.
- 9.10 Under the Act discharge of effluent to the public sewer can only take place with the agreement or consent of the sewerage undertaker (that is, the water company). For the Development, this would be Thames Water Utilities Limited (TWUL). The water companies control the nature and composition of the effluent, the maximum daily volume permitted the maximum flow rate and the sewer into which the effluent is discharged.
- 9.11 Classifications for various water bodies are included as part of the River Basin Management Plan (RBMP) for the Thames River Basin District. The RBMP sets out a Programme of Measures (POM) which needs to be undertaken in order for each water body to maintain or reach 'Good' status by 2015 in accordance with the WFD (**Ref 9.1**). The plan also sets out the various standards that each waterbody has to meet in order to be classified as having 'good' status.

Pollution Prevention Guidelines (PPGs)

- 9.12 The Environment Agency (EA) produces Pollution Prevention Guidelines (PPGs) (**Ref 9.5**) targeted at a particular industrial sector or activity, giving advice on the law and good environmental practice. The Pollution Prevention Guidelines are 'guidance' rather than Policy, however they are widely adopted. The following guidance notes are considered relevant for the Development:
- PPG1 - General Guide to the Prevention of Pollution (EA, 2013) – a basic guidance and introduction to pollution prevention.
 - PPG2 - Above Ground Oil Storage Tanks (EA, 2011) – guidance to help prevent pollution from above ground oil storage tanks and comply with the law (excludes oil refineries and distribution depots).
 - PPG3 - Use and Design of Oil Separators in Surface Water Drainage Systems (EA, 2006) – guidance to help decide if an oil separator is required at the Site and, if so, what size and type of separator is appropriate
 - PPG5 - Works In, Near or Liable to Affect Watercourses (EA, 2007) – guidance on pollution prevention planning, how to avoid pollution of the water environment, waste management and incident response for works near, in or over water.

- PPG6 - Working at Construction and Demolition Sites (EA, 2012) – guidance on pollution prevention measures for the construction and demolition industry.
- PPG8 - Safe Storage and Disposal of Used Oils (EA, 2004b) – guidance to help prevent pollution when storing and disposing of used oils from a single engine oil change to large industrial users.
- PPG13 - Vehicle Washing and Cleaning (EA, 2007) – guidance to help prevent pollution from vehicle washing and cleaning using automatic wash systems, high pressure or steam cleaners and washing by hand.
- PPG18 - Managing fire water and major spillages (EA, 2000) – guidance to help identify equipment and techniques available to prevent damage to the water environment caused by fires and major spillages.

Building Regulations H3 Hierarchy

9.13 The Building Regulation Rainwater Drainage H3 (3) (**Ref 9.6**) stipulates that;

‘rainwater from roofs and paved area is carried away from the surface to discharge to one of the following in order of priority:

- *An adequate soak away or some other infiltration system;*
- *A watercourse, or where that is not practicable; or*
- *A sewer.’*

Flood and Water Management Act (2010)

- 9.14 The Flood and Water Management Act (FWMA) (**Ref 9.7**) proposed the establishment of SuDS (Sustainable Drainage Systems) Approving Body (the “SAB”) at county or unitary local authority levels. The role of the SAB was envisaged as implementing the recommendations of the Pitt Review (2008) in promoting the use of SuDS for future development, into the planning process.
- 9.15 Following a period of consultation, the proposed role of the SAB in the planning process has been amended, with the promotion of SuDS being incorporated into the planning process. Ministerial Written Statement HCWS161 details this change in policy.
- 9.16 The Act gives the EA a strategic overview role for flood risk and gives local authorities (known as Lead Local Flood Authorities) (LLFAs)) responsibility for preparing and putting in places strategies for managing flood risk from groundwater, surface water and ordinary watercourses in their areas. Swindon Borough Council (SBC) is the LLFA in this area.
- 9.17 The FWMA also amends Section 106 of the WIA with respect to the right of connection to a public sewer. In the future the automatic right of connection will be revoked and all new connections must be made via a Section 104 Agreement for foul sewers.

National Planning Policy Framework (Feb, 2019) & Planning Practice Guidance

- 9.18 The National Planning Policy Framework (NPPF), together with the National Planning Practice Guidance (NPPG) ‘Flood Risk and Coastal Change’ (**Refs 9.8**) provide guidance to local

planning authorities to ensure the effective implementation of the planning policy set out in the NPPF on development in areas at risk of flooding.

- 9.19 The NPPF advocates the use of the risk-based sequential test (which recognises that risk is a function of probability and consequence), in which new development is preferentially steered towards the areas at lowest probability of flooding. These areas are identified by Flood Zones, which are defined as follows:
- Flood Zone 1: Low probability of flooding - less than 0.1% (1 in 1,000) annual probability of river or sea flooding in any year;
 - Flood Zone 2: Medium probability of flooding - between 1% and 0.1% (1 in 100 and 1 in 1000) annual probability of river flooding and between 0.5% and 0.1% (1 in 200 and 1 in 1000) annual probability of sea flooding in any year;
 - Flood Zone 3a: High probability - 1% (1 in 100) or greater annual probability of river flooding or 0.5% (1 in 200) or greater annual probability of sea flooding in any year;
 - Flood Zone 3b: The functional floodplain - where water has to flow or be stored in times of flood, including flood conveyance routes and areas designed to flood as part of a flood defence scheme.
- 9.20 It should be noted that Flood Zones 1, 2 and 3a ignore the presence of flood defences.
- 9.21 The Environment Agency (EA) released updated Climate Change Allowance in February 2016 'Flood Risk Assessments: Climate Change Allowances.' The peak river flow (fluvial) climate change allowances within the new guidance replace the 20% single allowance previously applied across England and Wales. Instead a range of allowances are provided, which take account of the findings from a series of different climate change models. Through a statistical analysis of the climate change impacts from these different models, estimates across a range of fluvial climate change impacts were provided; provided in a series of climate change 'bands' for different geographic river basins.
- 9.22 As well as varying geographically (the river basin district of the site) and for the lifetime of the development or 'epoch' of climate change (2015-2039, 2040-2069 and 2070-2115); the EA guidance for selecting the appropriate climate change band also depends on the current Flood Zone of the site (Flood zones are independent of climate change) and the flood risk vulnerability classification of any proposed development (e.g. more vulnerable use, less vulnerable use etc).
- 9.23 The updated climate change allowances have been applied to the baseline hydraulic model and the findings are reported in the FRA (**Appendix 9.1**).
- 9.24 Updated climate projections were presented as part of UKCP18 published on 26th November 2018. The EA have prepared a briefing note that confirms that the 2016 guidance is still the best national representation of how climate change is likely to affect flood risk for peak river flow and peak rainfall intensity. Further research is due to be published in 2019 that may result in changes to these allowances, however, at this stage it is considered reasonable to continue to use the 2016 guidance for planning decision making.

- 9.25 The EA is a statutory planning consultee on development and flood risk matters. Should the EA raise objections and the Local Planning Authority (LPA) still wish to approve a planning application for a major development (10 or more residential dwellings or 1,000 m² of non-residential floor space) the LPA must notify the Secretary of State.

Swindon Borough Local Plan 2026 (adopted March 2015)

- 9.26 The Site lies with the proposed Swindon New Eastern Villages (NEV) strategic allocation (NC3) in the Swindon Borough Local Plan 2026 (Local Plan) (**Ref 9.9**). Local Policies relevant to the development and water resources are summaries as follows:

- 'Policy EN6: Flood Risk' of the Local Plan details the specific policy regarding flood risk and the requirements for a site-specific Flood Risk Assessment in-line with national policy (the NPPF and NPPG).
- 'Policy IN2: Water Supply and Wastewater', of the Draft Local Plan details specific policy regarding water resource infrastructure. The policy identifies possible methods (new facilities, expansion of existing facilities etc.) for the provision of capacity to serve future development. Part d of the policy indicates that;

'Where necessary, the council will seek improvement to water and/or sewerage/ wastewater treatment infrastructure related and appropriate to the development so that the improvements are completed prior to occupation of the development.'

- Policy NC3, promotes the New Eastern Villages for 6,000 residential units, 40 ha of employment land, retail, community and other complementary uses, with associated infrastructure, open space and landscaping.

- 9.27 The policy requires the development to ensure;

'the risk of flooding from the development is minimised, both within the development and at existing neighbouring communities in accordance with policy EN6;' and includes provision for 'a sewage treatment works if required.'

New Eastern Villages Planning Obligations Supplementary Planning Document (October 2016)

- 9.28 The Council has also prepared and adopted a Supplementary Planning Document (SPD) for the New Eastern Villages (October 2016) (**Ref 9.10**).

- 9.29 The SPD identifies the infrastructure package required to serve the NEV, including utility provision, onsite flood mitigation works, and SuDS.

Sustainable Drainage Systems (SuDS) Vision for New Eastern Villages (NEV) Supplementary Planning Document (February 2017)

- 9.30 This SPD (**Ref 9.11**) was developed to support masterplanning within the NEV development area, which includes the Lotmead Farm Villages site. The guide sets out objectives and principles for drainage infrastructure within the NEV development. It also provides information on local considerations, interdependencies, opportunities and constraints.

Strategic Flood Risk Assessment SFRA (2008)

- 9.31 A Level 1 Strategic Flood Risk Assessment (SFRA) (**Ref 9.12**) was undertaken for the Council in 2008. The SFRA considered the New Eastern Villages site as a potential development option

as the Eastern Development Area in its assessment, identifying that improved data on the River Cole was required. The SFRA also sets out recommendations for any development within the borough with regard to flood risk.

Swindon Water Cycle Study – Phase 1 (2007)

9.32 The Swindon Water Cycle Study (WCS) (Ref 9.13) forms part of the Local Development Framework (LDF) with the SFRA. The study investigates the effects of future development on water resources, water quality and flooding. The WCS includes the Eastern Villages development as part of the future development used in the assessment and included consultants for the East Swindon Development group among the key stakeholders.

9.33 The WCS concludes that:

- *‘There is sufficient strategic water cycle capacity in Swindon to accommodate all of the development scenarios considered, however, this is subject to the recommendations outlined below.*
- *Development in Swindon can be accommodated without causing a failure of statutory environmental water quality objectives, subject to infrastructure being funded and delivered in the right place and at the right time.*
- *Development in Swindon up to 2025/26 need not be constrained by the uncertainties over the Upper Thames Reservoir, although the timely delivery of the reservoir will alleviate some water supply constraints.*
- *There is sufficient area within the study boundary that can be developed with or without mitigation without increasing flood risk, subject to confirmation by a strategic flood risk assessment (SFRA).*
- *The use of greater demand management techniques may be used to offset the requirement for some water cycle infrastructure, or delay the time by which it is needed.*
- *The exact location and phasing of development will need to be determined as part of the Swindon Borough local development framework (LDF) process to ensure that infrastructure is provided in the right place and at the right time.’*

9.34 Recommendations for a Phase 2 study included the re-evaluation of the water resources assessment in light of new data in Thames Water Resource Plan 06, when it is agreed with the Environment Agency and OFWAT.

Swindon Borough Council Water Cycle Study - Phase 2 (January, 2014)

9.35 The Swindon Borough Council Water Cycle Study - Phase 2 (Phase 2 WCS) (Ref 9.14) updates the WCS (Ref 9.13) to account for new policy and development forecasts. In particular the updated requirements for achieving the pollution targets set in the WFD (Ref 9.1).

9.36 The Phase 2 WCS indicates that the provision of additional Wastewater Treatment Works (WwTW), as recommended in the WCS to support future development, could prohibit the future aspirations to achieve ecological ‘Good’ status under the WFD for receiving watercourses. The Phase 2 WCS concludes that proposed options to support the NEV in the phase 1 WCS are not viable (i.e. improving existing WwTW or building a new WwTW).

- 9.37 With regard to the 2 options in the WCS for increasing wastewater treatment provision, the Phase 2 WCS states that;
- *‘The ‘no deterioration’ requirement of the Water Framework Directive makes a new WwTW discharge to a waterbody that currently has no WwTW discharge unviable;*
 - *The amended scale and profile of development make these options unviable.’*
- 9.38 The recommendations of the Phase 2 WCS with respect to future development in Swindon are;
- ‘With respect to Swindon Borough Council and Swindon WwTW, assuming that infrastructure can be provided to maintain the current effluent quality (discussed in section 4), then development can proceed without causing any deterioration to Water Framework Directive classification status whilst this process is underway.’
- 9.39 On this basis, the NEV developments can proceed assuming that any increases of treated effluent discharge would not cause deterioration in the existing water quality of the receiving watercourses; and that current WwTW will treat to a standard to achieve the ‘no deterioration’ criteria currently in place in the interim.
- 9.40 The provision of any additional wastewater capacity to support development would be assessed by Thames Water. As the NEV development is a regionally strategic development (south-west) Local policy indicates that infrastructure will be provided in a timely fashion to support the development.
- 9.41 Wastewater treatment for other water quality indicators is described as being sufficient to achieve the ‘no deterioration’ criteria in the WFD, and development to be allowable on that basis. The improvements necessary to achieve the WFD targets should be achievable through the future upgrades to infrastructure to improve current treated effluent discharge quality.

Swindon Local Flood Risk Management Strategy (July 2014)

- 9.42 The Swindon Local Flood Risk Management Strategy (LFRMS (Ref 9.15);
- ‘is a tool to help understand and manage flood risk across Swindon. Its primary focus is on local flooding arising from surface water, streams and ditches. The Strategy will assist the Council and their partners to better understand the risk of local flooding and how various agencies can work together to manage that risk.’
- 9.43 Policy EN6, (including the amendment as proposed in Appendix 1) provides that the LFRMS be considered to address flood risk at local level, including surface water management.

Consultation

- 9.44 The views of the EA were sought on flood risk. The EA confirmed they held no objection to the original proposals in letters dated August 2015 (Ref WA/2015/120566/01-L01 and WA/2015/120562/01-L01) and October 2015 (Ref WA/2015/120566/02-L01 and WA/2015/120562/02-L02). There have been no significant changes to the flood mitigation scheme proposed within the 2015 applications and the EA confirmed in October 2018 that the underlying modelling data is unchanged.

- 9.45 The views of the LLFA have been sought on flood risk, the safeguarded canal route, surface water management, and SuDS.
- 9.46 A meeting between the LLFA and PBA was held on 23rd October. **Table 9.1** summarises the consultee comments.

Table 9.1 Summary of Consultee Comments Received to Date Relating to Water Resources

Ref.	Consultee	Date	Summary of Main Points made by Consultee	Response
1	Swindon Borough Council	23 rd October 2018	Updating the hydraulic model	PBA will not be updating the hydraulic model. The EA River Cole EDA Model, 2011 with updated 2016 climate change runs is the most up to date model. The LLFA confirmed the EA should confirm the hydraulic model and flood mitigation scheme.
2	Swindon Borough Council	23 rd October 2018	Public Open Space (POS) and Allotments	PBA highlighted that these were located outside the floodplain and that they could be located inside the floodplain as they are considered Less Vulnerable or Water Compatible development. SBC confirmed that the POS is acceptable in the floodplain but the landscaping officer should be consulted in regards to the allotments. This firstly will be presented to the client to see if they would like to pursue the option.
3	Swindon Borough Council	23 rd October 2018	Canal corridor	PBA indicated that the minimum width for the canal corridor was set at 50m. SBC indicated that they knew the minimum width was 30m therefore 50m was sufficient. SBC stated that development should not prejudice future delivery of the canal. Discussion as to whether SuDS would be acceptable in the canal corridor, which may later be subsumed by the canal. Liaison with Wilts and Berks Canal Trust is needed to see if this is a possible option.
4	Swindon Borough Council	23 rd October 2018	SuDS features	The LLFA indicated their preference for linear SuDS features using the existing drainage ditches and features within the site. PBA indicated that is likely that strategic attenuation basins are likely to still be needed within each sub-catchment as swales provide limited value due to their restricted depth and width. SBC stated that using sports pitches to provide attenuation would need approval from their landscaping officer. There is the possibility of long term management issues with the land being owned and maintained by a third party, beyond the control of SBC. PBA suggested geo-circular cells to be used in the

				<p>school, sports pitches and local centre areas. These were not considered suitable SuDS by the LLFA.</p> <p>The benefits of standalone SuDS features at the schools were identified by the LLFA.</p>
5	Swindon Borough Council	23 rd October 2018	Draft Master Plan Comments	<p>SBC requested that existing and proposed drainage features were shown more predominantly on the Masterplan.</p> <p>The LLFA indicated that realignment of the central ditch would require the LLFA's consent.</p> <p>The Western attenuation basin is to be checked by the LLFA by the heritage officer given its proximity to the SAM.</p>
6	Swindon Borough Council	23 rd October 2018	Design Parameters	<p>The LLFA confirmed the following design principles were acceptable for the Surface Water Management Plan: it is considered preferential to assess the site as smaller sub-catchments.</p> <p>Swailes can be 1m deep in landscaped areas and 0.6m deep adjacent to highways with a maximum water depth of 0.45m.</p> <p>Surface water run-off should be limited to the greenfield QBAR rate up to and including the 1 in 100 + 40% allowance for climate change. ~4.5l/s is considered acceptable.</p> <p>All attenuation features will need to be designed to accommodate surface water run-off up to and including the 1 in 100year + 40% allowance for climate change.</p> <p>The LLFA indicated that it would be acceptable to show a fixed volume of surface water attenuation for each sub-catchment within the strategic feature and state that any residual storage volume would need to be provided by on-plot source control measures at the detailed design stage. PBA indicated that there is a possible future risk if the residual volume within the development plots impacts the number and density of housing that could be delivered and compromises the number of dwellings originally proposed through the outline application.</p>

Study Area

- 9.47 The Study Area for water resources is the Application Site and the land surrounding it. The development must not exceed flood risk to the surrounding land, cause a deterioration in the water quality or compromise the ability of the waterbodies to achieve a 'Good' WFD status.

Baseline Conditions

Existing Conditions

- 9.48 The baseline conditions have been established from;

- PBA Flood Risk Assessment (2018) (**Appendix 9.1**),
- The Environment Agency online maps.

9.49 **Figure 3.1** of the FRA shows the existing EA Flood Zones on site.

Receptors

9.50 The main receptors affected by potential changes to water resources have been identified as follows:

- Secondary A Aquifers of the Superficial deposits and the bedrock underlying the site.
- The River Cole.
- The Other Watercourses (Dorcan Stream, Liden Brook, Lenta Brook and the existing Land drains on the Site.) Refer to Figure 2.2 in **Appendix 9.1** for a location plan of these watercourse.
- Future Occupants.
- Offsite Land.
- Existing Commercial and Residential Development (the converted farm buildings as commercial offices and Lotmead Cottages, which are assumed to be retained within the Application Site).
- The Occupants of the Existing Commercial and Residential Development.

Application Site

9.51 The Site is largely open farmland, albeit it also comprises – inter alia –:

- Lotmead Farmstead, including dairy farm buildings;
- Lotmead ‘Pick Your Own’, which comprises various fruit and vegetables, a farm shop/café with outside seating area, animal and bird sanctuary/farm and children play area;
- Lotmead Business Village – renovated farm buildings offering business accommodation, and Lotmead cottages.

9.52 The Site also includes a Scheduled Ancient Monument in its south west corner along Wanborough Road, which comprises a former Roman settlement, now largely below ground. The Site is bordered to the north by open countryside and the River Cole, to the south and east by open countryside and to the west by Wanborough Road, from which both the main pedestrian and vehicular access are located.

9.53 In terms of topography, the Site is predominantly flat open landscape. The Site includes a network of watercourses including the River Cole, Dorcan Stream and a number of ponds. The Site falls within all three Flood Zones, as indicated on the Environment Agency’s flood maps.

- 9.54 The EA Flood Zone map shows the Development site to contain Flood Zones 1, 2 and 3 inside the site. The existing use of the site is agricultural and is mostly considered undeveloped with the existing cattle shed/ hay barns/ converted offices on-site being a less vulnerable use in the NPPF.

Fluvial Flooding

- 9.55 As part of the FRA, hydraulic modelling of the River Cole was obtained from the Environment Agency. This model was reviewed and refined with topographic survey and improved hydrology (corrections to the 1 in 1000 year hydrology) to establish the baseline Fluvial Flooding conditions.
- 9.56 The refinement of the model also looked at the future climate change scenario for the 1 in 100 year event and considers the updated EA guidance for Flood Risk Assessments relating to climate change allowances. The results of the modelling confirm the proposals are safe with regards to flood risk, do not increase flood risk to third parties and comply with all national and local policy.

Surface Water Flooding

- 9.57 The EA Surface Water flood mapping for the area shows the Site is at risk from surface water flooding. The flood risk on-site is classified between 'High' and 'Medium'. The surface water flooding follows the flow paths for fluvial flooding from the Liden Brook, and located over the existing fluvial Flood Zones. There are narrow corridors of higher risk following the Dorcan Stream and the ditch which drains from the south-east into it. Consequently the flood risk from surface water is similar to the fluvial flood risk on-site but is considered to be less significant than the fluvial flood risk. There may however, be local instances of ponding in local depressions etc. where surface water flood risk exceeds the fluvial flood risk.
- 9.58 Surface water is potentially more significant as a pollutant vector, providing a means for mobilising pollutants into the surrounding watercourses. The current Site is agricultural so there is a potential for solid particulates (soil particles/ silt/ animal waste) in the existing surface water run off to form part of the baseline conditions for surface water.

Water Quality

- 9.59 The reach of the River Cole from upstream of the Site, through the Site to the confluence of the Liden Brook is classified as having a 'Good Potential Ecological Status' as defined by the EA. The reach of the River Cole and Liden Brook downstream of the Site is described as being of a 'Moderate Potential Ecological Status'.
- 9.60 The River Cole, Dorcan Stream and Liden Brook are shown in the EA Water Framework Directive - 2009 River Basin Management Plans - Rivers online map, as not requiring assessment in terms of ecology. However, as these watercourses drain to the River Cole they will be included in the Water Quality assessment as the Water Quality in these watercourses will affect the River Cole, which is Water Quality -sensitive.
- 9.61 The River Cole, Dorcan Stream and Liden Brook are indicated as not requiring assessment in the EA Water Framework Directive - 2009 River Basin Management Plans - Rivers online map, in terms of chemical quality. Consequently an assessment of the Chemical Water Quality is not considered necessary in this ES chapter.

Water Supply and Sewer Capacity

- 9.62 The Water Cycle Study for Swindon indicated potential issues in the Water Supply and Sewer Capacity for the NEV development and increases in Sewer Capacity could have an adverse effect to the Treated Effluent Discharge to the River Cole. The WCS (**Ref 9.13**) recommended that a more detailed assessment be carried out for the Phase 2 Water Cycle Study (**Ref 9.14**).
- 9.63 The Phase 2 Water Cycle Study identified that the current Water Supply Provision will have capacity for the NEV without needing additional supply infrastructure. However, Thames Water has identified that the existing potable water network will need to be upgraded to provide a new trunk main to the NEV development.
- 9.64 The Phase 2 WCS (**Ref 9.14**) did identify a shortfall in wastewater treatment provision. The SPD (**Ref 9.10**) and Local Plan (**Ref 9.9**) assume that additional infrastructure would be provided by Thames Water to support the NEV development. Thames Water has confirmed that the existing foul water network does not have sufficient capacity and will be providing a new terminal pumping station for the NEV development, in which Lotmead Farm Villages will discharge to.
- 9.65 Further details regarding Utility capacity, including water supply and sewer capacity, are provided in the Utility Supply and Foul Water Sewerage Technical Note (**Appendix 9.2**), which should be read in conjunction with this document.
- 9.66 Based on the new supply enquiries undertaken and detailed in the Technical Note, it is considered that appropriate infrastructure is, or will be, in place to serve the proposed development.

Scope and Methodology

- 9.67 This section of ES chapter discusses the methodology used to determine the Environmental impact on;
- Fluvial Flood Risk,
 - Surface Water Flood Risk,
 - Water Quality,
 - Water Supply and Sewer Capacity.

Scoping

- 9.68 The scope of assessment has been determined through a scoping exercise submitted to the Council. Consultation has been undertaken with statutory regulators (including EA, TWUL, and the Council as the local planning authority. Details of this is provided in **Section 9.45**, 'Consultation'.

Determining the Sensitivity to Potential Change

- 9.69 Determination of the sensitivity (or value) of the receptors has been undertaken based upon defining the quality of condition of each receptor and determining their sensitivity to potential change.
- 9.70 The assessment of sensitivity (or value) of the receptors has been based on the criteria in **Table 9.2**.

Table 9.2: Sensitivity/value of receptor

Sensitivity/value of a Receptor	Description	Example
Very High	Attribute with a high quality and rarity, regional or national scale and limited potential for substitution.	<p>Examples include;</p> <p>Receiving watercourse classified as High Ecological status / potential under WFD</p> <p>Site protected under EU or UK wildlife legislation (SAC, SPA, SSSI)</p> <p>Site located within a groundwater Source Protection Zone (SPZ) inner protection zone (Zone 1), defined by a 50 day travel time from any point below the water table to the source</p> <p>NPPF Flood Risk Vulnerability Classification “Essential Infrastructure”</p>
High	<p>Attribute with a high quality and rarity, local scale and limited potential for substitution.</p> <p>Attribute with a medium quality and rarity, regional or national scale and limited potential for substitution.</p>	<p>Examples include;</p> <p>EA current river ecological and chemical qualities defined as Good</p> <p>EA current groundwater quantitative and chemical qualities defined as Good</p> <p>Human receptors (construction workers and future residents)</p> <p>Receiving watercourse classified as Good Ecological status / potential under WFD</p> <p>Species protected under EU or UK wildlife legislation</p> <p>Site located within a groundwater Source Protection Zone (SPZ) outer protection zone (Zone 1), defined by a 400 day travel time from any point below the water table to the source</p> <p>NPPF Flood Risk Vulnerability Classification “Highly Vulnerable”</p> <p>New water supply source required</p> <p>New waste water treatment plant required</p>
Medium	<p>Attribute with a medium quality and rarity, local scale and limited potential for substitution.</p> <p>Attribute with a low quality and rarity, regional or national scale and limited potential for substitution.</p>	<p>Examples include;</p> <p>Floodplain providing a moderate volume of storage</p> <p>Receiving watercourse classified as Moderate Ecological status/potential under WFD</p> <p>NPPF Flood Risk Vulnerability Classification “More Vulnerable”</p> <p>A requirement for substantial works to existing water supply infrastructure</p> <p>A requirement for substantial works to existing waste water treatment plant required</p>

Sensitivity/value of a Receptor	Description	Example
Low	Attribute with a low quality and rarity, local scale and limited potential for substitution	<p>Examples include;</p> <p>EA current river ecological quality defined as Poor / Bad and chemical quality defined as Fail</p> <p>Floodplain with limited existing development.</p> <p>Receiving watercourse classified as Poor Ecological status/ potential under WFD</p> <p>NPPF Flood Risk Vulnerability Classification “Less Vulnerable”</p> <p>A requirement for limited works to existing water supply infrastructure</p> <p>A requirement for limited works to existing waste water treatment plant</p>

- 9.71 Determination of the magnitude of change to the receptors as a result of the development has been undertaken based upon the criteria in **Table 9.3**.

Table 9.3: Magnitude of impact

Magnitude of Impact	Description	Example
High	Results in a loss of attribute and/or quality and integrity of the attribute	<p>Examples include;</p> <p>Change in ecological and / or chemical qualities of the surface water</p> <p>Loss of flood storage/increased flood risk</p> <p>Large change in:</p> <p>water quality of receiving watercourse</p> <p>NPPF Flood Risk Vulnerability Classification</p> <p>surface water flood risk</p> <p>fluvial flood risk</p> <p>water supply volume</p> <p>foul drainage volume</p>
Medium	Results in impact on integrity of attribute, or loss of part of attribute	<p>Examples include;</p> <p>Contribution of a significant proportion of the effluent in the receiving river, but insufficient to change its qualities</p> <p>Moderate change in:</p> <p>water quality of receiving watercourse</p> <p>NPPF Flood Risk Vulnerability Classification</p> <p>surface water flood risk</p> <p>fluvial flood risk</p>

Magnitude of Impact	Description	Example
		water supply volume foul drainage volume
Low	Results in some measurable change in attribute's quality or vulnerability	Examples include; Measurable changes in attribute, but of limited size and/or proportion Small change in: water quality of receiving watercourse NPPF Flood Risk Vulnerability Classification surface water flood risk fluvial flood risk water supply volume foul drainage volume
Negligible	No discernible change in environmental conditions.	Examples include; Discharges to watercourse but no significant loss in quality or biodiversity no significant impact on the economic value of the feature No increase in flood risk No change or barely perceptible change in: water quality of receiving watercourse NPPF Flood Risk Vulnerability Classification surface water flood risk fluvial flood risk water supply volume foul drainage volume

- 9.72 The significance of a potential effect upon a sensitive receptor is derived from both the level of sensitivity of that receptor and the magnitude of the change/impact arising from the Proposed Development. The significance of a potential effect is then determined using the matrix presented in **Table 9.4**. The significance of a potential effect can be either adverse or beneficial. The significance of a potential effect should also be qualified based on the likelihood of an impact occurring (using a scale of certain, likely or unlikely) and the confidence in the accuracy of the assessment. The result of this assessment is presented as "residual effects," which take into account the likely effects on a sensitive receptor following proposed mitigation and the likelihood of that effect occurring.

Table 9.4: Significance of Potential Effects Matrix

Sensitivity / value of a Receptor	Magnitude of Impact			
	High	Medium	Low	Negligible
Very High	Major	Major	Moderate	Slight
High	Major	Moderate	Slight	Negligible
Medium	Moderate	Slight	Negligible	Negligible
Low	Slight	Negligible	Negligible	Negligible

- 9.73 Temporary effects are considered to occur in the construction phase, and permanent effects in the occupational phase (albeit that the impact may first occur during construction i.e. change of surface material).
- 9.74 In all cases, where the level of overall effects are predicted to be moderate or substantial (shaded yellow), this will result in a significant effect. All other effects will be not significant.
- 9.75 The residual effects of the Development upon sensitive receptors, following the implementation of any proposed mitigation measures, have been assessed based on the standardised significance criteria. These have been based on a qualitative appraisal of the magnitude of the impact and the sensitivity of the affected receptor in relation to the assessed element (Flood risk apart from groundwater, water quality and, water supply and sewage capacity. The significance criteria are set out in Table 9.5).

Table 9.5: Water Resources Significance Criteria

Significance Level	Criteria	Typical Examples
Substantial Beneficial	Key improvements at district scale	Fundamental changes to the regional hydrological regime Fundamental reduction in volume and/or peak discharge of surface water runoff from the Site Fundamental improvement in ground or surface water quality Fundamental changes to flow conveyance and flood plain storage
Moderate Beneficial	Improvements at local scale	Material changes to the local hydrological regime; Material reduction in volume and/or peak discharge of surface water runoff from the Site Material improvement in ground or surface water quality Material changes to flow conveyance and flood plain storage
Slight Beneficial	Limited improvements	Some noticeable changes to the local hydrological regime;

Significance Level	Criteria	Typical Examples
	at local scale	<p>Some noticeable reduction in volume and/or peak discharge of surface water runoff from the Site</p> <p>Some noticeable improvement in ground or surface water quality</p> <p>Some noticeable changes to flow conveyance and flood plain storage</p>
Negligible	No effect	<p>No noticeable changes to the local hydrological regime;</p> <p>No noticeable change in volume and/or peak discharge of surface water runoff from the Site</p> <p>No noticeable changes in ground or surface water quality</p> <p>No noticeable changes to flow conveyance and flood plain storage</p>
Slight Adverse	Limited detrimental effects at local scale	<p>Some noticeable changes to the local hydrological regime;</p> <p>Some noticeable increase in volume and/or peak discharge of surface water runoff from the Site</p> <p>Some noticeable deterioration in ground or surface water quality</p> <p>Some noticeable changes to flow conveyance and flood plain storage</p>
Moderate Adverse	Detrimental effects at local scale	<p>Material changes to the local hydrological regime;</p> <p>Material increase in volume and/or peak discharge of surface water runoff from the Site</p> <p>Material deterioration in ground or surface water quality</p> <p>Material changes to flow conveyance and flood plain storage</p>
Substantial Adverse	Important detrimental effects at district scale which may become key factors in the decision-making process	<p>Fundamental changes to the regional hydrological regime</p> <p>Pollution of potable sources of water abstraction</p> <p>Fundamental increase in volume and/or peak discharge of surface water runoff from the Site</p> <p>Fundamental deterioration in ground or surface water quality</p> <p>Fundamental changes to flow conveyance and flood plain storage</p>

- 9.76 The magnitude of flood risk and severity of the effect upon people and property for the 'baseline' and 'with development' scenarios has been considered as part of the accompanying FRA (**Appendix 9.1, Section 6.4**)

Mitigation

- 9.77 Mitigation measures have been recommended where potential impacts are identified.
- 9.78 A Floodplain Restoration Scheme, as set out in the FRA (Appendix 9.1, Section 6.3) is proposed. This would be constructed in advance of any development within the current Flood Zones and would be classed as Primary Mitigation.
- 9.79 Additionally, there are further mitigation measures recommended; secondary mitigation measures such as sustainable drainage components will be incorporated within the surface water drainage strategy and tertiary mitigation measures such as a Construction Environmental Management Plan (CEMP) would be secured through the environmental permit applications.

Limitations and Assumptions

- 9.80 This assessment is based on the FRA, the drainage strategy and the hydraulic modelling. The limitations stated in these documents also apply to this document.
- 9.81 This assessment also relies upon the EA online maps, and the limitations and conditions stated for the use of these maps also apply to their use in this document.
- 9.82 It is assumed that any additional supply or capacity needed for the development will be provided by Thames Water in a timely fashion, to support development.

Environmental Assessment: Construction Phase

- 9.83 This section identifies the likely significant effects resulting from the Construction and Operation of the Proposed Development, having had regard to the sensitivity of a particular receptor and the magnitude of impact that will result from the development.

Fluvial Flooding

River Cole (Medium sensitivity)

- 9.84 There are no developments along the River Cole which would be affected during the construction phase of the Development. The only potential impact is to the A420 at Acorn Bridge downstream of the Site. Consequently the River Cole is considered a **Medium** sensitivity receptor for fluvial flooding.
- 9.85 The surface cover on the Site will change during the construction work as the grass cover is removed. This will increase the surface water runoff rate from the Site. As surface water runoff drains to the River Cole this will increase the fluvial flood risk in the River Cole. This increase in surface water runoff will increase the risk to Acorn Bridge.
- 9.86 The Site is adjacent to the River Cole so the drainage path for runoff into the River Cole could be short, but this impact will only occur during the construction of temporary works/SuDS. The actual change in surface cover during the construction of the (temporary works) Development will be relatively small compared to the catchment of the River Cole so the magnitude of effect is expected to be **Negligible/ Low Adverse**.

- 9.87 The Fluvial Flooding impact during the construction of the temporary works or SuDS is considered to be of a **Negligible Adverse** effect as the area of changed surface cover is minor.

Other Watercourses (Medium sensitivity)

- 9.88 There are no developments in the floodplain of the Other Watercourses (all in Flood Zone 1) which would be affected during the construction of the Development. As the Other Watercourses drain to the River Cole there is a potential impact to the A420 at Acorn Bridge downstream of the Site, consequently the Other Watercourses are considered a **Medium** sensitivity Receptor for fluvial flooding.
- 9.89 The surface cover on the Site will change during the construction work as the grass cover is removed. This will temporarily increase the surface water runoff rate from the Site. As surface water runoff from the Other Watercourses on-site drain to the River Cole, this will increase the fluvial flooding impact to the River Cole. This increase in surface water runoff will increase the risk to Acorn Bridge.
- 9.90 This impact will only occur during the construction of temporary works/SuDS, and the actual change in surface cover during the construction of the Development will be relatively small compared to the catchment of the River Cole so the impact is expected to be **Negligible/ Low Adverse**.
- 9.91 The significance of the Fluvial Flooding impact, due to change of surface cover in the construction of the Site is considered **Negligible/low Adverse**. Once temporary works/SuDS are in place to control surface water runoff, the significance of the effect is considered to be **Negligible**.

Occupants on-site (High sensitivity)

- 9.92 Workers on the Site are considered a **High** sensitivity receptor. The only work in Flood Zones 2 and 3 for the Site will be for the Floodplain Restoration scheme and the crossings of the River Cole, once the floodplain restoration scheme is constructed the area of for the green infrastructure and SuDS will become Flood Zone 1. This is considered a **Medium/Low** impact. Consequently, the effects of fluvial flooding upon the workers operating on the Development Site during the construction phase is considered to be of **Moderate/Slight Adverse** significance.

Surface Water Flooding

River Cole (Medium sensitivity)

- 9.93 There are no developments along the River Cole which would be affected during the construction phase of the Development. There is a potential Surface Water Flooding impact to the A420 at Acorn Bridge downstream of the site. Consequently the River Cole is considered to be a **Medium** sensitivity receptor.
- 9.94 The surface cover on the Site will change during the construction work as the grass cover is removed. This will increase the surface water runoff rate from the Site. As surface water runoff from the site drains to the River Cole, this will increase the surface water flooding to the River Cole.
- 9.95 This impact upon the River Cole will only occur during the construction of temporary works/SuDS. The actual change in surface cover during the construction of the Development

will be relatively small compared to the catchment of the River Cole so the impact is expected to be **Negligible/ Low Adverse**.

- 9.96 The impact during the construction of the temporary work or SuDS is considered to be of a **Negligible/Low Adverse**, as the area of changed surface cover is minor. Consequently the significance of the Surface Water Flooding impact upon the River Cole, due to change of surface cover during the construction of the Site is considered to have a **Negligible Adverse** effect.

Other Watercourses (Medium sensitivity)

- 9.97 There are no developments in the Surface Water Flood route in the EA Flooding from Surface Water online maps, which would be affected during the construction of the Development. As Surface Water Flooding along the Other Watercourses drains to the River Cole, the Surface Water Flooding impact is to the A420 at Acorn Bridge downstream of the site. Consequently, the Other Watercourses are considered a **Medium** sensitivity Receptor for surface water flooding.
- 9.98 The surface cover on the Site will change during the construction work as the grass cover is removed. This will increase the surface water runoff rate from the Site. This increase in surface water runoff will increase the risk to Acorn Bridge.
- 9.99 This impact will only occur during the construction of temporary works/SuDS, and the actual change in surface cover during the construction of the Development will be relatively small compared to the catchment of the River Cole so the Surface Water Flooding impact is expected to be **Negligible/ Low Adverse**.
- 9.100 The significance of the Surface Water Flooding effects, due to change of surface cover during the construction of Development is considered **Negligible Adverse**. Once temporary works/SuDS are in place to control surface water runoff, the effect is considered to be **Negligible**.

Occupants on site (High sensitivity)

- 9.101 Workers on site are considered a **High** sensitivity receptor. The only work in Flood Zones 2 and 3 for the Site will be for the Floodplain Restoration scheme and the crossings of the River Cole. The construction of the Floodplain restoration scheme will remove the surface water flow routes for the SuDS and green infrastructure corridors. This increase in surface water runoff is considered a **Medium/Low** impact. Consequently, the Surface Water Flooding effects during the construction of the Development to the workers on-site are considered to be of **Moderate/Slight Adverse** significance.

Water Quality

River Cole (High sensitivity)

- 9.102 The River Cole is located in a surface water Safeguard Zone in the EA Drinking Water Safeguard Zones online map. The River Cole past the site is also designated as 'good potential status in the EA Water Framework Directive 2009 - River Basin Management Plans online map. The EA Catchment Data Explorer classified the River Cole as 'Poor' status in 2016. Consequently the River Cole is a **High** sensitivity receptor for Water Quality.
- 9.103 The construction work will increase the storage of potential contaminant materials on site which could potentially contaminate the surrounding watercourses through accidental

spillage/leakage. The movement of construction vehicles will also mobilise soil particulates which could be mobilised by surface water flows into the surrounding Watercourses. The potential Water Quality impact during the construction of the Development to the River Cole is considered to be **High/Medium adverse**.

- 9.104 Consequently the effect on Water Quality during construction of the Development to the River Cole is considered to be of **Major/Moderate Adverse** significance.

Other Watercourses (High sensitivity)

- 9.105 The other watercourses on-site are located in a surface water Safeguard Zone in the EA Drinking Water Safeguard Zones online map. The Other Watercourses on-site drain to the River Cole which is a High sensitivity receptor. Consequently the Other Watercourses are considered to be a **High** sensitivity receptor.
- 9.106 The construction work will increase the storage of potential contaminant materials on site which could potentially contaminate surrounding watercourses through accidental spillage/leakage. The movement of construction vehicles will also mobilise soil particulates which could be mobilised by surface water flows into the surrounding Watercourses. The potential Water Quality impact during the construction of the Development to the Other Watercourses is considered to be **High/Medium Adverse**.
- 9.107 Consequently the effects on Water Quality during the construction of the Development to in the Other Watercourses is considered to be **Substantial/Moderate Adverse** significance.

Water Supply and Sewer Capacity

- 9.108 The construction of the Development may make use of any new wastewater treatment infrastructure to be constructed on site in earlier phases of the NEV development. The WCS (**Ref 9.11**) and Phase 2 WCS (**Ref 9.12**) indicate that there may be capacity issues for foul sewerage, but the Local Plan (**Ref 9.9**) and SPD (**Ref 9.10**) indicate that potential capacity issues should be addressed by Thames Water (through additional provision) in a 'timely' fashion.
- 9.109 The WCS and Phase 2 WCS indicate that sufficient water supply is available to development to 2026; it is thought that the construction works would not represent an increase in demand beyond the assessments of the WCS documents.
- 9.110 The resolution of this issue in the SPD references the Local Plan (Policy IN2), stating;
- 'Future wastewater treatment and improvements in related river quality will be addressed through the timely expansion of the Rodbourne Sewage Treatment Works and / or an additional Sewage Treatment Works to the east of Swindon to serve the New Eastern Villages developments, if proven to be the most sustainable option, particularly to ensure delivery of the housing trajectory.'
- 9.111 The Phase 2 WCS discounts these options but recommends that;
- 'With respect to Swindon Borough Council and Swindon WwTW, assuming that infrastructure can be provided to maintain the current effluent quality (discussed in section 4), then development can proceed without causing any deterioration to Water Framework Directive classification status whilst this process is underway.'

- 9.112 On the understanding that additional sewer capacity will not contravene the WFD (**Ref 9.1**) requirements to the River Cole additional Sewer capacity can be provided. The Local Plan and SPD consider that this provision is the responsibility of Thames Water. Paragraph 4.235 of the Local Plan states that:

‘Thames Water has plans in place to provide the necessary sewerage infrastructure to increase capacity in line with proposed new developments, and to fulfil requirements identified by Ofwat. However, sewerage plans will not be finalised until the details of the proposal are submitted for approval.’

- 9.113 The provision of Thames Water infrastructure is assumed to be provided in a timely manner in the Local Plan and SPD.
- 9.114 Consequently, in the event that a new wastewater treatment works is necessary to support the Development, the construction of the treatment works would be separate to the Development and should not be included in the impact of these Developments.
- 9.115 On the basis that the Phase 2 WCS assessment of the impact to water supply and Sewer Capacity from further development in Swindon is **Negligible** the effect upon all identified receptors are considered to be of **Negligible significance**.

Occupants of Existing Commercial Development (High sensitivity)

- 9.116 The Occupants of the Existing Commercial Development on site are considered to be a **High** sensitivity receptor. It is assumed that sufficient capacity exists for the construction of the Development; this is supported by the WCS (**Ref 9.11**). On this basis it has been assessed that there is a **Negligible** Water Supply and Sewerage Capacity impact from the construction of the Development to the Occupants of the Existing Commercial Development on-site. Consequently the significance of this Water Supply and Sewer Capacity impact is considered to be **Negligible**.

Offsite land (Low sensitivity)

- 9.117 Offsite land will be unoccupied during the construction of the Development and is considered to be of a **Low** sensitivity for Water Supply and Sewer Capacity.
- 9.118 The WCS (ref 9.11) indicates that there is capacity in the current Water Supply and Sewer Capacity infrastructure such that there will be a **Negligible** impact from the construction of the Phase 1 Development to Water Supply and Sewerage Capacity that will affect Offsite land including other development.
- 9.119 Consequently this impact is considered to be of **Negligible** significance.

Existing Commercial Development (High sensitivity)

- 9.120 The Existing Commercial Development on site is considered to be a **High** sensitivity Receptor for Water Supply and Sewer Capacity.
- 9.121 The WCS (Ref 9.11) indicates that there is capacity in the current Water Supply and Sewer Capacity infrastructure such that there will be a **Negligible** Water Supply and Sewerage Capacity impact from the construction of the Development to the Existing Commercial Development on-site. Consequently the Water Supply and Sewer Capacity impact during the construction of the Development is considered to be of **Negligible** significance.

Occupants of Offsite Development (High)

- 9.122 The Occupants of Offsite Development are considered to be of a **High** sensitivity to Water Supply and Sewer Capacity.
- 9.123 The WCS (Ref 9.11) indicates that there is sufficient capacity to support the Wider NEV development in Swindon. The Construction of the Development will therefore have a **Negligible** Water Supply and Sewer Capacity impact to the Occupants of Offsite Development. Consequently, the Water Supply and Sewer Capacity impact of the Phase 1 Development during the construction of the Development to Occupants of Offsite Development is considered to be of **Negligible** significance.

Environmental Assessment: *Operational Phase*

Fluvial Flooding

River Cole (Medium sensitivity)

- 9.124 There are no developments in the River Cole floodplain which would be affected during the operation of the Development. There is a potential impact to the A420 at Acorn Bridge downstream of the Site. Therefore the River Cole is considered to be a **Medium** sensitivity receptor.
- 9.125 Through the use of SuDS and the Floodplain Restoration scheme, the operation of the Development will reduce the fluvial flooding impact to the River Cole by reducing the surface water runoff from the Site. The Floodplain Restoration scheme provides a minor benefit at Acorn Bridge of around 0.1 m. The impact of the operation of the Development is considered to be **Medium/Low Beneficial**.
- 9.126 Fluvial modelling has been undertaken to assess climate change effects on the proposed Flood Restoration Scheme. The modelling shows that the flood extents as a result of the climate change allowances are no greater than the 1 in 1,000 annual probability fluvial flood extents, and therefore the developed areas of the site will remain at low risk of fluvial flooding.
- 9.127 The significance of the effect upon Fluvial Flooding, during the Operation of the Development is considered **Slight/Negligible Beneficial**.

Other Watercourses (Medium sensitivity)

- 9.128 There are no developments in the floodplain of the watercourses (all in Flood Zone 1) which would be affected during the Operation of the Development. As the Other Watercourses drain to the River Cole, there is a potential impact to the A420 at Acorn Bridge downstream of the site, Consequently the Other Watercourses on-site are considered a **Medium** sensitivity Receptor for fluvial flooding.
- 9.129 The use of SuDS and the Floodplain Restoration scheme will reduce the surface water runoff from the Other Watercourses on-site, which drain to the River Cole; this will reduce the fluvial flooding impact to the River Cole. This reduction in surface water runoff will decrease the fluvial flooding impact to Acorn Bridge. This impact is therefore considered to be **Medium/Low Beneficial**.
- 9.130 The significance of the effect on fluvial flooding to Other Watercourses during the operation of the Development is considered **Slight/Negligible Beneficial**.

Occupants on site (High sensitivity)

- 9.131 The Occupants of Development are a **High** sensitivity receptor. The Development will be located in Flood Zone 1. The SuDS and Floodplain Restoration scheme will reduce the surface water runoff rate and the impact of fluvial flooding to the Development. The operation of the Development will have a **Medium/Low Beneficial** impact to fluvial flooding to the Occupants of development. Therefore the effect upon the occupants of the development from fluvial flooding during the operation of the Development is of **Moderate/Slight Beneficial** significance.

Offsite Land (Medium sensitivity)

- 9.132 The Offsite land is expected to contain the wider NEV development during the operational phase. The NPPF requires that development does not increase flood risk offsite. On this basis the Offsite Land is considered to be a **High** sensitivity receptor. The SuDS and floodplain restoration scheme will have a **Negligible/Low Beneficial** impact to fluvial flooding offsite.
- 9.133 Consequently, the effects on offsite land from fluvial flooding during the operation of the Development are considered to be of **Negligible Beneficial** significance.

Occupants of Offsite Development (High sensitivity)

- 9.134 The Occupants of Offsite Development will be the occupants of the wider NEV developments and are considered to be a **High** sensitivity receptor. The operation of the Development will have a **Negligible** fluvial impact to the Occupants of the Offsite Development. Consequently, the fluvial flooding effects during the operation of the Development upon Occupants of the Offsite Development are considered to be of **Negligible** significance.

Surface Water Flooding

River Cole (Medium sensitivity)

- 9.135 There are no developments along the surface water flow routes along the River Cole on the EA online Flood Risk from Surface Water maps. There is a potential impact to the A420 at Acorn Bridge downstream of the site. Consequently, the River Cole is considered to be a **Medium** sensitivity receptor.
- 9.136 The operation of the Development will reduce the Surface Water Flooding impact to the River Cole by reducing the surface water runoff from the Site, through SuDS and the Floodplain Restoration scheme. The Surface Water Flooding impact of the operation of the Development is considered to be **Moderate/Low Beneficial**.
- 9.137 The significance of the Surface Water Flooding effects on the River Cole during the operation of the Development is considered **Slight/Negligible Beneficial**.

Other Watercourses (Medium sensitivity)

- 9.138 There are no developments along the surface water flow routes along the Other Watercourses, which connect to the River Cole on the EA online Flood Risk from Surface Water map. As the surface water flooding from Other Watercourses connects to the River Cole there is a potential Surface Water Flooding impact to the A420 at Acorn Bridge downstream of the site. Consequently the Other Watercourses are considered a **Medium** sensitivity Receptor for Surface Water Flooding.
- 9.139 The use of SuDS and the Floodplain Restoration Scheme will reduce the surface water runoff affecting the Other Watercourses. This reduction in surface water runoff will reduce the

Surface Water Flooding impact to Acorn Bridge. This impact is expected to be **Medium/Low Beneficial**.

- 9.140 The significance of the Surface Water Flooding impact to Other Watercourses during to the operation of the Development is considered **Moderate/Slight Beneficial**.

Occupants on site (High sensitivity)

- 9.141 The Occupants of on site are a **High** sensitivity receptor. As the surface water flow routes on site follow the fluvial flow routes, the SuDS and Floodplain Restoration scheme will have a **Medium/Low Beneficial** Surface Water Flooding impact, therefore the Surface Water Flooding effects to the occupants of the site during the operation of the Development is of **Moderate/Slight Beneficial** significance to the Occupants of the Development.

Water Quality

River Cole (High sensitivity)

- 9.142 The River Cole is located in a surface water Safeguard Zone in the EA Drinking Water Safeguard Zones online map. The River Cole past the Site is also designated as 'good potential status in the EA Water Framework Directive 2009 - River Basin Management Plans online map. The EA Catchment Data Explorer classified the River Cole as 'Poor' status in 2016. Consequently the River Cole is a **High** sensitivity receptor for Water Quality.
- 9.143 The operation of the Development will improve the Water Quality to the River Cole, through SuDS and the green infrastructure. The impact is of the operation of the Development is considered to be **Medium/Low Beneficial**.
- 9.144 The significance of effects on Water Quality, during the operation of the Development is considered to be **Moderate/Slight Beneficial**

Other Watercourses (High sensitivity)

- 9.145 The other watercourses on-site are located in a surface water Safeguard Zone in the EA Drinking Water Safeguard Zones online map. The Other Watercourses on-site drain to the River Cole which is a High sensitivity receptor. Consequently the Other Watercourses are considered to be a **High** sensitivity receptor.
- 9.146 The use of SuDS and green infrastructure will improve the Water Quality of the surface water runoff from the Other Watercourses. This Water Quality impact is considered to be **Medium/Low Beneficial**.
- 9.147 The significance of effects on Water Quality to Other Watercourses due to the operation of the Development Site is considered **Moderate/Slight Beneficial**.

Environmental Impact: Cumulative Impact

- 9.148 As the impacts of the Development have already been set out in the earlier sections, they are not repeated here.
- 9.149 Cumulative impact in relation to the Application is considered in the context of the whole of then NEV, including the 'Projects for Assessment' identified within **Appendix 2** of the ES.

Fluvial Flooding

- 9.150 The Site lies downstream of other NEV sites on the Liden Brook. Development along the Liden Brook upstream of the Site could increase the flood risk from the Liden Brook to the Site. The NPPF requires that the NEV needs to demonstrate that it creates no impact on the fluvial flood risk for the Development.
- 9.151 The use of SuDS for the remaining NEV, including those upstream could result in a reduction to runoff to below greenfield rates.
- 9.152 Consequently the cumulative impact on the fluvial risk to the Development is considered **Negligible**.

Surface Water and Drainage

- 9.153 The use of SuDs and the reduction in discharge to green field or lower rates is required throughout the NEV. Consequently it is expected that the cumulative developments could provide no change or an improvement to the surface water runoff from the Site.
- 9.154 The cumulative effects arising from the NEV Developments in respect of surface water drainage are considered to be **Negligible/Slight Beneficial**.

Water Quality

- 9.155 The WFD (Ref 9.1) requirements for at least 'no deterioration' in water quality require that the cumulative effects arising from the NEV developments on water quality are anticipated to be Negligible.

Water Supply and Sewerage Capacity

- 9.156 The cumulative impact of the NEV on the Development has been considered in the relevant local planning policy documents such that there is provision made to support the increase in demand from the NEV for both Water supply and wastewater treatment. Any additional infrastructure is needed to support the water supply demand from the NEV it should be provided in a 'timely' fashion.
- 9.157 Consequently the cumulative effects of the NEV developments on water supply and sewerage are considered to be **Negligible**.

Mitigation and Monitoring

- 9.158 This section of the ES chapter describes the secondary and tertiary mitigation to be applied to address any adverse impacts.

Construction Mitigation

Fluvial Flooding

- 9.159 No development will be located in higher risk Flood Zones (Flood Zones 2 and 3) apart from the Floodplain Restoration scheme and the road crossings of the River Cole. These are considered as 'essential infrastructure' or 'water compatible' uses and considered appropriate development subject to producing no increases to offsite flood risk.
- 9.160 The construction of the Floodplain Restoration scheme will involve works along the River Liden, in Flood Zone 3. Appropriate site management (CEMP) and flood evacuation (Flood Warning Plan) will be provided.

- 9.161 A flood defence consent would also be required for the road crossings or any temporary works close to the River Cole, Dorcan Stream and Liden Brook on site.
- 9.162 A Construction Environmental Management Plan (CEMP) will be undertaken for the Development, providing details of the appropriate measures being undertaken to mitigate the impacts of the Development build out.
- 9.163 A Flood Warning Plan and site management procedures in the CEMP (i.e. ensure no storing of plant or materials in Flood Zone 3 etc.) will be provided to Workers.
- 9.164 The likelihood of an extreme fluvial flooding event during the construction of the Floodplain Restoration scheme is considered to be low. The likely depth and velocity experienced on site and extent of flooding would indicate that construction workers should be able to safely evacuate.
- 9.165 The Floodplain Restoration scheme does not affect the proposed crossings of the River Cole. The CEMP and Flood Warning Plan will mitigate these risks as well.
- 9.166 Once constructed, the Floodplain Restoration scheme (a primary mitigation measure, integrated into the design of the Proposed Development) will improve flood risk for the green infrastructure corridors and for the SuDS. Consequently the Floodplain Restoration scheme should be constructed ahead of any construction work in the baseline Flood Zones on site (i.e. green infrastructure corridor, road connections between villages etc.); to reduce any risk during the construction phase.

Surface Water Flooding

- 9.167 The construction of the SuDS should occur before the Development to mitigate Fluvial Flooding impacts for the construction of the Development. Alternatively, temporary works (surface water storage) could be installed as mitigation if this is not possible. Site management procedures in the CEMP would also mitigate any impacts.
- 9.168 The phased development of the Site creates the potential for blockage of infrastructure built for earlier phases of the development. This will be mitigated through site management measures and potential temporary works outlined in the CEMP.
- 9.169 Once constructed, the SuDS attenuation will reduce the surface water runoff during the later phases of construction work.

Water Quality

- 9.170 The phased construction of the Proposed Development has the potential to increase the amount of soil particulates that could be mobilised by surface water flows which could decrease the water quality of receiving watercourses etc.
- 9.171 The presence of plant and other construction material on site, including fuels/ hydrocarbons, also represent a potential source of contamination.
- 9.172 Construction work, including cleaning, would also increase the likelihood of surface water contaminants becoming mobilised and entering the surface water drainage ditches.
- 9.173 A CEMP will be created for the Development, with instructions as to the management and mitigation of any on-site water quality impacts in the construction phase. This will included

the safe storage of plant or contaminants on site and refer to EA Pollution Prevention Guidance notes.

- 9.174 Details of any potential temporary works on site to prevent surface water runoff entering the River Cole may also be included in the CEMP for the construction phase if considered appropriate.
- 9.175 The construction of SuDS and green infrastructure on site will improve the water quality once finished so the potential adverse impact is only considered to be temporary.

Operational Mitigation

Fluvial Flooding

- 9.176 The proposed Development locates all 'less vulnerable', 'more vulnerable' and 'highly vulnerable' uses in Flood Zone 1. The construction of the Floodplain Restoration scheme increases the area of Flood Zone 1 on-site, reducing the risk to on-site occupants.
- 9.177 The crossings of the River Cole floodplain will encroach into Flood Zone 2 and 3. It is recommended that these be constructed as clear span structures with 600mm freeboard on the 1 in 100 year plus climate change flood level. If the Road crossings need to be designed to have an impact on the River Cole floodplain (i.e. as an embankment with culverts) then hydraulic modelling is expected to be necessary to demonstrate that no offsite impact is created and appropriate mitigation would be required.

Surface Water Flooding

- 9.178 A Floodplain Restoration Scheme to remove surface water flow routes through the Development will be created. In addition to SuDS to attenuation surface water runoff.

Water Quality

- 9.179 This increase in treated effluent as a result of the development is considered to have a negligible effect upon water quality. This is on the basis of that the increase in effluent discharge will meet the 'no deterioration' described in the Phase 2 WCS (**Ref 9.12**) and so would represent no change from the current baseline condition. Any new infrastructure required for the Development is to be provided in a timely fashion by Thames Water.
- 9.180 The potential significance of effect on Water Quality during the operation of the Development has been assessed as being **Negligible/Slight Beneficial**. Consequently no additional mitigation is required and residual effects are not considered further.

Water Supply and Sewer Capacity

- 9.181 The effects upon Water Supply and Sewer Capacity during the construction and operation phases of the Development are considered to be **Negligible**. This is on the basis that additional capacity is to be provided by Thames Water in a timely fashion to support the NEV development. The impact of the additional treated wastewater effluent from an increase in Sewer Capacity is assessed as satisfying the WFD (**Ref 9.1**) 'no deterioration' criteria such that the provision of additional sewer capacity is considered to have a **Negligible** effect.
- 9.182 The Water Supply and Sewer Capacity effects relating to the construction and operations phases of the development are discussed in further detail in the Utility Supply and Foul Sewerage Technical Note, which should be read in conjunction with this document.

Summary of Residual Effects

- 9.183 Where 'Moderate' or 'Substantial' effects have been identified during the construction and operation phases of Development, this section considers the residual effects following the implementation of specific mitigation measures.

Construction Phase

- 9.184 Effects upon on-site workers from fluvial flooding during construction were identified to be **Moderate/ Slight**. Whilst the sensitivity of this receptor is **High**,
- 9.185 The CEMP will identify and mitigate any short term, low probability risks during the construction of the Floodplain Restoration scheme and as a result, the residual effects upon this sensitivity receptor will be **Negligible**.

Water Quality

- 9.186 The potential significance of effects on the Water Quality during construction, following mitigation, is now assessed as being **Negligible**. The receptors are of **High** sensitivity and the impacts are **Negligible** through the use of mitigation in the CEMP during the construction of SuDS and green infrastructure.
- 9.187 The assessment is summarised in **Table 9.5**

Table 9.5: Summary Table

Description of impact	Stage (C /O)	Significant effect	Mitigation	Residual Effect
Impact on fluvial flooding	C	Moderate/ Slight	CEMP/ Flood warning and evacuation plan and temporary works to control construction impacts.	Negligible
Impact on surface water flooding	C	Moderate/ Slight	CEMP/ Flood warning and evacuation plan and temporary works to control construction impacts.	Negligible
Impact on Water Quality	C	Significant/ Moderate	CEMP/ Flood warning and evacuation plan and temporary works to control construction impacts.	Negligible
Impact on Water Supply and Sewer Capacity	C	Negligible	Provision of Water supply and sewer capacity as necessary for development (Local Plan and SPD).	Negligible
Impact on fluvial flooding	O	Moderate/ Substantial	Floodplain Restoration scheme and SuDS to mitigate rainfall runoff into channel and flood risk.	Moderate/ Substantial
Impact on	O	Slight/ Moderate	SuDS to reduce surface	Slight/

Description of impact	Stage (C /O)	Significant effect	Mitigation	Residual Effect
surface water flooding			water discharge to greenfield or lower rates. Floodplain Restoration scheme to mitigate surface water risk.	Moderate
Impact on Water Quality	O	Negligible/ Slight	Green infrastructure corridors as specific improve water quality. SuDS	Negligible/ Slight
Impact on Water Supply and Sewer Capacity	O	Negligible	Provision of Water supply and sewer capacity as necessary for development (Local Plan and SPD).	Negligible

Summary

- 9.188 This ES chapter has assessed the impact of the proposed Development; in relation to fluvial flood risk, surface water and drainage, water quality and, water supply and sewer capacity (collectively referred to as Water Resources).
- 9.189 A separate Flood Risk Assessment (FRA) has been prepared in accordance with the NPPF. The FRA demonstrates that future occupants of the Site will be safe from flooding, and the Proposed Development will not increase flood risk elsewhere.

Construction Phase

- 9.190 The construction impacts of the Development will be controlled and mitigated through on-site management and temporary works. A Construction Environmental Management Plan (CEMP) will be prepared for the Site which will serve to mitigate against the potential impacts associated with the construction work through site management procedures.
- 9.191 The Floodplain Restoration scheme will mitigate the fluvial and surface water flood risks on site and. The Floodplain Restoration scheme will be constructed prior to any works in the existing Flood Zone 2 and 3 areas to reduce flood risk during the construction phase.
- 9.192 The result of the proposed mitigation works is considered to ensure that the environmental impacts during the construction phase are **Negligible**.

Operational Phase

- 9.193 The use of SuDS, the creation of a green infrastructure corridor and the Floodplain Restoration Scheme mitigate the environmental impact during the operational phase of the Development.
- 9.194 The result of the proposed Floodplain Restoration works is that the Development should have a **Slight Beneficial** impact on water resources during the operational phase of the Development. The Development will create slight improvements to surface water runoff, fluvial flood risk and water quality through the on-site green infrastructure and the Floodplain Restoration scheme.

- 9.195 The issue of sewerage capacity was raised in the initial scoping by Thames Water and the Environment Agency in reference to WFD (ref 9.1) requirements.
- 9.196 From The Water Cycle Study (ref 9.11) and also the Water Cycle Study Phase 2 (Ref 9.12) document which is cited by the EA in the scoping response; it is understood that the wider NEV development can continue on the basis that the increase in treated effluent discharge from the NEV development would maintain the existing water quality and achieve the 'no deterioration' criteria of the WFD.
- 9.197 The Phase 2 Water Cycle Study identifies a need for a national scale improvement in existing wastewater treatment works. The existing standards for treated effluent discharge is not considered sufficient to be able to achieve the WFD targets by 2027, particularly with regards the criteria for phosphates.
- 9.198 This issue is considered outside of the remit of the NEV Development and should be resolved by Thames Water Utilities such that this Development; which has been assessed as being regionally significant for growth across the southwest of England, can continue.
- 9.199 The assumption that the 'timely' provision of additional capacity in both water supply and wastewater treatment has been assumed by the Council in the Local Plan (ref 9.9) and SPD (ref 9.10).

Residual Impacts

- 9.200 On the basis of the proposed mitigation works, the residual environmental impact has been reduced to a **Negligible** level. Risks still remain with regards to rare events such as accidental pollution incidences or flood events greater than the 1 in 1000 year occurring on site but these events are considered to be unlikely and represent a **Negligible** risk.

10. Ground Conditions

Purpose & parameters of the assessment

- 10.1 This chapter assesses the likely significant effects of the Proposed Development on the environment in respect of ground conditions. This chapter considers:
- The indirect effects of the Proposed Development on human health, the environment and the proposed structures relating to ground contamination.
 - The potential for the Proposed Development to directly contribute to or to be affected by land instability and geological hazards.
- 10.2 Other direct effects of the Proposed Development on the ground have been excluded from this assessment. The elements excluded from this assessment and the reasons for their exclusion are:
- Geology, as there are no designated geological sites or features of conservation value in the area affected by the Proposed Development.
 - Geomorphology, as there are no designated geomorphological sites or features of conservation value in the area affected by the Proposed Development.
 - Mineral Resources, as there are no mineral protection areas or mineral safeguarding zones in the area affected by the Proposed Development.
- 10.3 This chapter is supported by a Phase 1 Ground Condition Assessment (GCA) comprising a Preliminary Ground Stability Risk Assessment and a Tier 1 Qualitative Contamination Risk Assessment presented as **Appendix 10.1**.
- 10.4 The key parameters for this chapter are the potential effect on human health, environmental and building receptors as a result of the potential presence of land contamination on the Application Site and the potential risks to human health and the built environment caused by land instability at the Application Site.
- 10.5 This chapter has been prepared by Peter Brett Associates LLP, now part of Stantec.

Legislative and policy framework

Legislation

Part IIA of the Environmental Protection Act 1990

- 10.6 UK legislation on contaminated land is principally contained in Part IIA of the Environmental Protection Act, 1990 (which was inserted into the 1990 Act by section 57 of the Environment Act 1995) (**ref 10.13**).
- 10.7 Part IIA came into force in England on 1 April 2000 and provides a risk-based approach to the identification and remediation of land where contamination poses an unacceptable risk to human health or the environment. The broad approach, concepts and principles

behind land contamination management adopted by the Part IIA regime are applied to the determination of planning applications.

- 10.8 The role of the planning system is to control future development and land use. The assessment of risk arising from contamination and remediation requirements should be considered on the basis of both the current and proposed use. Current use includes any use that has planning permission but is as yet unimplemented. The underlying approach to identifying and dealing with risk and the broad policy objective of safeguarding human health and the environment are similar for both the Planning and Part IIA regimes.

The Contaminated Land (England) (Amendment) Regulations 2012

- 10.9 The Regulations and Statutory Guidance that supported the Act, has been revised with the issue of The Contaminated Land (England) (Amendment) Regulations (SI 2012/263) (ref 10.12) and the Contaminated Land Statutory Guidance for England.

- 10.10 The guidance includes a definition of 'risk', where a risk is said to be a combination of:

- the likelihood that harm, or pollution of water, will occur as a result of contaminants in, on or under the land; and
- the scale and seriousness of such harm or pollution if it did occur.

The Water Act 2003

- 10.11 The Water Act 2003 (Commencement No.11) Order 2012 amends the test for 'contaminated land' which relates to water pollution so that pollution of controlled waters must now be "significant" to meet the definition of contaminated land.

Policy

National Planning Policy Framework

- 10.12 Policy for planning authorities on the need to take into account the environmental consequences of land contamination and land stability in drawing up development plans and in determining planning applications is provided in the NPPF (ref 10.8). The NPPF indicates that planning policies and decisions should ensure that a site is suitable for its proposed use taking account of ground conditions and any risks arising from land stability. This includes risks from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation.

Local Planning Policy

The Local Plan for Swindon Borough Council is the Swindon Borough Local Plan 2026, adopted in March 2015 (ref 10.10).

- 10.13 Policy EN8 'Unstable Land' in Theme 7 'Natural and Built Environment' within Part 4 'Enabling Sustainable Development' of the Local Plan is relevant to the Proposed Development in relation to ground stability:

- (a) Development of land that is either known to be unstable, or is strongly suspected of instability, shall only be permitted when:

- 10.14 An evaluation has been submitted of the level and precise nature of any instability; and

- 10.15 There are no significant adverse effects on adjacent sites; and
- 10.16 The extent of remedial measure required to achieve a level of land stability suitable for the purpose use, capable of supporting future development loads has been identified.
- (a) Where planning permission is granted, conditions may be imposed requiring the execution of any necessary remedial works.
 - (b) Where a site is affected by land stability issues responsibility for securing a safe development rests with the developer and/or landowner, who will be required to carry out the above.
- 10.17 Policy EN9 'Contaminated Land' in Theme 7 'Natural and Built Environment' within Part 4 'Enabling Sustainable Development' of the Local Plan is relevant to the development in relation to ground contamination:
- (a) Development of land that is either contaminated, or is strongly suspected of being contaminated, shall only be permitted when:
- 10.18 An evaluation has been submitted of the level and precise nature of any contamination and need for removal or treatment; and
- 10.19 The potential of existing contaminants to pollute both surface water and ground water, both during and after construction has been established; and
- 10.20 The decontamination measures required to achieve a level of land quality suitable for the proposed end use have been identified; and
- (a) Where planning permission is granted, conditions may be imposed requiring the execution of any necessary remedial works.
 - (b) Where a site is affected by land contamination responsibility for securing a safe development rests with the developer and/or landowner, who will be required to carry out the above.

Other Relevant Standards and Guidance

- 10.21 The assessment is underpinned by the following guidance and/or best practice:
- DEFRA/EA, Contaminated Land Report 11 (CLR 11) Model Procedures for the Management of Land Contamination (**ref 10.6**);
 - BS 5930:2015 Code of practice for ground investigations (**ref 10.3**);
 - BS 10175:2011+A2:2017 Investigation of contaminated sites – code of practice (**ref 10.2**),
 - Planning Practice Guidance for Land Stability published by the Department for Communities and Local Government (**ref 10.5**).
 - National House Building Council (NHBC) Technical Standards (**ref 10.7**)

Consultation

Table 10.1 provides a summary of the consultation undertaken in support of the preparation of this chapter.

Table 10.1: Summary of Consultations Undertaken to Date

Consultee	Individual/department	Comments
Swindon Borough Council	David Rudland - Contaminated Land Officer	Supply of environmental data for the Application Site (08/11/2013). Updated supply of environmental data for the Application Site (17/12/2018).
Animal Health and Veterinary Laboratories Agency (AHVLA)	Jill Darby – South West Communications and Stakeholder Engagement Lead	Response relating to request for any information concerning animal burial sites, tanneries or knackeries on the Application Site (19/11/2013).
Environment Agency	Julia Hewitt – Customers and Engagement Officer	Supply of environmental data for the Application Site (10/01/2019).

Study Area

- 10.22 The Study Area for the assessment presented in this chapter comprises the Application Site (**Figure 1.1**) and immediate (adjoining) land for identification of specific current and historical land uses. A search radius of between 250 m and 1000 m is typically used depending on the type of data and zone of influence. For example, landfill sites are generally only considered if they are located within 250 m of a site boundary because gas migration is unlikely over a greater distance, whereas groundwater impacts and information regarding water abstractions is obtained over a wider 1000 m area.

Scope and Methodology (LAND CONTAMINATION)

- 10.23 Baseline information has been collected through desk study research including the review of historical Ordnance Survey (OS) maps, inspection of published geological maps and consultation with Regulatory Authorities. This information is presented in the Phase 1 Ground Condition Assessment (**Appendix 10.1**).
- 10.24 The presence of contamination in soil can present risks to human health and the environment, which adversely affect or restrict the beneficial use of land. Without appropriate mitigation, the presence of substances with potential to cause harm to human health, property or the wider environment may severely limit or altogether preclude development and the beneficial use of land.
- 10.25 The approach adopted for the identification of potential effects associated with ground conditions is to compare an estimated risk associated with the Proposed Development (considering separately the construction phase and operational phase) with the corresponding estimated risk associated with the existing baseline conditions.

10.26 Risk is based on a consideration of both:

- the magnitude of the potential consequence (i.e. severity) taking into account both the potential severity of the hazard and the sensitivity of the receptor; and
- the magnitude of probability (i.e. likelihood) taking into account both the presence of the hazard and receptor and the integrity of the pathway.

10.27 Details of PBA's methodology for the assessment of potentially contaminated land is given in **Appendix 10.1**. As an overview, for a risk to exist there needs to be a source – pathway – receptor linkage. Each Conceptual Site Model (CSM) for baseline, construction phase and operational phase considers:

- The principal hazards. The contaminants must be present in, on or under the land in a form and quantity that poses a hazard. The potential contamination sources are identified from a review of information on land use. The potential for generating contamination/gas of the land use is classified in one of five classes varying from Very Low (i.e. greenfield sites) to Very High (i.e. a hazardous waste landfill). The classification is presented in Table 1 of the methodology (**refer to Appendix 10.1**).
- The principal pathways. The potential exposure and migration pathways between the identified source(s) and receptor(s) are identified; and
- The principal receptor(s). A receptor is something that could be adversely affected by a contaminant, for example, a person, an ecosystem or groundwater. The importance of the receptor is classified in one of five bands from Very Low (i.e. a receptor of limited importance) to Very High (i.e. a receptor of national or international importance). The classification banding is presented in Table 2 of the methodology (**refer to Appendix 10.1**)

10.28 Potential effects are identified using the matrix presented in **Table 10.2**

Table 10.2: Matrix for Identifying Potential Effect (Based on the change from Baseline Risk)

Potential Effect						
Risk (Construction and Operational Phase)	Very High	Substantial Adverse	Major Adverse	Moderate Adverse	Minor Adverse	Negligible
	High	Major Adverse	Moderate Adverse	Minor Adverse	Negligible	Minor Beneficial
	Moderate	Moderate Adverse	Minor Adverse	Negligible	Minor Beneficial	Moderate Beneficial
	Low	Minor Adverse	Negligible	Minor Beneficial	Moderate Beneficial	Major Beneficial
	Very Low	Negligible	Minor Beneficial	Moderate Beneficial	Major Beneficial	Major Beneficial
		Very Low	Low	Moderate	High	Very High

Potential Effect

Risk (Baseline)

- 10.29 For example, if a pollutant linkage is estimated as having a Low risk in the baseline conditions and a High risk during construction phase then a Moderate Adverse effect would be identified. Substantial, Major and Moderate Adverse Effects (identified in the table in yellow) are identified as Significant.
- 10.30 The mitigation measures required to address possible unacceptable risks during both the construction phase and the operational phase are then identified and the effects of including the mitigation measures in both the construction and operational phases assessed once more through comparison with the baseline. The residual effects are identified by comparing the estimated risk associated with the baseline conditions and the estimated risk associated with the Proposed Development with the mitigation measures in place.

Assumptions and Limitations

- 10.31 The assessment is based on a Phase 1 Ground Condition Assessment which comprises a desk top study and site walkover and does not include information from intrusive ground investigation. The site walkover was confined to the Study Area and did not include the proposed access corridors to the A420 which is on third party land.
- 10.32 It should be noted that the assessment is in part based on published information which is generic to an area rather than specific to the Application Site. Where this is the case professional judgement has been used to inform the assessment in terms of likelihood and scale of contamination associated with the identified land uses.

Baseline conditions (land contamination)

Sources of Information

- 10.33 The baseline conditions at the Application Site have been determined from a review of available published information.
- 10.34 The information reviewed included:
- Published geological, hydrogeological and aquifer vulnerability maps and historical Ordnance Survey maps;
 - Existing information, investigations, studies and surveys in relation to the existing geological, geotechnical, contamination and geo-environmental aspects of the Application Site; and
 - Information obtained from public bodies and the former site users on the previous land uses and potentially contaminative activities that have taken place on the site.
- 10.35 This information is presented in a Phase 1 GCA prepared for the Application Site by PBA and included in **Appendix 10.1**.

Hydrological Setting

- 10.36 The River Cole flows in an easterly direction adjacent to the northern site boundary. Linden Brook flows in a northerly direction adjacent to the eastern site boundary. Dorcan Stream flows in a northerly direction through the western part of the site and partly along the western site boundary. Both the Linden Brook and Dorcan Stream discharge into the River Cole on the northern site boundary.
- 10.37 Multiple drainage ditches cross the Application Site, including an extensive ditch which traverses north-south across most of the central area of the Application Site. Occasional plastic pipes were observed discharging into the drainage ditches, presumably field drains or similar. Several small ponds, and possible water storage features, are also located across the Application Site.

Geological Setting

- 10.38 According to the British Geological Survey (BGS) 1:50,000 scale digimap, the Application Site is underlain by undifferentiated Upper Jurassic aged bedrock strata of the Ampthill Clay and Kimmeridge Clay Formations (**Figure 10.1**). These comprise a series of pyritous dark and medium grey mudstones and silty mudstones that weather to a stiff fissured clay near surface.
- 10.39 The bedrock geology is overlain in part by superficial Alluvium deposits. The Alluvium occurs as an extensive tract along the northern and eastern sides of the Application Site associated with the courses of the River Cole and its tributary the Linden Brook. A spur off the main alluvial tract runs across the western part of the Application Site along the course of the Dorcan Stream, a tributary of the River Cole (**Figure 10.2**). Alluvium is generally described as soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel.

Hydrogeological Setting

- 10.40 The Alluvium is classified as a Secondary A Aquifer by the Environment Agency. Secondary A Aquifers are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.
- 10.41 The groundwater vulnerability of the Alluvium is classified as low along the Dorcan Stream and part of the Linden Brook, and high across the northern and north-eastern areas of the Application Site. The depth to groundwater is assumed to be shallow given the low-lying nature of the Application Site and proximity of local watercourses. Groundwater flow direction is likely to be locally towards the nearest watercourse and generally northwards and eastwards following the course of the watercourses.
- 10.42 The undifferentiated Ampthill Clay and Kimmeridge Clay Formations are classified as Unproductive Strata. Unproductive Strata are rock layers or drift deposits with low permeability that has negligible significance for water supply or river base flow.

Historical Setting

- 10.43 The review of historical Ordnance Survey maps indicates that the Application Site has remained largely unchanged since the earliest map editions in the late 19th Century, comprising mainly fields with Lotmead Farm and associated farm buildings located in the western area of the Application Site. Localised changes to the Application Site in the second half of the 20th Century included:

- The infilling of small ponds and sections of field drain and watercourse and the construction of new field drains close to the northern side of Lotmead Farm,
- The infilling of meanders and the straightening of the section of the Dorcan Stream that runs through the Application Site and parts of the Linden Brook on the southern and eastern edges of the Application Site in the late 1960's, and
- Development of the Lotmead Business Park adjacent to Lotmead Farm which has included use as an engineering workshop, scrap yard and also unlicensed aggregate recycling.

10.44 Historically, the surrounding area has remained predominantly rural and, with the exception of isolated farmsteads, few features of relevance to this chapter are evident from the historical maps. The main local historical land use changes were the construction of the A419 dual carriageway in the 1970's and the expansion of the eastern suburbs of Swindon (comprising residential and industrial estates) up to the western side of the A419 at around the same time.

Areas of Environmental Sensitivity

10.45 The Application Site lies within the impact risk zone of two Sites of Special Scientific Interest (SSSI), namely Coate Water and The Coombs, Hinton Parva located approximately 3km beyond the south-western and south-eastern site boundaries, respectively. SSSI Impact Risk Zones are a GIS tool developed by Natural England to make an initial assessment of potential risks to SSSIs from development proposals.

10.46 The Impact Risk Zones on Site relate to potential planning proposals involving aviation uses, oil and gas exploration or extraction, livestock and poultry units, slurry lagoons or manure stores and so the nature of the proposed development of the Site is unlikely to present a risk to the off site SSSIs. There are no other environmentally designated sites or nature reserves within 2km of the site boundary.

Potential Sources of Contamination

10.47 Based on the known history of the Application Site, the following potential sources of contamination have been identified:

- Potential for soil gas (carbon dioxide, methane) generation within Alluvium and buried organic pond/ditch bed sediments.
- Potential for localised contaminant concentrations to be present, e.g. heavy metals, organic and inorganic chemicals, hydrocarbons and asbestos associated with the Lotmead Farm and Business Village.
- Potential for localised contaminant concentrations to be present e.g. agro-chemicals, hydrocarbons, asbestos and soil gas, associated with general farm land, infilled ponds, ditches/watercourses and isolated material stockpiles.

10.48 Based on the known history and current use the potential for contamination to be present in the soils and groundwaters in the area of the Application Site is, in general, Low and Very Low. The possible exception relates to the area of Lotmead Farm and Business Village for which the potential risk is assessed to be Moderate.

Potential Receptors

10.49 Potential receptors and their assessed sensitivity are presented in **Table 10.3**.

Table 10.3: Assessed Sensitivity of Potential Receptors

Receptor	Assessed Sensitivity	Description/Comment
Human Health - Current Site Users	Very High	The Site currently comprises a mix of farm, residential, office and industrial land-uses.
Human Health - Site Workers	High	The minimum classification where human health is identified as a possible receptor
Human Health - Neighbours	Very High	The area surrounding the Application Site currently comprises a mix of agricultural land and residential properties.
Human Health – Future Site Users	Very High	The Proposed Development includes residential land uses
Groundwater	Low	Alluvium is classified as a Secondary A aquifer. The Ampthill and Kimmeridge Clay Formations are unproductive strata
Surface Waters	High	Watercourses run along the northern, eastern and southern site boundaries and the Dorcan Stream flows across the Site.
Ecological Systems	Very Low	There are no environmental statutory designations within proximity of the site boundary.
Property	Very Low	Adjoining agricultural land

Baseline Risk Assessment

10.50 Based on a source-pathway-receptor assessment, the risks related to the existing baseline conditions at the Site has been assessed and are presented in **Table 10.4** with respect to each of the potential receptors identified.

Table 10.4: Assessed Risks Related to Existing Baseline Conditions

Receptor	Assessed Risk	Justification
Human Health – Current Site Users	Low	It is considered unlikely that current site users will be exposed to soil contamination and vapours due to prevalent land-uses
Human Health - Site Workers	Low	It is considered unlikely that site workers could be exposed to soil contamination and vapours in the site area as there no significant earthworks or ground works currently taking place.
Human Health - Neighbours	Low	It is considered unlikely that neighbours will be exposed to soil contamination and vapours due to prevalent land-uses and distances to receptors
Groundwater	Very Low	It is considered unlikely that groundwater is being significantly affected by existing contamination based on the prevalent ground conditions and limited extent of potential sources of contamination.
Surface Water	Low	It is considered unlikely that surface water is being significantly affected by existing contamination based on the prevalent ground conditions and limited extent of potential sources of contamination.
Ecological Systems	Very Low	It is considered unlikely that ecological systems are being significantly affected by existing contamination.
Property	Very Low	It is considered unlikely that adjoining property is being significantly affected by contaminants in the ground or the natural ground conditions on the Application Site.

Environmental Assessment - Construction Phase (LAND CONTAMINATION) - without mitigation

- 10.51 Construction of the Proposed Development will increase the number and length of time site workers would be on the Application Site. On this basis, the Proposed Development may affect the degree of potential risk to site workers with respect to ground contamination.
- 10.52 Based on the Conceptual Site Model the assessed environmental risks related to ground contamination during the construction of the Proposed Development have been assessed and are presented in **Table 10.5** with respect to each of the potential receptors identified.

Table 10.5: Construction Phase Risks and Potential Effects (without mitigation)

Receptor	Assessed Risk	Justification	Potential Effect
Human Health - Site Workers	Moderate	During the construction phase, there is an increased likelihood that site workers will	Minor Adverse

Receptor	Assessed Risk	Justification	Potential Effect
(High sensitivity)		be exposed to contamination in the ground due to the nature of the works and their increased presence.	
Human Health – Neighbours (Very High sensitivity)	Moderate	During the construction phase, there is an increased number of potential pathways on the basis that the limited areas of existing hardstanding will be removed, soils excavated and exposed and there will be a greater migration potential for dusts and vapours.	Minor Adverse
Groundwater (Low sensitivity)	Low	Potential introduction of new contaminant sources due to the release of contaminants from construction activity e.g. spill / leaks from defective plant and un-bunded fuel storage areas, silt-laden runoff from poorly managed stockpiles and poor site surface water management.	Minor Adverse
Surface Water (High sensitivity)	Moderate	Potential migration of new and existing contaminants in surface water and groundwater due to construction activity e.g. creation of contaminant pathways due to the introduction of service trenches, areas of loosely compacted fill, piling etc.	Minor Adverse
Ecological Systems (Very Low sensitivity)	Very Low		Negligible
Property (Very Low sensitivity)	Very Low		Negligible

Environmental Assessment - Occupational Phase (LAND CONTAMINATION) - without mitigation

- 10.53 The Proposed Development once completed will increase the length of time future site users will be on the Application Site, extend high sensitivity land uses (i.e. residential) over a larger proportion of the Application Site area and also alter site drainage and introduce contaminant pathways. On this basis, the Proposed Development may affect the degree of potential risk to future site users/neighbours and environmental receptors.
- 10.54 Based on the Conceptual Site Model the assessed environmental risks related to ground contamination during the use of the Proposed Development have been assessed and are presented in **Table 10.6** with respect to each of the potential receptors identified.

Table 10.6: Operational Phase Risks and Potential Effects (without mitigation)

Receptor	Assessed Risk	Justification	Potential Effect
Human Health - Future occupiers	High	There will not be an increase in land-use sensitivity from the baseline but there will be an increase in residential occupation across the Application Site which will increase the likelihood of localized areas of contamination in the ground and possible soil gases affecting future occupiers.	Moderate Adverse
Human Health – Maintenance/Site Workers	Low	Future construction and maintenance work is expected to be limited to maintenance work with little if any additional construction works. Considering the limited length of time workers are likely to be on the Application Site and the nature of the required work, the potential risk to future site workers is expected to be unchanged from the baseline	Negligible
Human Health - Neighbours	Low	Unlikely to be any significant effect above baseline conditions	Negligible
Groundwater	Low	Potential migration of new and existing contaminants in surface water and groundwater during occupation due to changes in drainage patterns, increased potential for leaching of contaminants from disturbed soil, increased number of contaminant pathways due to the introduction of service trenches, drainage runs etc.	Minor Adverse
Surface Water	Moderate		Minor Adverse
Ecological Systems	Low		Minor Adverse
Property	Very Low		Negligible

Environmental Assessment – Cumulative Effects (LAND CONTAMINATION)

- 10.55 With respect to ground contamination at the other Committed and Pending Developments in the area of the Proposed Development that have been identified for assessment of potential cumulative effects (**See Table 2.1**), conditions attached to any future planning applications will indicate that appropriate measures will be required to mitigate any potentially adverse effects on human health, the environment and the built environment related to ground contamination which will be enforced as part of those developments.

- 10.56 On this basis, the cumulative potential adverse effects on human health, the environment and the Proposed Development with respect to ground contamination is assessed to be not significant.
- 10.57 Land contamination risks have been assessed in terms of potential impacts to surface water receptors which is also discussed in Chapter 9 (Water Resources).

Mitigation & Monitoring (LAND CONTAMINATION)

- 10.58 The measures proposed to mitigate the identified potential effects of the Proposed Development relating to land contamination are discussed in this section with respect to the potential receptors identified in this assessment.
- 10.59 It is presumed that construction activity will commence after appropriate pre-commencement planning conditions are stipulated and discharged and so any ground investigations and remedial works will have been carried out, in accordance with good practice and statutory controls to meet the intended end use. Sufficient remediation will be carried out to ensure that the Application Site is suitable for the proposed end use. The hazard classification / potential for generating contamination for the Application Site would be reduced to at least Low for all areas, accordingly.
- 10.60 A Construction Environmental Management Plan (CEMP) will be submitted with a planning application. This will be prepared by the Principal Contractor and will include specific measures as appropriate, for the protection of environmental receptors and human health during construction and will therefore provide adequate control for any effects that arise during construction.

Human Health – Maintenance/Site Workers

- 10.61 To mitigate any potential risk, appropriate protective clothing and equipment will be worn by site workers; and good standards of hygiene adopted to prevent prolonged skin contact, inhalation and ingestion of soils during construction. In addition, the methods of working will be selected to limit the potential for air-borne dust to arise associated with the excavation and disturbance of the soils present on the Application Site.
- 10.62 To mitigate any potential risk associated with the inhalation of potentially hazardous ground gases, appropriate ventilation will be provided to all confined spaces and appropriate procedures adopted to ensure they are checked for hazardous gases prior to man-entry.
- 10.63 Should any localised areas of significant contamination be encountered during the works, the affected material would either be treated on site or excavated and removed off-site by licensed waste carriers and disposed of at an appropriate licensed facility. Where remediation of any contaminated ground or groundwater is required, an implementation and verification process will be established and agreed with the Local Authority to identify the remediation activities required and to confirm that the remediation has been undertaken correctly. This will be secured by a planning condition relating to land contamination.

Human Health - Future Occupiers

- 10.64 To mitigate any potential risk associated with the inhalation of potentially hazardous ground gases, the gassing regime at the Application Site will be characterised through ground investigation and monitoring to inform a ground gas risk assessment. Gas protection measures, such as a proprietary gas resistant membrane and/or passively vented under floor sub-space, may be required in proposed buildings subject to the outcome of the ground gas risk assessment.
- 10.65 In general, the removal and/or remediation of any contamination sources, either pre-construction and/or those discovered during construction, together with any localised remedial action necessary will reduce risks to all receptors, including future occupiers, during operation.

Groundwater, Surface Water & Ecological Systems

- 10.66 During the construction phase, contamination could be introduced to the Application Site through spillages or losses from temporary chemical/fuel storage. The proposed works will be carried out in accordance with current good environmental practice and guidance for construction. As such, any contamination generated in this way is expected to be small scale and the assessment does not consider these as separate sources.
- 10.67 The construction works will require the importation of fill materials including capping and sub-base to areas of pavements and hard surfacing, bedding and surround to the drainage system, and topsoil and subsoil to gardens and landscaped areas. All imported fill materials will be tested to ensure the concentrations of potential contaminants are below the guideline values for a residential development.
- 10.68 Risks to environmental receptors following construction will result from the potential migration of pollutants associated with uncontrolled/accidental spillages or discharges from development activities. Design measures will be proposed to mitigate against such risk and will follow best practice in drainage design, such as the use of trapped gullies, petrol/oil interceptors etc.

Property

- 10.69 No specific mitigation measures are required to mitigate potential risks to the Proposed Development.

Summary OF RESIDUAL EFFECTS (LAND CONTAMINATION) – AFTER MITIGATION

- 10.70 The potential adverse effects of the Proposed Development related to ground contamination are assessed as the change in degree of risk to site workers, neighbours and environmental receptors during the construction works and to future site users and environmental receptors during the use of the Proposed Development. These potential adverse effects will be mitigated through the implementation of remediation where necessary, and /or appropriate mitigation measures.
- 10.71 It is therefore concluded that the adverse potential effects associated with ground contamination and hazardous ground gases do not pose an unacceptable constraint to the Proposed Development.

Table 10.7: Assessed Residual Risks and Significance of Potential Effects Relative to Existing Baseline Conditions

Receptor	Baseline Risk Assessment	Assessed Risk	Significance of Residual Effect	Justification
Construction				
Human Health - Site Workers	Low	Low	Negligible	The provision of appropriate protective clothing and adoption of good standards of hygiene and appropriate methods of working will mitigate many of the significant effects to site workers. The potential adverse effect to site workers during the construction works will, at worst, remain as Low.
Human Health - Neighbours	Low	Low	Negligible	Mitigation measures as detailed in the CEMP to reduce exposure by dust and vapours will prevent any adverse effect on neighbours
Groundwater	Very Low	Very Low	Negligible	The modification of pollution pathways or remediation involving the selective removal or in-situ remediation of impacted soils will reduce the likelihood of a contamination event.
Surface Water	Low	Low	Negligible	
Ecological Systems	Very Low	Very Low	Negligible	
Property	Very Low	Very Low	Negligible	Appropriate measures will be adopted during construction to mitigate any potential sources of contamination arising from these works. On this basis, possibility of pollution incidents during construction will not adversely affect these receptors.
Occupation				
Human Health – Maintenance /Site Workers	Low	Very Low	Minor Beneficial	The removal and / or remediation of any contamination sources discovered, together with any localised remedial action necessary will prevent any adverse effect on future maintenance workers.
Human Health - Site Users	Low	Low	Negligible	The removal and / or remediation of any contamination sources discovered, together with any localised remedial action

Receptor	Baseline Risk Assessment	Assessed Risk	Significance of Residual Effect	Justification
Human Health - Neighbours	Low	Low	Negligible	necessary will prevent any potential adverse effect on future site users.
Groundwater	Very Low	Very Low	Negligible	The removal and / or remediation of any contamination sources discovered, together with any localised remedial action necessary, will prevent any adverse effect on environmental receptors.
Surface Water	Low	Very Low	Minor Beneficial	
Ecological Systems	Very Low	Very Low	Negligible	
Property	Very Low	Very Low	Negligible	

SCOPE AND METHODOLOGY (LAND STABILITY)

- 10.72 This assessment, which is based on the findings of the Phase 1 Ground Condition Assessment, seeks to establish the current baseline conditions in respect of land stability, before identifying and assessing the potential impacts that may arise due to the Proposed Development, and the effects on identified receptors from the impacts.
- 10.73 The significance of any effects of the development related to land stability are then determined by comparing the likely effects associated with the Construction Phase to the Baseline Conditions, and the likely effects associated with the Operational Phase to the Baseline Conditions, both without and then with mitigation measures in place.
- 10.74 Evaluation of the ground conditions (from a land stability perspective) at the Application Site is based on the suitability of the geomorphological and geotechnical properties of the ground for the intended end use, and the processes and treatment of the ground that may be required to achieve that end use.
- 10.75 The significance of the effects of these processes has been assessed by comparing the likely impacts of the interactions between these processes and the existing ground conditions. Factors taken into consideration include;
- Magnitude, scale and duration of the impact
 - The sensitivity of any receptors identified
 - The level of risk that an impact will occur
 - Effectiveness of any mitigation measures
- 10.76 For the purposes of this ground condition chapter, the following criteria have been adopted to describe the magnitude of impacts;

Table 10.8 Magnitude of Impacts (Land Stability)

	Adverse	Beneficial
Large	Complete destruction of the affected receptor/feature.	Complete restoration/remediation of the affected receptor/feature
Moderate	Fundamental adverse changes to the affected receptor/feature.	Fundamental improvements to the affected receptor/feature.
Small	Limited adverse changes to the affected receptor/feature.	Limited improvements to the affected receptor/feature.
Negligible	No material change to receptor/feature	No discernible impact.

- 10.77 A receptor/feature is classified in terms of its value or sensitivity; the criteria used in this ground conditions chapter are described in **Table 10.9** below. The human health and built environment classifications have been generated by PBA using professional judgement for each class.

Table 10.9 Sensitivity of Receptors (Land Stability)

	Built Environment	Human Health
High	Residential, commercial, education and employment development, motorways and A roads, mainline railway line, power transmission lines (grid), gas/oil pipelines	Residential, employment and uses where children are present, construction workers
Medium	Dual carriageway, B road, branch line railway, power distribution lines (local)	Public Open space
Low	Local services, C road	Limited access / Private land
Negligible	None	Unoccupied

- 10.78 This approach allows any effects of the Proposed Development during the Construction and Operational Phases to be identified as Beneficial or Adverse (except where negligible) and, depending on the magnitude of the change in impact, to be assessed as being Negligible, Minor, Moderate or Major. Major and Moderate Adverse Effects (in yellow below) are identified as Significant.

Table 10.10 Significance of Effects (Land Stability) – Relative to Existing Baseline Conditions

MAGNITUDE OF IMPACT	SENSITIVITY OF RECEPTOR			
	High	Medium	Low	Negligible

Large	Major	Major	Moderate	Minor
Moderate	Major	Moderate	Minor	Negligible
Small	Moderate	Minor	Minor	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

10.79 It should be recognised that, due to the outline nature of the application, no assessment has been made of the location of individual specific future buildings, albeit the intended uses in the locations as identified by the Parameter Plans (**Figures 1.2 to 1.6**) have been considered as part of the assessment.

10.80 Given the land use (historical and current) across the Application Site, and baseline data available, the assessment presented herein is considered appropriate for a preliminary characterisation of the Application Site sufficient for robust environmental assessment testing.

BASELINE CONDITIONS – LAND STABILITY

10.81 The baseline conditions at the Application Site have been determined from a review of available published information, as described earlier in this chapter.

10.82 This information is presented in the Phase 1 GCA report that has been prepared for the site by PBA and is included at Appendix 10.1.

Site History and Present Use

10.83 The history and present use of the Application Site is described earlier in this chapter. From the perspective of land stability, whilst the majority of the Application Site is flat, undeveloped land, there are areas within the Application Site where the natural ground conditions and historical use may result in the potential for geological stability hazards to exist.

Potential Geological Hazards – Relative to Existing Baseline

Natural and Artificial Cavities

10.84 A search of the PBA Natural Cavities Database indicated that there are no natural cavities recorded within 2km of the centre of the Application Site, with the nearest recorded natural cavity located approximately 3.4km to the south-east of the Application Site centre. Given the anticipated ground conditions at the Application Site, the risk of ground instability associated with natural cavities has been assessed as Very Low.

10.85 The Coal Authority's Online Gazetteer indicates that Swindon is not an area that requires a coal and brine mining search. Therefore, given the anticipated ground conditions at the Application Site, the risk of ground instability associated with coal mining has been assessed as Very Low.

10.86 A search of the PBA (Non-Coal) Mining Cavities Database indicated that there are no recorded non-coal mining cavities within 2km of the Application Site centre. The nearest recorded mining cavity is located approximately 12km, south-west of the Application Site centre. Given the anticipated ground conditions at the Application Site, the risk associated with non-coal mining cavities has been assessed as Very Low.

Collapsible Ground

- 10.87 Based on the anticipated ground conditions, the risk of collapsible ground is considered to be Very Low.

Compressible Ground

- 10.88 Made Ground may be present in some localised areas associated with the current and former uses of Lotmead Farm and Business Village, infilled ponds, infilled drainage ditches and watercourse meanders. Possible changeable ground conditions over short distances between the Made Ground and natural soils give rise to potential adverse foundation conditions. Soft compressible and poorly consolidated Made Ground may result in significant and potentially damaging total and/or differential settlements of any buildings founded on these materials.
- 10.89 Based on the available BGS geological map record, there is potential for areas of potentially 'weak' alluvial soils to be present on site (see **Figure 10.1**). The alluvial soils may potentially be 'soft', contain loose granular soils, or contain highly compressible peat or organic horizons and may be water-bearing. Significant thicknesses of alluvial soils on-site would likely require engineering solutions associated with the potential requirement for foundations to be deepened to bear in a competent stratum, for piled foundations to be necessary or for foundation and service trenches to require full side support and dewatering.

Running Sand

- 10.90 Based on the anticipated ground conditions, those parts of the Application Site underlain by Alluvium should be designated as a Low risk with respect to running sand because it is possible that the deposit may contain water bearing granular strata. The remainder of the Application Site can be considered as No Hazard.

Unstable Slopes/ Landslides

- 10.91 The Application Site slopes on a very shallow gradient at an average of around 1 degree to the north-east and therefore the risk of slope instability is considered to be Very Low.

Clay Shrinkage and Swelling/Heave

- 10.92 The BGS mapping indicates that the majority of the Application Site is directly underlain by bedrock strata of the Kimmeridge Clay and Amptill Clay Formations and on the northern and eastern parts of the Application Site these formations are present beneath deposits of Alluvium. Therefore, the presence of clay soils will require consideration as will the potential for compressible Alluvium and Made Ground associated with Lotmead Farm and Business Village, identified infilled ponds, drainage ditches and watercourse meanders.
- 10.93 All clay soils are to a varying degree susceptible to shrinkage and swelling due to both seasonal effects and due to the effect of trees and other vegetation. Standard geotechnical classification tests are likely to classify the clays of Kimmeridge Clay and Amptill Clay Formations as high volume change potential soils (**Ref 10.4**).

Aggressive Ground Conditions

- 10.94 The Amptill and Kimmeridge Clay Formations are known to contain sulphates that in certain conditions are known to chemically attack buried concrete. Over time, this chemical attack can lead to a reduction in foundation integrity and structural damage.

Table 10.11 Assessed Hazard Potential of Geological Hazards

Potential Geological Hazard	Assessed Hazard Potential	Taken Forward Through Impact Assessment
Natural and Artificial Cavities	No Hazard	No
Collapsible Ground	Very Low	No
Compressible Ground	No Hazard (site wide) to Moderate (local)	Yes
Running Sand	No Hazard (site wide) to Low (local)	No
Unstable Slopes/Landslides	Very Low	No
Clay Shrinkage and Swelling/Heave	Moderate	Yes
Aggressive Ground Conditions	Moderate	Yes

ENVIRONMENTAL ASSESSMENT (LAND STABILITY)

- 10.95 The potential effects associated with the Proposed Development relate to the development of significant additional built environment in areas where there are potential effects from geological stability hazards, and subsequently the introduction of new receptors (humans, buildings and infrastructure) that could be affected by the identified hazards.
- 10.96 The potential effects are presented in Table 10.12 with respect to features/receptors and the potential geological hazards identified.

Table 10.12 Description of Effects (Land Stability) – Relative to Receptors

Receptor	Description/Comment
Built Environment	Damage or collapse of buildings and infrastructure due to ground movements related to compressible ground or shrinkable clay soils/heave.
The Ground	Movement due to compressible ground or shrinkable clay soils/heave, leading to ground loss or deterioration in its geotechnical properties.
Human Health	Death or injury due to collapse of buildings and damage to infrastructure due to ground movements related to compressible ground or shrinkable clay soils/heave.

Construction Stage

- 10.97 During the construction stage, the number of and length of time that site workers would be on the Site will increase compared with the current situation. The potential effect on

site workers from the identified geological hazards (without mitigation measures) is considered to be Minor Adverse in relation to ground movements due to compressible/shrinkable/aggressive ground conditions. This is because the sensitivity of the receptor is High (human health) and the magnitude of potential impact is Negligible (i.e. no material change to the receptor).

- 10.98 Throughout the phases of construction, there will be increasing development completed including buildings and associated infrastructure. The potential effects on the built environment and the ground from the identified geological hazards (without mitigation measures) is considered to be Minor Adverse in relation to ground movements due to compressible/shrinkable/aggressive ground conditions. This is because the sensitivity of the receptor is High (housing) and the magnitude of potential impact is Negligible (i.e. no material change to the receptor).

Operation Stage

- 10.99 It is proposed to develop the Application Site for mixed use including residential, employment and education, together with associated local infrastructure. Once completed, there will be a much larger quantity of built environment at the Application Site over the current baseline and increased numbers of site users who will be within the Application Site for longer periods.
- 10.100 The potential effect on site users from the identified geological hazards (without mitigation measures) is considered to be Minor Adverse in relation to ground movements associated with compressible and shrinkable soils. This is because the sensitivity of the receptor is High (human health) and the magnitude of potential impact is Negligible (i.e. no material change to the receptor).
- 10.101 In the operation stage the potential effects on the built development and the ground from the identified geological hazards (without mitigation measures) is considered to be Moderate Adverse in relation to ground movements from the compressible/shrinkable soils. This is because the sensitivity of the receptor is High (housing) and the magnitude of potential impact is Small (i.e. limited adverse changes to the receptor).

10.102 Mitigation & Monitoring (LAND INSTABILITY)

- 10.103 The measures proposed to mitigate the identified potential effects of the Proposed Development related to land instability and geological hazards are discussed in this section with respect to the identified potential adverse effects.
- 10.104 The Proposed Development will require site specific ground investigation prior to commencement of the development. This investigation will identify any areas where subsequent specific ground improvement or remediation/mitigation is necessary.

Compressible Ground

- 10.105 It is proposed to construct buildings on foundations with loads transferred to competent ground. Where necessary, this may require the use of ground improvement or piled foundations. Due allowance will be made in the design and construction of piled foundations for down-drag on the pile shafts resulting from settlement of the surrounding ground. The use of pile foundations will limit movements of the proposed buildings and prevent undue damage or distress to those buildings.

10.106 With regard to the proposed infrastructure, this will be designed to accommodate potential ground movements by, for example, inclusion of geogrid reinforcement in the granular sub-base to roads, and the provision of flexible connections and increased falls to drainage pipes. Alternatively, it may be more cost effective to dig out the compressible material and replace with an engineered fill.

Clay Shrinkage and Swelling/Heave

10.107 It is proposed to adopt full clay site protocols as per NHBC Standards (**Ref 10.7**). This may require the localised deepening of conventional shallow foundations or the use of ground improvement or piled foundations if necessary.

Aggressive Ground Conditions

10.108 It is proposed to design buried concrete to resist aggressive ground conditions in accordance with the requirements of BRE's Special Digest 1 Concrete in aggressive ground (**Ref 10.1**).

Summary of Residual Effects (LAND STABILITY)

10.109 Residual effects are those that are predicted to remain after implementation of the mitigation measures described above, and the residual effects related to land stability relative to the construction and use of the development once completed have been assessed and are presented in this section and summarised in Table 10.13.

10.110 Therefore, following the implementation of the mitigation measures described in the sections above, it is considered that there will be a Minor to Moderate Beneficial residual effect relating to land stability at the Application Site overall.

Table 10.13 Summary of Residual Effects (Land Stability)

Potential effect	Significance (pre-mitigation)	Mitigation measure	Significance of residual effect
Construction stage			
Harm to construction workers	Minor Adverse (in relation to ground movements from compressible/shrinkable soils)	Appropriate ground investigation identification/implementation of any ground improvement, remediation/mitigation together with appropriate design and construction techniques.	Minor Beneficial
Damage to the built environment and the ground	Minor Adverse (in relation to ground movements from compressible/shrinkable soil)		Minor Beneficial
Operation stage			
Harm to site users	Minor Adverse (in relation to ground movements from compressible/shrinkable soils)	Appropriate ground investigation identification/	Minor Beneficial

	kable soil)	implementation of any ground improvement, remediation/mitigation together with appropriate design and construction techniques.	
Damage to the built environment and the ground	Moderate Adverse (in relation to ground movements from compressible/shrinkable soil)		Moderate Beneficial

11. Transportation

Purpose & Parameters of the Assessment

- 11.1 This chapter has been prepared by Peter Brett Associates LLP (PBA) to summarise the assessment of the likely environmental effects of the project in terms of transportation. The development proposals relate to *“An outline application (with all matters reserved save the detailed access off Wanborough Road) for demolition and/or conversion of the existing buildings on site, and redevelopment to provide:*
- Up to 2, 500 residential units (Use Class C3);
 - Up to 1,780 sq m of community/retail uses (Use Classes D1/D2/A1/A2/A3/A4);
 - Up to 2,500 sq m of business/employment use (Use Class B1) (comprising the retention of Lotmead Business Village and a net increase of c. 1,000 sq m of Use Class B1);
 - A Sports Hub with playing pitches and changing facilities;
 - 2 no. 2 Form Entry Primary Schools (2.2 ha per school);
 - Open space, strategic landscaping and other green infrastructure (including SUDs and areas for nature conservation);
 - Other associated road and drainage infrastructure;
 - Indicative primary access road corridors to the A420 and alignment with the Southern Connector Road; and
 - Improvements and widening along Wanborough Road for pedestrian, cycle and bus access.”
- 11.2 A Transport Assessment (TA) and a Framework Travel Plan (FTP) have been prepared to support the planning application, and are included in **Technical Appendix 11.1** and **11.2**. The reader is referred to these where further information is provided.
- 11.3 This Chapter includes a review of the current conditions within the area, outlines the mitigation measures that have already been incorporated into the design, or that will be implemented in the future, and assesses the significance of the effects of the Proposed Development. An assessment of the construction impacts and operational impacts has also been undertaken. As agreed with the Highways Authority, traffic flows include data from the Redlands planning application to assess cumulative impacts.
- 11.4 The assessment considers the potential impacts of the development including consideration of the first phase of development (known as Wanborough Green and comprising circa 200 homes) which is proposed to have direct access onto Wanborough Road. This Environmental Statement assesses the Proposed Development based on the likely construction completion year of 2040 for the site. However, traffic flows have been obtained from SBC’s ‘Swindon Strategic Highway Model’ (SHM), which has a future year of 2036. It has

been agreed with the SBC Highways that the development should be tested in the 2013 model as a proxy for 2040.

- 11.5 Previous applications for the development, and work undertaken to support the Appeal cases were based on 2,600 homes and 3,000 sq m of employment. Traffic modelling undertaken using SHM were based on 2,600 homes and 3,000sq m employment and therefore the assessments in the current Transport Assessment has been based on this level of development rather than 2,500 homes and 2,500 sq m employment applied for. This assessment is subsequently based on 2,600 homes and 3,000 sq m of employment and provides a robust assessment.

Legislative and Policy Framework

- 11.6 The legislative and policy context of the assessment is discussed in the following paragraphs.

National Planning Policy Framework (NPPF) (February 2019)

- 11.7 The NPPF (ref 11.1) sets out the Government's economic, environmental and social planning policies for England. Taken together, these policies articulate the Government's vision of sustainable development, which should be interpreted and applied to meet local aspirations.
- 11.8 The NPPF recognises the importance transport policies have in facilitating development but also in contributing to wider sustainability and health objectives. The NPPF identifies at paragraph 111, that *'all developments that generate significant amounts of movement should be supported by a Transport Statement or Transport Assessment. Plans and decisions should take account of whether:*
- (a) "appropriate opportunities to promote sustainable transport modes can be – or have been – taken up, given the type of development and its location;
 - (b) safe and suitable access to the site can be achieved for all users; and
 - (c) any significant impacts from the development on the transport network (in terms of capacity and congestion), or on highway safety, can be cost effectively mitigated to an acceptable agree."
- 11.9 NPPF paragraphs 34 to 36, identifies that Local Authority 'plans and decisions should ensure developments that generate significant movements are located where the need to travel will be minimised and the use of sustainable transport modes can be maximised. Plans should protect and exploit opportunities for the use of sustainable transport modes for the movement of goods and people.'

Swindon Local Transport Plan 3: 2011 – 2026, Main Strategy (April 2011)

- 11.10 The Local Transport Plan (ref 11.2) aims to reduce reliance on the private car. To encourage travel by more sustainable modes, the strategy includes the following elements;
- Rapid Transit Network;
 - Improved bus services and an orbital bus route;
 - Improved pedestrian and cycle networks and facilities;

- Parking Interventions; and
- Intelligent Transport Systems.

Swindon Borough Local Plan 2026 (Adopted March 2015)

11.11 Policies contained within the adopted Local Plan (ref 11.3) that would be relevant to transport considerations of the New Eastern Villages are identified as follows.

Policy TR1: Sustainable Transport Networks

11.12 This policy states that the council will use its planning and transport powers to help reduce the need to travel, and support and encourage the sustainable, safe and efficient movement of people and goods within and through the Borough. This will be achieved by [in summary]:

- Enabling a reliable and efficient transport network;
- Promoting and improving safety, security and healthy lifestyles;
- Promoting equality of opportunity and access to services and facilities for all;
- Minimising emissions from transport;
- Supporting and contributing towards improving Swindon's sense of place and quality of life;
- Targeted investment to improve key junctions and corridors;
- Enabling the provision of a rapid transit network from the new urban extensions to Swindon Town Centre; and
- Medium to long distance vehicle movements will be positively encouraged through site access/egress locations, road design, and other highway measures to access the strategic highway network at its nearest point in Swindon rather than rat-run through inappropriate rural roads in the Borough, Wiltshire and adjacent areas.

Policy TR2: Transport and Development

- (a) "New development should be located and designed to reduce the need to travel and to encourage the use of sustainable transport alternatives, particularly walking and cycling, and provide the potential to maximise bus travel.
- (b) Development shall be permitted where proposals provide access that is appropriate to the scale, type and location without detriment to highways safety and local amenity, and where there is an existing safe and convenient pedestrian and cycle access or provision is made for such access;
- (c) Development shall be permitted where proposals will not prejudice or impede an existing or planned cycle route, or provision is made for a more satisfactory route;
- (d) Development that results in the loss of existing rights of way or their disruption shall only be permitted when adequate, acceptable alternative provision or diversions be arranged;

- (e) Development shall be permitted where proposals do not remove, narrow or materially impair the approved line of the Thames Path or Ridgeway National Trails, and/or public access to them;
- (f) Developments shall provide appropriate mitigating measures to offset any adverse impacts on the transport network at both the construction and operational stages;
- (g) To assess and mitigate the impact of development and to promote sustainable travel choices, the following information will be required to support planning applications:
 - A Transport Assessment: where the proposed development is likely to have significant transport and related environmental impact (in accordance with Department for Transport guidance);
 - A Transport Statement: where the development has relatively minor transport implications (in accordance with Department for Transport guidance); and
 - A Travel Plan: where the proposed development is likely to have significant transport and related environmental impact (in accordance with Department for Transport guidance).
- (h) Parking provision, including secure cycle and motorcycle parking, should be provided in accordance with the Council's adopted parking standards."

Policy NC3: New Eastern Villages – Including Rowborough and South Marston Village Expansion

- 11.13 Policy NC3 is a resulting policy for the New Eastern Villages and identifies a mixed use urban extension of approximately 8,000 new homes with associated retail, employment, education and leisure uses to the east of Swindon. The development will be formed of individual 'villages'.
- 11.14 Specifically, the policy identifies the key principles required to support development, infrastructure requirements, constraints that need to be respected and/or mitigated and delivery mechanisms. Swindon Borough Council's New Eastern Villages SPD expands upon Policy NC3 in greater detail, as summarised in the subsequent section.

Swindon Borough Council New Eastern Villages Planning Obligations Supplementary Planning Document (October 2016)

- 11.15 The NEV Eastern Villages Planning Obligations SPD (ref 11.4) and its evidence base such as the Swindon Eastern Villages Transport Study prepared by JMP (April 2011) set out the transport improvements needed for the NEV.
- 11.16 The SPD seeks to secure the provision and implementation of necessary infrastructure and key transport objectives relating to the NEV.
- 11.17 Planning obligations (proportionate to the scale of development) will be made towards the transport related infrastructure requirements for the NEV which are identified as follows:
 - White Hart Junction Improvements
 - Great Stall Bridge (formerly known as The Green Bridge)

- A420 Highway Improvements
- West of A419 Highway Works
- Southern Connector Road (SCR)
- Express Bus Network (Rapid Transit)
- Park & Ride at the NEV
- Bus Service Provision
- Highway links between development islands
- New link across the railway at footpath 5
- New Eastern Villages Framework Travel Plan (Residential element)

Swindon Borough Council New Eastern Villages Framework Travel Plan Supplementary Planning Document October 2016 (Ref 11.5)

- 11.18 This SPD sets out the principles and suggested management mechanisms that are recommended for adoption to reduce the number of single-occupancy car trips from the NEV development.
- 11.19 The SPD encourages developments to be *“designed to promote pedestrian and cyclist permeability between development islands, with a network of green infrastructure corridors offering dedicated non-vehicular routes. The public transport network will be supported by the walking and cycling network throughout the NEV, which will also link to the existing Swindon communities.”*
- 11.20 The SPD sets out the principles and benefits of Travel Planning and provides guidance for site specific travel plans.
- 11.21 Global objectives, targets and indicators are set out for the NEV which are high level aims to be supported by site specific objectives. Global mode share targets to cover the whole NEV are also set out.

“In line with the Swindon Borough Local Plan 2026 (Policies CM1- 4 and TR1 – 2), Swindon Local Transport Plan 3 (2011 – 2026) and SBC’s own guidance for developers, the NEV development aims to create:

- *1. Inclusive Communities*
- *2. Low car dependency*
- *3. Healthy and sustainable travel*
- *4. Safe and secure walking and cycling routes*
- *5. Low carbon emissions*
- *6. Equality of access*

- 7. Accessibility to key destinations in the town, particularly the town centre
- 8. Accessibility to key destinations within the NEV, especially the secondary school and district centre”

- 11.22 The SPD sets out key sustainable transport infrastructure and soft measures to support travel planning.
- 11.23 The SPD sets out a package of measures and provides a ‘per dwelling’ cost for developer contribution, *“enabling the Council to undertake all elements of the travel plan and comprehensively assess the impacts of development.”*

Consultation

- 11.24 A formal scoping exercise was not considered necessary in light of the longstanding nature of the project (with ES topics previously defined as part of the 2015 submission) and our in depth knowledge and understanding of sensitive receptors and likely significant effects.
- 11.25 Nonetheless, an informal scoping exercise was carried out as part of the pre-application discussions with Swindon Borough Council. The purpose of this exercise was threefold: (1) to confirm that the topics previously scoped in and out of the 2015 EIA remain applicable to the 2019 ES; (2) to seek confirmation from statutory consultees that the existing baseline data (including the data collated during the appeal) remains applicable or if supplemental surveys are required to support the 2019 ES; and (3) to confirm if the proposed tailoring of previously agreed methodologies (to ensure the 2019 ES takes into account the latest baseline and accords with the latest legislation, policy and guidance) were acceptable.
- 11.26 An Informal Scoping Note, providing an overview of the proposed ES structure and methodology of the assessment was submitted to SBC on 7th November. A response was provided by SBC on 11th December 2018.

Study Area

- 11.27 SBC required the development proposals to be tested in the SHM. This testing informed the identification of the study area for the ES, which was agreed with SBC. The study area includes the network where the development proposals were identified to have material traffic impact on its conditions. The locations of the junctions are provided within Figure 11.1.
- 11.28 The junctions included within the study area are as follows:
- (i) Site Access / Wanborough Road;
 - (ii) Merlin Way;
 - (iii) Kingfisher Drive;
 - (iv) Covingham Drive;
 - (v) A420;

- (vi) A419 (north of White Hart Junction);
- (vii) A419 (south of White Hart Junction);
- (viii) High Street;
- (ix) Callas Hill;
- (x) A4312 Oxford Road;
- (xi) Drakes Way;
- (xii) B4006 Dorcana Way;
- (xiii) A420 (between Gablecross Junction and White Hart Junction); and
- (xiv) A419.

Baseline Conditions

Access for Pedestrians

- 11.29 A network of private rural lanes and footpaths exist within the overall Site Boundary, which head north, east and south. A public footpath also exists leading from South Marston over the A419 to the north, to the south western corner.
- 11.30 The Site can be further accessed from existing public highway and/or Public Rights of Way from the south western boundary, connecting with either of the Lotmead Farm or Lotmead Business Village accesses onto Wanborough Road. A circa 1.5m – 2.0m footway on the western side of Wanborough Road provides pedestrian access north into Swindon traversing a bridge over the A419.
- 11.31 Once over the A419 bridge, the road becomes Merlin Way and leads to the residential area of Covingham. The estate includes a network of footways, which provides opportunity for pedestrian access to services and amenities both within the estate and also through to those available in surrounding areas of Swindon.
- 11.32 A network of suburban streets forms the Covingham estate. Merlin Way runs north – south on the east side of the estate and Dorcan Way runs north – south on the west side. Kingfisher Drive and Covingham Drive provide east – west routes between these main routes. The majority of these streets have footways of 1.5m – 2.0m in width on either side of grass verge separating footways from the carriageway, which includes Kingfisher Drive and Covingham Drive. Formal crossing points are provided where necessary, including tactile paving with dropped kerbs and in many cases benefiting from central refuge islands. Beyond Covingham, available pedestrian infrastructure broadly mirrors that of Covingham, providing a good quality pedestrian environment within the suburban eastern side of Swindon. Similarly, Swindon town centre provides good quality pedestrian infrastructure.
- 11.33 Continuous footways are provided on the A4312 Oxford Road leading into the town centre. These are provided on both sides of Oxford Road. The southern side offers a circa 4m wide shared pedestrian/cycleway and on the northern side there is a dedicated 1.5 – 2.0m footway separated from the carriageway by grass verge.

- 11.34 The White Hart Roundabout is a large grade-separated roundabout, with the circulatory carriageway beneath the A419. Pedestrian demand through the roundabout is generally limited. However, a footway is provided around the north side of the roundabout from A4312 Oxford Road which connects to Ermin Street and to St Margaret's Retail Park on the A420.
- 11.35 Heading east towards Oxford from the White Hart Roundabout, the initial circa 600m of the A420 serves major adjacent land uses, including the Stratton Park Sainsbury's, Toys 'R' Us, St Margaret's Retail Park and Gablecross Police Station. Between St Margaret's Retail Park and the Police Station, a shared foot / cycle way is provided on the northern side of the A420. Between Gablecross Roundabout and White Hart Roundabout, a shared foot / cycle way is provided on the southern side.
- 11.36 Beyond the Gablecross Police Station, the A420 becomes a rural A-road and therefore pedestrian infrastructure provision is limited.

Pedestrian Access to Services and Amenities

- 11.37 An assessment has been carried out for the first phase of development (*i.e.* first 200 homes which will only have access onto Wanborough Road) in relation to accessibility to existing services and facilities. The Masterplan Application, and wider NEV, will deliver new facilities.
- 11.38 A review of services and amenities within a 30 minute walking distance of the first phase of development along existing infrastructure available to the site has been undertaken. Relevant types of services and amenities are identified as follows;
- Education – Nurseries, Primary and Secondary Schools;
 - Health – Hospitals and GPs;
 - Food Stores – Supermarkets and Convenience Stores;
 - Cashpoints;
 - Leisure Centres; and
 - Major Employment – Business Parks and Large Employers Outside of the Town Centre.
- 11.39 The review presents the range of identified services and amenities available within reasonable proximity of the first phase of development. This has been carried out using 'Geoconcept' based on a walking speed of 400m per 5 minutes, visualising six incremental 5 minute walking isochrones bands up to 30 minutes, as listed below:
- Up to 5 minutes;
 - 5-10 minutes;
 - 10-15 minutes;
 - 15-20 minutes;
 - 20-25 minutes; and

- 25-30 minutes.

- 11.40 The origin point is taken as the approximate centre of dwellings for the early delivery of 200 homes, where this would benefit the most from nearby services and amenities ahead of full implementation of the Masterplan Application Development and the wider NEV.
- 11.41 The resultant walking isochrones are shown in **Figure 11.2**.
- 11.42 A summary of key destinations identified on the walking isochrones plan is provided in **Table 11.2**.

Table 11.2: Key Walking Destinations

Destination	Walking Time
Poplars Day Care Nursery	0-5 minutes
Covingham Park Primary School	15-20 minutes
The Dorcan Academy Secondary School	20-25 minutes
Pantheon UK Ltd (major local employer)	20-25 minutes
Covingham Square Post Office	20-25 minutes
Covingham Square Convenience Store	20-25 minutes
The Dorcan Recreation Complex	20-25 minutes
Nythe Surgery	25-30 minutes
Stratton Park Sainsbury's Supermarket	25-30 minutes

Access for Cyclists

- 11.43 The Council's cycle map states that the Borough is 'a great place to cycle' and has a high rate of cycle commuters, given:
- the 'majority of the borough is quite flat';
 - there is 'an extensive network of off-road paths';
 - it is 'one of the safest places to cycle in the UK'; and
 - the National Cycle Route 45 provides access to the wider countryside.
- 11.44 The cycle routes in the eastern area of Swindon are provided within Appendix C of the TA.
- 11.45 Wanborough Road provides opportunity to access the west Site by cycle. Wanborough Road is a circa 7.3m (2 x 3.65m) wide rural distributor road and has only a moderate level of daily traffic movements, with an average HGV proportion of less than 2% in close proximity to the development site (recorded baseline traffic is discussed and referenced in subsequent sections).

- 11.46 Wanborough Road and subsequently Merlin Way is considered the most likely route for cyclists travelling to and from the Site, given that the majority of cyclists are anticipated to be travelling to destinations within Swindon, based on Census 2011 Travel to Work data.
- 11.47 Merlin Way and the roads within Covingham are more conducive for cycling on-street as the street characteristics become more typical to a suburban residential environment.
- 11.48 Both Kingfisher Drive and Covingham Drive provide continuation of these conditions for cyclists through to Dorcan Way, where there is a continuous off-road cycle route into Swindon Town Centre and the Techno Trading Estate, as well as the National Cycle Route 45.
- 11.49 The east-west cycle desire line across the White Hart Roundabout is facilitated by a grade-separated shared pedestrian/cycleway bridge between the A420 to the east and Oxford Road to the west, as identified in the pedestrian access section.
- 11.50 Once on Oxford Road (A4312), which is the eastern arterial route into Swindon, continuous cycle infrastructure is available leading into the town centre. This is provided as a circa 4m wide shared pedestrian/cycleway, which crosses junctions and links where necessary.
- 11.51 A circa 3.7m wide shared footway/cycleway is provided on the southern side on the A420 heading east towards Oxford from White Hart Roundabout for circa 600 metres. There is a crossing onto the northern side of the A420 at the Gablecross Roundabout, concluding at the Gablecross Police Station access.
- 11.52 As per the pedestrian access section, beyond the Gablecross Police Station, the A420 becomes a rural A-road and is the most direct route linking Swindon with Oxford, serving a primary purpose of accommodating the movement of vehicular traffic. Provision of cycle infrastructure therefore reduces, such that only the live carriageway of circa width 7.3m is present up to the Swindon/Oxfordshire border.

Cycle Access to Services and Amenities

- 11.53 The assessment has been carried out for the first phase of development only, as exact location of the services and amenities are not known with the wider NEV. A review of services and amenities within a 30 minute cycling distance of the initial 200 homes forming phase one, along existing infrastructure has been undertaken. Relevant types of services and amenities are identified as follows;
- Education – Primary and Secondary Schools;
 - Health – Hospitals and GPs;
 - Food Stores – Supermarkets and Convenience Stores;
 - Leisure Centres; and
 - Major Employment – Business Parks and Large Employers outside of the Town Centre.
- 11.54 The review presents the range of identified services and amenities available within reasonable proximity of the first phase of development. This has been carried out using 'Geoconcept' based on a cycling speed of 16kph, visualising six incremental 5 minute cycling isochrones bands up to 30 minutes, as listed overleaf:

- Up to 5 minutes;
- 5-10 minutes;
- 10-15 minutes;
- 15-20 minutes;
- 20-25 minutes; and
- 25-30 minutes.

- 11.55 The origin point is the same as for the pedestrian isochrones, which is the approximate centre of dwellings for the early delivery of the initial 200 homes, where this would benefit the most from nearby services and amenities ahead of full implementation of the Development and wider NEV.
- 11.56 The resultant cycling isochrones are shown in **Figure 11.3**.
- 11.57 A summary of key destinations identified on the cycling isochrones plan is provided in **Table 11.3**.

Table 11.3: Key Cycling Destinations

Destination	Cycling Time
Covingham Park Primary School	5-10 minutes
The Dorcan Academy Secondary School	5-10 minutes
Covingham Square Post Office	5-10 minutes
Covingham Square Convenience Store	5-10 minutes
The Dorcan Recreation Complex	5-10 minutes
Nythe Surgery	5-10 minutes
Stratton Park Sainsbury's Supermarket	5-10 minutes
Techno Trading Estate	10-15 minutes
Dorcan Industrial Park	10-15 minutes
Hobley Drive Aldi Supermarket	10-15 minutes
Swindon Town Centre	15-20 minutes
New College Swindon	15-20 minutes
Ocotal Way Tesco Extra	15-20 minutes
The Great Western Hospital	15-20 minutes

Swindon Railway Station	20-25 minutes
South Marston Industrial Estate	20-25 minutes
Cheney Manor Industrial Estate	25-30 minutes
David Lloyd Leisure Centre	25-30 minutes
Nationwide Head Office	25-30 minutes

Access to Public Transport

Bus Services

- 11.58 A network of bus services operate within the Swindon urban area and to surrounding villages. The closest bus service, the 'Thamesdown Travel (TT) Service 2', operates on Merlin Way between Swindon Town Centre and Covingham/Nythe at a 15 minute frequency in the commuter periods with a typical journey time of 19 minutes. The service operates southbound along Merlin Way before turning into Kingfisher Drive and St Pauls Drive.
- 11.59 The bus stops nearest to the site are at 'Wrenswood', located on Merlin Way. These are located within 1km to the north-west, which equates to a 10-15 minute walk.
- 11.60 Given the above, it is feasible that (without improvement), a combined walking/bus trip to Swindon town centre from Wanborough Road could be undertaken within 30-35 minutes.

Train Services

- 11.61 Swindon Railway Station is situated on the Great Western Main Line between Bristol Temple Meads (and Cardiff under the Severn Tunnel) to the west and London Paddington to the east. As such, the station provides a popular commuter origin, in accessing Bristol/Cardiff and London as well as interim destinations along this corridor, including Reading, Chippenham, Bath, Cheltenham and Gloucester. Reading Railway Station provides further destinations including Manchester, Birmingham, Southampton and London Waterloo.
- 11.62 Swindon Railway Station is also located on the Swindon to Gloucester "Golden Valley" line and serves Kemble, Stroud and Stonehouse. Connections can also be made to Bristol-Birmingham line, for a number of connections towards the Midlands.
- 11.63 A summary of the key rail destinations available direct from Swindon Railway Station is provided in **Table 11.4**, identifying the frequency and journey times of services within the peak commuter periods.

Table 11.4: Key Rail Destinations from Swindon

Destination	Peak Commuter Periods		Typical journey time (mins)
	No. services to destination between 07:30-09:00	No. services from destination between 17:00-18:30	
London Paddington	5	5	55-60
Bristol Temple Meads	4	3	40-55
Cardiff	2	2	62-71
Reading	4	4	26-34
Bath Spa	3	2	27-28
Gloucester	1	1	51-56
Oxford	2	2	34-54
Birmingham New Street	4	2	105-145

Highways network and access***Strategic Road Network (SRN)***

- 11.64 Swindon is situated adjacent and to the immediate north of the M4, which provides a nationally strategic motorway route between the Second Severn Crossing north of Bristol, and West London Boroughs, as well as linking to the wider and national SRN.
- 11.65 Junctions 15 and 16 of the M4 provide links into Swindon, with Junction 16 providing a route from the west via the A3102 local route, and Junction 15 providing a continuation of the Department for Transport's Highways Agency (HA) managed SRN along the eastern side of Swindon on the A419 towards Cirencester.
- 11.66 The A419 provides access into the south-east of Swindon via the southern arterial route from the A4259/A419 Commonhead Roundabout. The White Hart Junction provides access into Swindon on the A420. The A420 also provides a route towards Oxford.

Local Road Network (LRN)

- 11.67 The Site currently has vehicle access onto Wanborough Road to the west. Wanborough Road is a single carriageway road of circa 7.3m in width and subject to a speed limit of 30mph.
- 11.68 Wanborough Road provides access into eastern Swindon via Merlin Way, as well as south towards Wanborough village. It is also possible to join the A419 via Wanborough Village and Pack Hill at the Commonhead Roundabout discussed above.
- 11.69 Merlin Way provides the most direct route to the A419 from Wanborough Road, via the White Hart Roundabout in a southbound direction and via A419/Merlin Way Roundabout in a northbound direction.

- 11.70 Merlin Way also provides access to Swindon via the White Hart Roundabout, where A4312 Oxford Road provides the main arterial route into Swindon from the east. Along this arterial route, Oxford Road becomes Slade Drive ahead of the Swindon Road / Slade Drive / Dorcan Way / Drakes Way Roundabout, then Drakes Way. Swindon Road provides access north to the Techno Trading Estate, which is the largest employment area in Swindon.
- 11.71 Continuing west, Drakes Way meets the southern arterial route into Swindon from the A419 Commonhead Roundabout at the Queens Drive/Drakes Way Roundabout to become Queens Way, which leads west into Swindon town centre via the 'Magic Roundabout'.
- 11.72 The centre of Swindon can also be accessed from Merlin Way via Covingham Drive and Kingfisher Drive, which adjoin Dorcan Way leading north to the Swindon Road/ Slade Drive/Dorcan Way/Drakes Way Roundabout discussed above. However, these are residential roads.
- 11.73 The A420 leads east towards Oxford from the White Hart Roundabout. Between the White Hart Roundabout and built extent of Swindon to the east, the A420 provides access to retail parks, the Police Station and South Marston.

Baseline Traffic within Study Area

- 11.74 As agreed with the Highways Authority, the 'Base Year' for the study area is 2014 and the traffic impact within the site must be assessed using the Swindon Traffic Model. This is a SATURN model with a forecast year model of 2036, as well as a Highways England (HE) operated PARAMICS model for the Strategic Road Network (SRN).
- 11.75 The Swindon Traffic Model (SATURN) provides baseline traffic links and turning flows for 2014 and 2036. 2014 is taken as the most appropriate 'Base Year' for traffic impact considerations for the proposed 2,500 homes at Lotmead Farm Villages. It should be noted that the modelling tested a higher level of homes at 2,600.
- 11.76 The baseline traffic flows for the study area are set out in **Table 11.1**.

Table 11.1: 'Base Year' Traffic Flows

Link No.	Link	2014 'Base Year' Traffic Flows (AADT)				
		Traffic Flows (18hr)	HGV (18hr)	Traffic Flows (24hr)	HGV (24hr)	Speed (mph)
1	Wanborough Road	3766	70	3821	73	30
2	Merlin Way	10721	167	11021	172	30
3	Kingfisher Drive	3634	70	3714	71	30
4	Covingham Drive	8434	183	8646	186	30
5	A420 (east of site access)	20277	25	21021	28	40

6	A419 (north of White Hart Junction)	47519	6110	49436	6745	70
7	A419 (south of White Hart Junction)	48337	6659	50284	7448	70
8	High Street	3201	64	3255	65	30
9	Callas Hill	1431	40	1456	41	30
10	A4312 Oxford Road	16240	14	16819	15	30
11	Drakes Way	25206	12	26107	13	40
12	B4006 Dorcan Way	13565	1392	14050	718	40
13	A420 Between Gablecross Junction and White Hart Junction	20277	2441	21021	2690	40

Review of Personal Injury Collisions

- 11.77 An analysis of Personal Injury Collision data has been undertaken for a 60-month period. A total of 293 accidents occurred in the study area, of which only 1% was fatal and 6% were serious accidents. The remaining accidents (93%) were classed as slight accidents. The analysis of contributory factors demonstrated that a majority (62%) were attributed to Driver / Rider Error or Reaction and only 3% were attributed to Road Environment.
- 11.78 Full detail of the analysis is set out in Chapter 4 of the Transport Assessment attached at **Technical Appendix 11.1**.

Scope and Methodology

Proposed Assessment Methodology

- 11.79 This section sets out the methodology applied to determine likely environmental effects of the Development during the construction and operational phases.
- 11.80 An EIA should focus on the likely significant environmental effects of development. While the Proposed Development would generate traffic that would use roads across a very wide geographic area, likely significant effects would be more localised.
- 11.81 The methodology used in this chapter has been developed to fulfil the requirements of the latest EIA Regulations (as amended) (ref 11.6) and guidance set out within:
- The *Guidelines for the Environmental Assessment of Road Traffic* published by the Institute of Environmental Assessment in 1993 (now the Institute of Environmental Management and Assessment) (ref 11.7);

- Volume 11, Section 2, Part 5 of the *Design Manual for Roads and Bridges* (DMRB) – Environmental Assessment (Highway Agency et al.) 2008 (ref 11.8); and
- *Travel Plans, Transport Assessments and Statements in Decision Making* – Department for Communities and Local Government (2014) (ref 11.9).

11.82 In accordance with the above, the assessment has considered likely significant environmental effects in relation to severance, driver delay, pedestrian delay and amenity, fear and intimidation, accidents and safety and hazardous loads.

11.83 The *Guidelines for the Environmental Assessment of Road Traffic* provides a general rule that can be used as a screening process to establish the extent of the assessment. The rules are as follows:

- ‘Rule 1 - Include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%); and
- Rule 2 - Include any other specifically sensitive areas where traffic flows have increased by 10% or more’.

11.84 Categories of receptor sensitivity have been defined based on the principles set out in the *Guidelines for the Environmental Assessment of Road Traffic*, although in detail, each receptor assessed will have a different sensitivity to each specific impact. **Table 11.5** sets out how the sensitivity or value of each receptor has been determined.

Table 11.5: Receptor Sensitivity

Receptor sensitivity/ importance	Definition	Example
High	Attribute with a high quality and rarity, local scale and limited potential for substitution. Attribute with a medium quality and rarity, regional or national scale and limited potential for substitution.	Schools, colleges and other educational institutions; retirement/care homes for the elderly or infirm; roads used by pedestrians with no footways; high pedestrian activity; accident black spots.
Medium	Attribute with a medium quality and rarity, local scale and limited potential for substitution. Attribute with a low quality and rarity, regional or national scale and limited potential for substitution.	Hospitals, surgeries and clinics; parks and recreation areas; shopping areas; roads used by pedestrians with narrow footways.
Low	Attribute with a low quality and rarity, local scale and limited potential for substitution	Open space; tourist/visitor attractions; historical buildings; churches

11.85 The magnitude of impact is defined in **Table 11.6**.

Table 11.6: Magnitude of impact

Magnitude of Impact	Description
High	Very large or large change in environmental conditions (e.g. pollution levels, destruction of habitat). This could result in exceedance of Statutory objectives and/or breaches of legislation.
Medium	Intermediate change in environmental conditions.
Low	Small change in environmental conditions.
Negligible	No discernible change in environmental conditions.

- 11.86 The two principal criteria for determining the significance of an environmental effect are the sensitivity of the receptor and magnitude of impact. These have been taken into account within this assessment based on **Table 11.7**.

Table 11.7: Significance of Effect Matrix

Sensitivity/Value of a Receptor	Magnitude of Impact			
	High	Medium	Low	Negligible
High	Major	Moderate	Moderate	Slight
Medium	Moderate	Moderate	Slight	Negligible
Low	Moderate	Slight	Negligible	Negligible

- 11.87 In EIA terms, only 'Moderate' and 'Major' effects are considered to be significant.
- 11.88 Definitions of each of the potential impacts identified in the *Guidelines for the Environmental Assessment of Road Traffic* are set out below along with explanatory text relating to assessment criteria. It is on this basis that the assessment in this chapter has been undertaken.

Severance

- 11.89 Severance is the perceived division that can occur within a community when it becomes severed by a major traffic artery. This may result from the difficulty in crossing of a heavily trafficked road or a physical barrier. Severance is difficult to measure and by its subjective nature is likely to vary between different groups within a single community. In addition to the volume, composition and speed of traffic, severance is also likely to be influenced by the geometric characteristics of a road, the demand for movement across a road and the variety of land uses and extent of community located on either side of a road. All these factors are considered when determining the likely severance effect. The DMRB provides thresholds of community severance based on either the Annual Average Daily Traffic (AADT) or the length of diversion to cross a road.
- 11.90 The *Guidelines for the Environmental Assessment of Road Traffic* state that where changes in AADT (as a result of the development) are 30%, 60% and 90% or higher, then these links can be regarded as producing 'low', 'medium' and 'high' changes in severance respectively.

However, the guidance acknowledges that the measurement and prediction of severance is extremely difficult.

Driver Delay

- 11.91 Delay to drivers generally occurs at junctions where opposing vehicle manoeuvres are undertaken with vehicles having to give or receive priority depending upon the type of junction arrangement. The guidance states that computer modelling programs can be used to assess the changes in driver delay on the network as a result of proposed development. The guidelines do not state specific thresholds to calculate the magnitude of the impact. However, guidance does advise that 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.

Pedestrian Delay and Amenity

- 11.92 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.
- 11.93 The determination of what constitutes a material impact on pedestrian delay and amenity is generally left to the judgement of the assessor and knowledge of local factors and conditions. However, the *Guidelines for the Environmental Assessment of Road Traffic* (Ref 11.7) suggest that pedestrian delay, the time a pedestrian has to wait before crossing a road, at an individual link should not exceed 40 seconds where no crossing facilities are available. It further advises that the lower threshold equates to a two-way flow of approximately 1,400 vehicles per hour.
- 11.94 Pedestrian amenity can be materially affected where traffic flow is halved or doubled. It can also be improved by the provision of new dedicated facilities or segregated routes.
- 11.95 **Table 11.8** below shows the magnitude scale applied to the category 'pedestrian delay and pedestrian amenity' for the purpose of this assessment.

Table 11.8: Pedestrian Delay - Scale of Magnitude

Magnitude	Description
High	Increase in traffic flow of >50%
Medium	Increase in traffic flow of 40%-50%
Low	Increase in traffic flow of 30%-40%
Negligible	Increase in traffic flow of <30% or Traffic flow less than 800 vehicles per hour*

*Note: This threshold is based upon the Manual for Streets (2007) threshold of 10,000 vehicles per day for traffic flow and road safety for streets with direct frontage access. Peak hour flow is estimated at approximately 8.5% of daily flow (850 vehicles), although this has been reduced to 8% (800 vehicles) in order to provide a robust assessment threshold.

Fear and Intimidation

- 11.96 Fear and Intimidation is broadly defined as the relative pleasantness of a journey, it is affected by traffic flow, traffic composition and pavement width / separation from traffic. It encompasses the overall relationship between pedestrians and traffic, including fear and intimidation which is the most emotive and difficult effect to quantify and assess. There are no commonly agreed thresholds for quantifying the significance of changes in pedestrian amenity, although the IEMA guidelines suggest the thresholds replicated in **Table 11.9**.

Table 11.9: Fear and Intimidation - Threshold Guidelines

Degree of Hazard	Average traffic flows over 18hr day (vehicles/hour)	Total 18hr HGV flow	Average vehicle speed over 18hr day (mph)
High	1,800	> 3,000	> 20
Medium	1,200 – 1,800	2,000 – 3,000	15 – 20
Low	600 – 1,200	1,200 – 2,000	10 – 15

- 11.97 Notwithstanding the thresholds set out above, the guidance suggests that they should be approached with a certain level of caution as the individual factors could be weighted by local circumstances to decide on the overall value of intimidation. For example, a road may show higher speeds but lower flows making crossing easier or high flows but congested and constant traffic, therefore reducing total fear of passing vehicles but increasing crossing difficulties.

Accidents and Safety

- 11.98 The guidance states that overall changes in vehicle kilometres on account of the proposed development may be used to assess the magnitude of impact on accidents and safety. However, the guidance does not prescribe specific criteria, which can be applied to the changes in vehicle kilometres to identify impact magnitude dependent on local circumstances such as traffic speed, flow and composition as well as vehicle conflict and pedestrian activity. The guidelines state that it is this combination that enables a professional judgement to be made regarding the significance of the effect.

Hazardous Loads

- 11.99 The guidelines state that the transport of dangerous or hazardous loads by road should be recognised in the Environmental Statement.
- 11.100 The effects of noise, visual effects and dust and dirt are assessed in more detail in **Chapters 13, 14 and 15** within the ES.

Sensitive Receptors

11.101 The sensitivity of highway users is dependent upon the impact. The strategic highway users will be less sensitive to increases in traffic than local highway users. The local area has been studied for sensitive receptors, which have been identified in **Table 11.10**.

Table 11.10: Sensitivity/value of receptor in Study Area

Link No.	Link	Description	Sensitivity/value of a Receptor
1	Wanborough Road	Single carriageway with a section footway on western side.	Low
2	Merlin Way	Single carriageway with wide verges and footways	Low
3	Kingfisher Drive	Residential road with wide verges and footways. Presence of Covingham Kingfisher Pre-School	High
4	Covingham Drive	Residential road with wide verges and footways	Low
5	A420 (west of Police Station Junction)	Single carriageway, highly trafficked and no pedestrian access	Low
6	A419 (north of White Hart Junction)	Dual carriageway, highly trafficked and no pedestrian access	Low
7	A419 (south of White Hart Junction)	Dual carriageway, highly trafficked and no pedestrian access	Low
8	High Street	Single carriageway with a footway on one side	Low
9	Callas Hill	Single carriageway with no footways	Low
10	A4312 Oxford Road	Single carriageway with footways on either side, medium level of pedestrian activity	Low
11	Drakes Way	Highly trafficked route to town centre, segregated service road on which footway is provided on southern side	Low
12	B4006 Dorcan Way	Single carriageway with wide verges and footways. Presence of Covingham Park Primary School and Dorcan Academy	High
13	A420 (between Gablecross Junction and White Hart Junction)	Single carriageway, highly trafficked and with pedestrian access	Low

11.102 The location of the links are shown on **Figure 11.4**.

11.103 All links in the study area have been identified as being 'low' sensitivity receptors with the exception of Kingfisher Drive and Dorcan Way which have been identified as being 'high' sensitivity receptors. Therefore, 'low' sensitivity receptors will be assessed against 'Rule 1' i.e. increase in traffic flows of more than 30%, has been used to identify the links which require further assessment in line with the criteria set out in the *Guidelines for the Environmental Assessment of Road Traffic*. The 'high' sensitivity receptors have been assessed against 'Rule 2' i.e. an increase in traffic flows of more 10% has been used to identify any links which require further assessment.

Baseline Data Collection

Desktop Studies

11.104 Public transport operator websites have been examined, along with discussions with the local bus operators in order to inform baseline public transport conditions. These included local bus operators and National Rail websites.

11.105 An analysis of Personal Injury Collision data has been undertaken for a 60-month period, this data was requested directly from SBC.

Traffic Model

11.106 Traffic impacts have been determined using the SHM, 200 homes will be accessed via Wanborough Road only, and the remaining 2,400 homes accessing via the Southern Connector Road, A420 East junction and A420 'The Hub' junction. SHM outputs are included in Appendix F of the TA (**Technical Appendix 11.1**).

11.107 Traffic flows obtained from the SHM within the study area are peak hour only and these have been converted into AADT traffic flows for the ES. Data from the TRICS database and ATCs from the baseline surveys was used to create a daily profile for each land use and used to factor the peak hours flows into daily flows.

Assessment Scenarios

11.109 This ES tests the following assessment scenarios;

- The Construction Phase; and
- The Operational Phase.

11.110 The Operational Phase assessment will comprise two assessment scenarios of up to 2,600 homes, employment, primary school and local centre, which is a robust assessment based on the development proposals.

11.111 The Operational Phase assessment scenarios are set out in further detail in **Table 11.11**.

Table 11.11: Operational Phase Assessment Scenarios

	Year	Scenario	Matrix (development) assumptions
Development	2036	Do Minimum	Committed 2036 Local Plan developments / NEV Infrastructure package

2036	Do Something	2036 Do Minimum + Development (full build out) / NEV Infrastructure package
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Environmental Assessment: Construction Phase

- 11.112 Traffic will be generated throughout the construction of the Development. This would principally be associated with the movement of construction personnel to the Site, the delivery of materials and the removal of waste materials.
- 11.113 Construction traffic would, however, vary during the construction period as a result of the processes that are underway at the Site, the intensity of construction and the number of staff on Site. It is therefore anticipated that the effects of construction traffic would be intermittent during the construction period and it may be that at some periods such effects would be negligible.
- 11.114 The construction traffic generation has been determined on the basis of the number of operatives and management staff required on Site and the material quantities to be imported through the duration of the works.
- 11.115 The construction process would require work to be undertaken in several different areas at the same time utilising a range of skills from general labourers and skilled operatives through to professionals and managers. It is envisaged that workers would originate from a variety of areas and that some would travel together to and from the Site.
- 11.116 Given the working hours on a construction site, construction worker trips are likely to occur outside the peak hours, i.e. before 08:00 and after 18:00. Similarly, HGV traffic would travel to the Site outside the peak hours i.e. between 09:30 and 16:30. Therefore, the construction phase is not expected to have an impact on the local road network during the peak hours.
- 11.117 The construction effect assessment is likely to be constant during construction period. This assessment assumes a construction completion year for the Development of 2036. It is likely that construction will not be completed by this year, however this presents a worst case in terms of percentage impact on the highway network as background traffic would be expected to increase per annum.
- 11.118 Based on the above assumptions, the construction of the Development is expected to generate a maximum of 60 two-way HGV movements per day or 8 HGV trips per hour during the construction period. It is worth noting that this is a peak rather than a typical level of traffic, particularly regarding deliveries.
- 11.119 At this stage, it is estimated that this peak would require up to 80 operatives and five management staff on the Site. Based on PBA's experience of these developments, a number of these trips would be shared due to the distances travelled by operatives and the fact that they often travel together from their depots rather than from home. On this basis, it has been estimated that a workforce of 85 would equate to 66 vehicle trips arriving before 08:00 and leaving after 18:00. These times would vary however because of the reduced hours of daylight in the winter.
- 11.120 In summary, as a worst-case assessment, the total construction traffic generated would be:

- 66 employee vehicle trips, before and after peak hours (before 08:00 and after 18:00 subject to the time of year);
- 60 two-way HGVs movements per day; and
- The construction phase could also result in a peak of 8 HGV movements in an hour.

Driver Delay

11.121 The development will result in an increase in HGV movements in the vicinity of the Site for the temporary duration of the construction period, compared to the baseline scenario. The construction period is anticipated to be up to 5 years although the exact phasing of each of the plots is unknown at this stage.

11.122 It is considered that the highest number of HGV movements will be associated with the first phases of construction which include all necessary enabling works and new permanent access routes into the development.

11.123 Construction traffic will route via the Strategic Road Network (SRN).

11.124 It is predicted that the Development will generate up to 60 two-way HGV movements per day during the intense enabling works phase of (i.e. groundworks, foundations). This is based on the premise that the gate team at the site would reasonably be able to process 3 vehicles per hour across an 8-hour working day. A comparison between the construction traffic HGVs and the AADT and % Heavy Duty Vehicles (HDV) for the surrounding highway is set out in **Table 11.12**.

Table 11.12 – Construction Traffic (HGV)

Link No.	Link	2014 'Base Year' Traffic Flows (AADT)			Construction	
		Traffic Flows	HGV	HGV %	HGV	Revised HGV %
1	Wanborough Road	3821	73	1.9%	60	3.5% (+1.6%)
2	Merlin Way	11021	172	1.6%	60	2.1% (+0.5%)
5	A420 (east of site access)	21021	28	0.1%	60	0.4% (+0.3%)
6	A419 (north of White Hart Junction)	49436	6745	13.6%	60	13.8% (+0.2%)
7	A419 (south of White Hart Junction)	50284	7448	14.8%	60	14.9% (+0.1%)

10	A4312 Oxford Road	16819	15	0.1%	60	0.5% (+0.4%)
13	A420 Between Gablecross Junction and White Hart Jnction	21021	2690	12.8%	60	13.1% (+0.3%)

11.125 This shows that the links within the study area that will be used in the routing are likely to see an increase in the proportion of HGVs of between 0.1% and 1.6%. The largest change on Wanborough Road and the smallest on A419 south of White Hart Junction.

11.126 The construction traffic is therefore anticipated to have a negligible impact on Driver Delay.

Pedestrian Severance

11.127 Pedestrian crossings around the vicinity of the site are signalised providing separate pedestrian phases. The level of HGVs associated with the construction phase are not considered likely to impact upon the signal timings or call times for any of the pedestrian crossings in the vicinity of the site.

11.128 The impact on pedestrian severance is therefore negligible.

Fear and Intimidation

11.129 The construction phase of the Development will result in an anticipated maximum level of HGV movements of approximately 60 two-way movements per day.

11.130 The HGV flows detailed above do not reach the threshold (greater than 600 vehicles per hour) for each of the three criteria for Fear and Intimidation as set out in **Table 11.9**.

11.131 The HGV construction traffic is therefore anticipated to have a negligible impact on Fear and Intimidation and Amenity.

Accidents and Safety

11.132 A review of Personal Injury Collision (PIC) data identified a total of 293 collisions over a five-year period. 17 of these (5.8%) collisions involved an HGV, which is considered proportionate to the level of HGV movements on the surrounding highway network, and therefore the small increase in HGVs is not expected to cause any significant risk on accidents.

11.133 As such the impact of HGVs during construction on road safety is considered negligible.

Conclusion

11.134 In conclusion, the construction of the Proposed Development is considered to have a **negligible** impact which would be temporary.

Environmental Assessment: Operation Phase

11.135 This section details the potential effects of the development once construction is completed and the site is in operation.

Driver Delay

11.136 The operation of the junctions within the Study Area with and without development is set out in within the TA (Technical **Appendix 11.1**). **Table 11-13** sets out the overall change in traffic volumes around the local highway network between the 2036 'Do Minimum' and the 2036 'Do Something' scenario.

Table 11.13 – Change in Traffic Volumes

Link No.	Link	2036 Do Minimum		2036 Do Something		% Impact of Development	
		18hr	24hr	18hr	24hr	18hr	24hr
1	Wanborough Road	5360	5441	6361	6465	19%	19%
2	Merlin Way	13243	13642	14041	14462	6%	6%
3	Kingfisher Drive	2034	2076	2109	2153	4%	4%
4	Covingham Drive	8391	8593	8724	8934	4%	4%
5	A420 (west of Police Station Junction) (east of site access)	29150	30269	30401	31564	4%	4%
6	A419 (north of White Hart Junction)	76907	80091	78631	81864	2%	2%
7	A419 (south of White Hart Junction)	74499	77739	74830	78072	0%	0%
8	High Street	2577	2626	2835	2890	10%	10%
9	Callas Hill	2329	2374	2368	2413	2%	2%
10	A4312 Oxford Road	24025	24911	24981	25887	4%	4%
11	Drakes Way	29470	30802	29698	31043	1%	1%
12	B4006 Dorcan Way	19454	20206	19529	20283	0%	0%
13	A420 (between Gablecross Junction and White Hart Junction)	50635	52398	54018	55885	7%	7%

11.137 The NEV transport mitigation package identified by SBC has been developed to accommodate traffic from the full NEV on the local highway network. The threshold will therefore not be reached, as the package is expected to accommodate the travel demands of the full NEV developments. Therefore, there is expected to be a negligible impact on driver delay.

Pedestrian Severance

11.138 The vehicle flows as a result of the Development is expected to bring about an increase of 0% to 19% of vehicles across the day, all of which are well below the 30% threshold identified in the Severance Criteria and is therefore considered to be negligible.

11.139 The Development is considered to have a negligible impact on Pedestrian Severance.

Fear and Intimidation

11.140 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, its HGV proportion, its speed and its proximity to people.

11.141 The assessment undertaken for the Development is based on the change in traffic flows, rather than the increase in HGV flows or traffic speeds, as it is expected that the Development will generate a very small volume of HGV movements and would therefore have a negligible impact during the operational phase.

11.142 The change in the 18-hour traffic flows between the 2036 'Do Minimum' and the 2036 'Do Something' scenarios result in flows that are below the threshold of a change of 600 vehicles per hour for a minor impact and is therefore considered negligible.

Accident and Road Safety

11.143 The analysis of accident data shows a low accident rate in the area surrounding the Site.

11.144 It is difficult to predict the effects of the development on accidents and road safety. For example, although the project would increase traffic flows on some links, this could lead to slower vehicle speeds, which may reduce the number and/or severity of accidents.

11.145 However, any increase in traffic generated by the Development could potentially increase the risk of accidents. This increase in risk is likely to be small, as the increases in traffic flows are low in comparison to baseline traffic flows. There will be walking and cycling improvements, which could lead to road safety improvements, particularly for vulnerable road users.

11.146 On balance, it is considered that the effect on Accidents and Safety will be negligible.

Hazardous Loads

11.147 During the operational phase it is not expected that the development will generate any hazardous loads, therefore there will be a negligible impact.

Conclusion

11.148 In conclusion, the Proposed Development is considered to have a negligible impact with the delivery of the NEV package set out in the Mitigation & Monitoring section.

Environmental Assessment: Cumulative effects

11.149 The following types of cumulative effects have been considered, to accord with the EIA Regulations and best practice guidance,

- **Effect interactions (intra-project):** the interaction and combination of environmental effects of the Proposed Development affecting the same receptor either within the Site or in the local area; and
- **In-combination interactions (inter-project):** the interaction and combination of environmental effects of the Proposed Scheme with a committed project (or projects) affecting the same receptor.

i) Effect Interactions (intra-project)

11.150 Environmental topics which share issues of Transportation include Air Quality and Noise and Vibration. Traffic data for the NEV and the anticipated flows from the Proposed Development has been shared amongst the consultant team and incorporated into the modelling undertaken to assess the environmental effects relating to noise and vibration and air quality. In consideration of the characteristics of the site and surroundings and the assessment findings of the relevant topic chapters, it is considered that likely significant intra-project effects will not arise.

ii) In-combination effects (inter-project)

11.151 SBC has assessed the cumulative impacts of the NEV as part of the evidence base for the Draft Swindon Local Plan 2011-2026. A package of transport infrastructure measures has been developed to accommodate the NEV as a whole.

11.152 As set out in the 'New Eastern Villages Planning Obligations SPD, the NEV infrastructure requirements comprises the following:

- White Hart Junction Improvements
- Great Stall Bridge (formerly known as The Green Bridge)
- A420 Highway Improvements
- West of A419 Highway Works
- Southern Connector Road (SCR)
- Express Bus Network (Rapid Transit)
- Park & Ride at the NEV
- Highway links between development islands
- New link across the railway at footpath 5
- NEV Framework Travel Plan (Residential element)

11.153 Given that the Cumulative scenario has already been tested by the Council, as part of the overall consideration of the NEV within the traffic model, it is not considered necessary to repeat this assessment.

Mitigation & Monitoring

11.154 The 'Primary Mitigation Measures have been outlined above under 'in-combination effects'. These are committed improvements that are inherent to the overall development of the NEV.

11.155 A Construction Environmental Management Plan (CEMP) will form a secondary mitigation measure which will stipulate construction traffic routes and times. The construction traffic would be routed via strategic roads to avoid the use of more sensitive roads. Contractors working on the Site would have to comply with this during construction.

11.156 During the operational phase the following secondary Mitigation will also be in place:

- Wanborough Road improvements, including footway widening, parapet heightening, traffic calming and crossing facility (See **Figure 11.5**);
- Contribution towards the traffic calming at Wanborough Road;
- Footway between the development and Wanborough Village; and
- Commitment to Travel Plans for the employment land uses and schools.

Summary of Residual Effects

11.157 This section sets out the effects of the Proposed Development, assuming that the mitigation detailed above is implemented. The residual effects affect the likely effect of the development on the environment having taken account of the mitigation measures.

- Adverse - Detrimental or negative impacts to an environmental resource or receptor; and
- Beneficial – Advantageous or positive impact to an environmental resource or receptor.

11.158 For impacts described as Beneficial or Adverse, define significance level as:

- Negligible – Imperceptible impacts to an environmental resource or receptor;
- Minor – Slight, very short or highly localised impact of no significant consequence;
- Moderate – More than a slight, very short or localised impact (by extent, duration or magnitude), which may be considered significant; and
- Major – Considerable impact (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability, legislation, policy or standards.

11.159 For the purposes of this EIA, moderate and major impacts will be deemed 'Significant'.

11.160 All mitigation measures detailed should be those that are required and as such will be designed into the development.

11.161 **Table 11.14** summarises the impacts relating to transportation.

Table 11.14 Summary Table of Transportation Impacts

Description of Likely Significant Effects	Significance (Major, Moderate, Slight, Negligible or Nil)	Effects					Description of Mitigation/ Enhancement Measures	Description of Residual Effects	Significance (Major, Moderate, Slight, Negligible or Nil)	Residual Effects					
		B/A, P/T, D/I, ST/M/LT, L/R/N								B/A, P/T, D/I, ST/M/LT, L/R/N					
Construction Phase															
Severance	Negligible	A	T	D	ST	L	CEMP	None	Negligible	A	D	ST	L	T	
Driver Delay	Negligible	A	T	D	ST	L	CEMP	None	Negligible	A	D	ST	L	T	
Pedestrian Delay and Amenity	Negligible	A	T	D	ST	L	CEMP	None	Negligible	A	D	ST	L	T	
Fear and Intimidation	Negligible	A	T	D	ST	L	CEMP	None	Negligible	A	D	ST	L	T	
Accidents and Safety	Negligible	A	T	D	ST	L	CEMP	None	Negligible	A	D	ST	L	T	
Hazardous Loads	Negligible	A	T	D	ST	L	CEMP	None	Negligible	A	D	ST	L	T	
Operational Phase															
Severance	Negligible	A	P	D	LT	L	Improved environment and facilities at Wanborough Road and Travel Plans	None	Negligible	B	T	D	LT	L	
Driver Delay	Negligible	A	P	D	LT	L	Improved environment and facilities at Wanborough Road and Travel Plans	None	Negligible	B	T	D	LT	L	
Pedestrian Delay and Amenity	Negligible	A	P	D	LT	L	Improved environment and facilities at Wanborough Road	None	Negligible	B	T	D	LT	L	
Fear and Intimidation	Negligible	A	P	D	LT	L	Improved environment and facilities at Wanborough Road	None	Negligible	B	T	D	LT	L	

Accidents and Safety	Negligible	A	P	D	LT	L	Improved environment and facilities at Wanborough Road	None	Negligible	B	T	D	LT	L
Hazardous Loads	Negligible	A	P	D	LT	L	Improved environment and facilities at Wanborough Road	None	Negligible	A	T	D	LT	L

(Beneficial or Adverse) (B/A), (Permanent or Temporary) (P/T), (Direct or Indirect) (D/I), (Short Term, Medium, Long Term) (ST/M/LT) (Local, Regional, National) (L, R, N)

12. Ecology and Nature Conservation (Including Arboriculture)

Purpose & Parameters of the Assessment

- 12.1 This chapter considers the likely direct and indirect impacts of the Proposed Development on ecological and arboricultural features of value. This includes the likely impacts on wildlife designations, habitats of nature conservation interest, legally protected and notable species of plants and animals (terrestrial and aquatic), and trees of arboricultural value.
- 12.2 This chapter includes a summary of the current baseline and predicted future ecological and arboricultural conditions and identifies measures to avoid, mitigate and/or compensate, where appropriate, for significant effects that may arise as part of the Proposed Development.
- 12.3 This chapter has been prepared by the Environmental Dimension Partnership Ltd (EDP); a firm of environmental planning consultants. Specifically, this Chapter has been prepared by an experienced Associate Ecologist who is a Chartered Environmental Scientist with the Society for the Environment (SocEnv), a full member of the Chartered Institute for Ecology and Environmental Management (MCIEEM), and who has over 16 years professional and relevant experience of ecology in an environmental planning context, including undertaking numerous ecological assessments for Environmental Impact Assessments.
- 12.4 Input to this chapter has also been provided by a Principal Arboriculturist who is a technical member of the Arboricultural Association and who has over 15 years professional and relevant experience of Arboriculture in an environmental planning context.
- 12.5 For reasons of clarity and due to the quantity of baseline ecological and arboricultural information collated during the assessment, the detailed methods, results and a full set of associated drawings are provided in technical appendices as follows:
- **Appendix 12.1:** Ecology Baseline Report (2017);
 - **Appendix 12.2:** Update Phase 2 Survey Report (2017);
 - **Appendix 12.3:** Arboricultural Impact Assessment (2019);
 - **Appendix 12.4:** Outline Landscape, Ecology and Arboricultural Management Plan (2018);
 - **Appendix 12.5:** Ecology Consultee Correspondence (2018).
- 12.6 This chapter draws upon and summarises these technical appendices.
- 12.7 The baseline work that informed and supported the previous planning application for the Application Site in 2017 ('Masterplan Application Site' and 'Phase 1 Application Site'), has not been updated (neither have the technical reports that supported the 2017 Environmental Statement). See **Appendix 12.1** and **12.2**. This is because it has been agreed with SBC that the baseline results are still 'in date' for the current application (See Consultation below).

The two ecology reports relate to the previous planning application (and subsequent appeal) are structured according to the 'Masterplan Application Site' and 'Phase 1 Application Site'. Nonetheless, the actual results are still applicable to the current Application Site.

- 12.8 With regard to the parameters of the Assessment, the extent of development in terms of scale and quantum of Green Infrastructure (GI) is set out in the Parameter Plans. These Parameter Plans identify the 'worst case' parameters (*i.e.* maximum extent of developable areas and minimum quantum of open space, include the likely distribution of these features). The GI Parameter Plan is of particular relevance to this Chapter and identifies the distribution and quantum of areas managed specifically for biodiversity ('biodiversity zones'), amounting to c.15.4ha, and areas where existing vegetation will be retained.
- 12.9 The other technical topics of the EIA Report that are directly relevant to this EclA are Socio-Economics & Human health (Chapter 8), Water Resources (Chapter 9), and Landscape & Visual (Chapter 13). These will be cross-referred throughout this chapter, where appropriate to the assessment.

Legislative and Policy Framework

- 12.10 The following legislation, policy, and guidance are relevant to the assessment. These have been taken into account during the assessment, since it is against this background that the Proposed Development will be judged to be acceptable on the grounds of biodiversity and arboriculture.

European Wildlife Legislation

- 12.11 The Conservation of Habitats and Species Regulations 2017 enacts, within the UK, the European Directives EU Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (as amended) and Directive 2009/147/EC on the Conservation of Wild Birds. These Regulations provide for the designation and protection of statutory designations of European value ('European sites'), and the protection of a number of rare and vulnerable species in a European context ('European Protected Species' – EPS). European sites, including Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Ramsar Sites are recommended for designation in the UK by the Joint Nature Conservation Committee (JNCC).

National Wildlife Legislation

- 12.12 The *Wildlife and Countryside Act 1981* (as amended, principally by the *Countryside and Rights of Way Act 2000* and the *Natural Environment and Rural Communities Act 2006*) enshrines the protection of statutory designations of national importance (Sites of Special Scientific Interest – SSSIs and National Nature Reserves - NNRs) in England and Wales. Such sites are designated by Natural England under the Act and are protected from any development that may destroy or adversely affect such sites, either directly or indirectly. The Act also sets out varying degrees of protection and offences with regard to native species that are rare and vulnerable in a national context and their habitat. The Act also provides for the control and management and offences in respect of invasive non-native species.
- 12.13 In addition, the *Animal Welfare Act 2006* further protects wild animals from unnecessary suffering when under the control of man and combines with the *Wild Mammals (Protection) Act 1996*, which protects wild mammals from intentional cruelty. The *Protection of Badgers*

Act 1992 (as amended) affords protection specifically to badger (*Meles meles*) and their setts.

- 12.14 Section 40 of the *Natural Environment & Rural Communities Act 2006* places a statutory duty on Local Planning Authorities to consider the effects upon biodiversity when exercising their functions in England and Wales. This includes consideration of (a list that is required to be in operation under Section 41 of the Act).
- 12.15 Finally, ‘important’ hedgerows, are protected from removal (up-rooting or otherwise destroying) by the *Hedgerow Regulations 1997*.

Arboricultural Legislation

- 12.16 Under *The Town and Country Planning (Tree Preservation)(England) Regulations 2012*, a Tree Preservation Order is an order made by a local planning authority in England to protect specific trees, groups of trees or woodlands in the interests of amenity. An Order prohibits the: cutting down, topping, lopping, uprooting, wilful damage or wilful destruction of trees without the local planning authority’s written consent. If consent is given, it can be subject to conditions which have to be followed. In the Secretary of State’s view, cutting roots is also a prohibited activity and requires the authority’s consent

National Planning Policy

- 12.17 The National Planning Policy Framework (NPPF) (MHCLG, 2018) advocates a presumption by Local Planning Authorities in favour of sustainable development that protects and enhances the natural environment by:
- Avoiding ‘significant harm’ to biodiversity (or adequately mitigating or compensating for significant harm) and providing net gains to biodiversity;
 - Protecting and enhancing designations;
 - Avoiding loss of irreplaceable habitats.
- 12.18 The relevant sections of the NPPF in this regard are Paragraphs 8, 170, 174 and 175.

Local Planning Policy

- 12.19 Strategic Policy SD1 in the adopted Swindon Borough Local Plan 2011-2026 (SBC, 2015) requires sustainable development to respect, conserve and enhance the natural environment. Other draft policies are contained within the draft Local Plan provide for the protection and enhancement of the natural environment, as follows:
- Policy EN1, which requires for development to protect and enhance green infrastructure, including the protection and integration of existing trees, hedges and woodland;
 - Policy EN2, which requires a net increase in tree cover through new planting (Community Forests);
 - Policy EN4, which requires that negative impacts upon biodiversity are avoided, through sensitive layout, inclusion of buffers and ecological connectivity with the wider environment. Also requires that damage or disturbance to local sites will generally be unacceptable, other than in exceptional circumstances. All development,

where appropriate shall protect and enhance biodiversity and provide net local biodiversity gain, or provide suitable mitigation and compensation.

- 12.20 Policy NC3 New Eastern Villages – including Rowborough and South Marston Village Expansion, which requires “an extensive green infrastructure network that maximises opportunities for habitat connectivity and enhanced biodiversity including extending the River Cole green infrastructure corridor and connecting with Nightingale Wood.”
- 12.21 The NEV Planning Obligations SPD (SBC, 2016) requires that biodiversity, including the River Cole Corridor and River Cole Meadow County Wildlife Sites, are protected, integrated and enhanced. The SPD also reiterates the requirements of policies EN4 and NC3.

National Biodiversity Policy

- 12.22 The Post-2010 Biodiversity Framework (JNCC, 2012) and Biodiversity 2020 (Defra, 2011) were implemented in 2012 and 2011 respectively and are the biodiversity policies for the UK and England respectively, superseding the UK Biodiversity Action Plan. These policies aim to deliver a more strategic, holistic landscape-scale approach to nature conservation, wildlife, people, places, and climate change resilience. The policies make provision for large, national strategic Nature Improvement Areas (NIAs) within which nature conservation efforts can be co-ordinated and targeted, and monitor the enhancement of biodiversity through a series of monitored species and habitats (‘biodiversity indicators’). These biodiversity indicators are based upon the list of habitats and species of Principal Importance for the conservation of biodiversity identified in Section 41 of the *Natural Environment & Rural Communities Act 2006* last updated in 2008.
- 12.23 The UK Government’s 25 Year Environment Plan for England (Defra, 2018) is the policy framework that will inevitably replace Biodiversity 2020. It echoes and extends many of the objectives for an integrated, holistic approach to nature conservation with particular emphasis on natural capital and the benefits to the economy and human health and wellbeing from access to nature.

Local Biodiversity Policy

- 12.24 At a local level, the Wiltshire Biodiversity Action Plan 2008 (Anon, 2008) provides a series of habitat action plans with associated actions and targets to improve the extent/condition of those habitats and associated notable species. There is also a bat action plan.
- 12.25 There are no local level, strategic and formally identified ‘biodiversity improvement areas’ in Wiltshire, but it is believed that the Wiltshire Wildlife Trust does manage large areas of land under the Wildlife Trust’s ‘Living Landscapes’ initiative in addition to its own nature reserves.
- 12.26 At a local level, the Wiltshire Biodiversity Action Plan 2008 (Anon, 2008) provides a series of habitat action plans with associated actions and targets to improve the extent/condition of those habitats and associated notable species. There is also a bat action plan.

Other Material Guidance

- 12.27 National Planning Policy Guidance for the Natural Environment (MHCLG, 2016) biodiversity echoes what has already been described above, but there is additional emphasis in the Guidance on protecting and enhancing ecological networks and Local Wildlife Sites (non-statutory designations). National Planning Policy Guidance for biodiversity also provides

further advice on preparing and determining a planning application where there may be impacts on biodiversity.

- 12.28 Protected species are a material consideration in the determination of planning applications and Natural England as the statutory nature conservation organisation for England provides specific 'Standing Advice' regarding various protected species (Natural England, 2016). This advice contains details on potentially significant impacts and recommended survey effort to support planning applications.
- 12.29 The chapter has been prepared with reference to The Chartered Institute of Ecology and Environmental Management's (CIEEM's) Ecological Impact Assessment (EcIA) Guidelines (CIEEM, 2018); these are the main guidelines for such an ecological assessment. The guidelines include guidance on which ecological features should be considered in the assessment and provides a framework for assigning value to such features.
- 12.30 Current guidance on delivering net biodiversity gain is provided by CIEEM (2016).
- 12.31 There is also a British Standard for biodiversity, planning and development (BSI, 2013) which echoes many of the considerations already described above, and on preparing and determining a planning application where there may be impacts on biodiversity.

Consultation

- 12.32 The views of the LPA have been sought on several occasions since 2013, in respect of likely ecological sensitivities, survey scope, and mitigation pertaining to the Application Site, and the various EIA screening/scoping requests and applications that were made.
- 12.33 A formal EIA scoping response was received from the Council in January 2014 which included ecological responses from Natural England, the Environment Agency, Oxfordshire County Council, and Wiltshire Wildlife Trust. Natural England responded again in June 2015. A copy of such correspondence is provided in Appendix EDP 1 of the report in **Appendix 12.1**.
- 12.34 Comments from a third-party Ecologist, acting on behalf of SBC, were then received in April 2017, in relation to the previous submission (and subsequent Appeal) made for the Application Site. These are also included in Appendix EDP 1 of **Appendix 12.1**.
- 12.35 In relation to the current application, a response was received in November 2018 from the LPA. Relevant correspondence in this regard is provided in **Appendix 12.4**.
- 12.36 A summary of all the consultee comments to date and how they have been addressed is provided in **Table 12.1**.

Table 12.1: Summary of Consultee Comments Received to Date Relating to Ecology

Ref	Consultee	Date	Summary of Main Points Made by Consultee	Response
1	Wiltshire Wildlife Trust	17 Jan 2014 via SBC EIA scoping	Refer to BS42020:2013 for decision making	The chapter has been prepared with regard to various statutes, policy and guidance, including

		response		BS42020:2013
2	Natural England	17 Jan 2014 via SBC EIA scoping response	No specific comments relating to the Application Site at that time; only standing advice applicable to any development	No specific action taken
3	Natural England	17 Jun 2015 (application determination response)	Recommend opportunities taken to increase proportion of 'biodiversity zones' for Priority Habitats beyond 8.4ha	The proportion of informal greenspace dedicated to biodiversity has been increased to 15.4ha.
4	Natural England	17 Jun 2015 (application determination response)	It is unclear how hedges will be managed and this needs resolving at outline stage	Detailed design is a matter for Reserved Matters application following grant of outline consent. Nonetheless an indication of key principles is provided in Appendix 12.3 .
5	Natural England	17 Jun 2015 (application determination response)	Lack of detail on habitat creation/enhancement/ management, means net gain has not been demonstrated.	The proportion of informal greenspace dedicated to biodiversity has been increased to 15.4ha. EDP considers that the Development Proposals will deliver a net biodiversity gain, and opportunities for a range of fauna as explained in the Mitigation and Monitoring and Summary of Residual Effects sections of this Chapter. Nonetheless an indication of key principles, commensurate with the level of detail reasonably required at outline application stage, is provided in Appendix 12.4 .
6	Natural England	17 Jun 2015 (application determination response)	A ratio of 2:1 tree planting will not necessarily provide a net gain for biodiversity; recommend 3:1.	The proportion of informal greenspace dedicated to biodiversity has been increased to 15.4ha. EDP considers that the Development Proposals will deliver a net biodiversity gain, and opportunities for a range of fauna

				as explained in the Mitigation and Monitoring and Summary of Residual Effects sections of this Chapter.
7	Oxfordshire County Council	17 Jan 2014 via SBC EIA scoping response	Requirement to assess effect of changes in hydrology to habitats	Effects from changes in hydrology are covered under Chapter 9 (Water Resources). This Chapter cross refers to Chapter 9 in relation to the River Cole and tributaries.
8	Oxfordshire County Council	17 Jan 2014 via SBC EIA scoping response	Requirement to assess effects of increased traffic on designated sites adjacent to highways	Effects from changes in traffic and air quality are covered under Chapters 11 (Transportation) and 15 (Air Quality).
9	Environment Agency	17 Jan 2014 via SBC EIA scoping response	Refer to BS42020:2013 for decision making	The chapter has been prepared with regard to various statutes, policy and guidance, including BS42020:2013.
10	Environment Agency	17 Jan 2014 via SBC EIA scoping response	Include consideration of impacts on a freshwater species (the bryozoan <i>Lophopus crystallinus</i>) in the ecological assessment	See the Environmental Assessment sections of this Chapter for the assessment on this feature.
11	Environment Agency	17 Jan 2014 via SBC EIA scoping response	Include consideration of impacts on Water Framework Directive waterbodies in the ecological assessment	See the Environmental Assessment sections of this Chapter for the assessment on such features.
12	Environment Agency	17 Jan 2014 via SBC EIA scoping response	Design suggestions relating to SUDS and locating SUDS within green infrastructure, and green infrastructure connectivity to the wider landscape	The approach to green infrastructure is described in the introductory chapters to this Environmental Impact Report and the DAS accompanying it. Detailed design is a matter for Reserved Matters application following grant of outline consent. Nonetheless an indication of key principles, commensurate with the level of

				detail reasonably required at outline application stage, is provided in Appendix 12.4 .
13	Swindon Borough Council	20 Apr 2017 (in response to a 2017 ecology baseline report)	Update surveys for Extended Phase 1 bat roosts and great crested newt	All surveys were repeated in 2017. See Appendix 12.2 . The LPA has agreed that up to date surveys will not need repeating. See Appendix 12.4 .
14	Swindon Borough Council	20 Apr 2017 (in response to a 2017 ecology baseline report)	Requirement to supplement February 2017 site visit (update Extended Phase 1 survey) visit to the south west portion of the Application Site due to it being outside the normal survey season	EDP conspires this is not considered necessary. Habitats of low intrinsic value (i.e. arable and improved grassland, the main habitats in the southwest of the site) can be identified at any time of year by experienced Ecologists.
15	Swindon Borough Council	20 Apr 2017 (in response to a 2017 ecology baseline report)	Further studies of serotine bats in Building B12 required	Repeat bat surveys were undertaken for all buildings including Building B12. See Appendix 12.2 . EDP considers sufficient information was obtained to determine status and usage by bats.
16	Swindon Borough Council	20 Apr 2017 (in response to a 2017 ecology baseline report)	Requirement for ecological assessment of two access road routes	As described in the introductory chapters to this Environmental Impact Report, access to the two access road routes for surveys has not been possible. An assessment of the two access roads is included in this chapter based on existing desk-based information and using a precautionary approach to the assessment.
17	Swindon Borough Council	20 Apr 2017 (in response to a 2017 ecology baseline report)	Disagree with the conclusion that the Application Site is of only 'Local' value for foraging bats and otters. Application Site is considered significant for bats and otters. The presence of	The methodology for valuation of all ecological features follows CIEEM guidelines, as described in this Chapter. There are no species-specific guidelines on how to value many species populations, therefore professional judgement and experience has been used by the chapter author, as described in the Scope and Methodology

			<i>Lophopus crystallinus</i> is of significant conservation importance.	section of this chapter. EDP considers it has assigned an appropriate value based on survey results and contextual information as described in this Chapter.
18	Swindon Borough Council	20 Apr 2017 (in response to a 2017 ecology baseline report)	Significant opportunities exist to enhance the Application Site for otter and water vole. Measures are needed to conserve and enhance suitable habitat for <i>Lophopus crystallinus</i>	EDP considers that the Development Proposals will deliver a net biodiversity gain, and opportunities for a range of fauna as explained in the Mitigation and Monitoring and Summary of Residual Effects sections of this Chapter. This includes buffering from the river and creating new waterbodies on site (which benefits otter and eater vole).
19	Swindon Borough Council	20 Apr 2017 (in response to a 2017 ecology baseline report)	Native black poplar are on site and need to be protected and their presence will affect the evaluation of hedgerows 'importance' assessment	The EDP arboricultural survey recorded one single hybrid black poplar tree (T180; located immediately south of the northernmost northern access road) and a group of hybrid black poplar (G47; located south of Lotmead Farm). The trees have not been confirmed as native black poplar. See Appendix 12.3 . The trees are being retained within the development proposed, and accordingly no further assessment or update to the baseline is required.
20	Swindon Borough Council		Off-site ecological issues not assessed for last application, particularly with regard to great crested newts. It is important for off-site issues to be properly assessed this time. If the ecology surveys will be more than 2 years old by the time of re-submission, or site	For the previous application (and subsequent appeal), the off-site areas (access roads) were assessed in the previous EIA, on a precautionary basis using desk-based information, in the absence of site-specific survey information. The same land access restrictions persist now as they did then, and therefore the same approach has been taken to the assessment for this application. The suite of surveys is from 2017 and will be 'in date' at the point of submission (less than 2 years old).

and off-site conditions are judged to have changed significantly, especially with regard to protected species, then new ecology surveys will be needed

Study Area

- 12.37 The Study Area for ecology (the outer limit within which certain ecological features were considered as part of the assessment) is 10 Km from the Application Site boundary, as shown on **Figure 12.1**. Within this Study Area, different ecological features were considered pertinent to the assessment, within differing distances from the Application Site (known as Zone of Influence – see Scope and Methodology).
- 12.38 The Study Area for Arboriculture is the Application Site.

Baseline Conditions

- 12.39 This Section of the assessment summarises the baseline conditions at and within the wider landscape around the Site, as determined through baseline work described in the Methodology section of this Chapter. A more detailed account of the baseline conditions is provided in **Appendix 12.1 to 12.3** inclusive. An updated Phase 1 habitat plan and designated site context is shown on **Figures 12.2** and **12.3** respectively.

Site Context (Wider Landscape)

- 12.40 No part of the Site is covered by any statutory designations of European/International value, and there are none within 10km. Accordingly, such designations will not be considered further and do not constitute part of the Final Assessment Scope.
- 12.41 With respect to statutory designations of national value, seven are situated within 5km of the Site, three of which are designated for their geological interest and are therefore not considered further. The remaining four SSSIs are listed within **Table 12.3**.

Table 12.2: National Designations Located Within 5km of the Application Site

SSSI Name	Approximate Distance From Application Site	Description/Reasons for designation
The Coombes, Hinton Parva	3km south east	Measuring approximately 16ha, this site supports an area of botanically rich chalk grassland subject to grazing.
Coate Water	3.1km south west	49ha in total; comprises two lakes and adjacent semi-natural vegetation including semi-natural woodland, reedbed and wet meadows.

Tuckhill Meadows	4km north east	Supports remnants of calcareous fen and complex of neutral and calcareous grassland.
Burderop Wood	4.7km south west	Comprises approximately 48ha. Supports wet ash-maple and acid pedunculate oak-hazel-ash woodland, with a rich ground flora.

12.42 The Site does not reside within any of the Impact Risk Zones (IRZs) around these SSSIs. By considering the reasons for their designation, lack of foreseeable effect-receptor pathways (e.g. no surface water course connections), and reasons of distance, it is considered that *no significant adverse effects* upon the integrity of these SSSIs will arise as a result of the Proposed Development and therefore no further assessment is needed. Accordingly, these designations will not be considered further and do not constitute part of the Final Assessment Scope.

12.43 With respect to non-statutory designations of County value or less, there are five Local Wildlife Sites (or equivalents) present within 2km of the Site, as listed within **Table 12.4** and shown on **Figure 12.2**.

Table 12.3: Non-statutory Designations of County Value Located within 2km of the Application Site

SSSI Name	Approximate Distance From Application Site	Description/Reasons for designation
River Cole LWS	Forms northern and eastern boundary of Site	A river complex draining into the Thames.
Brook Meadow LWS	0.8km to north east	Supports neutral grassland, hay meadow and plantation across an area of approximately 4.6ha. Includes a restored section of the River Cole and a number of created wetland features.
Wanborough Meadows LWS	1.6km to south	Narrow strip of meadow with unimproved grassland, measures approximately 3ha.
St Julian's Community Woodland Wiltshire Wildlife Trust Reserve	1.8km to north west	Community woodland recently planted and managed as a WWT reserve. Measures approximately 1.6ha.
Warneage Wood Woodland Trust Reserve	1.8km south	A new community forest of broadleaf trees planted in 1994. Measures 19ha.

12.44 By considering the reasons for their designation, lack of foreseeable effect-receptor pathways (e.g. no surface water course connections), and reasons of distance, it is considered that *no significant adverse effects* upon the integrity of the following non-statutory designations will arise as a result of the Proposed Development:

- Brook Meadow LWS;
- Wanborough Meadows LWS;
- St Julian's Community Woodland WWT Reserve; and,
- Warneage Wood Woodland Trust Reserve.

12.45 Accordingly, these four designations will not be considered further and do not constitute part of the Final Assessment Scope.

12.46 The River Cole and its tributaries (Liden Brook and Dorcan Stream) bound the Application Site, and in the case of Dorcan Stream, flow through the Application Site. Potential therefore exists for impacts to occur and therefore the River Cole LWS is taken forward for assessment and therefore constitutes part of the Final Assessment Scope.

12.47 The River Cole is situated in the Upper Thames catchment of the Thames River basin. The Water Framework Directive (WFD) Waterbody Classification results (for cycle 2 in 2013) classifies the section of the River Cole adjacent to the northern boundary ('source to Lenta Brook') as a 'heavily modified' watercourse. Although classified at 'Moderate' Ecological Status overall¹ at the last cycle (2013), the Objectives (relating to the options for restoring the watercourse to Good Ecological Status) are listed as 'Poor (technically infeasible)'. The Biological Quality Elements of the score have not been assessed under WFD. See Hydrology Chapter.

Site Description and Immediate Surrounds

12.48 The Application Site occupies approximately 168ha when connection roads to the A420 are included. The Application Site as a whole is an intensively managed agricultural landscape dominated by arable ley/improved grassland of limited intrinsic value, interspersed with a strong network of hedgerows, ponds and bounded by watercourses. See **Figure 12.3**.

12.49 In addition to field and hedges, there are also localised occurrences of broadleaved woodland copses, poor-semi improved grassland, amenity grassland, scrub, tall ruderal, waterbodies and ditches. A small lake (Pond P1), marshy grassland and broadleaved plantation woodland are present in the northwest area of the Site. The southwest area of the Site comprises numerous buildings associated with the Lotmead Dairy Farm and Business Park, and along the southern boundary there are a number of cottages. The River Cole forms the northern boundary of the Site and flows in a west to east direction. A tributary, the Dorcan Stream flows through the southwest area of the Site and forms the northwest boundary of the Site. A further tributary, the Liden Brook, forms the eastern boundary. Both tributaries flow south to north.

12.50 The arboricultural survey of the Application Site (excluding the two northerly access routes) recorded a total of 128 individual trees, 101 groups of trees and 50 hedgerows, totalling 279 items. The survey has identified that 21 trees have been classified as category A and form prominent arboricultural features across the Application Site. There are three veteran items within the Application Site. A veteran tree, by a recognized criteria, shows features of biological, cultural or aesthetic value that area characteristic of, but not exclusive to, individuals surviving beyond the typical age range for the species.

¹ <http://environment.data.gov.uk/catchment-planning/WaterBody/GB106039022890>

12.51 The following protected and notable species are present at at/within close proximity (within 50m) to the Application Site:

- Assemblage of breeding birds;
- Assemblage of foraging bats;
- Small maternity roost of serotine (*Eptesicus serotinus*) and (brown) long-eared bats (*Plecotus auritus*) in Building B12);
- Small dormouse (*Muscardinus avellanarius*) population/low numbers of individuals;
- Small otter (*Lutra lutra*) population/low numbers of individuals on the Dorcan Stream, River Cole and Liden Brook;
- Small water vole (*Arvicola amphibious*) population/low numbers of individuals in the River Cole and Liden Brook;
- A medium-sized metapopulation of great crested newt (*Triturus cristatus*) in Ponds P3 and P4 onsite);
- A high population of grass snake (*Natrix helvetica helvetica*);
- A freshwater bryozoan (*Lophopus crystallinus*) population in the River Cole system including the Dorcan Stream and Liden Brook.

Future Baseline / 'Do Nothing'

12.52 Assuming that agricultural land use continues up until construction commences in Q1 2020, then it is unlikely that the existing baseline described above would appreciably change in that short time frame at the Application Site.

12.53 The Application Site resides within the New Eastern Villages area allocated within the Swindon Borough Local Plan 2026. It is therefore near-certain that the existing baseline would change in the near future to a predominantly residential land use with green infrastructure. There is no realistic 'do-nothing' option.

Scope and Methodology

Technical Methodology: Valuing Important Ecological Features

12.54 A number of criteria have become accepted as a means of assessing the nature conservation/ecological value of a defined area of land which are set out in 'A Nature Conservation Review' (Ratcliffe, 1977) and include diversity, rarity and naturalness.

12.55 In urban areas the Ratcliffe criteria are often expanded to bring in 'social criteria' such as wildlife corridors, accessibility for the public, presence or absence of other green spaces in the local area (Collis & Tyldesley, 1993).

12.56 The Guidelines for Ecological Impact Assessment in the United Kingdom (CIEEM, 2018) builds upon these earlier principles and advocates an approach to valuing features that involves professional judgement based on available guidance and information.

- 12.57 Whilst it is usual to consider habitats and species together when ascribing a value to a feature using this geographic context, nonetheless there are circumstances where an ecologist may feel it necessary to assign a value to a particular species independently of its habitat. In doing so it is necessary to consider its distribution and status, including a consideration of trends based on available historical records, and to make use of any relevant published evaluation criteria.
- 12.58 The guidelines recommend that the value or potential value of an ecological resource or feature should be determined within a defined geographical context, and the guidelines provided a geographical range ('frame of reference') from international value to negligible importance (value), that can be adapted. The following adapted geographical frame of reference, based upon the CIEEM guidelines used in this Assessment, is as follows:
- European/International value (SACs, SPAs, Ramsar sites);
 - National value (SSSIs and NNRs, within UK and/or England);
 - County value (e.g. within Wiltshire): e.g. Local Nature Reserves, Local Wildlife Sites, Ancient woodlands;
 - District value (e.g. Swindon Borough): e.g. watercourses, ponds, hedgerows, woodland – where species rich/extensive/atypical examples are present – moderate population sizes or species assemblages with moderate diversity of species;
 - Local value (e.g. Covingham Parish): e.g. watercourses, ponds, hedgerows, woodland – common and widespread species with small populations;
 - Site-level (e.g. Lotmead Farm Villages) and immediate environs: e.g. small areas of grassland and scrub – agricultural land – common and widespread species with small populations; and
 - Negligible value; typically applied to areas of built development, active mineral extraction, or intensively farmed agricultural land.

Technical Methodology: Desk Study and Determination of Zone(s) of Influence

- 12.59 The desk study is an important element of undertaking an ecological impact assessment of any site proposed for development, enabling the initial collation and review of contextual information such as designated sites together with known records of protected and priority species.
- 12.60 The potential Zones of Influence around the Application Site, within which potential ecological effects may occur from impacts associated with development at the Application Site, covers two administrative areas; namely Swindon Borough and Oxfordshire.
- 12.61 The original desk study was undertaken in 2013 and updated in March 2017 and involved contacting/reviewing the following information sources:
- Wiltshire and Swindon Biological Records Centre (WSBRC);
 - Thames Valley Environmental Records Centre (TVERC);

- Multi-Agency Geographic Information for the Countryside (MAGIC) website www.magic.gov.uk; and,
- Oxfordshire Bat Group

12.62 The following information was obtained:

- Sites of European value (10km radius);
- Sites of national value (5km);
- Sites of County value or less (2km);
- Annex II bat species² records (6km); and
- All other protected/notable species records (1km).

12.63 These search areas are considered sufficient to cover the potential Zones of Influence of the Proposed Development in relation to designations, habitats and species. The zones reflect due consideration that was given to a variety of factors including the nature conservation value of the ecological features (receptors) listed above, the distances over which certain species can disperse, the potential routes for effects to occur (effect-receptor pathways by land, water or air), and the distances across which such effects may occur.

12.64 In addition to the above, freely available web-based Ordnance Survey plans and aerial photographs of the area surrounding the Site were reviewed to identify key habitat features in and around the Application Site (up to a distance of 500 m) including ponds that could offer potential breeding habitat for great crested newt.

12.65 Specific projects beyond the Application Site specified for inclusion in an in-combination/cumulative impacts section for the Ecology Chapter, are discussed at the rear of this chapter.

Technical Methodology: Baseline Surveys

12.66 No requirement for specific Phase 2 ecological surveys were expressed by consultees during the consultations to date (see Consultation section above), other than a general statement by Natural England that: "...the area likely to be affected by the proposal should be thoroughly surveyed at appropriate times of the year for relevant species..."

12.67 Using professional judgement and experience, industry guidance, and part-informed by consultation responses received between 2013 and 2017, baseline information was collated through a comprehensive suite of detailed ecology surveys of the Application Site in 2017, as set out below and described in further detail within **Appendix 12.1 and 12.2**:

- An Extended Phase 1 Survey. Originally completed in April and May 2013 and then ground-truthed in February and April 2017;
- A hedgerow survey. Originally completed in April and July 2013 with respect to the Ecological Criteria set out within the Hedgerows Regulations 1997; ground-truthed in February and April 2017;

² Bat species listed in Annex II of the EC Habitats Directive, namely Greater horseshoe, Lesser horseshoe, Barbastelle and Bechstein's bats

- Breeding bird surveys. Originally completed between May and July 2013. Updated in May and July 2017;
- Roosting bat visual assessments of trees and buildings. Originally completed in May 2013. Updated in June and July 2017;
- Roosting bat emergence and re-entry surveys (buildings). Originally completed in July and August 2014. Updated between June and August 2017;
- Bat activity transect and static detector surveys. Originally completed between May and August 2013. Updated between May and October 2017;
- Dormouse nest tube surveys and nut searches. Originally undertaken between May 2013 and November 2014. Updated between May and October 2017;
- Otter and water vole surveys undertaken of all watercourses and waterbodies on or bordering the Application Site. Originally undertaken in May 2013. Updated in June 2017;
- Badger surveys. Undertaken originally throughout April and May 2013. Updated in February and April 2017 during ground-truthing of Extended Phase 1 survey;
- Habitat suitability assessments of 13 ponds and two ditches for their suitability to support protected and notable amphibian. Originally completed in April 2013. Onsite ponds updated in February and April 2017 during Extended Phase 1 Survey (7 ponds);
- Great crested newt presence/absence surveys of 11 waterbodies, with further surveys undertaken of three ponds (P3, P4 and P8) to determine population size. Originally completed between May and June 2013. Six onsite ponds that were present in 2017 were surveyed in May and June 2017;
- Terrestrial refugia surveys for common reptiles. Originally completed between April and July 2014. Updated in August and September 2017; and
- White-clawed crayfish (*Austropotamobius pallipes*) surveys of the River Cole and Liden Brook. Originally undertaken in July and August 2013. Updated in September 2017.

12.68 In addition, an arboricultural survey was undertaken in 2014 in accordance with the recommendations of British Standard 5837:2012 *Trees in relation to Design, Demolition and Construction*. The arboricultural survey was partly reviewed and partly-revised in 2017 to take into account the retention of trees along the existing avenue off Wanborough Road. This resulted in the production of an arboricultural addendum report which is included as **Appendix 12.3**.

12.69 **Table 12.5** summarises other survey types which, while commonly required for development sites, were not considered necessary/appropriate in this case.

Table 12.4: Surveys Scoped Out From the Assessment

Survey	Reason for Scoping Out of the Assessment
Botanical surveys	Phase 1 habitat survey information was sufficient to confirm habitat

(grasslands or woodlands)	value, with no indication of particularly high value habitat present. No requirement for survey expressed during consultations to date.
Wintering bird surveys	No SPA or Ramsar sites within 10km; lack of extensive waterbodies (lakes) nor a series of large waterbodies on or within 2km; potentially suitable habitat on the Site (e.g. waterbodies, marshy grassland) limited in extent and distribution. No requirement for survey expressed during consultations to date.
Terrestrial invertebrate surveys	Desk study and Extended Phase 1 Survey did not identify notable species records nor particularly unique or valuable habitats that may support notable terrestrial invertebrate species. No requirement for survey expressed during consultations to date.
Fish and aquatic invertebrate	The desk study provided sufficient information regarding presence of freshwater bryozoan <i>Lophopus crystallinus</i> . No requirement for pre-determination survey expressed during consultations to date. Desk study and Extended Phase 1 Survey did not identify notable species records nor particularly unique or valuable habitats that may support notable fish/or other aquatic invertebrate species. No requirement for survey expressed during consultations to date.

Final Scope of the Assessment

12.70 Informed by the baseline investigations and consultations described in earlier sections of this Chapter, the key ecological features taken forward for detailed assessment comprise those assessed to be of **District level** nature conservation value or above, as listed in **Table 12.6**. See also Technical Methodology: Defining Significance of Effect below.

12.71 The following have been scoped out and not taken forward for assessment (for reasons described in Baseline Conditions) and/or because the features were considered by EDP to be below the District value threshold for this assessment (see **Appendix 12.1** and **12.2**):

- The Coombes, Hinton Parva SSSI
- Coate Water SSSI
- Tuckhill Meadows SSSI
- Burderop Wood SSSI;
- Brook Meadow LWS;
- Wanborough Meadows LWS;
- St Julian's Community Woodland WWT Reserve;
- Warneage Wood Woodland Trust Reserve;
- Marshy grassland;
- Waterbodies;

- Small brown long-eared bat roost
- Foraging bat assemblage;
- Dormouse;
- Otter;
- Water vole; and
- Breeding bird assemblage.

Table 12.5: Final Scope of the Ecological Assessment

Important Ecological Feature	Key Attributes	Value	Included in Final Scope of Assessment?
Habitats/Land-use			
River Cole LWS/River Cole and its tributaries (Liden Brook and Dorcan Stream)	Landscape-scale wildlife corridor	County	Yes
Hedgerows and associated mature trees	Strong, species-rich, green network	District	Yes
Faunal Species Assemblages/Populations			
Freshwater bryozoan L. crystallinus population	Conservation notable (Red data List)	County	Yes
Grass snake population	High population present	District	Yes
Serotine population	Small maternity roost present	District	Yes
Great crested newt population	Medium population present onsite in Ponds P3 and P4	District	Yes
Assemblages of fish and aquatic invertebrates (River Cole and its tributaries)	-	District	Yes

Table Notes: ¹ in accordance with the impact assessment methodology described below, features of less than District level nature conservation value have been excluded from the Final Scope of the Assessment.

Technical Methodology: Defining Significance of Effect

- 12.72 The CIEEM guidelines advocate an approach to valuing certain features that involves professional judgement based on available guidance and information.
- 12.73 CIEEM guidance advocates identifying features including designations, habitats, and faunal species and assemblages/populations.

- 12.74 The assessment of the potential impacts and consequential effects of the Proposed Development need to take into account both on-site impacts and effects and those that may occur to adjacent and more distant ecological features. Impacts can be permanent or temporary, direct or indirect and can include:
- Direct loss of wildlife habitats;
 - Fragmentation and isolation of habitats;
 - Disturbance to species from noise, light or other visual stimuli;
 - Changes to key habitat features; and
 - Changes to the local hydrology, water quality and/or air quality.
- 12.75 The significance of an adverse effect (or a beneficial effect) is the product of the magnitude of the impact and the value or sensitivity of the nature conservation features affected. In order to characterise the impacts on each feature, the following parameters are taken into account:
- The magnitude of the impact;
 - The extent of the area over which the impact would occur;
 - The duration of the impact;
 - Whether the impact is reversible and over what timeframe; and
 - The timing and frequency of the impact.
- 12.76 There is no agreed absolute method for assessing the significance of adverse or beneficial impacts on nature conservation features, although a common practice is to derive significance using magnitude-sensitivity matrices. In addition, since the purpose of an EIA is to focus on potentially significant effects, it is not reasonable to expect the assessment to include every ecological feature that may be affected, since effects are unlikely to be significant where features of low (in this instance considered by EDP to be of Site or Local level or below) value or sensitivity are, for example, subject to low or short-term impacts.
- 12.77 On this basis, the assessment therefore focuses on features that are considered by EDP, based on professional judgement, experience and contextual information, to be of **District value** (within Swindon Borough) nature conservation value or above.
- 12.78 The **Important Ecological Features** for this assessment are therefore those that are:
- present (proven or likely present),
 - likely to be affected by the Proposed Development (with **Primary Mitigation** included – see below), and
 - which are of District value or above (whether protected or otherwise).

- 12.79 However, this does not mean that effects upon other features of less than District level (i.e. Local or Site-level) nature conservation value have been discounted. On the contrary, the Proposed Development has been designed to ensure no net loss of biodiversity in accordance with the requirements of the NPPF and local policy (see Purpose and Parameters of the Assessment), and to ensure legislative compliance for protected species by avoiding/minimising impacts through primary mitigation. Generic primary mitigation measures designed-into the Proposed Development to ensure no net loss of biodiversity, due to potential impacts on features of less than District level nature conservation value, is discussed above under Primary Mitigation.
- 12.80 Furthermore, where there are a number of small-scale effects that are not significant alone, the assessor may determine that, cumulatively these may result in an overall significant effect. Following current guidance, this assessment identified whether the impacts described are significant, based on the integrity and the conservation status of the ecological feature, as explained in more detail below.
- 12.81 The integrity of designations as described in (CIEEM, 2018) has been used in this assessment to determine whether the effects of the Proposed Development on designations (of District value or greater) are likely to be significant.
- 12.82 The conservation status of habitats and species within a defined geographical area is described in CIEEM (2018) and has been used in this assessment to determine whether the effects of the proposals upon features of District value or greater are likely to be significant.
- 12.83 On the basis of the above, and within this assessment, ecological effects are described as either:
- **significant or not significant**, and a combination of the following:
 - either **adverse or beneficial or negligible**
 - either **direct or indirect**
 - either **permanent or temporary**
 - and where relevant, either '**short**', '**medium**' or '**long-term**' (short – up to 1 year, medium – 1 to 10 years, or long-term – over 10 years) of effect.
- 12.84 Modifications to the location or design of any proposed development made during the pre-application phase that are an *inherent part of the project* is known as **Primary Mitigation**. This has occurred for the Proposed Development, through an iterative design process (as described in the introductory chapters to this Environmental Impact Report and the DAS accompanying the application). See also the Green Infrastructure Parameter Plan and Illustrative Masterplan submitted with this Environmental Impact Report.
- 12.85 The initial assessments below include Primary Mitigation, in the absence of **Secondary Mitigation** (actions that will require further measures in order to avoid a significant effect in EIA terms), and **Tertiary Mitigation** (actions that are required, with or without input from the EIA feeding into the design process, to meet legislative/policy/best practice requirements).

- 12.86 The assessment also takes into account the likely success of mitigation. In addition to determining the significance of an effect on any ecological feature, the assessment also identifies any legal requirements for mitigation measures.
- 12.87 The assessment of residual effects thereafter, includes Primary, Secondary and Tertiary Mitigation.
- 12.88 It is anticipated that there will be a construction period of c. 15 years with commencement in Q4 2019/Q1 2020 (first phase) and completion of the wider development in year 2035. These timescales have been considered during the assessment.
- 12.89 The following types of cumulative effects are also considered:
- **Effect interactions (intra-project):** the interaction and combination of environmental effects of the Proposed Development affecting the same receptor either within the Application Site; and
 - **In-combination interactions (inter-project):** the interaction and combination of environmental effects of the Proposed Development with a committed project (or projects) affecting the same receptor.
- 12.90 The assessment of cumulative effects is a qualitative assessment based on any available information, and where information is not available, assumptions are made and stated based on professional judgement alongside any uncertainty as part of the assessment.

Limitations & Assumptions

- 12.91 Ecological surveys are limited by factors which affect the presence of plants and animals such as the time of year, migration patterns and behaviour. The ecological survey has not therefore produced a complete list of plants and animals and the absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future.
- 12.92 The two access routes to the A420 and adjacent land within 500m of the redline boundary could not be accessed from March 2015 to undertake an Extended Phase 1 Survey, nor an appraisal of offsite waterbodies. For the same reasons, an arboricultural survey of the access routes was also not possible. This was and still is due to landowner (third party) restrictions as described in the introductory chapters to this Environmental Impact Report.
- 12.93 Nonetheless, freely available web-based Ordnance Survey mapping, aerial photography and planning application documents submitted for an adjacent site north of the River Cole³ have been used to identify the likely habitats present. In addition, a precautionary approach to the assessment with regards to great crested newt in off-site ponds has been taken (presence is assumed in all off-site ponds within 500m that could not be surveyed in 2017). The access roads reside in an intensively managed agricultural landscape, so it is unlikely that habitats of considerable intrinsic value are present, and unlikely that exceptional nor unique species-populations are present.

³ Gleeson Application Ref S_OUT_14_0253

- 12.94 The updated Extended Phase 1 Surveys were conducted in February 2017 and April 2017. With regards to the former, although it was conducted outside the season of April to October recommended by JNCC survey guidance, the habitats present are of limited intrinsic value (see below) and can be readily identified by experienced Ecologists at any time of year.
- 12.95 The application which this assessment supports relates to an outline planning application and therefore the detailed design of the Proposed Development is reserved and will be the subject of suitably worded planning conditions attached to any grant of consent. To enable the assessment to be undertaken, a number of assumptions have therefore been made regarding potential impacts and mitigation measures, subject to detailed design stage, as follows:
- All trees of moderate or greater bat roost potential and their Root Protection Areas (RPAs) are to be retained;
 - The vast majority of the existing tree stock, and all Category A trees/tree groups are to be retained;
 - The vast majority of the hedge network, and all species-rich hedges will be retained;
 - Sustainable Urban Drainage Systems (SUDS) will be appropriately designed/engineered in such a way that changes in water quality and quantity in the River Cole and its tributaries from SUDs will be low/negligible.
- 12.96 Overall it is considered that the ecological baseline is a representative and reliable basis for an assessment and that the assessment is robust, based on applying precautionary principles as described above where required. Detailed reasoning (including taking a precautionary approach to interpretation, presence of species confirmed, and/or sufficient coverage) is described in **Appendix 12.1 and 12.2**.

Environmental Assessment: Construction Phase

- 12.97 The Proposed Development (including the two northern access roads) will result in the permanent loss of mainly arable/improved grassland (approximately c.144ha) of limited intrinsic nature conservation value. This represents a loss (change) of c.85% of available land (168.7ha, including connection roads) within the Application Site. See **Table 12.7a**.
- 12.98 As previously mentioned in the introductory chapters to this ES and this chapter, the design and layout of the Proposed Development has been refined through various iterations to ensure that potentially significant ecological effects are avoided or minimised through good design. This is Primary Mitigation, and for the Application Site includes the following measures (see also **Table 12.7b**):
- Locating the Proposed Development overwhelmingly within habitats of limited intrinsic value (arable and improved grassland);
 - Retained open space provision of 83.9ha (see GI Parameter Plan) – this is 49% of available land within the Application Site (168ha overall);
 - Retention of a substantial buffer from the River Cole, Dorcan Stream and Liden Brook;

- Retention of Ponds P3 and P4 (great crested newt breeding ponds);
- Retention of buildings with proven bat roosts;
- Retention of the vast majority of existing ditches (retention of >2.6km of the existing 2.7km);
- Retention of the vast majority of the existing hedge network and tree stock (8.8km of the existing 9.3km will be retained).

Table 12.6a: Permanent Habitat Losses to Development (Without Secondary or Tertiary Mitigation): Area Features

Habitat	Primary Mitigation			Newly Created Extent (Ha) (Secondary/Tertiary Mitigation)	Net Loss/Gain (Ha)
	Existing Total Extent (Ha)	Permanent Loss/Change (Ha)	Retained (Ha)		
Arable	86.5	86.5	0	0.0	-86.5
Improved Grassland	63.0	63.0	0	0.0	-63.0
Built Environment	6.7	3.0	3.7	59.9	56.9
Tall Ruderal	2.9	2.9	0	0.0	-2.9
Broad-leaved Plantation Woodland	2.2	0.2	2.0	0.2	0.0
Amenity Grassland	1.8	1.8	0	3.4	1.6
Running Water	1.7	0.0	1.7	0.0	0.0
Poor Semi-improved Grassland	1.4	1.4	0	0.0	-1.4
Broad-leaved Semi-natural Woodland	0.8	0.0	0.8	2.6	2.6
Standing Water	0.5	0.0	0.5	2.9	2.9
Scattered Trees (Broad-leaved)	0.4	0.2	0.2	0.0	-0.2
Dense Continuous Scrub	0.3	0.3	0	0.0	-0.3
Scattered Scrub	0.3	0.3	0	0.0	-0.3
Marshy Grassland	0.2	0.0	0.2	0.0	0.0

Allotments	0.0	0.0	0	2.6	2.6
Other greenspace	0.0	0.0	0	62.1	62.1
Sports Hub (amenity)	0.0	0.0	0	10.5	10.5
Sub-totals					-15.4
<i>Biodiversity Zones</i>					
Lowland Deciduous Woodland	0.0	0.0	0	0.5	0.5
Lowland Meadows	0.0	0.0	0	5.0	5.0
New Nature Reserve (incl. various Priority Habitats)	0.0	0.0	0	4.9	4.9
Lowland Meadows/Floodplain Grazing Marsh mosaic	0.0	0.0	0.0	5.0	5.0
Sub-totals	0	0	0	15.4	15.4
TOTALS	168.7	159.6	9.1	159.6	-

Table 12.6b: Permanent Habitat Losses to Development (Without Secondary or Tertiary Mitigation): Linear Features

Habitat	Primary Mitigation			Newly Created Extent (Ha) (Secondary/Tertiary Mitigation)	Net Loss/Gain (Km)
	Existing Total Extent (Km)	Permanent Loss/Change (Km)	Retained (Km)		
Hedgerow	9.3	0.5	8.8	0.3	-0.2
Seasonally wet ditch	2.8	<0.1	>2.7	4.6	>4.5
Linear (treelines)	1.2	0.0	1.2	0	0
TOTALS	13.3	<0.6	>12.7	4.9	-

12.99 This Primary Mitigation is included in the assessment of construction-phase effects, but excludes any Secondary and Tertiary Mitigation.

12.100 In the absence of Secondary and Tertiary Mitigation, and in addition to permanent land take for the Proposed Development commenced during construction, the following impacts upon

Important Ecological Features scoped into the assessment may occur due to construction activities:

- Trampling and loss of vegetation from increased footfall/temporary land take from vehicular movements;
- Dust deposition onto habitats within the Application Site and off-site in close proximity (within 250m);
- Sediment-laden/alkaline surface water run-off entering waterbodies/watercourses;
- Animals being directly harmed by vehicles/machinery or indirectly disturbed by noise/vibration/lighting.

Construction Phase Assessment of Effects: River Cole LWS/River Cole and its Tributaries and Associated Fish and Aquatic Invertebrates

- 12.101 The inclusion of intrinsic Primary Mitigation within the Proposed Development has resulted in a scheme design that provides a substantial buffer between the vast majority of the River Cole and two of its three major tributaries (Liden Brook and Dorcan Stream) which significantly reduces the possibility of occurrence of pollution incidents. There are only a limited number of locations where such incidents may occur; there is one crossing point of the River Cole and one crossing point on the Liden Brook for the two access roads; and along the west side of the ditch tributary to the River Cole in the centre of the Application Site. See **Figure 12.3**
- 12.102 In the absence of appropriate Secondary and Tertiary Mitigation, water quality within the River Cole and its three tributaries may be temporarily reduced due to sediment laden/alkaline run-off entering the water course from areas of temporary soil storage, concreting, access tracks, particularly during periods of heavy rainfall. For each individual event, this in turn could result in a temporary reduction in the vigour/condition of fish, the freshwater bryozoan, and other aquatic invertebrates due to toxicity as biological oxygen demands and chemical composition of their environment is altered.
- 12.103 Isolated incidents are unlikely to be catastrophic but the probability of irreversible detrimental change/the cumulative magnitude of the impact increases with multiple exposure events, and with little time for recovery in between events.
- 12.104 Enabling a Water Framework Directive Waterbody (of which the River Cole is one such 'Waterbody' within the Upper Thames River Basin) to achieve 'Good Ecological Status' requires a catchment scale, cross-partnership approach. Nonetheless, in a worst-case scenario of cumulative multiple exposure events onsite, and in the absence of Secondary and Tertiary Mitigation, achieving 'Good Ecological Status' may be compromised, and is considered to be a potentially **significant adverse**, indirect, temporary or permanent effect at the **County Level**.
- 12.105 There is no realistic 'do-nothing' option to assess for this Important Ecological Feature, since the Application Site resides in a planning allocation and will be developed.

Construction Phase Assessment of Effects: Hedgerow Network and Associated Mature Broadleaf Trees

- 12.106 The inclusion of intrinsic Primary Mitigation within the Proposed Development has resulted in a scheme design that limits the number of trees/extent of hedgerow requiring removal. Up to 16 items will be partially lost or require a breach to the group or hedgerow to facilitate construction of the Proposed Development. None of these are Veteran trees.
- 12.107 In the absence of appropriate Secondary or Tertiary Mitigation, short sections of hedgerows and individual trees could be directly, damaged by contact with construction vehicles or machinery, or their vigour/condition indirectly reduced due to root/soil compaction. It is unlikely that a significant proportion of the hedge and tree network would be removed in a single event, nor cumulatively impacted at separate locations across the Application Site in a single event, even in the absence of Secondary or Tertiary Mitigation.
- 12.108 Nonetheless, on a worst-case scenario basis, this is considered to be a **significant adverse**, direct or indirect, temporary effect at the **District Level**.
- 12.109 There is no realistic 'do-nothing' option to assess for this Important Ecological Feature, since the Application Site resides in a planning allocation and will be developed.

Construction Phase Assessment of Effects: Serotine Maternity Roost in Building B12

- 12.110 The inclusion of intrinsic Primary Mitigation within the Proposed Development has resulted in a scheme design that avoids demolition of all buildings that have medium-potential, high-potential or confirmed bat roosts. This therefore avoids direct effects.
- 12.111 Therefore, in the absence of appropriate Secondary or Tertiary Mitigation, serotine bats could be indirectly, temporarily disturbed by noise and vibration and or lighting from nearby construction activities, rather than direct impacts.
- 12.112 In turn, such indirect effects could cause them to abandon the roost resulting in reduced breeding success and recruitment to the local population of serotine due to death of young, and/or loss of condition/vigour of adults. In the absence of Secondary or Tertiary Mitigation, this is considered to be a potentially **significant adverse**, indirect, temporary or permanent effect at the **District Level**. Such an effect would also be an offence under national European wildlife legislation.
- 12.113 There is no realistic 'do-nothing' option to assess for this Important Ecological Feature, since the Application Site resides in a planning allocation and will be developed.

Construction Phase Assessment of Effects: Great Crested Newt at and Within 500m of Breeding Ponds (P3, P4 and P8)

- 12.114 The inclusion of intrinsic Primary Mitigation within the Proposed Development has resulted in a scheme design that avoids loss of great crested newt ponds and retains sufficient terrestrial buffer around the ponds. This therefore avoids direct effects within 'core terrestrial habitat' area around the ponds.
- 12.115 In the absence of appropriate Secondary or Tertiary Mitigation, great crested newt could be directly harmed by contact with construction machinery/vehicles, or indirectly affected by temporary loss of habitat outside the 'core terrestrial habitat' zone around the breeding ponds.

12.116 This in turn could result in reduced breeding success and recruitment to the local population of great crested newt due to death of young, and/or loss of condition/vigour of adults. In the absence of mitigation and appropriate design, this is considered to be a potentially **significant adverse**, direct or indirect, temporary or permanent effect at the **District Level**. Such an effect would also be an offence under national European wildlife legislation.

12.117 There is no realistic 'do-nothing' option to assess for this Important Ecological Feature, since the Application Site resides in a planning allocation and will be developed.

Construction Phase Assessment of Effects: Grass Snake

12.118 The inclusion of intrinsic Primary Mitigation within the Proposed Development has resulted in a scheme design that avoids loss of grass snake aquatic habitat (ponds and ditches). This therefore avoids direct effects associated with grass snake occupying these habitats.

12.119 Nonetheless, in the absence of appropriate Secondary or Tertiary Mitigation, grass snake could be directly harmed by contact with construction machinery/vehicles, or indirectly affected by temporary loss of terrestrial habitat beyond retained aquatic habitats.

12.120 This in turn could result in reduced breeding success and recruitment to the local population of grass snake due to death of young, and/or loss of condition/vigour of adults. In the absence of mitigation and appropriate design, this is considered to be a potentially **significant adverse**, direct or indirect, temporary or permanent effect. Intentional/reckless harm to grass snake is also an offence under national wildlife legislation

12.121 There is no realistic 'do-nothing' option to assess for this Important Ecological Feature, since the Application Site resides in a planning allocation and will be developed.

Environmental Assessment: Operational Phase

12.122 As previously mentioned, the design and layout of the Proposed Development has been refined through various iterations to ensure that potentially significant ecological effects are avoided or minimised through good design. This is Primary Mitigation, and for the Application Site includes the habitat retention/buffering measures described above under Environmental Assessment: Construction-Phase. This Primary Mitigation is included in the assessment of operation-phase effects, but excludes any Secondary and Tertiary Mitigation.

Potential Operation-Phase Impacts

12.123 In the absence of Secondary and Tertiary Mitigation, the following impacts upon Important Ecological Features scoped into the assessment may occur due to occupation of the Proposed Development:

- Permanent loss of habitats reducing biodiversity;
- Permanent loss of habitats reducing opportunities for faunal species;
- Sediment or pollution-laden discharges to surface waterbodies/watercourses during occupation;
- Animals being directly harmed by vehicle movements along roads;

- Animals being directly harmed/indirectly disturbed by anti-social behaviour, mismanagement of the sites; assets and/or recreational usage.
- Animals being indirectly disturbed by lighting.

Operation Phase Assessment of Effects: River Cole LWS/River Cole and its Tributaries and Associated Fish and Aquatic Invertebrates

- 12.124 The inclusion of intrinsic Primary Mitigation within the Proposed Development has resulted in a scheme design that provides a substantial buffer between the vast majority of the River Cole and two of its three major tributaries (Liden Brook and Dorcan Stream) which significantly reduces the possibility of occurrence of pollution incidents. There are only a limited number of locations where such incidents may occur; there is one crossing point of the River Cole and one crossing point on the Liden Brook for the two access roads; and along the west side of the ditch tributary to the River Cole in the centre of the Application Site. See **Figure 12.3**.
- 12.125 In the absence of appropriate Secondary or Tertiary Mitigation, water quality within the River Cole and its tributaries may be temporarily reduced due to sediment/pollutant/nutrient-laden run-off entering the water course from occupation of the Proposed Development during periods of rainfall. For each individual event, this in turn could result in a temporary reduction in the vigour/condition of fish, the freshwater bryozoan, and other aquatic invertebrates due to toxicity as biological oxygen demands and chemical composition of their environment is altered.
- 12.126 Isolated incidents are unlikely to be catastrophic but the probability of irreversible detrimental change/the cumulative magnitude of the impact increases with multiple exposure events, and with little time for recovery in between events.
- 12.127 Enabling a Water Framework Directive Waterbody (of which the River Cole is one such 'Waterbody' within the Upper Thames River Basin) to achieve 'Good Ecological Status' requires a catchment scale, cross-partnership approach. Nonetheless, in a worst-case scenario of cumulative multiple exposure events onsite, and in the absence of Secondary and Tertiary Mitigation, achieving 'Good Ecological Status' may be compromised, and is considered to be a potentially **significant adverse**, indirect, temporary or permanent effect at the **County Level**.
- 12.128 There is no realistic 'do-nothing' option to assess for this Important Ecological Feature, since the Application Site resides in a planning allocation and will be developed.

Operational Phase Assessment of Effects: Hedgerow Network and Associated Mature Broadleaf Trees

- 12.129 The inclusion of intrinsic Primary Mitigation within the Proposed Development has resulted in a scheme design that significantly reduces the number of trees/extent of hedgerow requiring removal. Up to only 12 items (trees, tree groups or sections of hedgerow) will be permanently lost due to the Proposed Development. None of these are Veteran trees.
- 12.130 The occupied Proposed Development will result in the loss of 0.5Km of hedgerow. See **Table 12.7b**.
- 12.131 Therefore, even in the absence of Secondary and Tertiary Mitigation, the functional integrity and cohesiveness of the hedge network and tree stock as a green dispersal network for fauna

is unlikely to be significantly compromised as a result of occupation of the Proposed Development. Nonetheless, on a worst-case scenario basis, and in the absence of appropriate Secondary and Tertiary Mitigation, this is considered to be a **significant adverse**, direct, permanent effect at the **District Level**.

- 12.132 There is no realistic 'do-nothing' option to assess for this Important Ecological Feature, since the Application Site resides in a planning allocation and will be developed.

Operational Phase Assessment of Effects: Serotine Maternity Roost in Building B12

- 12.133 The inclusion of intrinsic Primary Mitigation within the Proposed Development has resulted in a scheme design that avoids demolition of all buildings that have medium-potential, high-potential or confirmed bat roosts. Therefore, **no operational effects** are anticipated, since there are no proposals to demolish or undertake structural works to Building B12 to facilitate occupation of the Proposed Development.

- 12.134 There is no realistic 'do-nothing' option to assess for this Important Ecological Feature, since the Application Site resides in a planning allocation and will be developed.

Operational Phase Assessment of Effects: Great Crested Newt Within 500m of Breeding Ponds (P3, P4 and P8)

- 12.135 The inclusion of intrinsic Primary Mitigation within the Proposed Development has resulted in a scheme design that avoids loss of great crested newt ponds and retains sufficient terrestrial buffer around the ponds. This therefore avoids direct effects within 'core terrestrial habitat' area around the ponds
- 12.136 In the absence of Secondary and Tertiary Mitigation, great crested newt could be directly harmed by contact with vehicles outside the 'core terrestrial habitat' zone, and/or indirectly affected by loss or disturbance of habitat arising as a result of anti-social activities, mismanagement and/or recreational use.
- 12.137 This in turn could result in reduced breeding success and recruitment to the local population of great crested newt due to death of young, and/or loss of condition/vigour of adults. In the absence of Secondary or Tertiary Mitigation, this is considered to be a potentially **significant adverse**, direct or indirect effect, temporary or permanent at the **District Level**. Such an effect would also be an offence under national European wildlife legislation.
- 12.138 There is no realistic 'do-nothing' option to assess for this Important Ecological Feature, since the Application Site resides in a planning allocation and will be developed.
- Operational Phase Assessment of Effects: Grass Snake**
- 12.139 The inclusion of intrinsic Primary Mitigation within the Proposed Development has resulted in a scheme design that avoids loss of grass snake aquatic habitat (ponds and ditches). This therefore avoids direct effects associated with grass snake occupying these habitats.
- 12.140 In the absence of Secondary and Tertiary Mitigation, grass snake could be directly harmed by contact with vehicles outside these aquatic habitats, or indirectly affected by loss or disturbance of habitat from anti-social activities, mismanagement and/or recreational use during occupation of the Proposed Development.
- 12.141 This in turn could result in reduced breeding success and recruitment to the local population of grass snake due to death of young, and/or loss of condition/vigour of adults. In the

absence of Secondary and Tertiary Mitigation, this is considered to be a potentially **significant adverse**, direct or indirect, temporary or permanent effect at the **District Level**. Intentional/reckless harm to grass snake is also an offence under national wildlife legislation.

- 12.142 There is no realistic 'do-nothing' option to assess for this Important Ecological Feature, since the Application Site resides in a planning allocation and will be developed.

Environmental Assessment: Cumulative Effects

Effect Interactions (intra-project): River Cole LWS/River Cole and its Tributaries and Associated Fish and Aquatic Invertebrates

- 12.143 The only Important Ecological Feature taken forward for assessment where there is a clear intra-project effect (because the same feature/receptor is assessed in more than one chapter), is the River Cole and its major tributaries (Liden Brook and Dorcan Stream).
- 12.144 In this Chapter the assessment (before Secondary and Tertiary Mitigation) concludes a **significant adverse effect**. In Chapter 9 (Flood Risk Assessment), the assessment (before Secondary and Tertiary Mitigation) concludes a 'high risk' of fluvial flooding (taken to be equivalent to a **significant adverse effect**).
- 12.145 However, as described in Scope and Methodology, the CIEEM methodology for the impact assessment on Important Ecological Features only makes a distinction between significant and not significant effects. There is no scope for distinction between a minor, moderate or major significant effect, such that a multiplication of different levels of significant effects is not possible (which otherwise may result in a higher level of significant effect (e.g. moderate significant effect x moderate significant effect = major significant effect)).
- 12.146 Therefore, a significant effect (in ecological terms) with a significant effect (in water quality and/or flood risk terms) can only equate to a significant, adverse cumulative effect (in the absence of Secondary and Tertiary Mitigation).
- 12.147 Nonetheless, there is parity between the two technical topics on the required Secondary and Tertiary Mitigation to avoid significant effects to the River Cole and tributaries, such that EDP considers no additional measures are needed. The cumulative residual effect is therefore considered by EDP to be a **not significant, neutral, cumulative, residual effect**.

In-combination Effects (Inter-Project): River Cole LWS/River Cole and its Tributaries and Associated Fish and Aquatic Invertebrates

- 12.148 EDP considers that the cumulative environmental consequences of all development coming forward within the New Eastern Villages allocation has already been deemed by Swindon Borough Council to be acceptable (i.e. in EIA terms not significant).
- 12.149 A list of projects relevant to the EIA is provided in **Chapter 2, Table 2.1**. Of these, EDP considers only two are relevant to an in-combination assessment: The Hub/Symmetry Park to the northwest and Great Stall East to the north. This is due to the close proximity of both developments to the River Cole in addition to the proposed development.
- 12.150 In the absence of Secondary and Tertiary Mitigation for all three developments, this may be a significant, adverse, cumulative effect.

12.151 Nonetheless, all three developments are advocating providing an engineered solution (SUDS) to control water quality and quantity impacts (Symmetry Park and Great Stall east have been consented in part on this basis), such that there is no evidence to indicate anything other than a **not significant, neutral, cumulative, residual effect**.

Mitigation & Monitoring

Construction Phase: Secondary and Tertiary Mitigation

12.152 In addition to the Primary Mitigation mentioned previously (retention of and buffering from existing habitats), measures are required to avoid potentially significant adverse effects (Secondary Mitigation) and measures are required to ensure planning policy and legislative compliance (Tertiary Mitigation). These are not necessarily unique to the Proposed Development and would be required for any development.

12.153 In summary, such measures include:

- pre-commencement site walkover by an Ecologist,
- staged vegetation clearance by suitably experienced landscape contractor,
- supervision of works by a suitably experienced Ecological Clerk of Works,
- timings of works at particular locations to avoid sensitive periods of species life cycles,
- tool box talks,
- particular working methods to avoid/minimise risk of encountering species,
- demarcation of retained vegetation using temporary fencing,
- no artificial lighting to illuminate retained mature trees nor buildings,
- following standard pollution prevention measures.

12.154 It is anticipated that a full and detailed Construction Ecological Mitigation Plan (CEMP), or equivalent document (e.g. Ecological Construction Method Statement, ECMS) with such measures will be conditioned as part of any grant of planning permission and will be prepared by a suitably experienced Ecological Clerk of Works. An outline of the main construction-stage mitigation measures is described in an outline LEAMP provided in **Appendix 12.4**, commensurate with the level of detail required at outline application stage.

Construction Phase: Feature-specific Secondary and Tertiary Mitigation for River Cole LWS/River Cole and its Tributaries and Associated Fish and Aquatic Invertebrates

12.155 None are considered necessary over and above the generic measures described above and in **Appendix 12.4**.

Construction Phase: Feature-specific Secondary and Tertiary Mitigation for Hedgerow Network and Associated Mature Broadleaf Trees

12.156 None are considered necessary over and above the generic measures described above and in **Appendix 12.4**.

Construction Phase: Feature-specific Secondary and Tertiary Mitigation for Serotine Roost in Building B12

12.157 None are considered necessary over and above the generic measures described above and in **Appendix 12.4**.

Construction Phase: Feature-specific Secondary and Tertiary Mitigation for Great Crested Newt

12.158 All works within 500m of great crested newt breeding ponds (currently proven to be Ponds P3, P4 and P8) will be undertaken in accordance with a great crested newt mitigation licence from Natural England. The specific measures will be subject to agreement through the licensing process. However, in principle the measures are likely to include a combination of the following (see also **Appendix 12.4**):

- Enhancement of the Great Crested Newt Receptor Site around Ponds 3 and 4 with formally installed hibernacula (at least 2), creation of planting and suitable management of;
- Within the period mid-March to mid-October inclusive, and by the Named Ecologist (Ecological Clerk of Works) on the licence:
 - a detailed programme of sensitive vegetation clearance and hand searching in areas >250m to 500m from Ponds 3, 4 and 8;
 - temporary exclusion of great crested newt from working areas within 250m of Ponds 3, 4 and 8 by the installation, operation and monitoring of temporary amphibian fencing;
 - capture of great crested newt using a pitfall trapping regime, augmented by hand searching and placement of 1m x 1m mats within the exclusion fencing;
 - translocation of captured great crested newt to the Great Crested Newt Receptor Site.
- No commencement of site enabling works including temporary landtake within a 250m radius around Ponds 3 and 4 (the Great Crested Newt Receptor Site) prior to the completion of the translocation exercise across the Application Site; and
- No disturbance/removal of other naturally occurring hibernacula (log piles, boulders, rubble, tree/hedge roots, mammal burrows) located within a 250m radius of the Great Crested Newt Receptor Site prior to the completion of the translocation exercise.

Construction Phase: Feature-specific Secondary and Tertiary Mitigation for Grass Snake

12.159 The specific measures will be subject to agreement with the Council via suitably worded planning condition. However, in principle the measures are likely to include a combination of the following (see also **Appendix 12.4**):

- No vehicular movements/temporary landtake within an area approximately 250m radius around Pond P1 (the Grass Snake Receptor Site);

- Enhancement of the Grass Snake Receptor Site with formally installed hibernacula (at least 2) and compost heaps/grass cutting piles, in addition to suitable sowing/planting and/or management of existing vegetation assemblage and structure;
- No disturbance/removal of other hibernacula (log piles, boulders, rubble, tree/hedge roots, mammal burrows) within a 250m radius of the Grass Snake Receptor Site between the period mid-October to mid-March inclusive; and
- Within the period mid-March to mid-October inclusive, and by the Ecological Clerk of Works:
 - a careful programme of sensitive vegetation clearance within working areas;
 - temporary exclusion of grass snake from working areas by the installation and operation of temporary reptile fencing;
 - capture of reptiles using placement of 1m x 1m mats; augmented by hand searching; and
 - translocation of captured grass snake to the Grass Snake Receptor Site.

Operation Phase: Delivering Biodiversity Net Gain

- 12.160 In addition to the Primary Mitigation mentioned previously (retention of and buffering of existing habitats), measures are required to avoid potentially significant adverse effects (Secondary Mitigation) and measures are required to ensure planning policy and legislative compliance (Tertiary Mitigation) for the Application Site.
- 12.161 To achieve this, new Priority Habitat-equivalents will be created across the Application Site (including Ponds, Lowland Meadows-equivalent, Floodplain Grazing Marsh-equivalent and Lowland Deciduous Woodland-equivalent Priority Habitats) – totalling c.18.0ha which is c.11% of the available land within the Application Site (168.7ha). Of this, c.15.4ha will be managed specifically for biodiversity in ‘biodiversity zones’. See the Green Infrastructure Parameters Plan and **Table 12.7a**. In addition, 300m of new species rich hedgerow and 4.5km of seasonally wet ditch (SUDs infrastructure) will be created. See **Table 12.7b**.
- 12.162 As described in Chapter 9 (Flood Risk Assessment), the proposed changes to the floodplain of the Liden Brook along the eastern boundary involve localised points of land-lowering allowing spillage into the restored floodplain during high flows. At detailed design stage, the crest levels of the spills will be set to optimise the operation of the Proposed Development to maximise biodiversity and flood risk benefits. It is anticipated that, over time, frequent low-order flood events will result in the establishment of a wet grassland akin to Floodplain Grazing Marsh-equivalent Priority Habitat which will benefit a range of fauna including birds and invertebrates.
- 12.163 This would represent a biodiversity gain, due to the establishment of a habitat of greater intrinsic nature conservation value over a wide area along the floodplain, compared with the existing improved grassland that is present, which is of limited intrinsic nature conservation value.
- 12.164 In particular, this gives rise to a unique opportunity to create a transitional mosaic of Lowland Meadows-equivalent Priority Habitat and Floodplain and Grazing Marsh-equivalent

Priority Habitat from a south-west to northeast direction respectively, within the northeastern 'biodiversity zone', reflecting changes in flooding and topography.

12.165 In addition, to this, the following is proposed (precise numbers/design/location subject to detailed design at Reserved Matters stage):

- Install a number of bat and bird boxes on existing trees and on/within new buildings;
- Install small mammal underpasses where a new road crosses and existing or new blue or green corridor (hedge or ditch);
- Install otter-friendly culverts/bridges at the two access road crossing points;
- Install log piles and compost/grass cutting piles within key locations around the Application Site;
- Design of SuDs lagoons to provide biodiversity opportunities for wildlife, including variable shelf profile to provide different water depths and planting where appropriate/necessary with aquatic/emergent plants;
- Appropriate seeding of SuDs swales with a range of native grass seed mixes according to variations in anticipated wetness and topography;
- Appropriately managed public access to certain parts of the Site (including the Great Crested Newt and Grass Snake Receptor Sites);
- Appropriate management of habitats in perpetuity under a formal management plan;
- Inclusion of circular ecological nature trails around the Application Site with interpretation signage.

12.166 A Landscape, Ecological and Arboricultural Management Plan (LEAMP) or similar document will be conditioned as part of any grant of planning permission and will be co-prepared by a suitably experienced Ecologist. The LEAMP will provide more detail behind the measures outlined above, accompanied by drawings. It is anticipated that the management of the Application Site in accordance with the agreed LEAMP/its successor document will be undertaken by an appropriately experienced Stewardship Management company.

12.167 An outline of how net biodiversity gain will be delivered is provided in an outline LEAMP provided in **Technical Appendix 12.4**, commensurate with the level of detail required at outline application stage.

Feature-specific Secondary and Tertiary Mitigation (Operation Phase): River Cole LWS/River Cole and its Tributaries and Associated Fish and Aquatic Invertebrates

12.168 Sustainable Urban Drainage Systems (SUDS) will be appropriately designed/ engineered in such a way that changes in water quantity/quality in the River Cole and its tributaries from SUDS during occupation of the Proposed Development will be low/negligible. This will also ensure compliance with water quality standards. See Chapter 9.

Feature-specific Secondary and Tertiary Mitigation (Operation Phase): Hedgerow Network and Associate Mature Broadleaf Trees

- 12.169 To mitigate for the loss of trees and hedgerows, new planting will take place on a ratio of 2:1 (two items planted for every one lost). The overall scheme will therefore benefit from a net gain in tree stock and hedgerow length which will contribute to the overall setting of the Application Site. This will enhance the amenity and ecological value of the Application Site and contribute to the overall green infrastructure for the area. It is anticipated that this would be secured via a suitably worded condition which would be required to minimise harm and ensure safe, long-term retention to trees and hedges. New tree and hedge planting will ensure diversity of species and age, and secure succession to the tree stock and hedgerow network into the future.

Feature-specific Secondary and Tertiary Mitigation (Operation Phase): Serotine Roost in Building B12

- 12.170 Building B12 is being retained within the Proposed Development and ample foraging opportunities will exist within the Application Site post-construction. Measures to retain and manage the serotine roost within the building for the longer term will be implemented, including: 1) ensuring future occupiers/landowners are aware of its presence via a formally prepared document/report; 2) ensuring no structural works occur to the building without a full mitigation plan being prepared.
- 12.171 More generally, the installation of bat boxes on and within buildings and on trees where appropriate will further enhance the wider bat assemblage utilising the Application Site.

Feature-specific Secondary and Tertiary Mitigation (Operation Phase): Great crested newt

- 12.172 A dedicated core area around Ponds P3 and P4 (Great Crested Newt Receptor Site) will be retained and further enhanced through the provision of new sowing/planting, suitable hibernacula and through appropriate management over the long-term in accordance with a formal management plan for the Application Site.

Feature-specific Secondary and Tertiary Mitigation (Operation Phase): Grass Snake

- 12.173 A dedicated core area (Grass Snake Receptor Site) is being retained and enhanced through the provision of new planting, suitable hibernacula and appropriate management over the long-term in and around Pond P1.

Summary of Residual Effects

- 12.174 The residual effects described in **Table 12.8** are the likely effects occurring, following implementation of the construction phase and operation phase mitigation measures described above (Primary, Secondary and Tertiary Mitigation).
- 12.175 The Secondary and Tertiary Mitigation measures proposed are industry-standard and are not novel unproven measures and therefore there is high confidence that such measures will adequately mitigate the potential effects described.
- 12.176 In summary, with appropriate Primary, Secondary and Tertiary Mitigation incorporated into the Proposed Development, and in EIA terms, **no residual significant adverse effects** are predicted. In planning policy terms, the Proposed Development will therefore also avoid 'significant harm to biodiversity' and moreover will deliver a net gain to biodiversity and

arboricultural stock in accordance with national and local planning policy and national biodiversity policy.

Table 12.7: Summary of Residual Effect

Feature	Stage (C /O)	Significance of Effects ¹	Main Secondary and Tertiary Mitigation	Significance of Residual Effect
River Cole LWS/River Cole and associated aquatic fauna	C	Significant, adverse	Buffering/pollution prevention measures delivered through CEMP	Not significant, neutral
Hedgerow network and trees	C	Significant, adverse (worst case scenario only)	Temporary demarcation and buffering delivered through CEMP	Not significant, neutral
Small serotine maternity roost	C	Significant, adverse	Standard avoidance measures delivered through CEMP	Not significant, neutral
Medium population great crested newt	C	Significant, adverse	Trapping, capture and exclusion under Natural England derogation licence	Not significant, neutral
High population of grass snake	C	Significant, adverse	Trapping, capture and exclusion delivered through CEMP	Not significant, neutral
River Cole LWS/River Cole and associated aquatic fauna	O	Significant, adverse	Design and operation of appropriate SUDS; partial-restoration of floodplain	Not significant, beneficial
Hedgerow network and trees	O	Significant, adverse (worst case scenario only)	Habitat enhancement and creation (2:1 planting of tree stock)	Not significant, beneficial
Small serotine maternity roost	O	Significant, adverse	Habitat enhancement and creation for roosting and foraging bats	Not significant, beneficial
Medium population great crested newt	O	Significant, adverse	Creation and management of dedicated receptor site	Not significant, beneficial
High population of grass snake	O	Significant, adverse	Creation and management of dedicated receptor site	Not significant, beneficial

Table Notes: Construction - C; Operation – O; ¹ includes Primary Mitigation (retention of and buffering from key habitats)

13. Landscape and Visual

Purpose and Parameters of Assessment

- 13.1 This Chapter, prepared by The Urbanists, assesses the landscape and visual impact of the proposed development of land at Lotmead Farm Villages, off Wanborough Road, Swindon. The assessment involves a description and analysis of baseline conditions. An assessment is made of the capacity of the landscape to accommodate the likely changes of the proposed development without detriment. Judgments are then made as to the likely level of landscape and visual impacts and their level of significance.
- 13.2 The Application Site is largely open farmland mostly under arable cultivation, comprising:
- Lotmead Farmstead, including dairy farm buildings;
 - Lotmead 'Pick Your Own' facility, which comprises various fruit and vegetable production area, a farm shop/café with outside seating area, animal and bird sanctuary/farm and a children's play area;
 - Lotmead Business Village – renovated and converted farm buildings offering business accommodation; and
 - Lotmead cottages, in residential occupation.
- 13.3 The Application Site, along with much of the surrounding area, is substantially flat but there are low hills to the north of the A420 and the Ridgeway is a prominent topographic feature some distance to the south.

Legislative and Policy Framework

- 13.4 More general planning policy at a national, regional and local level is discussed in Chapter 4. This section highlights those aspects of planning policy which are relevant to the landscape appraisal of the proposed development. The Application Site Plan and Study Area (**Figure 13.1**) illustrates the disposition of the various landscape planning designations in relation to the Application Site and its context.

National Planning Policy Framework (NPPF) Feb 2019.

- 13.5 With regard to landscape matters – and the effects on landscape character in particular - paragraph 127 of the NPPF notes that:

'Planning policies and decisions should ensure that developments:

..... c) are sympathetic to local character and history, including the surrounding built environment and landscape setting, while not preventing or discouraging appropriate innovation or change (such as increased densities).'

- 13.6 Paragraph 172 goes on to say that:

Great weight should be given to conserving landscape and scenic beauty in National Parks, the Broads and Areas of Outstanding Natural Beauty, which have the highest status of protection....

National Planning Policy Guidance (NPPG) on Design (Revision date March 2014)

13.7 The NPPG advises that:

'Planning should promote local character (including landscape setting)

Development should seek to promote character in townscape and landscape by responding to and reinforcing locally distinctive patterns of development, local man-made and natural heritage and culture, while not preventing or discouraging appropriate innovation.

The successful integration of all forms of new development with their surrounding context is an important design objective, irrespective of whether a site lies on the urban fringe or at the heart of a town centre.

When thinking about new development the site's land form should be taken into account. Natural features and local heritage resources can help give shape to a development and integrate it into the wider area, reinforce and sustain local distinctiveness, reduce its impact on nature and contribute to a sense of place. Views into and out of larger sites should also be carefully considered from the start of the design process.'

Paragraph: 007 Reference ID: 26-007-20140306

Swindon BC Adopted Local Development Plan Policies directly relevant to the LVIA:

Policy EN5: Landscape Character and Historic Landscape

13.8 a. Proposals for development will only be permitted when:

- the intrinsic character, diversity and local distinctiveness of landscape within Swindon Borough are protected, conserved and enhanced;
- the design of the development and materials used are sympathetic to the surrounding landscape;
- unacceptable impacts upon the landscape are avoided; and,
- where other negative impacts are considered unavoidable, they are satisfactorily mitigated.

13.9 b. In meeting the requirements of EN5a, applicants for development should demonstrate how they have taken into account Landscape Character Assessments and assessed the potential impact of the proposal upon the following attributes of the landscape:

- existing landscape form, features, topography and character;
- the contribution of the landscape to biodiversity and wildlife;
- local geology and geo-diversity;
- views, visual amenity and the landscape setting;

- valuable historic and heritage areas and assets;
- environmental amenity such as tranquillity & noise, pollution and light pollution; and,
- the existing social, physical, economic and environmental roles and functions of the landscape at the local and strategic scale (for example as a place of cultural and leisure activity, living, employment and separation of settlements).'

New Eastern Villages (NEV) Green Infrastructure Supplementary Planning Document (July 2017).

13.10 Guidance relevant to the LVIA:

'Landscape Character: GI – Key principle 1

In accord with Policy EN5, applicants will be expected to demonstrate how they have taken into account Landscape Character Assessments and assessed the potential impact of the proposal the landscape character at the NEV.

....

Applicants will be expected to submit Landscape Visual Impact Assessments or Environmental Impact Assessments to fully assess landscape impacts and mitigation.' (page 18)

Consultation

- 13.11 Given the longstanding nature of the project, and the team's (including The Urbanists') in depth knowledge and understanding of the likely receptors and their sensitivities, it was not considered necessary to carry out a formal scoping exercise.
- 13.12 Nonetheless, an informal scoping exercise was carried out in collaboration with the LPA, with an Informal Scoping Note being provided to the LPA on 9th November 2018 covering the proposed ES Structure and methodologies for the technical chapters (**Appendix 1.1**). A response on each topic chapter was provided by the LPA on 11th December 2018 (**Appendix 1.2**).
- 13.13 The response received from the Council in respect of landscape and visual matters covered the identification and extent of the Study Area, the technical basis for establishing the area over which visibility was predicted to occur and the number and disposition of viewpoint locations.
- 13.14 The LVIA has utilised a computer-generated Zone of Theoretical Visibility (ZTV) to assist in the prediction of visual effects arising from the proposed development. This specialist work was commissioned from a leading expert in this field, Gordon Citrine, and is based upon a Digital Terrain Model. This is in accordance with the provisions set out in GLVIA3. The ZTV has used the new Application Site boundary as its basis for analysis and assessment, with additional provisions for assessment of viewpoints within the Study Area beyond the Application Site, especially with regard to the Wessex Downs AONB.

Study Area

- 13.15 The Study Area for the assessment has been defined in accordance with the guidance provided in the GLVIA 3rd edition, 2013, which advises that the Study Area for a landscape assessment needs to cover “the site itself and its wider landscape context, within which the proposed development may influence landscape character”.
- 13.16 The identification of an appropriate Study Area for the LVIA has been guided by the production of the Zone of Theoretical Visibility. The ZTV identifies the approximate area of land from which there would be potential views of the proposed development, based upon a Digital Terrain Model, and assuming bare ground (**see Figure 13.9 - ZTV (Bare Earth)**). The potential Study Area was then modified by detailed field observations and analysis, which take account of the wider pattern of landform and land use as well as intervening land cover features such as woodlands, trees, hedgerows and buildings (**see Figure 13.10 - ZTV (Intervening Visibility)**).
- 13.17 The ZTV has been established with a radius of up to 5 km which, in our professional opinion, is the maximum distance within which we would anticipate significant visual effects to arise from this type of development (**see Figure 13.1 – Application Site Plan & Study Area**). However, valued viewpoint locations – in particular from promoted viewpoints or promoted recreational footpath routes - have been considered beyond this range, where appropriate.
- 13.18 Wherever possible, the analysis has been objective, the residual effects quantified, and any subjective judgments have been described in clearly defined terms. Both objective analysis and subjective professional judgments are required for effective, high quality landscape and visual analysis.

Baseline Conditions

Land Use

- 13.19 The Application Site is predominantly open farmland, mostly under arable cultivation with some dairying. As well as the agricultural operations there is Lotmead ‘Pick your Own’ and Lotmead Business Village centred on renovated farm buildings adjacent to Lotmead Farmhouse.
- 13.20 Fields are geometric, variable in size, medium to large in scale and bounded by hedgerows in variable condition.

Topography

- 13.21 The Application Site is predominantly flat and open. The land tends to gently fall from around 94 – 95m Above Ordnance Datum (AOD) towards the line of the River Cole on the northern boundaries of the Application Site; levels there are around 90 -91m AOD. The river corridor marks the lowest area of topography in the Study Area.
- 13.22 Levels in the vicinity of the Application Site are broadly similar but the buildings of Mount Pleasant Farm, approximately 300m to the east of the eastern boundary, form a locally significant rise, up to around 10m above the general levels of the Application Site below.
- 13.23 The village of Bourton, approximately 2kms to the east of the Application Site, is also situated on a locally significant rise in the clay vale.

13.24 To the north of the A420, the topography is more varied with a series of gentle undulations accommodating a complex system of streams and small irregular-shaped fields.

13.25 At a distance of some 3-4kms to the south and south east of the Application Site, the scarp slope of the North Wessex Downs Escarpment marks the transition between the flat clay vales – which include the Application Site - and the chalk uplands to the south. The escarpment is a very important feature in views to the south from the Application Site.

Existing Application Site Vegetation and Boundaries

13.26 The principal vegetation features consist of riparian corridors of tree and shrub growth, particularly along the line of the River Cole on the northern boundary, and hedgerows of variable quality, some containing significant tree cover. There are also a handful of small copses, usually located in field corners, and a larger area of young scrub woodland running north-eastwards from the Lotmead farmstead towards the River Cole boundary.

13.27 There is a stand of large poplars south of the farmstead and the driveway to the farm has an avenue of young mature lime trees.

13.28 The predominant species in hedgerows are hawthorn and blackthorn and other species include elder and suckering elm regrowth.

13.29 Tree species include pedunculate oak, white willow and ash. These are mostly contained within the hedgerows.

Existing Structures

13.30 The principal structures located within the Application Site are Lotmead farmstead and the accompanying dairy farm buildings. Lotmead Business Village occupies a series of renovated converted former agricultural buildings at the farm.

13.31 A short distance to the west, the Lotmead 'Pick your Own' facility is contained within several sheds and other structures.

13.32 Lotmead Cottages are located on the western boundary of the Application Site, adjacent to the existing site access onto Wanborough Road.

13.33 Beyond the Application Site, construction work has begun on the road infrastructure and buildings of The Hub/Symmetry Park, situated to the north of the Application Site but within the overall area of the New Eastern Villages.

13.34 There are comparatively few other buildings in the close vicinity of the Application Site. Earls court Manor and Lower Earls court Farm are Grade II Listed Buildings relatively near to the eastern boundary. Mount Pleasant Farm is also similarly located (**Figure 13.2 – Landscape Planning Designations**).

13.35 The aircraft hangar of Redlands Airfield is a significant structure, lying about 1.5kms to the south of the Application Site and is a very visible element in a number of longer views across the clay vale.

Rights of Way

13.36 An existing right of way within the Application Site crosses the western corner, going northwards to connect with the A420 close to the Police Headquarters (**Figure 13.7 – Access**

– **Public Rights of Way**). The A420 is highly trafficked and appears to be a significant constraint on the use of this public footpath.

- 13.37 There are a series of essentially north-south footpath links to the east of the Application Site, connecting Wanborough and Horpit with Bourton and areas to the north of the A420.
- 13.38 A number of footpaths climb the scarp slopes around the villages of Hinton Parva, Bishopstone and Ashbury. There is an area of publicly accessible open land at Bishopstone which is under the control of the National Trust.
- 13.39 The Ridgeway is a nationally important promoted long-distance route running along the top of the scarp slope, the nearest point to the Application Site being in the vicinity of the footpath's crossing point of the M4 Motorway.

Public Roads

- 13.40 The Application Site is bordered to the west by Wanborough Road, from which both pedestrian access and vehicular access is currently obtained.
- 13.41 The A419 (T) adjoins the western corner of the Application Site and the A420 travels east west about 0.7kms to the north.
- 13.42 There is a minor road connecting Horpit with the wider network and this country lane continues north-eastwards to link various farmsteads and isolated dwellings such as Mount Pleasant Farm and Earls court Manor.
- 13.43 The villages aligned along the edge of the escarpment are connected by various minor roads.
- 13.44 The M4 Motorway is located about 4.5kms from the southern edge of the Application Site, at its closest point.

Landscape Character Assessment

- 13.45 '*Landscape character*' is defined as a distinct and recognisable pattern of elements that occur consistently in a particular type of landscape and how people perceive it. It reflects particular combinations of geology, landform, soils, vegetation and land-use, and human settlement. It creates the particular 'sense of place' of different areas of the landscape.
- 13.46 Published landscape character assessments relevant to the Application Site and/or the wider Study Area have been reviewed and are summarised in **Technical Appendix 13.1**. The extents and dispositions of all character areas are illustrated in **Figures 13.3 – 13.6, inclusive**. These published assessments and guidance documents include:
- NCA 108 Upper Thames Clay Vale Key Facts & Data, published by Natural England (ref 13.4.);
 - NCA 109 Midvale Ridge National Character Area Profile, published by Natural England (ref 13.5.);
 - NCA 116 Berkshire & Marlborough Downs Key Facts & Data, published by Natural England (ref 13.6.);

- The North Wessex Downs Area of Outstanding Natural Beauty Landscape Character Assessment (2002), published by the Countryside Agency (ref 13.7.);
- The Wiltshire Landscape Character Assessment (2005), published by Wiltshire County Council (ref 13.8.);
- The Oxfordshire Wildlife & Landscape Study (OWLS), incorporating the Oxfordshire Landscape Character Assessment (2004), published online only by Oxfordshire County Council (ref 13.9.);
- Landscape Character Areas Adopted Supplementary Planning Guidance Swindon Borough Local Plan 2026 Revised Deposit Draft (2004), published by Swindon Borough Council (ref 13.10.);
- Landscape Strategy Planning Advisory Note (2006), published by Vale of White Horse District Council (ref 13.11.) (*note: this document was adopted in July 2006 but can no longer be used as supplementary planning guidance as it has not been subject to public consultation*).

13.47 These assessments offer a hierarchical appraisal of the study area. While methodologies vary and there is a lack of consistency between the different data bases, this nonetheless represents a strong body of baseline landscape character evidence. For the disposition of national, regional and county landscape character areas, **see Figures 13.3, 13.4 and 13.5.**

13.48 The description of the baseline landscape character relevant to the LVIA has drawn on the existing published Landscape Character Assessment undertaken for Swindon Borough Council, supplemented by targeted fieldwork. Notwithstanding the view that the establishment of baseline conditions is essentially a descriptive exercise, the current GLVIA3 guidelines advise that *‘Existing assessments must be reviewed critically as their quality may vary, some may be dated and some may not be suited to the task in hand. Before deciding to rely on information from an existing assessment, a judgement should be made as to the degree to which it will be useful in informing the LVIA process.’* (paragraph 5.13) This critical review was included in the analysis for the assessment, and selected findings taken into account as appropriate when undertaking specific, more detailed surveys of the Application Site itself and its immediate surroundings. In accordance with current guidance, this process provided the opportunity to record the specific characteristics of this more limited area, and to analyse to what extent the Application Site and its surroundings conform to or are different from the wider Landscape Character Assessments that exist, and to pick up other characteristics that may be important in considering the effects of the proposal. (paragraph 5.16)

Local Landscape Character Areas

13.49 The Council published their Landscape Character Areas Adopted Supplementary Planning Guidance (2004). This was adopted as part of the Swindon Borough Local Plan 2026. For the purposes of this assessment, this guidance is used as the main baseline template for landscape character. The relevant Character Areas in this guidance have however, been reviewed in the field as part of this LVIA, so as to ensure that they take account of changes in the environment since the original study. An assessment of each Character Area’s sensitivity to change has also been made.

- 13.50 The Vale of the White Horse Landscape Strategy covers part of the study area outside the Swindon Boundary and, for this reason, it is also included as part of the relevant Local Landscape Character data base.

Swindon Borough Landscape Character Areas SPG

- 13.51 Five Landscape Character Areas identified in this guidance are located within the Study Area (refer to Figure 13.6 - Swindon Borough and District Landscape Character Areas). These are:

- ii. Vale of White Horse
- iv. Scarp
- v. Down Plains
- vi. High Downs
- vii. Midvale Ridge

- 13.52 Settlements, other than small hamlets, are generally excluded from these identified Landscape Character Areas.

ii. Vale of White Horse

- 13.53 The entire Application Site (as indeed does most of the wider area designated for the NEV) lies within Character Type ii. Vale of the White Horse.
- 13.54 Topographically this is a broad, flat, low-lying valley at an elevation typically between 89m and 115m AOD. There are numerous small streams flowing across the vale from south to north, joining the River Cole, as well as numerous ponds, two of which are located within the Application Site. It is a relatively open landscape with very few woodlands and fields are bounded by hedgerows with scattered trees. This degree of openness in the landscape allows for middle distance views in an east-west direction along the Vale floor. The extensive views southwards up to the ridge of the North Wessex Downs are an important characteristic of the landscape.
- 13.55 There are a number of public rights of way connecting villages to the south of this Character Area with Bourton to the north east as well as towards Swindon.
- 13.56 This Character Area is comparatively lightly populated with a few scattered farms and isolated properties along some of the local lanes. However, the urban edge of Swindon and the transport corridors of the A420 and A419(T) are evident intrusions into this rural quality.
- 13.57 In terms of historical references, the area contains a deserted medieval village adjacent to Wanborough, the remains of a Roman settlement and roads at Lotmead, and the line of the former Wilts and Berks Canal follows close to the boundary with the A420.
- 13.58 The landscape assessment of this ES is that this Character Area is of medium sensitivity to the type of urban expansion being envisaged for the Application Site. Whilst the Character Area contains some landscape features of value, such as the network of hedges and isolated small copses, and there are extensive views southwards to the scarp ridge of the North Wessex Downs, the area is also adversely impacted by the encroaching urban edges of Swindon, including the large scale industrial and retail areas to the north. The recent construction of

some of the buildings and infrastructure of the Hub/Symmetry Park adds further encroachment of urban edge character. The infrastructure corridors of the major roads on the northern and western boundaries are further detractors. This assessment of landscape sensitivity has been established in accordance with the rationale set out in paragraphs 13.102 to 13.104, inclusive, and the criteria set out in **Table 13.2**.

- 13.59 The character type description is accompanied by a checklist of 'Development Considerations' as follows:

'Within the Vale of the White Horse Landscape Character Area proposals should:

- *Ensure that the scale and massing of development does not adversely affect the area's perception of remoteness,**
- *Where appropriate, have regard to the area's close proximity to, and in the case of the land to the south of Pack Hill, its location within, the North Wessex Downs Area of Outstanding Natural Beauty,***
- *Where opportunities arise, provide additional tree planting to increase tree cover by creating blocks of woodland,*
- *Reflect the existing pattern of isolated units through an open, dispersed development pattern,*
- *Where opportunities arise, provide planting that reinforces existing hedgerows to compensate for the trees lost to Dutch elm disease during the 1970's.*
- *Retain the perception of distinctiveness and separation from Swindon within the Rural Buffer area identified in the Local Plan.'*

** The remoteness attributed to this Character Area by the previous landscape character assessment is not apparent in this locality.*

*** The cited 'close proximity' to the AONB is not a determining factor in assessing the landscape effects on this Character Area; the separation distance from the Application Site is strongly influential.*

iv. Scarp

- 13.60 The Scarp Character Area runs east-west to the south of the Vale of the White Horse Character Area. It is a transitional area between the broad lowland valley and the High Downs Character Area to the south.
- 13.61 This distinctive topographic feature is dissected at intervals by very steep-sided coombes with a number of spring-line settlements typically situated part way up the escarpment. These spring-line villages include Bishopstone and Hinton Parva.
- 13.62 The scarp slope rises steeply above the clay vales, its crest ranging from a height of about 115m to 70m AOD. From the ridge there are sweeping views northwards towards Swindon, the Vale of the White Horse, Midvale Ridge and the Cotswolds in the far distance.

- 13.63 The boundary of the North Wessex Downs Area of Outstanding Natural Beauty (AONB) follows the northern edge of the minor road connecting the scarp line villages.
- 13.64 The pattern of farming has ancient origins, some of which date back to the Iron Age. There are small scale fields generally enclosed by hedgerows with standard trees. Parish boundaries form narrow bands running north-south connecting the Clay Vales and Down Plains. An extensive public rights of way network, particular around Wanborough, connects this high ground with the plain.
- 13.65 This is a Character Area with a strong, coherent landscape character formed by the combination of striking topography, attractive villages set in a pattern of small hedged fields and sunken lanes. The area contains a range of designated sites and landscapes, including the North Wessex Downs AONB and, for these reasons, is assessed as being of *very high sensitivity* to the change which might be brought about by a development such as the Proposed Development. This assessment of landscape sensitivity has been established in accordance with the rationale set out in paragraphs 13.102 to 13.104, inclusive, and the criteria set out in **Table 13.2**.
- 13.66 The character type description is accompanied by a checklist of ‘Development Considerations’ as follows:

‘Within the Scarp Landscape Character Area proposals should:

- *Maintain the scenic views northwards towards the Cotswolds,*
- *Integrate into the scarp slope with careful attention paid to new planting and maintaining the wooded appearance of the slope,*
- *Ensure that structures do not punctuate the scarp skyline when viewed from the clay vales or Downs Plains,*
- *Have regard to the area’s location within the North Wessex Downs Area of Outstanding Natural Beauty,*
- *Where appropriate, provide for a lowering of ground level through the removal of surface material, enabling the development to be inset into the slope, thereby reducing its overall height,*
- *Be restricted to single storey, where necessary, to reduce the development’s visual impact,*
- *Retain the perception of distinctiveness and separation from Swindon.’*

v. Down Plains

- 13.67 This area of high plains lies on the southern margins of the study area and is generally at a height of approximately 170-180m AOD. It lies between the lower and the upper chalk escarpments and enjoys sweeping views southwards across the open landscape towards the High Downs, Iron Age forts and tree clumps. To the north, Swindon and its industrial suburbs are prominent features in the view.

- 13.68 This LCA has a wide and open landscape character with large, extensive arable fields, the boundaries of which are often defined by post and wire fencing rather than hedgerows. Woodland is limited to occasional shelterbelts.
- 13.69 There are strong historical references, with the Ermine Way Roman Road preserved in the line of a modern road as well as ancient parish boundaries reflected in some of the field pattern.
- 13.70 This Character Area is assessed as being of *very high sensitivity* to change of the type envisaged by the Proposed Development, due to the strong sense of place and unified character of the landscape, qualities which are reflected in the AONB designation which covers the entire area. This assessment of landscape sensitivity has been established in accordance with the rationale set out in paragraphs 13.102 to 13.104, inclusive, and the criteria set out in **Table 13.2**.
- 13.71 The character type description is accompanied by a checklist of ‘Development Considerations’ as follows:

‘Within the Down Plains Landscape Character Area proposals should:

- *Reflect the existing pattern of isolated units through an open, dispersed development pattern,*
- *Ensure that scale and massing is restrained and low key, and appropriate to its surroundings,*
- *Where opportunities arise, ensure that existing elements of the built form, which compromise landscape character through their scale and visual intrusiveness, are integrated into the landscape,*
- *Where opportunities arise, provide for planting to create shelter belts based around hedgerow patterns rather than tree clumps,*
- *Have regard to the area’s location within the North Wessex Downs Area of Outstanding Natural Beauty,*
- *Ensure that Vistas towards the High Downs are not interrupted or compromised.’*

vi. High Downs

- 13.72 This high, rolling landform ranges from about 170m to 270m AOD and is at the southern extremities of the Study Area. There is a north-west facing escarpment with a series of dry river valleys running southwards.
- 13.73 This area of high ground provides for sweeping views northwards towards the Downs Plain and then further afield to the Midvale Ridge and the Cotswolds.
- 13.74 Like the Down Plains, fields are large and extensive with few hedgerow boundaries. Dominant tree clumps, usually located on the crest of the downs, are a characteristic feature of the landscape.

- 13.75 There are no modern settlements and a limited number of well-dispersed agricultural buildings. The only road of any significance is the A346.
- 13.76 Like the Down Plains, this area of high upland has a distinctive sense of place reflected in its AONB designation. This Character Area is assessed as being of *very high sensitivity* to development of the type proposed for the Application Site. This assessment of landscape sensitivity has been established in accordance with the rationale set out in paragraphs 13.102 to 13.104, inclusive, and the criteria set out in **Table 13.2**.
- 13.77 The character type description is accompanied by a checklist of Development Considerations as follows:

'Within the High Downs Landscape Character Area proposals should:

- *Reflect the existing pattern of isolated units through an open, dispersed development pattern,*
- *Ensure that the scale and massing of the development does not adversely impact on the views into/out of the area, reflecting its high visibility and prominence, both inwards and outwards,*
- *Ensure that the skyline remains free from development,*
- *Where appropriate, ensure that any planting reflects existing planting levels and styles, e.g. tree clumps on the skyline and maintains the openness of the High Downs,*
- *Where appropriate, provide for alterations to the land form to screen the development in a manner that echoes the existing landform,*
- *Have regard to the area's location within the North Wessex Downs Area of Outstanding Natural Beauty,*
- *Retain the area's perception of remoteness from urban development.'*

vii. Midvale Ridge

- 13.78 This Character Area lies in the northern part of the Study Area and the north of the Vale of White Horse Character Area. It is an area of rolling landform with valleys, ridges, hills and plateau tops ranging in heights of between 90 and 140m AOD. There are some open views southwards from the higher ground across the Vale of the White Horse towards the High Downs.
- 13.79 Numerous streams and ditches run southwards to feed into the River Cole and they often form field and woodland boundaries, giving rise to a small to medium scale, somewhat fragmented landscape.
- 13.80 There is significant tree cover with a number of substantial woodlands, such as Nightingale Wood, as well as narrow linear shelter belts.
- 13.81 Human influences are significant, with important settlements such as Highworth and Blundson occupying local hilltops. There are also a series of smaller villages and the A429 and A361 transport corridors cross the Character Area.

- 13.82 There is evidence of early human occupations with an Iron Age hill fort at Blunsdon. An 18th century registered landscape is located at Stanton Fitzwarren and there are several early mill sites.
- 13.83 There is some intervisibility from the industrial estates on the eastern edges of Swindon which detract from the landscape quality. However, the Character Area is assessed as being of *medium sensitivity* to change to the Proposed Development, due to the reasonably good quality and variety of landscape resources evident. This assessment of landscape sensitivity has been established in accordance with the rationale set out in paragraphs 13.102 to 13.104, inclusive, and the criteria set out in **Table 13.2**.
- 13.84 The character type description is accompanied by a checklist of 'Development Considerations' as follows:

'Development Considerations within the Midvale Ridge Landscape Character Area proposals should:

- *Ensure that non-developed hilltops remain free from development to preserve the prominence and quality of existing hilltop settlements,*
- *Where opportunities arise, provide for additional tree planting that maintains the scale and dispersed pattern of existing woodlands*
- *Where appropriate, within the southern Midvale Ridge area, have regard to its close proximity to the Downs Plains and High Downs areas,*
- *Provide planting to contain the development within a discrete area, reflecting the undulations of the landscape.*
- *Retain the perception of distinctiveness and separation from Swindon within the Rural Buffer areas identified in the Local Plan.'*

Character Area 2A Western Clay Vales

- 13.85 This Character Area on the eastern edges of the Study Area, lies outside the Swindon Council administrative boundary and is a designation emanating from the Vale of the White Horse District Council's Landscape Strategy.
- 13.86 It is, in many respects, a continuation of the Swindon LCA Vale of the White Horse Character Area and has a similar pattern of relatively large fields resulting from historic hedgerow removal. While relatively open, there is a greater extent of tree cover with considerable numbers of small copses and hedgerow trees. Willows are a characteristic landscape feature along the watercourses.
- 13.87 There is a tradition of brick and tiled buildings in hamlets and villages. The village of Bourton is within the Study Area, situated a little to the east of the Application Site.
- 13.88 Like the Swindon LCA Vale of the White Horse, the sensitivity to change is assessed as being *medium*. While there are long views southwards to the North Wessex Downs, views along the valley floor are more limited by hedgerow tree cover and small copses. The A420 road corridor and the mainline railway are significant detractors within this landscape. This

assessment of landscape sensitivity has been established in accordance with the rationale set out in paragraphs 13.102 to 13.104, inclusive, and the criteria set out in **Table 13.2**.

Summary of Key Landscape Character Baseline Conclusions

13.89 Having reviewed the various published documents concerning landscape character relevant to the study area, and having tested this information in the field, the following conclusions have been drawn relevant to this LVIA:

- The landscape of the Application Site is not generally typical of the relevant published landscape character description for the identified Landscape Character Area within which it lies, since it is strongly influenced by the close proximity to the west of the hard urban edge of Swindon generally demarcated by the A419 (T) road corridor.
- This is a broad, substantially flat lowland landscape, mostly intensively managed as arable or pasture.
- It is a relatively open landscape with very few woodlands. The relatively large fields are bounded by hedgerows with scattered trees.
- Although the substantially flat landform and intervening hedgerows and trees limit visibility outwards from it, the character of the Application Site is to some extent adversely impacted by the encroaching urban edges of Swindon, including the large scale industrial and retail areas to the north. The infrastructure corridors of the major roads on the northern and western boundaries are further detractors.
- There are some fine long views to the scarp slope and higher ground of the AONB to the south. Particular consideration will need to be given in the detailed development planning to minimise impacts on local landscape character in adjacent areas.
- There are the remains of a Roman settlement and roads on the southern edges of the Application Site. This is a Scheduled Monument.
- Only one public footpath crosses the western extremities of the Application Site.
- No trees within the Application Site or in close proximity are covered by Tree Preservation Orders.

Visual Receptors

13.90 Scrutiny of the ZTV has resulted in the identification of various potential viewpoint locations within the Study Area (see **Table 13.1** below). The views from these potential locations were subsequently reviewed and assessed in the field, photographically recorded and included in **Figures 13.011A-F - Viewpoints VP1 to VP10**, as providing a range of representative views of the proposed Application Site which might be experienced by various receptors.

13.91 A significant number of the potential views of the Application Site are from public rights of way on the high ground within the Scarp and Downs LCAs. The publicly accessible locations include the national long-distance Ridgeway footpath with the promoted viewpoint of Charlbury Hill (**refer to Figure 13.7 – Access – Public Rights of Way**).

- 13.92 There is a network of paths connecting the spring-line villages such as Bishopstone and Hinton Parva with the plain below. Views out northwards towards the Application Site exist at points on this network.
- 13.93 Closer to the Application Site, footpath and bridleway links between Wanborough and Bourton and Sevenhampton pass relatively close to the eastern boundaries of the Proposed Development. There is also a network of footpaths to the north of the A420 from where there may be glimpses of the Application Site.
- 13.94 Residential receptors are amongst the most sensitive to visual impacts and desk-top and field survey has identified that there will be effects on some properties situated on higher ground within the spring-line settlements, such as Hinton Parva and Bishopstone. Also, some of the higher parts of Wanborough may be affected. There are isolated properties to the east and south-east of the Application Site which may also have views.
- 13.95 Other settlements and properties in the vicinity were considered unlikely to have views of the Application Site, due to the screening effect of the intervening topography and hedgerows, and this was corroborated during subsequent field survey.
- 13.96 There are potential views from the A420 at the proposed northern Application Site entrances, but it is unlikely that other major roads - such as the A419(T) or the M4 to the west and south, respectively - will have views. There will be glimpses from Wanborough Road as it passes the existing Application Site entrance to Lotmead Farm.
- 13.97 The minor road connecting the spring-line villages on the scarp slope to the south may have some views northwards across the vale with glimpses of the Application Site.
- 13.98 There will potentially be views to the Application Site from the mainline railway running east-west parallel to the A420 to the north of the Application Site.

Table 13.1: Schedule of Viewpoint Sensitivities

- 13.99 This assessment of Viewpoint Sensitivities has been established in accordance with the rationale set out in paragraphs 13.106 to 13.107, inclusive, and the criteria set out in **Table 13.4**.

Viewpoint	Location	Description and Viewpoint Sensitivity
1	Entrance to Lotmead Farm <i>Grid Ref: SU 19651 85088</i>	View from residential receptor adjacent Wanborough Road including tree-lined entrance drive leading to Lotmead Farm. <i>Sensitivity – Very High</i>
2	View from newly-constructed entrance to the New Eastern Villages – including Application Site – from the A420 <i>Grid Ref: SU 19376 86706</i>	View with foreground access road and new planting, across a flat, low-lying field flanked by a substantial hedgerow. The high ground of the Wessex Downs AONB, including Charlbury Hill, is prominent on the horizon <i>Sensitivity – Medium</i>

3	Footpath north of Earls court Manor <i>Grid Ref: SU 21496 85771</i>	View across farmland with well-treed hedgerow field boundaries towards Application Site <i>Sensitivity – Medium</i>
4	Bridle path at the edge of Nightingale Wood <i>Grid Ref: SU 20476 87929</i>	View across farmland with well-treed hedgerow field boundaries towards the Application Site. The high ground of the Wessex Downs AONB, including Charlbury Hill and Liddington Hill, is prominent on the horizon <i>Sensitivity – Medium</i>
5	Footpath at its junction with Highworth Road <i>Grid Ref: SU 19359 89963</i>	View across flat farmland. The fields are interspersed with well-treed hedgerows, through which there are glimpses of the Honda Works. The high ground of the Wessex Downs AONB, including Liddington Hill, is prominent on the horizon. <i>Sensitivity – Medium</i>
6	Railway bridge at Lower Bourton <i>Grid Ref: SU 22768 87520</i>	View across flat, low-lying farmland interspersed with overgrown hedgerows and small blocks of woodland. The taller buildings in Swindon town centre are visible on the horizon. <i>Sensitivity - Low</i>
7	Footpath at its junction with Idstone Road <i>Grid ref: SU 26172 84726</i>	View across low-lying farmland set within a strong framework of hedgerows and hedgerow trees. Swindon town centre can just be glimpsed on the distant horizon. Public footpath within the AONB <i>Sensitivity – Very High</i>
8	Local footpath through Home Farm, Hinton Parva <i>Grid ref: SU 22096 83328</i>	View across low-lying farmland set within a strong framework of hedgerows and hedgerow trees. The Honda Works are prominent in the background, with glimpses of Swindon town centre to the left of the photograph <i>Sensitivity - Medium</i>
9	Wanborough Rd close to the junction at Callas Hill <i>Grid Ref: SU 21748 83117</i>	View from gently-rising downland across low-lying farmland set within a strong framework of hedgerows and hedgerow trees. The Honda Works are conspicuous in the background, with glimpses of Swindon town centre to the left of the photo. The Redland airfield hangar is also prominent in the middle distance. Lotmead Farm is just visible. Viewpoint within the AONB <i>Sensitivity – Very High</i>

10	Footpath through residential area in Wanborough <i>Grid Ref: SU 21031 82948</i>	View from a public footpath bisecting a residential estate in Wanborough looking across low lying farmland set within a strong framework of hedgerows and hedgerow trees. Lotmead Farm is visible through the intervening vegetation <i>Sensitivity - High</i>
11	Charlbury Hill <i>Grid ref: SU 23781 82116</i>	From the top of Charlbury Hill there are panoramic views over the flat low lying farmland in which the Application Site is located. Promoted viewpoint within the AONB <i>Sensitivity – Very High</i>
12	B4192, at junction with Ridgeway and Aldbourne Circular Trail <i>Grid ref: SU 21819 80459</i>	View from gently rolling downland towards the flat low lying farmland in which the Application Site is located. The road immediately draws the eye towards Swindon, in particular the prominent bulky mass of the Honda Works. Viewpoint is on long distance promoted trail within the AONB <i>Sensitivity – Very High</i>

Visual Baseline Conclusions

13.100 The following conclusions have been drawn from the visual baseline analysis:

- The Application Site is located on flat, low-lying land adjacent to the River Cole. The surrounding landform is also generally flat but rises gently to the north towards Highworth. To the south, the boundary of the Wessex Downs AONB marks the point where this flat valley landscape gives way to rising ground at the base of the escarpment. Immediately to the south east of the Application Site there is also a perceptible higher point in the vicinity of Mount Pleasant Farm;
- The rising ground of the scarp slope of the Wessex Downs AONB renders the Application Site more readily visible in views from the south, than from the north. Thus, the ZTV is skewed to the south (**refer to Figures 13.9 and 13.10 ZTV**);
- Application Site boundaries include mature overgrown hedgerows with scattered standard trees, as well as the riparian vegetation associated with the River Cole. These, together with the flat landform, have the effect of partially screening near to middle distance views into the Application Site;
- Indeed, field boundaries delineated by these hedgerows create a strong visual framework and are a dominant feature of the wider valley landscape;
- Views toward the Application Site from the north-west, west and south-west are effectively curtailed by the eastern edge of Swindon, the A419(T) and the industrial estates located to the north-east of Swindon;
- Views towards the Application Site from the north and north-east are limited by the village of South Marston, the Thornhill Industrial Estate and Nightingale Wood. Where

views do exist, these tend to be partially screened by intervening layers of field boundary vegetation and road and rail infrastructure;

- With the notable exception of the area around Mount Pleasant Farm, there are limited opportunities to view the Application Site from the south, south-east and east in the near to middle distance, due to a combination of flat landform and multiple intervening layers of field boundary vegetation, riparian vegetation and woodland plantations; in this respect, there do not appear to be any clear views from the village of Bourton;
- Visual receptors to the north and east of the Application Site are primarily recreational users of public rights of way, who are moderately sensitive to change, and motorists, who are less so;
- Visual receptors located along the chalk escarpment and within the AONB itself are primarily recreational users of public rights of way, as well as some residential receptors, both of whom are very highly sensitive to change. These receptors experience long distance views toward the Application Site which, due to their elevated viewing point, are seen in the context of the urban and industrial edge of Swindon, the A419(T), and the large-scale industrial estates, with the very large scale Honda factory to the north being particularly conspicuous (**refer to Figures 13.11D-F Viewpoints 8-12**);
- Whilst there are some residential receptors in the villages of Wanborough and Hinton Parva, they become more infrequent in the other villages at the foot of the escarpment to the east. This is due to a combination of factors, namely distance, the general flatness of the topography and the strong framework of intervening vegetation.

Scope and Methodology

13.101 This assessment has been based on current best practice, as set out in the following documents:

- *“Guidelines for Landscape and Visual Impact assessment” (3rd Edition, 2013)*, published by the Landscape Institute and the Institute of Environmental Assessment (**ref. 13.1**); and
- *“Making Sense of Place – Landscape Character Assessment Guidance,” (2002)* (**ref.13.2**) published by the Countryside Agency and Scottish Natural Heritage.
- *“Topic Paper 6: Techniques and Criteria for Judging Capacity and Sensitivity”* (Scottish Natural Heritage and the Countryside Agency, 2004) (**ref. 13.3**).

Surveys

13.102 Detailed desk-top surveys were carried out of published material on the landscape of the Application Site and its wider context. Material included maps, photographic evidence, historic landscape and cultural data. Fieldwork undertaken on 30th November 2018 and on 1st January 2019 enabled the recording of various landscape elements such as topography, land use and vegetation. From the analysis of this combination of material, it was possible to carry

out an evaluation of landscape character and assess the predicted effect of the proposed development.

Viewpoint Selection

- 13.103 There have been consultation discussions with the Council about the viewpoints which should be assessed. **Figure 13.8, Assessment Viewpoint Location Plan** shows the locations of these, which are in almost the same positions as in the previous applications. Only minor adjustments have been made where necessary, such as Viewpoint 2 by the A420, where there have been recent changes with the construction of a road access. Analysis of the latest Application Site Development Masterplan and the accompanying updated ZTV, coupled with field checking and survey, have confirmed that the original selection of viewpoints remains valid.
- 13.104 The 12 candidate representative viewpoints were selected from desk-top analysis of the computer-generated ZTV and other mapped information. These candidate viewpoints were then reviewed in the field and refined as necessary.

Landscape Sensitivity

- 13.105 The term 'landscape receptor' means an element or a group of elements which will be directly or indirectly affected by the proposals. Landscape receptors are physical elements or attributes of the landscape that could be affected by the development, such as landscape character, landform, water courses, woodland, groups of trees or hedgerows, land uses and field boundaries.
- 13.106 Prior to the advent of the landscape character assessment procedure now used by local authorities, the sensitivity of a given landscape receptor was often defined in terms of landscape value, which took the form of national planning designations - such as National Parks and Areas of Outstanding Natural Beauty - or local designations, such as Areas of Great Landscape Value or Special Landscape Areas. Recent assessment guidance has placed greater emphasis on those landscapes which do not benefit from national or local designations, but which may be valued locally for particular reasons. In assessing the value of a given landscape, we have used the range of factors which can be taken into consideration as listed in Box 5.1 of GLVIA3, insofar as they relate to the particular landscape context.
- 13.107 The sensitivity of landscape receptors is assessed by combining judgements on the susceptibility to the type of change proposed and the value attached to the landscape, in accordance with GLVIA3, and defined in accordance with the criteria set out in **Table 13.2**, below:

Table 13.2: Sensitivity of Landscape Receptors

Level of Sensitivity	Indicative Landscape Receptor Criteria
Very High	An area possessing a particularly distinctive sense of place, in very good condition, or of the highest value recognised for its scenic quality and/or landscape character; for example: National Parks, Areas of Outstanding Natural Beauty, Grade I and II* Listed Buildings and Grade I registered historic parks; or an intact feature of very high intrinsic value [such as prominent trees or tree groups, forming a critical and readily discernible part of the landscape pattern or historic landscape

Level of Sensitivity	Indicative Landscape Receptor Criteria
	pattern]; landscapes or features with an absence of landscape detractors and very low tolerance to change of the type identified. No potential – or very limited potential – for substitution or replacement.
High	An area possessing a distinctive sense of place, in good condition, or highly valued for its scenic quality and/or landscape character; for example: Heritage Coasts, Grade II Listed Buildings and Grade II registered historic parks; or locally-designated areas of special landscape value, or open countryside designated as Access Land; Green Belt land; or an intact feature of high intrinsic value [such as prominent trees or tree groups, forming a key part of the landscape pattern or historic landscape pattern]; landscapes or features with very few landscape detractors and a low tolerance to change of the type identified. Limited potential for substitution or replacement.
Medium	An area with a tangible sense of place and/or character in moderate condition; or an area with a value or scenic quality substantiated at a local level by criteria other than formal designation; for example: local common land with permissive access and limited usage rights, or land with local cultural or historical associations; or a partly damaged feature of high intrinsic value; or an intact feature of moderate intrinsic value [such as prominent trees or tree groups which contribute to the character of the site, screening or framing of views, landscape or historic landscape pattern]; a landscape or feature with few landscape detractors which is partially tolerant of change of the type identified. Some potential for substitution or replacement.
Low	An area with a poorly defined sense of place, and/or landscape character in poor condition, often not valued for its scenic quality, with evident landscape detractors; or a feature of low intrinsic value [such as trees and species-poor hedgerows of no special quality or function]; or a landscape or feature that is tolerant of change of the type identified. Clear potential for substitution or replacement.
Very Low	An area with a very poorly defined sense of place, and/or landscape character, in very poor or substantially degraded condition, with many landscape detractors and an evident absence of scenic quality; or a feature of very low intrinsic value [such as poorly-managed trees and intermittent hedgerows of no apparent quality or function]; or a landscape or feature that is very tolerant of change of the type identified. Good potential for substitution or replacement.

Magnitude of Landscape Effect

13.108 The criteria used to assess the magnitude of landscape effects (including those on landscape character and historical landscape character and setting) are based upon the geographic extent of the area influenced, the predicted amount of physical change - and its duration and reversibility - that will occur as a result of the proposals, as described in **Table 13.3**, below. These are based on best practice examples and experience:

Table 13.3: Magnitude of Landscape Effect

Landscape Effect Magnitude	Criteria
Very High - Adverse	The proposals will be at <i>complete variance</i> with the scale, landform, pattern or character of the landscape, and/or would <i>substantially diminish or conflict with or destroy</i> the integrity of key characteristics, elements or features of the baseline condition. Large scale effects influencing several landscape types or character areas.
High - Adverse	The proposals will be <i>tangibly at odds</i> with the scale, landform, pattern or character of the landscape and/or would cause a <i>noticeable alteration to, or diminution of the integrity of</i> key characteristics, features or elements of the baseline condition. Effects experienced at the scale of the landscape type or character area(s) within which the proposal is situated.
Medium - Adverse	A <i>noticeable partial loss or alteration to</i> one or more key elements/features/characteristics of the baseline condition. Addition of some landscape elements that would conflict with the key characteristics, features or elements of the baseline landscape condition. Effects within the immediate landscape setting of the Site itself.
Low - Adverse	The proposals will <i>not quite fit into</i> the scale, landform, pattern or character of the landscape and/or would cause a <i>perceptible diminution</i> of the integrity of the key characteristics, features or elements of the baseline landscape condition. Effects confined to within the Site itself.
Very Low - Adverse	The proposals will create a <i>barely perceptible diminution of the integrity of the key characteristics, features or elements</i> of the baseline landscape condition. Effects experienced only within very small parts of the Site itself.
No change	The proposals will <i>not cause any change</i> to the scale, landform, pattern or character of the landscape.
Very Low - Beneficial	The proposals will provide a <i>barely perceptible enhancement of the integrity of the key characteristics features or elements of the baseline condition</i> . Effects experienced only within very small parts of the Site itself.
Low - Beneficial	The proposals will achieve a <i>degree of fit</i> with the scale, landform, pattern or character of the landscape and <i>make a minor contribution to enhancing</i> the key characteristics, features or elements of the baseline condition. Effects confined to the Site itself.
Medium - Beneficial	The proposals <i>will fit with</i> the scale, landform, pattern or character of the landscape and would <i>noticeably enhance</i> the key characteristics, features or elements of the baseline condition. Effects experienced within the immediate landscape setting of the Site itself.

Landscape Effect Magnitude	Criteria
High - Beneficial	The proposals will <i>fit well</i> with the scale, landform, pattern or character of the landscape and/or would cause a <i>readily perceived widespread enhancement of the key</i> characteristics, features or elements of the baseline condition. Effects at the scale of the landscape type or character area(s) within which the proposal is situated.
Very High - Beneficial	The proposals <i>will fit very well</i> with the scale, landform, pattern or character of the landscape and would <i>fundamentally restore or greatly enhance</i> the key characteristics, features or elements of the baseline condition. Large scale effects influencing several landscape types or character areas.

Sensitivity of Visual Receptors

13.109 The term 'visual receptor' means people - individuals and/or defined groups of people - who have the potential to be affected, directly or indirectly, by the proposals. Visual receptors are at accessible viewpoints, the sensitivity of which would be dependent on the location, the activity and expectations of the viewer, and the importance of the view. These would include viewpoints available to the users of outdoor facilities, sporting activities and users of public rights of way; viewpoints from landscape features and beauty spots; viewpoints outside local properties (which would represent the view for residents); and viewpoints available to people travelling through the landscape. Views may be glimpsed and fleeting, or open and sustained.

13.110 The determination of the sensitivity of the visual receptors is a matter of professional judgement. The guidance in GLVIA3 recommends that the assessment of sensitivity will be dependent on:

- the location and context of a viewpoint;
- the expectations and occupation or activity of the viewer;
- the importance of the view (which may be determined with respect to its popularity or the numbers of people affected, its appearance in guidebooks, on tourist maps, and in the facilities provided for its enjoyment and references to it in literature or art); and
- the scale of the view and the extent of visibility.

13.111 The rationale for determining the sensitivity of visual receptors is set out in **Table 13.4**, below.

Table 13.4 Sensitivity of Visual Receptors

Level of Sensitivity	Visual Receptor Criteria
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Level of Sensitivity	Visual Receptor Criteria
Very High	Viewers with a <i>priority interest</i> in their visual environment and/or prolonged viewing opportunities; for example, residents within their homes or within the curtilage of their property; or visitors to National Parks and Areas of Outstanding Natural Beauty; or walkers and riders on National Trails.
High	Viewers with a <i>particular interest</i> in their visual environment and/or prolonged viewing opportunities; for example, visitors to Heritage Coasts, National Trust Land not within a designated landscape, or designated Access Land offering extensive attractive views; or walkers and riders on promoted long distance routes or promoted regional trails. Motorists travelling on promoted tourist routes using dedicated and promoted opportunities/facilities intended to encourage them to stop and enjoy views for a sustained period of time.
Medium	Viewers with a <i>general interest</i> in their visual environment; for example, visitors to regionally or locally valued countryside - including Access Land offering limited attractive views - and users of local open space facilities, and walkers or horse riders on local public rights of way which are not specifically promoted for their visual interest. Motorists travelling on promoted tourist routes using dedicated opportunities/facilities to stop and enjoy views for a short period of time.
Low	Viewers with a <i>passing or momentary interest</i> in their everyday surroundings; for example, motorists or people at their place of work, whose attention is primarily focussed on other activities and who are therefore less susceptible to change.
Very Low	Viewers with <i>no more than an incidental interest</i> in their everyday surroundings; for example, vehicle drivers at work or commuting to their workplace, or people at their place of work, whose attention is predominantly focussed on other activities and who are therefore far less susceptible to changes in the view.

Magnitude of Visual Effects

- 13.112 The magnitude of visual effects depends on factors such as separation distance, the time of day, the season, the prevailing weather conditions, elevation and aspect, as well as the context of the view. The predicted level of effect has been assessed during good visibility and light conditions, therefore with the best possible view of the proposals. Proper allowance has also been made for the likely visibility of the proposed development during the winter aspect; that is, without the presence of leaves on deciduous vegetation and its consequential contribution to screening effects.
- 13.113 The following scale has been adopted for assessing the magnitude of visual effects, based on the degree of change to the view, or to the composition - see **Table 13.5**, below. This is based on best practice examples and previous experience.

Table 13.5: Magnitude of Visual Effect

Magnitude of Visual Effect	Criteria
Very High Adverse or Beneficial Visual Effect	The proposals will cause a <i>dominant or complete change</i> to the composition of the view, the appreciation of the landscape character, or the ability to take or enjoy the view. There would be a substantial change to the baseline, with the proposed development creating a new focus and having a defining influence on the view. Direct views at close range with changes over a wide horizontal and vertical extent.
High Adverse or Beneficial Visual Effect	The proposed development will be <i>very noticeable</i> , and the composition of the view, the appreciation of landscape character, or the ability to take in and enjoy the view would be fundamentally altered by its presence. Direct or oblique views at close range with changes over a notable horizontal and/or vertical extent.
Medium Adverse or Beneficial Visual Effect	The proposals will cause a <i>clearly noticeable change</i> to the view, which would affect the composition, the appreciation of landscape character or the ability to take in or enjoy the view. The proposed development will form a new and recognisable element within the view which is likely to be recognised by the receptor. Direct or oblique views at medium range with a moderate horizontal and/or vertical extent of the view affected.
Low Adverse or Beneficial Visual Effect	The proposals will cause a <i>perceptible change</i> to the view, but which would not materially affect the composition, the appreciation of landscape character, or the ability to take in or enjoy the view. The proposed development will form a minor constituent of the view being partially visible or at sufficient distance to be a small component. Oblique views at medium or long range with a small horizontal/vertical extent of the view affected.
Very Low Adverse or Beneficial Visual Effect	The proposals will cause a <i>barely perceptible change</i> to the view, which would not affect the composition, the appreciation of landscape character, or the ability to take in or enjoy the view. The proposed development will form a barely noticeable component of the view, and the view, whilst being slightly altered, would be similar to the baseline situation. Long range views with a negligible part of the view affected.
No change	The proposals will cause no change to the view.

Assessment of Overall Level of Effect

13.114 The scale shown in **Table 13.6**, below, has been adopted to assess the overall level of both landscape and visual effects and whether they are considered to be adverse, beneficial or neutral. (Note that neutral effects would be those where there may be a landscape or visual change, but the overall weighting of positive and negative effects is very finely

balanced). The basis of this scale is derived from professional experience. In accordance with good practice, the main aim in the reporting of the identified effects is to describe the key landscape and visual issues which are relevant to determining this planning application; for the purposes of this assessment, such effects are referred to as being *significant* - which we would define as being likely to influence the outcome of the planning decision – that is, a material consideration.

Table 13.6: Assessment of Overall Landscape or Visual Level of Effect

(It should be noted that some of assessment values below, e.g. moderate/minor, are expressed as a continuum. In these instances, our professional judgement is that the assessment of the level of effect is not sufficiently weighted as to be defined by a single value of say moderate or minor. Our approach follows GLVIA3 guidance on the importance of professional judgement in landscape and visual assessment)

Receptor Sensitivity	Magnitude of Change					
		<i>Very High</i>	<i>High</i>	<i>Medium</i>	<i>Low</i>	<i>Very Low</i>
	<i>Very High</i>	Major	Major	Major/ Moderate	Moderate	Moderate/ Minor
	<i>High</i>	Major	Major/ Moderate	Moderate	Moderate/ Minor	Minor
	<i>Medium</i>	Major/ Moderate	Moderate	Moderate/ Minor	Minor	Minor/ Negligible
	<i>Low</i>	Moderate	Moderate/ Minor	Minor	Minor/ Negligible	Negligible
	<i>Very Low</i>	Moderate/ minor	Minor	Minor/ Negligible	Negligible	Negligible

13.115 In all cases, where the level of overall effects are predicted to be moderate or higher (shaded yellow), this will result in a significant effect. All other effects will be not significant.

13.116 In certain cases, where additional factors may arise, a further degree of professional judgement may be applied when determining whether the overall change in the view will be significant or not and, where this occurs, this is explained in the assessment. The participation of two qualified and highly experienced Chartered Landscape Architects in the LVIA is in accordance with current best practice guidance in GLVIA3 for a complex project; and is instrumental in achieving a more rigorous assessment based upon consensus and the elimination of any personal bias, thus increasing confidence in the outcomes of the assessment. A Statement of Competence, providing details of the professional staff who prepared this Assessment, is included at Appendix 13.2.

Limitations and Assumptions

13.117 The authors have previously stated that the ‘worst-case’ scenario used for the visual assessment has assumed maximum levels of winter visibility due to the absence of leaves on deciduous vegetation. With regard to the worst-case scenario for landscape change, the worst-case scenario would occur if all of the Proposed Development in the New Eastern

Villages were to occur at the same time, as a continuous process across all types and phases of construction. This is an unlikely occurrence, so the construction phase effects have been assessed based upon current available information as to the likely phasing of the development.

- 13.118 Mitigation measures used in the LVIA have been confined to primary and secondary mitigation measures: that is, primary measures utilised through the identification and selection of the Application Site itself, and secondary measures which arise out of specifically identified effects which can be mitigated through reasonable actions which might reasonably be undertaken by the Applicant.

Landscape & Visual Impact Assessment: Construction Phase

General

- 13.119 The LVIA has followed the guidance set out in the current GLVIA3 in respect of differentiating between 'impacts' and 'effects'. This guidance generally distinguishes between the 'impact', defined as the action being taken, and the 'effect', defined as the change resulting from that action, and recommends that the terms are used consistently in this way.' (paragraph 1.15).
- 13.120 A detailed description of the construction activities is provided in **Chapter 4** and this forms the basis for the following assessment.
- 13.121 The following is a schedule of the main elements of the proposed development that have the potential to cause landscape and/or visual impacts:
- Erection of construction site and works compounds, temporary storage areas and temporary security fencing and associated vehicle movements;
 - Earthworks, such as soil stripping, soil storage, cut/fill activities and main drainage infrastructure works and associated plant and vehicle movements;
 - Primary vehicular access construction leading off the A420 and further vehicular access from Wanborough Road;
 - Provision of site access roads, parking and other infrastructure;
 - Construction of up to 2,448 residential units, 2 new primary schools, retail and business employment sites and new public open space.

- 13.122 For the purposes of the assessment of landscape and visual impacts during construction, it is assumed that all the soft landscape works which form part of the Green Infrastructure would follow the construction phase. These soft landscape elements are considered to be part of the mitigation and will be assessed separately in later this chapter. The following assessment therefore represents the 'worst-case' scenario during construction.

Landscape Effects During Construction

Land Use

- 13.123 There will be major change as the predominantly open farmland Application Site is converted to a development platform with housing and other built elements occupying much of the Application Site area. However, the **Green Infrastructure Parameters Plan (Figure 4.4)** shows

that significant landscape features such as hedgerows and some small copses will be retained and incorporated within the new landscape framework.

- 13.124 The combination of the *very high magnitude* of change to the land use and the *low* sensitivity to change of the land use resource will result in a of effect, without mitigation, which is *moderate adverse*.

Topography

- 13.125 The Application Site is predominantly flat, and the construction of the development platforms will little change the essential nature of the topography.
- 13.126 The site topography, as a landscape resource, is considered to be of *low* sensitivity to change and, given the relatively *low magnitude* of alterations to landform which will be necessary to accommodate the Proposed Development, the level of effect, without mitigation is likely to be *minor/negligible adverse* and *not significant*.

Existing Site Vegetation and Site Boundaries

- 13.127 The Green Infrastructure Parameters Plan shows that substantial parts of the Application Site's existing vegetation features will be retained within the Proposed Development. Nonetheless, there will be considerable loss of elements of this vegetation, including hedgerows and trees. These will be local effects. The magnitude of effect is considered to be *medium adverse* on this component of the landscape resource, which is assessed as being of *medium sensitivity* to change. This would result in a likely level of effect, without mitigation, of *moderate/minor adverse* and *not significant*.

Rights of Way and Land Accessible to the Public

- 13.128 An existing public right of way within the site crosses the western corner, running northwards to connect with the A420 close to the Police Headquarters. During construction a temporary diversion will be required, the detailed alignment of which will need to be agreed with the LPA.
- 13.129 There are comparatively few public rights of way in the vicinity of the Application Site (**refer to Figure 13.7 – Access – Public Rights of Way**) and this local resource is considered to be of *medium sensitivity*. Effects during construction would be temporary, of local extent and the operational routes would not be substantially less convenient for users. For this reason, the predicted magnitude of effect on this resource is considered to be *low* and the likely level of effect without mitigation would be *minor adverse* and *not significant*.

Demolition of selective buildings at Lotmead farmstead

- 13.130 The proposed demolition and removal of selected buildings at the farmstead itself will result in local construction phase effects. It is predicted that this impact will remove the more modern utilitarian farm buildings, thus revealing the more traditional buildings at the old core of the farmstead.
- 13.131 The Lotmead farmstead is considered to be of *low* sensitivity to the change proposed for the Application Site. The magnitude of change is predicted to be *medium*. As a consequence of the removal of some widely-occurring elements and the re-exposure of an older vernacular landscape element, this demolition and removal is likely to result in a *minor beneficial* magnitude of landscape effect which would be *not significant*.

Landscape Character Effects During Construction

13.132 During the construction phases, the Application Site will gradually change from open fields on the edge of an urban area to being land dominated by enabling infrastructure development and then to a construction site.

13.133 The temporary nature of the construction phase means that it is not possible to accurately assess the magnitude and significance of effects on individual landscape character receptors, but some broad observations can be made, as follows:

- The Application Site is wholly located within the SBC Landscape Character Area Vale of the White Horse and will experience temporary direct effects. Given the scale and substantial geographical area affected, the level of effect on the landscape character of this LCA is assessed as *moderate adverse* and *significant*;
- The Scarp, Down Plains, High Downs and Zone 2A Western Clay Vales LCAs may experience indirect (*see Glossary of Terms*) temporary effects during construction to some degree. With regard to the Scarp, Down Plains and High Downs, the magnitude of landscape effect on landscape character is predicted to be *no change*, since the separation distance involved would mean no effects on any area contiguous with or close to the Application Site. Part of the Zone 2A Western Clay Vales LCA is close to the eastern edge of the Application Site, but there is effective separation from it. There would be the potential for some indirect landscape effects experienced in a small local area of the western extremity of this LCA. The level of effect is predicted as being *very low*. When combined with the *medium sensitivity* ascribed to this LCA, the resulting level of effect would be *minor/negligible* and *not significant*;
- LCA Mid Vale Ridge and the urban area of Swindon appear to have almost no connectivity with the Application Site. Their *medium* sensitivity to change of this LCA, when combined with the predicted magnitude of change - which is at most *very low adverse* - would result in a level of effect on their landscape character which is *minor/negligible* and *not significant*.

Visual Effects During Construction

13.134 During the construction phase, the enabling infrastructure works will gradually spread out across the Application Site, with a resultant reduction in the quality of views towards the Application Site. The full range of visual receptors described above is likely to experience effects at some stage in the construction process, but these will vary according to the location and nature of the activities. Given the temporary nature of the construction process, it is not possible to accurately assess the magnitude and significance of effects for individual receptors, but the following general points are noted:

- Receptors near the new entrance routes from the A420 will be in close proximity to the works and these main road users, with an ascribed *medium sensitivity* to this type of change will experience locally *medium adverse* visual effects, resulting in a level of effect which would be at most *moderate/minor adverse* and *not significant*;
- Likewise, there will be the same level of visual effects for road users near the access from Wanborough Road being retained as the access to the first phase of the development on the Application Site;

- There will be partial views of the works for near to middle distance receptors – say up to 3kms from the centre of the Application Site. The intervening bands of hedgerow vegetation and small copses will provide significant screening and so the general level of visual effects is likely to be *low adverse*, and locally *medium adverse*. Only where there are occasional residential receptors will the resultant level of effect become *moderate adverse* and *significant*. In all other instances, the resultant overall level of effects would be *not significant*.
- More distant viewpoints, those over 3.5kms – in particular from the High Downs to the south - will have glimpses of the construction works set within a framework of existing trees and hedgerows. At this long distance the Proposed Development will be seen in the context of the busy A419 trunk road and adjoining extensive areas of residential, industrial and commercial buildings on the edge of Swindon and in the locality of South Marston, with the very large and conspicuous Honda car plant immediately to its north-west. These elements constitute a large proportion of the existing views to the north-west from upper elevations within the AONB. For these reasons, the predicted level of overall visual effects during construction are likely to be *moderate/minor adverse* and not significant.

The ‘Do-Nothing Scenario’.

- 13.135 Schedule 4 of the EIA Regulations 2017 - with reference to Regulation 18(3) – sets out the details of ‘*Information for Inclusion in Environmental Statements*’. Paragraph 3 of Schedule 4 requires the inclusion of:

‘A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.’

- 13.136 The existing land use of the Application Site is predominantly agriculture. The agricultural landscape is a continually evolving element, in response to both natural and economic factors. If the proposed development did not take place, it can be assumed that the Application Site’s landscape would remain substantially unaltered, provided that the agricultural holding remains economically viable and that the cropping regimes and cycles remain the same as at present. However, any field boundary hedgerows and associated trees may be retained in situ and subject to more intensive management or, if they are no longer required for livestock containment, may be subject to removal in the pursuit of the increased efficiency of arable cultivation. Unless any such hedgerow is protected under the Hedgerow Regulations 1994, such matters are not governed by land use planning provisions. The landscape of the Application Site cannot therefore be guaranteed to remain in the same baseline condition in the event of no development occurring. If the surrounding sites identified in the overall masterplan for the New Eastern Villages were to be developed and the Application Site were to remain in its undeveloped state, then its rural context and landscape character would change markedly, with the Application Site effectively being substantially enclosed by urban development.

Operational Impacts

- 13.137 The following descriptions of the effects on the landscape resources, landscape character and visual amenity relate to the completed development prior to the implementation of the

landscape and visual mitigation measures contained in the Green Infrastructure strategy. This part of the assessment therefore deals with 'Year 0' – immediately following completion of construction works - and is effectively the 'worst-case' scenario in terms of landscape and visual effects.

- 13.138 At 'Year 0', it is assumed that the Application Site has been built-out in accordance with the various Parameters Drawings included in **Chapter 4** of the ES. These drawings cover land use, movement, Green Infrastructure, building heights and densities.

Landscape Effects During Operational Phase Year 0

Land Use

- 13.139 At Operational Year 0, the Application Site will have been built-out and the land use will have changed from pastoral and arable agriculture to housing areas with a supporting infrastructure of community and retail uses and a primary school. Important landscape features such as hedgerows and some small copses will be retained and incorporated within the new landscape framework, which will develop and establish in future years.
- 13.140 There will be a *very high* and permanent magnitude of change to the land use on the Application Site, and the likely overall level of effect, without mitigation, on this *low* sensitivity resource is likely to be *moderate adverse* and *significant*.

Topography

- 13.141 The Application Site is predominantly flat and of *low* sensitivity in terms of the landform landscape resource. Alterations to landform will be necessary to accommodate the development, such as screening bunds and surface water drainage attenuation ponds, but these will result in a *low* magnitude of change to this broad, substantially level site. The resultant level of effect, without mitigation, is therefore likely to be *minor/negligible adverse* and *not significant*.

Existing Application Site Vegetation and Boundaries

- 13.142 Vegetation resources across the Application Site have been judged to be of *medium sensitivity*. While the site planning as shown on the 'Green Infrastructure Parameters' drawing envisages much of this resource being retained -particularly on boundaries - there will be substantial permanent loss to of these features to make way for access provisions and for some parts of the built development.
- 13.143 The magnitude of effects is considered *medium* on this component of the landscape resource. Given the *medium sensitivity* to change of the resource this would result in a likely level of overall effect, without mitigation, which is *moderate/minor adverse* and *not significant*.

Rights of Way and Land Accessible to the Public

- 13.144 During construction the existing right of way across the Application Site, referred to previously, will have been temporarily diverted but at Year 0 it will have been permanently relocated on a detailed alignment to be agreed with LPA.
- 13.145 The Movement Parameters plan anticipates a series of new footpath connections back towards Swindon and to the surrounding landscape. These new connections would substantially enhance the existing local footpath network which in the vicinity of the Application Site is relatively sparse.

- 13.146 For these reasons, the magnitude of effect on this *medium sensitivity* local landscape resource is considered to be *medium beneficial* and the likely overall level of effect without mitigation would be *moderate/minor beneficial* and *not significant*.

Landscape Character Effects during Operation

- 13.147 There will be a major change to the landscape character and identity of the Application Site, and this is likely to have an effect on its immediate surroundings as well as having some potential effects on wider LCAs within the study area. The following text is an analysis of the predicted effects on the various constituent LCAs, based on the relative scale of the development in the wider landscape setting and the distance and degree of inter-visibility between the Proposed Development and the respective landscape character receptors.

ii. Vale of White Horse

- 13.148 The entire Application Site (as indeed does most of the wider area designated for the New Swindon Villages) lies within SBC *Character Type ii. Vale of the White Horse*.
- 13.149 There would be a local loss of some features in the landscape and the building of new housing and associated infrastructure will result in major changes compared to the baseline situation. These changes would be permanent and most influential in the vicinity of the Application Site. However, the strength of boundary features and the substantially flat nature of the local topography would limit the effects over the wider LCA.
- 13.150 The magnitude of effect at Year 0 is considered to be *high adverse* due to the large scale of the development proposals. This Character Area is judged to be of *medium sensitivity* to the type of urban expansion being envisaged with the Proposed Development and therefore the overall level of effect on the Character Area as a whole is likely to be *moderate adverse* and *significant*.

iv. Scarp

- 13.151 The Scarp runs east west to the south of the Vale of the White Horse Character area. It is a transitional area between the broad lowland valley and the High Downs to the south.
- 13.152 There will be no direct landscape effects on this character area. However, the scale of the Proposed Development will be discernible from some elevated positions on the Scarp but set within a well-established network of hedges and small copses of which the majority will be retained. The visibility of Swindon and its residential, industrial and commercial edges also mean that this is not a pristine view from the escarpment and that view does not constitute a key contributory factor to the landscape character of the Scarp Character Area. Consequently, the magnitude of landscape effect on landscape character at Year 0 is predicted to be *no change*, since the separation distance involved would mean no effects on any area contiguous with or close to the Application Site.

v. Down Plains

- 13.153 This area of high plains lies on the southern margins of the study area and is assessed as being of *very high sensitivity* to change due to the strong sense of place and unified character of the landscape, qualities which are reflected in the AONB designation which covers the entire area.
- 13.154 Potential effects are likely to be similar but slightly less than LCA iv. Scarp, with the greater elevation increasing the visibility of Swindon urban area and other detractors and the

development being further away from this LCA receptor. The Masterplan Application Development, although large in scale, will read as comparatively minor component in the much wider context appreciated from the Downs Plains. The visibility of Swindon and its residential, industrial and commercial edges again mean that this is not a pristine view from the Down Plains and that view does not constitute a key contributory factor to the landscape character of the Character Area. Consequently, the magnitude of landscape effect on landscape character at Year 0 is predicted to be *no change*, since the separation distance involved would mean no effects on any area contiguous with or close to the Application Site.

vi. High Downs

- 13.155 Like the Down Plains Character Area, this area of high upland has a distinctive sense of place, reflected in its AONB designation. This Character Area is assessed as being of *very high sensitivity* to development of the type proposed. The same observations largely apply as for the Down Plains. Again, the visibility of Swindon and its residential, industrial and commercial edges also mean that this is not a pristine view from these elevated areas and that view does not constitute a key contributory factor to the landscape character of the High Downs Character Area. Consequently, the magnitude of landscape effect on landscape character at Year 0 is predicted to be no change, since the separation distance involved would mean no effects on any area contiguous with or close to the Application Site.

vii. Midvale Ridge

- 13.156 This Character Area lies in the northern part of the study area and to the north of the Vale of White Horse Character Area. This Character Area is assessed as being of *medium sensitivity* to change due to the reasonably good quality and variety of landscape resources.
- 13.157 The proposed accesses from the A420 to the Application Site are within 200m of the southern boundary of this LCA but the majority of the development is some way further to the south. Field boundary vegetation considerably limits intervisibility and the experience of the new built Proposed Development would be partly in the context of the present industrial and commercial edge of Swindon. LCA Mid Vale Ridge appears to have almost no connectivity with the Application Site. Its *medium* sensitivity to change, when combined with the predicted magnitude of change at Year 0 - which is at most *very low adverse* - would result in a level of effect on its landscape character which is *minor/negligible* and *not significant*.

Character Area 2A Western Clay Vale

- 13.158 This Character Area on the eastern edges of the Study Area is, in many respects, a continuation of the Swindon LCA Vale of the White Horse and is also assessed as *medium* in its sensitivity to change.
- 13.159 There will be no direct effects and only the western extremities of this LCA will have visual connectivity with the Application Site due to the extent of intervening vegetation.
- 13.160 The magnitude of effect at Year 0 is *very low*. The resulting level of effect is therefore likely to be *minor/negligible adverse* and *not significant*.

Visual Effects During Operational Phase Year 0

- 13.161 Visual effects are defined as changes in the appearance of the landscape as a result of development. This can be positive (beneficial or an improvement) or negative (i.e. adverse or a detraction). The assessment of visual effects describes:

- The changes in the character of the available views resulting from the development;
- The changes in the visual amenity of the visual receptors.

13.162 A ZTV has been identified and from this a series of representative viewpoints have been established. These viewpoints have been assessed for the various development conditions and the results are presented in the **Viewpoint Tables** included in **Appendix 13.1**. This viewpoint analysis has been used to inform the following discussion of the likely visual effects at Year 0 (and Year 10) on the principal groups of visual receptors.

Residential Receptors

13.163 Residential receptors are amongst the most sensitive to visual effects. In accordance with GLVIA 3rd Edition, the assessment of visual effects is based on the likely view(s) from ground floor rooms that are normally occupied during daylight hours.

Settlements

Swindon

13.164 Very few houses in Swindon have views towards the Application Site. The Application Site will be almost completely invisible from this direction, principally because of the nature and extent of the tree cover along the A419(T) and also hedgerows on the edges of the Application Site. The sensitivity of the receptors is *very high*, but the magnitude of effect is *very low* resulting in a level of effect which is *moderate/minor adverse* and *not significant*.

Wanborough

13.165 There are glimpsed views of the Application Site from a limited number of residential properties in Wanborough looking across low-lying farmland set within a strong framework of hedgerows and hedgerow trees. However, in these views the eye is immediately drawn to the prominent massing of the Honda works, other conspicuous, very substantial industrial buildings and the Redlands airfield hangar (**refer to Figure 13.11E – Viewpoint 10**). From Wanborough the existing intervening vegetation will afford only glimpses of the development. It will be seen intermittently as a narrow band within the framework of existing vegetation, stretching eastwards from the edge of Swindon into more open countryside. Foreground trees interrupt views of the western end of the development. The sensitivity of the receptors is *very high*, but the magnitude of effect is *low* resulting in a level of overall effect on a small number of properties which is *moderate adverse* and *significant*.

Hinton Parva

13.166 A number of properties in this settlement have views towards the Application Site across low-lying farmland set within a strong framework of hedgerows and hedgerow trees. The Honda Works are prominent in the background, with glimpses of Swindon town. Most of the Application Site appears to be hidden by intervening vegetation. At Year 0, parts of the development will be glimpsed through and above intervening vegetation, particularly in the vicinity of Lotmead Farm. The sensitivity of the receptors is *very high*, but the magnitude of effect is *low* resulting in a level of overall effect on a number of properties which is *moderate adverse* and *significant*.

Other Settlements

13.167 No residential receptors in other settlements have been identified as likely to experience significant visual effects from the Proposed Development.

Individual Properties

- 13.168 A number of scattered rural properties to the south east of the Application Site may have views towards the Proposed Development. However, the substantially flat intervening topography and the extent of intervening hedgerow vegetation and woodland will screen the majority of the Proposed Development. The sensitivity of the receptors is *very high*, but the magnitude of effect is *low* resulting in a level of overall effect which is *moderate adverse* and *significant*.
- 13.169 There are several properties on Wanborough Road situated close to the Application Site, including one at the present entrance to Lotmead Farm (**refer to Figure 13.11A – Viewpoint 1**). This access off Wanborough Road is retained as a permanent access to the Proposed Development. The existing entrance would be widened and there would be oblique views of the western end of the Proposed Development from the property at the entrance and from several others near the southern boundary of the Application Site. The sensitivity of the receptors is *very high*, and the magnitude of effect is *medium*, resulting in a level of overall effect which is *major/moderate adverse* and *significant*.

Roads

- 13.170 There are a number of major roads in the Study Area.
- 13.171 The M4 motorway is about 4.5kms from the southern edges of the Application Site at its closest point, but there are no views of the Application Site.
- 13.172 The A419(T) adjoins the western corner of the Application Site and there appear to be little or no views to the Application Site because of the extent of planting along this trunk road corridor.
- 13.173 The A420 runs east-west about 0.7kms to the north of the Site and two new Application Site accesses are in the process of being constructed leading off this main road (**refer to Figure 13.11A – Viewpoint 2**). At these points, at Year 0, there will be a *locally medium* magnitude of change. Road users on this busy road would be regarded as *medium* sensitivity receptors and therefore the likely resultant level of effect would be *moderate/minor adverse* and *not significant*.
- 13.174 The Application Site is bordered to the west by Wanborough Road from which both pedestrian access and vehicular access is obtained. There will be views into the Application Site at the present access to Lotmead Farm and some of the southern edges of the new residential areas will be visible. Along this section of the road at Year 0 there will be a *short-distance medium* magnitude of change in the view. Road users on this minor, but well used, road would be regarded as *medium* sensitivity receptors and therefore the likely resultant level of effect would be *moderate/minor adverse* and *not significant*.
- 13.175 There is a minor road connecting Horpit with the wider network and this minor lane extends north- eastwards to link various farmsteads and isolated dwellings, such as Mount Pleasant Farm and Earls court Manor. This is a *low sensitivity* receptor separated by intervening hedgerows from visual contact with the Proposed Development. The consequent magnitude of change in the views is likely to be *low adverse* and therefore the overall level of effect would be *minor/negligible adverse* and *not significant*.

13.176 The villages following the edge of the North Wessex Downs escarpment are connected by a minor road, which occasionally has views northwards towards the Application Site (**refer to Figure 13.11E – Viewpoint 9; and 13.11D – Viewpoint 7**). This well-used road is on the boundary of the AONB and users should be regarded as being *high* sensitivity. The magnitude of change in the views will be *low* due to the distance, angle of view and intervening vegetation. This will result in an anticipated level of effect which is *moderate/minor adverse* and *not significant*.

13.177 No other roads have been identified as having views which might be significantly affected by the Proposed Development.

Rights of Way

13.178 There are a series of essentially north-south public footpath links to the east of the Application Site connecting Wanborough and Horpit with Bourton and areas to the north of the A420 (**refer to Figure 13.11B – Viewpoint 4; Figure 13.11C – Viewpoints 5 and 6**). There will be some partial views for users from this part of the network, particularly on the higher ground around Mount Pleasant Farm, filtered by existing vegetation (**refer to Figure 13.11B – Viewpoint 3**). Users of these local footpaths are assessed as *medium sensitivity* receptors and the Proposed Development would result in a *medium* magnitude of change in views. This combination would result in an expected level of effect which is *moderate/minor adverse* and *not significant*.

13.179 A number of public footpaths climb the scarp slopes around the villages of Hinton Parva, Bishopstone and Ashbury (**refer to Figure 13.11D – Viewpoints 8**). There is an area of designated Access Land at Bishopstone which is under the control of the National Trust but views out from this to towards the Application Site appear to be screened by intervening topography. From those parts of the scarp slope where there are views northwards, there will be glimpses of the Proposed Development, but this would be set within a substantial framework of existing hedgerows and tree cover. The Honda Works and other parts of the industrial and commercial edges of Swindon are conspicuous visual detractors within these views.

13.180 Users of these local footpaths within the AONB are *very high sensitivity* receptors. The magnitude of change in these glimpsed views would be *very low adverse* and therefore the overall level of effect would be *moderate/minor adverse* and *not significant*.

13.181 The Ridgeway is a nationally important promoted long-distance route running along the top of the scarp slope, the nearest points to the Application Site being in the vicinity of its crossing point of the M4. Charlbury Hill is a promoted viewpoint located a short distance off this route (**refer to Figure 13.11F – Viewpoint 12**).

13.182 From the top of Charlbury Hill there are panoramic views over the flat low-lying farmland in which the Application Site is *located* (**refer to Figure 13.11F – Viewpoint 11**). Set within a strong framework of hedgerows and hedgerow trees, and at this distance and given the oblique angle of view, the Application Site, interlaced with by this vegetation, can only be glimpsed intermittently. In the wider landscape, this view is dominated by the bulk and massing of the prominent Honda Works and other large industrial and commercial buildings to the north. To the north-west, the dense urban outer area of Swindon is also prominent. From this elevated and distant viewpoint, existing vegetation will afford intermittent views

of the Proposed Development which will appear as a very narrow linear extension of Swindon stretching out into more open countryside.

- 13.183 Users of the Ridgeway Path and, indeed of the Charlbury Hill viewpoint, are *very high sensitivity* receptors. The magnitude of change in these views is considered to be *very low* and the overall significance of effect would therefore be *moderate/minor adverse* and *not significant*.

Mitigation

Indicative Landscape Strategy

- 13.184 An indicative landscape strategy has been developed together with the overall masterplanning of the Application Site. Elements of the landscape strategy have been integral in shaping the Illustrative Masterplan. There has been a twofold aim of the landscape strategy: to minimise and mitigate for the potentially adverse landscape and visual impacts which will arise from the Proposed Development; and to provide, where possible, enhancements to the landscape resource.
- 13.185 The strategic landscape proposals are presented within the Green Infrastructure Parameters plan. This strategy seeks to establish a strong framework for the overall development, including the following elements:
- Create primary and secondary green corridors through the Application Site incorporating some of the retained existing landscape features;
 - Strong structural boundary planting particularly along the southern and eastern margins to visually contain the development within the surrounding landscape and protect views from the AONB to the south;
 - Localised landform manipulation to create well contoured screening banks at key locations;
 - Planting to reflect the character of the area and help assimilate the development into its surroundings;
 - Create a hierarchy of public and private open spaces within the green infrastructure network to increase accessibility and add to the sense of place;
 - Utilise the visual and biodiversity opportunities of the sustainable drainage system;
 - Increase publicly accessible links through footpaths and cycleways with the surrounding landscape.

Assessment Criteria

- 13.186 The successful implementation of mitigation measures which require the establishment of planned areas within and/or bordering the Application Site will require a period of establishment management and maintenance following the completion of the construction phase. It is assumed that any such works which would occur beyond the normal 3 to 5-year implementation contract obligations would need to be secured within the mechanism of an approved Green Infrastructure Management Plan.

- 13.187 For the purposes of this assessment it has been assumed that the landscape and mitigation measures would be implemented in the first growing season following the completion of the construction phase. The effects of the Proposed Development are assessed 10 years after planting when the average height of whips and transplants planted as structural screening is assumed to be approximately 6.5m and standard and feathered trees would be approx. 7-8m high.

Residual Effects

Landscape Effects

- 13.188 The following assessment has been carried out of the landscape and visual effects which remain after the anticipated establishment of the landscape infrastructure at Operational Year 10. The residual effects identified are those effects which will persist, having taken into account all of the proposed mitigation measures.

Land Use

- 13.189 At Operational Year 10, the Proposed Development will be an established and permanent change of lower to medium quality agricultural land to a well-designed and sustainable new housing community set within a strong Green Infrastructure. The loss of open agricultural land will to some extent be offset by a high-quality living environment which has been assimilated into the wider landscape by creating a designed structure of trees, woodlands and hedgerows.
- 13.190 The sensitivity of the agricultural land use is considered to be *low*. At Year 10, the magnitude of effect is likely to be *medium* and the overall level of residual effect would be *minor adverse* and *not significant*.

Topography

- 13.191 The changes by Year 0 of the development would have been minor. As the new planting matures it will tend to further obscure any changes so that, by Year 10, the appearance of any bunds, swales and attenuation ponds will be softened.
- 13.192 The topographic resource is considered to be of *low sensitivity*. The magnitude of effect would be *very low*, and the resulting overall level of residual effect would be *negligible adverse* and *not significant*.

Existing Application Site Vegetation and Boundaries

- 13.193 By Year 10 there would be a permanent well-established green infrastructure across the Application Site. The indicative landscape strategy would introduce extensive areas of native tree and shrub planting. Species rich meadows and wetland would add to biological diversity. These new vegetation features would be adding to a framework of retained trees and hedgerows and would much more than compensate for the vegetation losses which occurred during the construction phase.
- 13.194 The existing vegetation resources across the Application Site have been judged to be of *medium sensitivity*. The magnitude of effect by Year 10 is considered to be *medium* with the resultant overall level of residual effect being *moderate/minor beneficial* and *not significant*.

Rights of Way and Land Accessible to the Public

- 13.195 By Year 0, the only existing right of way across the Application Site will have been permanently relocated on a detailed alignment to be agreed with The Council.
- 13.196 A series of new connections will be made from the Application Site to Swindon and other neighbouring settlements. There will also be connections into the local countryside and, as the Green Infrastructure planting matures, the visual and perceptual qualities of these linkages will improve.
- 13.197 For these reasons, the magnitude of effect by Year 10 is considered to be *high* and the likely overall level of residual effect on this *medium sensitivity* resource would be *moderate beneficial* and *significant*.

Landscape Character Assessment

- 13.198 As the vegetation matures, the effects on local and wider landscape character are likely to change. The new vegetation resource is of a type which is not out of character in the lowland plain and will help assimilate the scale of the Proposed Development into the landscape.

ii. Vale of White Horse

- 13.199 The Proposed Development would lead to a localised major change to the open agricultural nature of a relatively small part of this Landscape Character Area. The new housing and associated infrastructure works would not be entirely out of character, given the proximity of such development on the adjacent edge of Swindon.
- 13.200 The Green Infrastructure strategy will retain landscape features of value and incorporate them into an extensive new framework of boundary and internal planting which will contribute to the landscape character and ecological diversity of the Application Site and its immediate surroundings.
- 13.201 The magnitude of effect by Year 10 is considered to reduce to *medium*, given the maturing landscape framework. This Character Area is judged to be of *medium sensitivity* to the type of urban expansion being envisaged for the Proposed Development and therefore the overall level of residual effect is likely to be *moderate/minor adverse* and *not significant*.

iv. Scarp

- 13.202 While the scale of the Proposed Development will be discernible from elevated positions on within the Scarp Character Area, the maturing landscape framework of retained hedgerows, trees and extensive new planting will visually soften and integrate the development into its setting. Swindon and its industrial and commercial edges will remain as detractors in views from the escarpment.
- 13.203 The sensitivity of this receptor is assessed as *very high*. However, the visibility of Swindon and its residential, industrial and commercial edges mean that this is not a pristine view from the escarpment and that view does not constitute a key contributory factor to the landscape character of the Scarp Character Area. Consequently, the magnitude of landscape effect on landscape character at Year 10 is predicted to remain as *no change*, since the separation distance involved would mean no effects on any area contiguous with or close to the Application Site.

v. Down Plains

- 13.204 The same observations largely apply as for the Down Plains. Again, the visibility of Swindon and its residential, industrial and commercial edges also mean that this is not a pristine view from these elevated areas and that view does not constitute a key contributory factor to the landscape character of the High Downs Character Area. Consequently, the magnitude of landscape effect on landscape character at Year 10 is predicted to remain as *no change*, since the separation distance involved would mean no effects on any area contiguous with or close to the Application Site.

vi. High Downs

- 13.205 The same observations largely apply as for the Scarp. Again, the visibility of Swindon and its residential, industrial and commercial edges also mean that this is not a pristine view from these elevated areas and that view does not constitute a key contributory factor to the landscape character of the High Downs Character Area. Consequently, the magnitude of landscape effect on landscape character at Year 10 is predicted to remain as *no change*, since the separation distance involved would mean no effects on any area contiguous with or close to the Application Site.

vii. Midvale Ridge

- 13.206 Very little of the Proposed Development will be visible when the new planting structure has become established by Year 10. Even without the planting, there is little inter-visibility or connectivity with this LCA.
- 13.207 The Character Area Mid Vale Ridge appears to have almost no connectivity with the Application Site. Its *medium* sensitivity to change, when combined with the predicted magnitude of change at Year 10 - which is at most *very low adverse* - would result in a level of effect on its landscape character which is *minor/negligible adverse* and *not significant*.

Character Area 2A Western Clay Vale

- 13.208 As has been already stated, only the western extremities of this Character Area will have any visual connectivity with the Application Site, due to the nature and extent of the intervening vegetation. The mitigation effects of the establishment of the new and retained vegetation within the landscape framework by Year 10 will further increase this visual separation.
- 13.209 For these reasons, the sensitivity of this receptor is judged to be *medium* and the magnitude of effect at Year 10 is *very low*. The resultant level residual effect is therefore likely to be *minor/negligible adverse* and *not significant*.

Visual Effects

Residential Receptors

Settlements

Swindon

- 13.210 At Year 10 the Application Site will be almost completely invisible from this direction and the proposed landscape structure planting will reinforce this screen. There may nonetheless be slight glimpses, particularly in winter. For this reason, the magnitude of effect assessed would remain as *very low*. With the sensitivity of the receptors being *very high*, this results in a level of residual effect which is *moderate/minor adverse* and *not significant*.

Wanborough

- 13.211 From Wanborough at Year 10, the existing intervening vegetation will be reinforced by the established new planting and this combination will effectively assimilate the Proposed Development into these wide views (**refer to Figure 13.11E – Viewpoint 10**). Very brief glimpses will be seen at some points across a narrow band within the more open countryside. The sensitivity of the receptors is *very high*, but the magnitude of effect at Year 10 would reduce to *very low* resulting in a level of residual effect which is *moderate/minor adverse* and *not significant*.

Hinton Parva

- 13.212 At Year 10, while the new planting will add to the existing layers of hedgerows and trees there will still be glimpses of the roofs of new buildings indicating the presence of the Proposed Development (**refer to Figure 13.11D – Viewpoint 8**). The view is set in the context of the large scale industrial/commercial development on the edges of Swindon. The sensitivity of the receptors is *very high*, but the magnitude of effect would reduce to *very low*, resulting in a level of residual effect which is *moderate/minor adverse* and *not significant*.

Other Settlements

- 13.213 No residential receptors in other settlements have been identified as likely to experience significant visual effects from the Proposed Development.

Individual Properties

- 13.214 The establishment of new structural planting around and within the Application Site will have a degree of further visual effect on the scattered rural properties to the south and east of the Application Site. The substantial flatness of the topography and the nature and extent of intervening hedgerow vegetation and woodland already largely screen the majority part of the Proposed Development at Year 0. By Year 10, the vegetation density would have substantially increased. The sensitivity of the receptors is *very high*, but the magnitude of effect would remain *very low* resulting in a significance of effect which is *moderate/minor adverse* and *not significant*.
- 13.215 There are several properties along Wanborough Road close to the Application Site, including one at the present entrance to Lotmead Farm. This entrance is retained as part of the access to the Proposed Development. Even with the establishment of the new structural landscape, there will still be some views into the Application Site from some of these properties. The sensitivity of the receptors is *very high*, and the magnitude of effect would remain as *medium*, resulting in a level of residual effect which is *major/moderate adverse* and *significant*.

Roads

- 13.216 There will be no views from the M4 motorway or any significant views from the A419(T).
- 13.217 By Year 10 the two new accesses on the A420 will have become assimilated into the adjacent landscape as the new structure planting has become established (**refer to Figure 13.11A – Viewpoint 2**). The main part of the Application Site, already largely hidden from A420 road users by intervening hedgerows, will be even more visually enclosed by the new structural landscape planting. For these reasons the likely magnitude of change would reduce to *very low* and the likely level of residual effect on this *medium* sensitivity receptor would be *minor adverse* and *not significant*.

- 13.218 The establishment of the proposed structural planting by Year 10 will only have a limited effect on the visual experience of users of Wanborough Road. This is because this Application Site entrance will open up views into the Proposed Development, albeit along only a short section of this road. The anticipated magnitude of change will remain locally as *medium*. Road users on this minor, but well-used, road would be regarded as a *medium sensitivity* receptor and therefore the likely level of residual effect would be *moderate/minor adverse and not significant*.
- 13.219 A minor road connects Horpit with the wider network and this country lane extends north eastwards to link various farmsteads and isolated dwellings. Users of this local access road would be *low* sensitivity receptors. The road is separated by intervening hedgerows from visual contact with the Proposed Development. The proposed structural landscape planting along the southern boundaries of the Application Site will add to this screening, to the extent that at Year 10, the magnitude of change in views is likely to reduce to *very low*, resulting in a level of residual effect which is *negligible adverse and not significant*.
- 13.220 The villages aligned along the edge of the North Wessex Downs escarpment are connected by a minor road, which occasionally has views northwards towards the Application Site. Although the structural landscape will have become established and the screening effects increased, there will still be some glimpses of the upper parts of some buildings on the Application Site after the establishment of planting at Year 10 (**refer to Figure 13.11E – Viewpoint 9**).
- 13.221 The magnitude of change experienced by these local access road users, *high sensitivity* receptors, will reduce to *very low*. This will result in an anticipated level of residual effect of *minor adverse and not significant*.
- 13.222 No other roads have been identified as having views which might be significantly affected by the Proposed Development.

Rights of Way

- 13.223 There are a series of public footpath links to the east of the Application Site, connecting Wanborough and Horpit with Bourton, and users will continue to have occasional glimpses of the Proposed Development but, by Year 10, it will be set within a well-established framework of tree blocks and hedgerows. By then the anticipated magnitude of change would have reduced to *low*. Users of these local footpaths are assessed as *medium sensitivity* receptors and there would be an expected level of residual effect which is *minor adverse and not significant*.
- 13.224 Footpaths on the scarp slopes around the villages of Hinton Parva, Bishopstone and Ashbury would continue to have glimpses of the upper parts of buildings on the Proposed Development, and the Honda Works and other nearby areas of Swindon – plus the new building on The Hub/Symmetry Park - would remain as considerable visual detractors within these views, although seen within the context of the dense urban development at the north-eastern fringes of Swindon. Users of these local footpaths within the AONB are *very high sensitivity* receptors. The magnitude of change in these glimpsed views would remain *very low adverse* and therefore the level of residual effect would remain as *moderate/minor adverse and not significant*.

- 13.225 Views from The Ridgeway and from the top of Charlbury Hill would be little changed between Years 0 and 10 of the development, with the establishment of the landscape structure increasing the density of intervening vegetation around the new building developments. Looking down from these elevated viewpoints, some upper parts of the Proposed Development will remain visible, but the whole Application Site will remain as just a small part of the built fabric of the view when set in the context of the prominent urban sprawl of Swindon (**refer to Figure 13.11F – Viewpoints 11 & 12**). In the wider landscape, this view is dominated by the bulk and massing of the prominent Honda Works and other large industrial and commercial buildings to the north. To the north-west, the dense urban outer area of Swindon is also prominent.
- 13.226 Users of the Ridgeway Path and, indeed of the Charlbury Hill viewpoint, are *very high sensitivity* receptors. At Year 10, the magnitude of change in these views is considered to remain at *very low* and the overall level of residual of effect would therefore remain as *moderate/minor adverse* and *not significant*.

Cumulative Effects

- 13.227 The GLVIA 2013 Edition identifies the need to keep the task of cumulative assessment *'reasonable and in proportion to the nature of the project under consideration'*. It also notes in paragraph 7.5 that *'it is always important to remember that the emphasis in EIA is on likely significant effects rather than cataloguing of every conceivable effect that might occur.'*
- 13.228 The current best practice guidance for LVIA set out in the GLVIA3 addresses the matter of cumulative landscape and visual effects, noting that this is an evolving area of practice (page 152). Between-project (or inter-project) cumulative effects are usually of greater importance for LVIA than within-project (or intra-project) cumulative effects (page 133). The Study Area identified for the assessment of cumulative landscape and visual effects is co-terminus with the extent of the ZTV.
- 13.229 In this assessment, the primary focus has been on the combined effects of the different combinations of development, rather than on the additional effects of the main project under consideration.
- 13.230 The cumulative effect scenario under consideration in this LVIA Chapter is the Proposed Development with the wider 'Project for Assessment' identified in **Chapter 2, Table 2.1** of the ES.
- 13.231 The New Eastern Villages planning concept will establish a new major mixed-use development to the east of the A419 (T) on the eastern edges of Swindon. Approximately 8,000 dwellings will be provided, in the form of seven interconnected villages set within a framework of Green Infrastructure. Although the predominant land use will be residential, there will be land developed for business/employment and supporting infrastructure for the NEV will include schools, sports, leisure and shops.
- 13.232 Drawing from the Swindon Borough Council New Eastern Villages Green Infrastructure Supplementary Planning Document July 2017 (GI SPD), the key points of the vision for the concept relevant to landscape and visual issues are:

- Sensitively and positively respond to the existing landscape context, natural and historic assets and the character and identity of the surrounding villages, as well as enhancing biodiversity and Green Infrastructure;
- Comprise new distinct villages with individual identities and characters linked together by green spaces that integrate with the existing urban area and wider landscape setting.

13.233 Some of the developments in the overarching New Eastern Villages allocation have been brought forward and are at different stages of the planning and construction process. However, there is uncertainty with regard to timescales and what exactly they will comprise. Bearing in mind the limitations of information available and to keep the cumulative assessment meaningful and proportionate, this LVIA has therefore only assessed a fully-developed scheme at Year 10 post completion.

Existing Baseline Conditions

Landscape Resources

- 13.234 In this part of the assessment the landscape is dealt with as a single resource, given the lack of detailed information on the nature of the full New Eastern Villages scheme.
- 13.235 The existing land use throughout the New Eastern Villages is almost entirely agricultural. However, Redlands Airfield lies within the southern part of the land area with its hangar, grass runway and associated facilities.
- 13.236 The land is predominantly flat with gentle slopes down to watercourses and a maximum variation in elevation of about 11m over the entire area.
- 13.237 The pattern and type of vegetation is also fairly consistent over the full area of the New Eastern Villages site, with well-developed hedgerows which include a proportion of mature trees. Riparian vegetation follows the watercourses in narrow bands and there are a handful of small copses, mostly in field corners.
- 13.238 The combination of substantial vegetation on field boundaries and the general flatness of the land leads to limits on longer views along the valley.
- 13.239 Overall, this landscape resource is considered to be of *medium sensitivity* to change of the type envisaged in the Proposed Development.

Landscape Character

- 13.240 The landscape character baseline has been simplified for the purposes of the cumulative assessment to the following:
- the Vale landscapes (which include LCA ii Vale of the White Horse, vii Midvale Ridge and 2A Western Clay Vale) and are rated as being of medium sensitivity;
 - the scarp and Downs landscapes (which include LCA iv Scarp, v Down Plains and vi High Downs) and are rated as being of very high sensitivity.

Summary of Existing Baseline for considering Cumulative Effects

13.241 Existing Baseline:

- The Proposed Development Site is located in a substantially flat, low-lying rural landscape on the eastern urban edge of Swindon;
- The Application Site itself is also substantially flat, comprising a series of fields contained by mature, mostly overgrown hedgerows with a scattering of mature trees;
- Indeed, field hedgerows with trees, are a dominant feature of the surrounding farmland, creating a strong and distinctive framework in the local landscape, which also restricts local views into the Application Site;
- This combination of hedgerow vegetation and substantially flat topography restricts visibility of the Application Site from most aspects except from the south;
- Approximately 2kms to the south of the Application Site, this substantially flat valley landscape gives way to the rolling downland of the North Downs Wessex AONB, the land rising up relatively sharply above the villages of Wanborough, Idstone, Hinton Parva, Bishopstone and Ashbury. Whilst there are not many views of the Application Site from these villages, which lie just above the foot of the scarp slope, the Application Site is overlooked from the high ground above, which includes notable viewpoints such as Charlbury Hill (designated Access Land). A prominent feature of these views is the strong vegetation framework, referred to above, which tends to result in only intermittent views of parts of the Application Site;
- There do not appear to be many views of the Application Site from the Ridgeway National Trail. This is because for the most part, it runs just beyond the crest of the scarp slope;
- Views of the Application Site from within the North Wessex Downs AONB tend to be far-reaching and panoramic. Whilst the landscape in view may be regarded as a pleasant pastoral landscape, it is not exceptional and suffers from a number of significant visual detractors. The most prominent of these is the urban sprawl of Swindon, including the large-scale industrial complex on the town's north eastern outskirts.

Visual Receptors

13.242 Visual receptors for the purposes of the cumulative assessment can be simplified into those located within the Vale and those on the Scarp and Downs's landscape area. Each receptor group has been ascribed a level of sensitivity which equates to that of the of the highest individual receptor, so as to ensure the assessment is representative of the worst-case scenario. This means that for the Vale landscape area's visual receptors this will be *high sensitivity* and for the Scarp and Downs receptors, *very high*.

Likely Cumulative Effects

Landscape Effects

13.243 The land use for the New Eastern Villages area will be completely altered, with open agricultural land being replaced with mixed-use built development. This development will be set within a strong designed framework of Green Infrastructure which, by Year 10, will have provided a high quality setting for the buildings.

- 13.244 Landform will appear to be largely unaltered and the new vegetation structure will have much more than merely replaced the trees and hedgerows which would be lost during the construction phase. The sensitivity of the landscape resource is *medium* and the overall magnitude of effect at Year 10 of the combined Proposed Development is *high* resulting in an overall level of cumulative effect which is *moderate adverse* and *significant*.

Landscape Character

The Vale Landscapes

- 13.245 The Proposed Development will occupy something in the region of 700ha. of land, a substantial area in the context of the Vale, although significantly more modest in scale when seen in the wider context of the extensive urban area of Swindon.
- 13.246 The buildings and other supporting infrastructure will permanently change the landscape fabric of the area and its character. Indeed, the Proposed Development will in due course create an entirely new Character Area located on the eastern edges of Swindon. Although a high-quality urban environment will be created within a substantial integrated Green Infrastructure, there will be major changes to the aesthetic qualities of the existing landscape. An open agricultural landscape with some sense of tranquillity will be replaced by a more contained and urban landscape.
- 13.247 The sensitivity of the Vale landscape character to development of this type and scale is considered to be *medium*. The magnitude of effect by Year 10 would be *high* and the resulting level of cumulative effect would be *moderate adverse* and *significant*.

The Scarp and Downs Landscapes

- 13.248 The changes brought about by the Proposed Development, including the Application Site, would have no significant indirect and permanent effects on the Scarp and Downs landscapes. Although the scale of the Proposed Development means that it would be visible, it would be viewed as set within a framework of well-vegetated field boundaries and a substantial established structural landscape. This new built development will not stand as an isolated element in the Vale below but will be seen in the context of the large mass of the Swindon urban area including the industrial and commercial buildings on the outskirts.
- 13.249 The sensitivity of this receptor is assessed as *very high*. However, the visibility of Swindon and its residential, industrial and commercial edges mean that this is not a pristine view from the escarpment and that view does not constitute a key contributory factor to the landscape character of the Scarp Character Area. Consequently, the magnitude of landscape effect on landscape character at Year 10 is predicted to remain as *no change*, since the separation distance involved would mean no cumulative effects on any area contiguous with or close to the Application Site.

Visual Effects

Receptors in the Lowland Vale

- 13.250 The present landscape is broad and flat with some longer views to the escarpment to the south. The longer views along the Vale are limited to some extent by the nature and extent of hedgerow vegetation cover.
- 13.251 The substantially flat topography and existing tree and hedgerow growth will limit views of the Proposed Development from residential receptors, footpaths and roads within the Vale.

The new landscape planting structure will, however, alter the degree of openness of the views from some of these receptors and will be a noticeable change from the baseline situation.

- 13.252 The sensitivity of visual receptors is considered to be *high* – as an overall worst-case scenario – and the magnitude of effect would be *low* at Year 10. This would result in a level of cumulative visual effect which is *moderate/minor adverse* and *not significant*.

Receptors on the Scarp and the Downs

- 13.253 There will be middle and long distance views down from these elevated viewpoints onto the Proposed Development site. Although the nature and extent of the existing hedgerows and tree cover, combined with the new landscape structure planting, will do much to assimilate the development, the broad extent of it will be visible. However, current views from the Scarp are heavily influenced by the detractors of the urban industrial fringe of Swindon. In this context the Proposed Development will appear as a more modest – and greener – expansion of the urban area.

- 13.254 From the AONB, the Great Stall sites within the Proposed Development may appear more readily visible than the Application Site, probably because they are on subtly sloping ground. Thus, in the context of the whole of the Proposed Development, the specific developments at Great Stall – in particular the large proposed warehouses – may be more noticeable than buildings on the Application Site, even though the latter is closer to the AONB.

- 13.255 The sensitivity of the Scarp and Downs locations for visual receptors is *very high* and the magnitude of effect at Year 10, given the establishment of the Green Infrastructure, is likely to be *low*. This would result in a level of cumulative visual effect which is *moderate adverse* and *significant*.

Summary of Cumulative Effects

- 13.256 It is evident that views from the elevated land within of the North Wessex Downs AONB to the south are likely to be both more sensitive and more susceptible to change than from elsewhere.
- 13.257 From within the AONB, the strong framework of vegetation within the Vale landscape below will afford limited views of the Proposed Development, which will be seen as narrow band of housing extending from the urban edge of Swindon out into farmland to the east.
- 13.258 The very large mass, intensified by the pale reflective cladding of the vast Honda Works and other large industrial buildings, will mean that these buildings remain a prominent feature in the elevated views from the south, as indeed will the existing urban sprawl of the eastern and south-eastern edge of Swindon. The Proposed Development will be partly visible from the edge of the AONB and will visually read as an extension of Swindon, rather than as a separate development in the open countryside.
- 13.259 From within the AONB, the Great Stall East site's development may appear to be more readily visible than the Proposed Development, probably because they are on subtly sloping ground. Thus, in the context of the whole of the Proposed Development, those developments at Great Stall – and, in particular, the large warehouse – would be more noticeable than those on the Application Site, even though the latter is closer to the AONB.

- 13.260 From these elevated viewpoints which provide oblique overhead views of the Proposed Development, new planting which is proposed, reinforcing the strong framework of existing vegetation will undoubtedly assist in assimilating the whole development into the wider landscape setting, but it will not fully hide it.
- 13.261 Most views from the villages at the foot of the AONB scarp slope are not considered to be an issue. This is due to a combination of factors, namely, the general flatness of the intervening topography, the strong framework of intervening vegetation and, in the case of the easternmost villages, separation distance.
- 13.262 From the Vale to the north and east, the Proposed Development will either not be visible or only glimpsed due to the substantial flatness of the land and the framework of intervening vegetation, reinforced with new planting in and around it.
- 13.263 The development of the Parameter Plans (**Figures 4.2-4.6**), while requiring some loss of existing vegetation, will allow for a new Green Infrastructure which will include substantial areas of tree and shrub planting, wetlands and meadows with associated increased biodiversity interest. In an area of relatively poor current public access, the proposed range of new footpaths and cycleway will create improved connections with Swindon and the surrounding landscape.
- 13.264 The Proposed Development, when complete, is likely to create a new urban landscape character area. There will be substantial adverse effects on landscape character within the development area and, to some extent, on the surrounding landscape. It would not be possible to mitigate all significant adverse landscape and visual effects but the extensive Green Infrastructure setting for the development will make a substantial contribution to assimilating the development and bring benefits of ecological enhancement, vegetation diversity and increased public accessibility. It is therefore considered that the cumulative landscape and visual effects of the Application Site, when combined with the Proposed Development, are acceptable when considered within the context of the Local Plan policy and guidance relating to this expansion of Swindon.

Summary of Residual Effects

- 13.265 The residual effects identified are those effects which will persist, having taken into account *all* of the proposed mitigation measures. Although residual effects can occur during the construction phase of the development these are, by definition, transitory effects. The more important residual effects are those which would persist after all mitigation measures have been implemented. Where such measures rely wholly, or extensively, upon the planting of new woodland, trees and hedgerows, those residual effects which would persist at Year 10 are those which have been given the greatest emphasis in the following Summary.

Landscape Effects

- 13.266 The Landscape and Visual Impact Assessment has identified, in accordance with current best practice guidance, a range of landscape effects which are predicted to occur as a direct or indirect result of the completion of the proposed development at the Application Site. The direct landscape effects will occur at the level of the Application Site itself and in the areas contiguous with it, and where there is a degree of continuity of landscape character in areas close by in the wider locality. Indirect landscape effects would be likely to occur rarely beyond this area and only under particular circumstances.

Land Use

- 13.267 At Operational Year 10, the Proposed Development will be an established and permanent change from agricultural land to a well-designed and sustainable new housing community set within a strong Green Infrastructure. The sensitivity of the agricultural land use is considered to be *low*. At Year 10, the magnitude of effect is likely to be *medium* and the overall level of residual effect would be *minor adverse* and **not significant**.

Topography

- 13.268 As the new planting will have become established and begun to mature, it will tend to further obscure any changes so that, by Year 10, the appearance of any bunds, swales and attenuation ponds within the Proposed Development will be softened. The topographic resource is considered to be of *low sensitivity*. The magnitude of effect would be *very low*, and the resulting overall level of residual effect would be *negligible adverse* and **not significant**.

Existing Application Site Vegetation and Boundaries

- 13.269 By Year 10 there would be a permanent well-established Green Infrastructure across the Application Site, incorporating extensive areas of native tree and shrub planting, species-rich meadows and wetland. These new vegetation features would be adding to a framework of retained trees and hedgerows and would much more than compensate for the vegetation losses which occurred during the construction phase. The existing vegetation resources across the Application Site have been judged to be of *medium sensitivity*. The magnitude of effect by Year 10 is considered to be *medium* with the resultant overall level of residual effect being *moderate/minor beneficial* and **not significant**.

Rights of Way and Land Accessible to the Public

- 13.270 The only existing public footpath right of way across the Application Site will have been permanently relocated on a detailed alignment agreed with The Council. A series of new connections will have been made from the Application Site to Swindon and other neighbouring settlements, as well as connections into the local countryside. As the Green Infrastructure planting continues to mature, the visual and perceptual qualities of these linkages will improve. For these reasons, the magnitude of effect by Year 10 is considered to be *high* and the likely overall level of residual effect on this *medium sensitivity* resource would be *moderate beneficial* and **significant**.

Landscape Character

- 13.271 As the retained and newly-planted vegetation matures, the effects on local and wider landscape character are likely to change. The new vegetation resource being established is of a type which is not out of character in the lowland plain and will help assimilate the scale of the Proposed Development into the landscape.

Vale of White Horse Character Area

- 13.272 The Proposed Development would lead to a localised major change to the open agricultural nature of a relatively small part of this Landscape Character Area. The new housing and associated infrastructure works would not be entirely out of character, given the proximity of such development on the adjacent edge of Swindon. The Green Infrastructure implemented will have retained landscape features of value and incorporated them into an extensive new landscape framework which will contribute to the landscape character of the Application Site and its immediate surroundings. Consequently, the magnitude of effect by Year 10 is considered to reduce to *medium*. This Character Area is judged to be of *medium*

sensitivity to the type of urban expansion being envisaged for the Proposed Development and therefore the overall level of residual effect is likely to be *moderate/minor adverse* and **not significant**.

Scarp Character Area

- 13.273 The sensitivity of this receptor is assessed as *very high*. However, the visibility of Swindon and its residential, industrial and commercial edges mean that this is not a pristine view from the escarpment and that view does not constitute a key contributory factor to the landscape character of the Scarp Character Area. Consequently, the magnitude of landscape effect on landscape character at Year 10 is predicted to remain as **no change**, since the separation distance involved would mean no effects on any area contiguous with or close to the Application Site.

Down Plains Character Area

- 13.274 The same observations largely apply as for the Scarp Character Area. The magnitude of landscape effect on landscape character at Year 10 is predicted to remain as **no change**.

High Downs Character Area

- 13.275 The same observations largely apply as for the Downs Plains Character Area. The magnitude of landscape effect on landscape character at Year 10 is predicted to remain as **no change**.

Midvale Ridge Character Area

- 13.276 Very little of the Proposed Development will be visible when the new planting structure has become established by Year 10. Even without the planting, there is little inter-visibility or connectivity with this LCA, which also appears to have almost no connectivity with the Application Site. Its *medium* sensitivity to change, when combined with the predicted magnitude of change at Year 10 - which is at most *very low adverse* - would result in a level of effect on its landscape character which is *minor/negligible adverse* and **not significant**.

Character Area 2A Western Clay Vale

- 13.277 Only the western extremities of this Character Area will have any visual connectivity with the Application Site, due to the nature and extent of the intervening vegetation. The mitigation effects of the establishment of the new and retained vegetation within the landscape framework by Year 10 will further increase this visual separation. For these reasons, the sensitivity of this receptor is judged to be *medium* and the magnitude of effect at Year 10 is *very low*. The resultant level residual effect is therefore likely to be *minor/negligible adverse* and **not significant**.

Visual Effects

Residential Receptors

Settlements

Swindon

- 13.278 At Year 10 the Application Site will be almost completely invisible from this direction and the proposed landscape structure planting will have reinforced this screen. There may nonetheless be slight glimpses, particularly in winter. For this reason, the magnitude of effect assessed would remain as *very low*. With the sensitivity of the receptors being *very high*, this results in a level of residual effect which is *moderate/minor adverse* and **not significant**.

Wanborough

- 13.279 From Wanborough at Year 10, the existing intervening vegetation will have been reinforced by the established new planting and this combination will have effectively assimilated the Proposed Development into these wide views. Very brief glimpses will still be seen at some points across a narrow band within the more open countryside. The sensitivity of the receptors is *very high*, but the magnitude of effect at Year 10 would reduce to *very low* resulting in a level of residual effect which is *moderate/minor adverse* and ***not significant***.

Hinton Parva

- 13.280 At Year 10, while the new planting will have added to the existing layers of intervening hedgerows and trees, there will still be glimpses of the roofs of new buildings indicating the presence of the Proposed Development, all of which are seen in the context of the large scale industrial/commercial development on the edges of Swindon. The sensitivity of the receptors is *very high*, but the magnitude of effect would reduce to *very low*, resulting in a level of residual effect which is *moderate/minor adverse* and ***not significant***.

Individual Properties

- 13.281 The combination of the retained vegetation and the establishment of new structural planting around and within the Application Site will have had a degree of further visual effect on the scattered rural properties to the south and east of the Application Site. By Year 10, the vegetation density would have substantially increased. The sensitivity of the receptors is *very high*, but the magnitude of effect would remain *very low* resulting in a significance of effect which is *moderate/minor adverse* and ***not significant***.
- 13.282 There are several properties along Wanborough Road close to the Application Site. Even with the establishment of the new structural landscape, there will still be some views into the Application Site from some of these nearby properties. The sensitivity of the receptors is *very high*, and the magnitude of effect would remain as *medium*, resulting in a level of residual effect which is *major/moderate adverse* and ***significant***.

Roads

- 13.283 There will be no views from the M4 motorway or any significant views from the A419(T).
- 13.284 By Year 10 the two new accesses on the A420 will have become assimilated into the adjacent landscape as the new structure planting has become established and matures, as will the main part of the Application Site. For these reasons the likely magnitude of change would reduce to *very low* and the likely level of residual effect on this *medium* sensitivity receptor would be *minor adverse* and ***not significant***.
- 13.285 The establishment of the proposed structural planting by Year 10 will only have a limited effect on the visual experience of users of Wanborough Road. This is because this Application Site entrance will open up views into the Proposed Development, albeit along only a short section of this road. The anticipated magnitude of change will remain locally as *medium*. Road users on this minor, but well-used, road would be regarded as a *medium sensitivity* receptor and therefore the likely level of residual effect would be *moderate/minor adverse* and ***not significant***.
- 13.286 A minor road connects Horpit with the wider network and this country lane extends north eastwards to link various farmsteads and isolated dwellings. Users of this local access road would be *low* sensitivity receptors. The road is separated by intervening hedgerows from

visual contact with the Proposed Development and by Year 10 the structural landscape planted along the southern boundaries of the Application Site would have added to this screening. Consequently, the magnitude of change in views is likely to reduce to *very low*, resulting in a level of residual effect which is *negligible adverse* and *not significant*.

- 13.287 The villages aligned along the edge of the North Wessex Downs escarpment are connected by a minor road, which occasionally has views northwards towards the Application Site. Although the structural landscape will have become established and the screening effects increased, there will still be some glimpses of the upper parts of some buildings on the Application Site after the establishment of planting at Year 10. The magnitude of change experienced by these local access road users, *high sensitivity* receptors, will reduce to *very low*, resulting in an anticipated level of residual effect of *minor adverse* and *not significant*.
- 13.288 No other roads have been identified as having views which might be significantly affected by the Proposed Development.

Rights of Way

- 13.289 There are a series of **public footpath links** to the east of the Application Site, connecting **Wanborough** and **Horpit** with **Bourton**. Users will continue to have occasional glimpses of the Proposed Development but, by Year 10, it will be set within a well-established framework of tree blocks and hedgerows. The anticipated magnitude of change would have reduced to *low*. Users of these local footpaths are assessed as *medium sensitivity* receptors and there would be an expected level of residual effect which is *minor adverse* and *not significant*.
- 13.290 **Footpaths** on the scarp slopes around the **villages of Hinton Parva, Bishopstone and Ashbury** would continue to have glimpses of the upper parts of buildings on the Proposed Development, albeit in the context of the Honda Works and other nearby areas of Swindon and the new building on The Hub/Symmetry Park. Users of these local footpaths within the AONB are *very high sensitivity* receptors. The magnitude of change in these distant glimpsed views would remain *very low adverse* and therefore the level of residual effect would remain as *moderate/minor adverse* and *not significant*.
- 13.291 Views from **The Ridgeway and from the top of Charlbury Hill** would be little changed between Years 0 and 10 of the development, with the establishment of the landscape structure increasing the density of intervening vegetation around the new building developments. Some upper parts of the Proposed Development will remain visible, but the whole Application Site will remain as just a small part of the built fabric of the view when set in the context of the prominent urban edge of Swindon. Users of the Ridgeway Path the Charlbury Hill viewpoint are *very high sensitivity* receptors. At Year 10, the magnitude of change in these views is considered to remain at *very low* and the overall level of residual of effect would therefore remain as *moderate/minor adverse* and *not significant*.
- 13.292 The residual landscape and visual effects are summarised in **Table 13.7**, below.

Table 13.7: Summary Table of Landscape and Visual Residual Effects

Potential Effect	Duration of Effect	Level of Effect at Year 0 and Significance	Mitigation Measures	Geographical Importance*							Level of Residual Effects at Year 10 and Significance	
	(Permanent/Temporary)	(Major/Moderate/Minor)		I	UK	E	R	N	LA	L	(Major/Moderate/Minor)	
		(Beneficial/Adverse/Negligible)									(Beneficial/Adverse/Negligible)	
Landscape Effects												
Loss of open Agricultural Land on Application Site	Permanent	Moderate adverse Significant	Green Infrastructure implementation							x	x	Minor Adverse Not Significant
Alterations to Site Topography on Application Site	Permanent	Minor/negligible adverse Not Significant	Green Infrastructure implementation								x	Negligible adverse Not Significant
Existing Application Site and Boundary Vegetation	Permanent	Moderate/minor adverse Not Significant	Green Infrastructure implementation								x	Moderate/minor beneficial Not Significant
Single Public Right of Way in westernmost part of Application Site – Route Diversion	Permanent	Moderate/minor beneficial Not Significant	Diversion agreed with Local Authority. Green Infrastructure implementation provides enhanced local PRow network							x	x	Moderate beneficial Significant
Change in Local Landscape Character (Vale of White Horse)	Permanent	Moderate adverse Significant	Green Infrastructure implementation							x	x	Moderate/minor adverse Not Significant
Change in Local Landscape Character (Scarp, Down Plains &		No Change										No Change

<i>High Downs)</i>						
Change in Local Landscape Character (<i>Midvale Ridge</i>)	Permanent	Minor/negligible adverse Not Significant	Green Infrastructure implementation		x x	Minor/negligible adverse Not Significant
Potential Effect	Duration of Effect (Permanent/ Temporary)	Level of Effect at Year 0 and Significance (Major/Moderate/Minor) (Beneficial/Adverse/Negligible)	Mitigation Measures	Geographical Importance*		Level of Residual Effects at Year 10 and Significance (Major/Moderate/Minor) (Beneficial/Adverse/Negligible)
Visual Effects				I U K E R N L A L		
Change in Local Landscape Character (<i>Western Clay Vale</i>)	Permanent	Minor/negligible adverse Not Significant	Green Infrastructure implementation		x	Minor/negligible adverse Not Significant
Residential Receptors: Swindon	Permanent	Moderate/minor adverse Not Significant	Green Infrastructure implementation		x	Moderate/minor adverse Not Significant
Residential Receptors: Wanborough	Permanent	Moderate adverse Significant	Green Infrastructure implementation		x	Moderate adverse Significant
Residential Receptors: Hinton Parva	Permanent	Moderate adverse Significant	Green Infrastructure implementation		x	Moderate/minor adverse Not Significant
Residential Receptors: Individual Properties (Wanborough Road)	Permanent	Major/moderate adverse Significant	Green Infrastructure implementation		x	Moderate/minor adverse Not Significant
Roads: A420	Permanent	Moderate/minor adverse Not Significant	Green Infrastructure implementation		x x	Minor Adverse Not Significant
Roads: Wanborough Road	Permanent	Moderate/minor adverse Not Significant	Green Infrastructure implementation		x	Moderate/minor adverse Not Significant

Roads: Horpit minor road	Permanent	Moderate/minor adverse Not Significant	Green Infrastructure implementation	x	Negligible adverse Not Significant
Roads: North Wessex Downs edge	Permanent	Moderate/minor adverse Not Significant	Green Infrastructure implementation	x	Minor Adverse Not Significant
Public Rights of Way: Wanborough-Horpit-Bourton	Permanent	Moderate/minor adverse Not Significant	Green Infrastructure implementation	x	Minor Adverse Not Significant
Public Rights of Ways: Hinton Parva, Bishopstone, Ashbury	Permanent	Moderate/minor adverse Not Significant	Green Infrastructure implementation	x	Moderate/minor adverse Not Significant
Public Rights of Way: Ridgeway & Charlbury Hill	Permanent	Moderate/minor adverse Not Significant	Green Infrastructure implementation	x x	Moderate/minor adverse Not Significant
Viewpoint 1	Permanent	Major/moderate adverse Significant	Green Infrastructure implementation	x	Major/moderate adverse Significant
Viewpoint 2	Permanent	Moderate/minor adverse Not Significant	Green Infrastructure implementation	x x	Minor Adverse Not Significant
Viewpoint 3	Permanent	Moderate/minor	Green Infrastructure	x	Moderate/minor adverse

		adverse Not Significant	implementation		Not Significant
Viewpoint 4	Permanent	Moderate/minor adverse Not Significant	Green Infrastructure implementation	x	Moderate/minor adverse Not Significant
Viewpoint 5	Permanent	Moderate/minor adverse Not Significant	Green Infrastructure implementation	x	Moderate/minor adverse Not Significant
Viewpoint 6	Permanent	Minor adverse Not Significant	Green Infrastructure implementation	x	Minor adverse Not Significant
Viewpoint 7	Permanent	Moderate/minor adverse Not Significant	Green Infrastructure implementation	x	Moderate/minor adverse Not Significant
Viewpoint 8	Permanent	Moderate/minor adverse Not Significant	Green Infrastructure implementation	x	Minor Adverse Not Significant
Viewpoint 9	Permanent	Moderate/minor adverse Not Significant	Green Infrastructure implementation	x	x Minor Adverse Not Significant

Viewpoint 10	Permanent	Moderate adverse Significant	Green Infrastructure implementation		x	Moderate/minor adverse Not Significant
Viewpoint 11	Permanent	Moderate/minor adverse Not Significant	Green Infrastructure implementation	x	x	Moderate/minor adverse Not Significant
Viewpoint 12	Permanent	Moderate/minor adverse Not Significant	Green Infrastructure implementation	x	x	Moderate/minor adverse Not Significant

* Geographical Level of Importance

I = International; UK = United Kingdom; E = England; R = Regional; N = including Neighbouring Authority; LA = Swindon Borough; L = Local

14. Noise and Vibration

Purpose and Parameters of the Assessment

- 14.1 This chapter assesses the potential effects of noise and vibration impacts associated with the construction and operation of the proposed development as well as assessing the suitability of the site for residential development.
- 14.2 The proposed development is for 2,500 dwellings, 2,500sqm of employment (including the retention of 1,500sqm of existing floorspace at Lotmead Business Village), two 2FE Primary Schools and local centre, with access to the Southern Connector Road, A420 (through the NEV) and 200 homes only via Wanborough Road. A full description of development is provided at Chapter 4.
- 14.3 The assessment work was carried out in support of previous planning applications, which applied for 2,600 homes and 3,000 sq m of employment. For clarity, this assessment is therefore based upon 2,600 homes and 3,000sq m rather than 2,500 homes and 2,500sq m of employment, which is now being applied for. This assessment therefore provides a worst case assessment of the development proposals.
- 14.4 The chapter describes the methods used to assess the likely significant effects identifying the baseline conditions currently existing at the site and surrounding area, the potential direct and indirect impacts of the development arising from noise and vibration, the mitigation measures required to prevent, reduce, or offset the effects and identification of the residual effects upon sensitive receptors. It has been prepared by PBA (now part of Stantec).
- 14.5 The assessment of the Proposed Development is based on the likely construction completion year of 2040 for the site. Traffic flows have been obtained from SBC's Swindon Strategic Highway Model, which has a future year of 2036 with full NEV build out included. It has been agreed with the SBC to use the 2036 scenario to test development impacts.
- 14.6 An explanation of acoustic terminology used in the chapter can be found in the Glossary at the end of this ES.

Legislative and Policy Framework

National Legislation

The Control of Pollution Act, 1974

- 14.7 The Control of Pollution Act (CPA) (HMSO,1974) Section 61 sets out procedures for contractors to obtain 'Prior Consent' for construction works within agreed noise limits.

The Environmental Protection Act, 1990

- 14.8 Under Part III of the Environmental Protection Act (EPA) (HMSO, 1990) local authorities have a duty to investigate noise complaints from premises (land and buildings) and vehicles, machinery or equipment in the street. This includes noise arising from construction sites.
- 14.9 If a Local Authority's Environmental Health Officer (EHO) is satisfied that the noise amounts to a statutory nuisance, then the authority must serve an abatement notice on the person responsible or in certain cases the owner or occupier of the property. The notice could

require that the noise or nuisance must be stopped altogether or limited to certain times of the day.

National Planning Policy

Revised National Planning Policy Framework

14.10 The revised National Planning Policy Framework (NPPF) was published in February 2019 (Ministry of Housing, Communities and Local Government, 2019).

14.11 With respect to noise, Paragraph 170 states that:

“Planning policies and decisions should contribute to and enhance the natural and local environment by: ...

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans”.

14.12 Paragraph 180 of the NPPF states that:

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health and living conditions, as well as the potential sensitivity of the wider area to impacts that could arise from the development. In doing so, they should:

a) Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and quality of life;

b) Identify and protect tranquil areas which may have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.”

14.13 The NPPF goes on to advise, in Paragraph 182, that:

“Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.”

Noise Policy Statement for England

14.14 The Noise Policy Statement for England (NPSE) (Department for Environment, Food and Rural Affairs, 2012) seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. It also sets out the long-term vision of Government noise policy:

"To promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development".

14.15 The NPSE clarifies that noise should not be considered in isolation of the wider benefits of a scheme or development, and that the intention is to minimise noise and noise effects as far as is reasonably practicable having regard to the underlying principles of sustainable development.

14.16 The first two aims of the NPSE follow established concepts from toxicology that are applied to noise impacts, for example, by the World Health Organisation (WHO). They are:

- No Observed Effect Level (NOEL) - the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise; and:
- Lowest Observed Adverse Effect Level (LOAEL) - the level above which adverse effects on health and quality of life can be detected.

14.17 The NPSE extends these to the concept of a significant observed adverse effect level.

- Significant Observed Adverse Effect Level (SOAEL) - The level above which significant adverse effects on health and quality of life occur.

14.18 The NPSE notes:

"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times".

Planning Practice Guidance – Noise

14.19 The Government's Planning Practice Guidance (PPG) (Department for Communities and Local Government, 2014) on noise provides guidance on the effects of noise exposure, relating these to people's perception of noise, and linking them to the NOEL and, as exposure increases, the LOAEL and SOAEL.

14.20 As exposure increases above the LOAEL, the noise begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. As the noise exposure increases, it will then at some point cross the SOAEL boundary.

14.21 The PPG identifies the LOAEL as the level above which:

"noise starts to cause small changes in behaviour and/or attitude e.g. turning up the volume of the television, speaking more loudly, or, where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance affects the acoustic character of the area such that there is a perceived change in the quality of life."

14.22 The PPG identifies the SOAEL as the level above which:

"noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area."

Local Planning Policy

Swindon Borough Local Plan 2026

- 14.23 The Swindon Borough Local Plan 2026 was adopted by Swindon Borough Council (SBC) in March 2015 and includes policies to ensure development is of the highest quality, avoids environmentally sensitive locations, respects the existing built environment and meets the needs of present and future residents.

- 14.24 Policy DE1: High Quality Design states that:

"High standards of design are required for all types of development. Proposals for development should address the objectives of sustainable development through high quality design and place-making principles. To ensure this, proposals will be assessed against all the following design principles: ...

c. Amenity, in respect of:

- Light, privacy, outlook, noise, disturbance, smell, pollution and space."*

- 14.25 Policy EN5: Landscape Character and Historic Landscape states that:

"...b. In meeting the requirements of EN5a, applicants for development should demonstrate how they have taken into account Landscape Character Assessments and assesses the potential impact of the proposal upon the following attributes of the landscape: ...

- Environmental amenity such as tranquillity and noise, pollution and light pollution."*

- 14.26 Policy EN7: Pollution states that:

"Development that is likely to lead to emissions of pollutants such as noise, light, vibration, smell, fumes, smoke, soot, ash, dust, grit or toxic substances that may adversely affect existing development and vulnerable wildlife habitats, shall only be permitted where such emissions are controlled to a point where there is no significant loss of amenity for existing land uses, or habitats."

New Eastern Villages (NEV) Planning Obligations Supplementary Planning Document

- 14.27 Following the adoption of the Swindon Borough Local Plan 2026 (the Local Plan) in March 2015, the New Eastern Villages (NEV) Planning Obligations Supplementary Planning Document has been produced to provide more detailed advice and guidance on the relevant policies in the Local Plan.
- 14.28 A list of the infrastructure requirements is outlined for each village within the NEV in Appendix C. The requirements outline the consideration for noise mitigation and attenuation due to the close proximity of the A419 and A420, as per Policy DE1 of the Swindon Borough Local Plan

Other Relevant Policy, Standards and Guidance

Calculation of Road Traffic Noise

- 14.29 The Calculation of Road Traffic Noise (CRTN) (Department for Transport Welsh Office, 1988) describes procedures for traffic noise calculation and is suitable for the assessment of schemes where road traffic noise may have an impact. The 'Method for converting the UK road traffic noise index $L_{A10,18h}$ to the EU indices for road noise mapping' (TRL Limited, 2006) can be used to convert $L_{A10,18h}$ road traffic noise levels to $L_{Aeq,16h}$ daytime and $L_{Aeq,8h}$ night-time ambient noise levels.
- 14.30 Paragraph 43 in Section 3 details the methodology to be employed when calculating the $L_{A10,18hour}$ noise level using the shortened measurement procedure. It is necessary to measure the L_{A10} noise levels of 3 consecutive one-hour periods between 10:00 and 17:00 hours.
- 14.31 The measured $L_{A10,1hour}$ noise levels are arithmetically averaged to give a single figure $L_{A10,3hour}$ value.
- 14.32 Equation 1 is then used to calculate the $L_{A10,18hour}$ noise level:

$$L_{10,18hour} = L_{10,3hour} - 1dB(A) \quad (1)$$

- 14.33 Planning Policy Guidance 24: Planning and Noise (PPG 24) details guidance for local authorities on the use of their planning powers to minimise the adverse impact of noise. This document has now been superseded, however technical aspects of the document with respect to sound are still considered to be relevant.
- 14.34 Annex 1, section 9 states that the following relationship can be used to calculate the $L_{Aeq,16hour}$ noise level, as described in Equation 2:

$$L_{Aeq,16hour} = L_{10,18hour} - 2dB(A) \quad (2)$$

Calculation of Railway Noise

- 14.35 The Calculation of Railway Noise (CRN) (Department for Transport, 1995) describes a prediction method for the calculation of railway noise and is suitable for the assessment of schemes where railway noise may have an impact.
- 14.36 Section 11 details the prediction methodology used when calculating the $L_{Aeq,16hour}$ daytime and $L_{Aeq,8hour}$ night-time levels associated with moving trains.
- 14.37 The railway line under assessment should be divided into segments, such that the variation of noise within each track segment is less than 2 dBA.
- 14.38 For each segment, the following for each train and track should be determined:
- The reference SEL (SEL_{ref}) at a given speed, at a distance of 25 m from the near-side railhead of the track segment, taking into account the length of train and the type of track support system;

- Corrections to the SEL_{ref} for distance of the reception point from the track, ground and air absorption, screening from barriers, the angle of view at the reception point and reflection effects at the reception point;
- The Single Event Level (SEL) at the reception point can then be determined for each segment by applying the corrections determined above. The SEL values can then be converted to a L_{AeqS} value for each segment, taking into account the time period required and the number of trains, using Equations 3 and 4 below:

$$L_{Aeq,6hour} = SEL - 43.3 + 10\log_{10} Q_{NIGHT} \quad (3)$$

$$L_{Aeq,18hour} = SEL - 48.1 + 10\log_{10} Q_{DAY} \quad (4)$$

14.39 where Q_{NIGHT} is the total number of each train type passing the reception point during the time period (midnight to 0600 hours) and Q_{DAY} is the number of trains passing during the period (0600 hours to midnight).

14.40 The L_{AeqS} values determined by using Equations 3 and 4 are then used to calculate the total daytime and night-time L_{Aeq} for the railway, using the procedure outlined in Chart 9 of CRN.

British Standards 5228:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open sites

14.41 BS 5228:2014 Part 1: Noise (British Standards Institution, 2014) does not provide specific limits for construction noise but rather offers a number of different methodologies for identifying and assessing the significance of noise effects. The standard, as a whole, provides practical information on demolition and construction noise and vibration reduction measures, and promotes a 'Best Practice Means' approach to control noise and vibration.

14.42 The calculation method provided in BS 5228:2014 Part 1: Noise is based on the numbers and types of equipment operating, their associated Sound Power Levels (L_w), and the distance to receptors, together with the effects of any screening. The types and numbers of construction plant are estimated in BS 5228:2014 Part 1: Noise and based on previous experience of similar sites.

14.43 BS 5228:2014 Part 2: Vibration (British Standards Institution, 2014) provides similar guidance for vibration effects including vibration due to piling activities. Likely levels of vibration at given distances can be estimated from existing piling vibration data presented in this British Standard.

British Standard 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

14.44 BS 8233:2014 (British Standards Institution, 2014) sets out desirable guideline values in habitable rooms such as living rooms and bedrooms. The standard also provides advice in relation to design criteria for external noise.

14.45 The guideline values relate to steady external noise without a specific character, previously termed 'anonymous noise'. According to the standard, noise has a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate. Examples of noise with a character may include tonal/intermittent

plant noise emissions, music playback, and workshop noise. Examples of external steady noise sources may include environmental noise sources such as busy road traffic.

World Health Organisation Guidelines for Community Noise

- 14.46 The WHO Guidelines for Community Noise (World Health Organisation, 1999) provide guidance of a similar nature to BS 8233:2014. However, it places more emphasis on the potential health impacts associated with noise. Specifically, the document recommends internal and external noise levels that would provide an acoustic environment that is conducive to uninterrupted speech and sleep.
- 14.47 The WHO guidelines suggest that daytime sound levels of above 50 dB $L_{Aeq,16h}$ are of 'moderate annoyance' in the community with levels above 55 dB $L_{Aeq,16h}$ being of 'serious annoyance'.

World Health Organisation Environmental Noise Guidelines for the European Region

- 14.48 The WHO Environmental Noise Guidelines for the European Region provides recommendation for protecting human health from exposure to environmental noise origination from various sources.

- 14.49 The guidelines states, with respect to aircraft noise:

"For average noise exposure, the GDG strongly recommends reducing noise levels produced by aircraft below 45 dB L_{den} as aircraft noise above this level is associated with adverse health effects.

For night noise exposure, the GDG strongly recommends reducing noise levels produced by aircraft during night time below 40 dB L_{night} as night time aircraft noise above this level is associated with adverse effects on sleep.

To reduce health effects, the GDG strongly recommends that policy-makers implement suitable measures to reduce noise exposure from aircraft in the population exposed to levels above the guideline values for average and night noise exposure. For specific interventions the GDG recommends implementing suitable changes in infrastructure".

Design Manual for Roads and Bridges

- 14.50 The Design Manual for Roads and Bridges (DMRB) (Department for Transport, 2011) is considered as the regulatory standard for the design of a new road or improvements to an existing road. Volume 11 Section 3 Part 7 (HA 213/11 – Revision 1) sets out the method for assessing noise and vibration associated with road traffic. DMRB provides guidance on the selection of the scheme assessment area and the relevant assessment years as well as quantifies the noise and vibration impacts generated by changes in road traffic.

British Standard 6472:2008 Guide to Evaluation of Human Exposure to Vibration in Buildings Part 1: Vibration Sources other than Blasting

- 14.51 BS6742-1:2008 (British Standards Institution, 2008) contains guidance with respect to the evaluation of the human response to vibration.
- 14.52 The standard assesses impact in terms of the Vibration Dose Value (VDV). The VDV defines a relationship that produces consistent assessment of continuous, intermittent, occasional and impulsive vibration and the subsequent human response.

- 14.53 The VDV is expressed as a single value over a stated time period. For assessment purposes these periods are typically taken to be a 16-hour daytime period (07:00 to 23:00 hours) and an 8-hour night-time period (23:00 to 07:00 hours).

Aircraft Noise Index Study (ANIS)

- 14.54 The Aircraft Noise Index Study (Civil Aviation Authority, 1985) was a study adopted by the UK Government as a measure of noise exposure at the major London airports. Based on the ANIS study, the UK Government, in its Air Transport White Paper (ATWP), 2003 proposed that:

- 57 dB $L_{Aeq,16hr}$ is the threshold for the onset of significant community noise annoyance from aircraft noise;
- 63 dB $L_{Aeq,16hr}$ is regarded as the threshold for medium levels of significant community noise annoyance; and
- 69 dB $L_{Aeq,16hr}$ is regarded as the threshold for high levels of significant community noise annoyance.

BS 7445:2003 Part 1 Description and Measurement of Environmental Noise. Guide to Quantities and Procedures

- 14.55 BS 7445-1:2003 (British Standards Institution, 2003) describes methods and procedures for measuring noise from all sources which contribute to the total noise climate of a community environment, individually and in combination. The results are expressed as equivalent continuous A-weighted sound pressure levels, $L_{Aeq,T}$.
- 14.56 BS 7445-1:2003 states that the sound level meters, used for measuring environmental noise, should conform to Class 1 (or Class 2 as a minimum) as described in BS EN 61672-1:2013 'Electroacoustics. Sound Level Meters. Specifications' (British Standards Institution, 2003) and should be calibrated according to the instructions of the manufacturer. It is recommended that field calibration should be undertaken before and after each series of measurements.
- 14.57 Key aspects of the outdoor measurement procedure are as follows:
- Whenever possible the measurements should be undertaken at a distance of more than 3.5 m from a reflective structure other than the ground;
 - The ideal measurement height is between 1.2 m and 1.5 m; and
 - Measurement time intervals should be chosen so that measurements are completed within specified meteorological conditions.
- 14.58 BS 7445-1 also provides advice on selecting appropriate parameters when recording various types of noise, e.g. steady noise, fluctuating noise, etc.

A Guide to the Design, Specification and Construction of Multi Use Games Areas (MUGAs) Including Multi-Sport Synthetic Turf Pitches

- 14.59 A Guide to the Design, Specification and Construction of Multi-Use Games Areas (MUGAs) Including Multi-Sport Synthetic Turf Pitches (STP) (Sport England, 2002) defines the minimum

standards acceptably by Sport England for the procurement and construction of MUGAs and provides high level guidance with respect to the consideration of noise from MUGAs.

14.60 Paragraph 6.1 states:

“The location of the MUGA should be sympathetic to its surroundings and any adjacent infrastructure and early guidance should be sought on policy and any necessary permission that may be required from the Local Planning Authority. It is normally advisable to locate a MUGA (especially floodlit ones) at least 12m, and ideally at least 30m from other residences. On flat terrain sites, landscaping and mounding can be used to obviate noise breakout and floodlight spillage”.

14.61 Paragraph 6.1 continues to state that:

“Good locations for MUGAs and STPs include:

Those close to car parks and support facilities (especially where constantly supervised);

Those where there are good sound absorbing/spectator terracing and banking possibilities e.g. the facility sits in a natural amphitheatre-where it is possible to view activities (even remotely using CCTV) from on high and where the facility will be sheltered by the surrounding terrain;

Those where there is good access to the facility for people with disabilities.

Avoid locating a MUGA or STP:

Where steep gradients lead to and away from the area, especially at personnel and maintenance vehicle access points;

Where there is poor access to the facility for people with disabilities;

Where the facility is remote from support facilities such as changing accommodation;

In very exposed terrain (where needs dictate it is advisable to install a shelter belt of evergreen trees-especially to the NE, N and NW geographical aspects of a facility);

Where it is not possible for access roads/footpaths and maintenance routes to reach the main personnel/maintenance gates;

Where incoming services (electricity feed cables and water/drainage) will be prohibitively expensive to install;

Where too many site perimeter and internal security/access gates have to be passed, meaning gates keep having to be locked and unlocked;

Where it is not possible for a facility supervisor to monitor persons, vehicular and cycle movements (especially on access routes and in relation to changing rooms, parked up cars etc.);

Where emergency vehicles cannot readily get to the facility;

Where users have to traverse naturally turfed areas (mud, debris and contaminants all lead to the rapid deterioration of the playing surface);

Too close to unstable ground (landslides) or drainage outfalls (back falling or ponding on the MUGA due to blocked drains);

Too close to deciduous (leaf drop in autumn) or leaf sap forming trees;

Where non-sports users may be passing and be at risk of injury, through unauthorised entry or access etc.”.

Consultation

14.62 The Environmental Health Department (EHD) at SBC was contacted in January 2015, as part of the consultation process for a previous application for the Site. The following was discussed and agreed:

- The EHD agreed with the proposed methodology with some additional comments and minor amendments which have been noted and discussed throughout the Methodology section in this chapter;
- It was proposed that suitable internal noise levels would be the overarching criterion in determining the suitability of a site for residential development. The EHD agreed, stating that this *“is fine in all circumstances except where development land is adjacent to, or subject to, noise from commercial/industrial noise. Where this is the case, we would require a BS 4142 assessment to be undertaken”*;
- It was agreed that alternative means of ventilation (to opening windows) should only be provided in order to ensure suitable background ventilation rates are achieved, however, purge ventilation rates should be achieved by means of opening windows.
- The Great Western Railway Line (GWML) is located approximately 500 m to the north of the site, therefore, it has been agreed that vibration due to train movements should not be significant and will not be assessed any further.

14.63 Additional consultation with the EHD at SBC was undertaken in February 2017 to agree an assessment methodology in relation to the assessment of construction noise and vibration from the Proposed Development and to the assessment of the noise impact associated with the operation of Redlands Airfield.

14.64 For the assessment of construction noise and vibration, it was agreed that:

- An assessment of construction noise from the development site would be undertaken, based on guidance source levels detailed within BS5228-1:2009+A1:2014 and on a number of assumptions that have been informed by the Construction Management Plan;
- The criteria for the assessment of construction noise would be based on criteria levels identified within Tables E.1 and E.2 of BS5228-1:2009+A1:2014;

- The low frequency sound content of construction activities would be considered, in both the 63 and 125 Hz octave bands;
- An assessment of construction vibration from the development site would be undertaken, based on guidance source levels detailed within BS5228-2:2009+A1:2014;
- The criteria for the assessment of construction vibration would be based on criteria levels identified within Table B.1 of BS5228-2:2009+A1:2014.

14.65 For the assessment of the noise impact of Redlands Airfield, it has been agreed that:

14.66 An assessment would be undertaken of the noise impact associated with Redlands Airfield, using a computer acoustic model produced using modelling software SoundPLAN v8.0;

14.67 The assessment would be based on information obtained as a result of consultation with the operators of Redlands Airfield;

14.68 The assessment criteria would be based on internal and external noise level criteria detailed within BS8233:2014 and WHO Guidelines for Community Noise.

14.69 In addition, an informal scoping exercise was carried out in collaboration with the LPA, with an Informal Scoping Note being provided to the LPA on 7th November 2018 covering the proposed ES Structure and methodologies for the technical chapters (**Appendix 1.1**). A response on each topic chapter was provided by the LPA on 11th December 2018 (**Appendix 1.2**), confirming that the proposed methodology for this Noise Chapter and use of existing the baseline data collected in 2015 was acceptable.

Study Area

Noise Sensitive Receptors

14.70 Receptors are elements of the surrounding environment that are sensitive to changes in the baseline noise and vibration conditions. The sensitivity of the receptor depends on the extent to which it is susceptible to such change.

14.71 Residential dwellings are considered to have a high sensitivity. Residential amenity is also considered to have a high sensitivity.

14.72 Commercial receptors are considered to have a low sensitivity to the change in noise and vibration conditions.

14.73 Noise sensitive receptors closest to the site consist primarily of residential dwellings located to the north, east, south and west of the Proposed Development. These receptors have been included within the study area.

14.74 **Table 14.1** details the receptors considered within the assessment, as well as their location, type and sensitivity level. The locations of the receptors are illustrated in **Figure 14.1**. Receptors have been grouped where appropriate for clarity, however where there are groups, the impact at the worst-case receptor within the group has been considered.

Table 14.1: Noise Sensitive Receptors

Location	Description	Type of Receptor	Receptor Sensitivity
Receptor R1	Poplars Daycare Nursery and Pre-School, Wanborough Road	Educational	Medium
Receptor R2	Retained Residential Dwellings	Residential Façade and Amenity	High
Receptor R3	Residential Dwellings located on Cornmarsh Way	Residential Façade and Amenity	High
Receptor R4	Residential Dwellings located on Church Ground	Residential Façade and Amenity	High
Receptor R5	Farm and Residential Dwelling located on the A419	Residential Façade and Amenity	High
Receptor R6	Retail Premises located at St Margaret's Retail Park	Commercial	Low
Receptor R7	Farm and Residential Dwelling located on the A420	Residential Façade and Amenity	High
Receptor R8	Residential Dwelling located on the A420	Residential Façade and Amenity	High
Receptor R9	Residential Dwelling located on the A420 Oxford Road	Residential Façade and Amenity	High
Receptor R10	Farm and Residential Dwelling located on the A420	Residential Façade and Amenity	High
Receptor R11	Farm and Residential Dwelling located on the A420	Residential Façade and Amenity	High
Receptor R12	Lower Earls Court Farm, A420	Residential Façade and Amenity	High
Receptor R13	Mount Pleasant Farm	Residential Façade and Amenity	High
Receptor R14	Redlands Airfield	Residential Façade and Amenity	High
Receptor R15	Marlborough House, Wanborough Road	Residential Façade and Amenity	High
Receptor R16	Proposed Residential Dwellings	Residential Façade and Amenity	High

- 14.75 Preliminary guidance on mitigation measures is provided where appropriate with the aim of demonstrating that the requirements of the relevant local and national policies can be met.

Noise Model

- 14.76 An acoustic model has been prepared to complement the baseline studies and to assist in the calculation of the likely noise impacts arising from the operation of the proposed development.

- 14.77 The acoustic model has been produced using SoundPLAN v8.0 and has been calibrated using the results of the baseline sound survey. Sound propagation across the site has been determined using calculation methodologies detailed within CRTN and CRN.
- 14.78 The acoustic model includes the surrounding road network (including the major road links of Wanborough Road, the A419 and the A420). The traffic data used within the model is presented in **Appendix 14.1**.
- 14.79 The acoustic model also includes railway movements on the nearby Great Western Main Line.
- 14.80 The existing site mapping and topographical data has been obtained from a mixture of both OS data and a topographical survey of the site.
- 14.81 The 18-hour Average Annual Weekday Traffic (AAWT) flow data has been provided by PBA for the following scenarios:
- 2014 Baseline;
 - 2036 Future Year with Committed Developments (Do Minimum); and
 - 2036 Future Year with Committed Developments and Proposed Development (Do Something).
- 14.82 Sound level contour maps have been generated for a range of scenarios, using a 5 m x 5 m calculation grid size in order to inform the assessment of the site.

Baseline Conditions

Baseline Data Collection

- 14.83 An unattended environmental sound survey was undertaken from approximately 14:00 on Wednesday 11th February 2015 to approximately 16 00 on Thursday 12th February 2015 to establish the existing sound climate at the Application Site. The survey was undertaken over a 24-hour period so to obtain typical daytime and night-time sound levels during a weekday period.
- 14.84 In addition, attended environmental sound measurements were taken on 11th February 2015 to assist with the verification of the computer acoustic model.
- 14.85 Unattended measurements were taken at four locations within the Application Site boundary to obtain source sound levels associated with the surrounding road network. Attended measurements were undertaken at four locations in close proximity to the site, close to nearby existing noise sensitive receptors. **Table 14.2** describes the measurement positions. The positions are also illustrated in **Figure 14.1**.

Table 14.2: Description of Measurement Locations

Position	Description	Measurement Period
P1	Unattended noise survey location approximately 160 m to the north east of Wanborough Road and Poplars Daycare Nursery.	24 hours

	This location was within the Phase 1 Development boundary.	
P2	Unattended noise survey location approximately 550 m to the north east of Wanborough Road and Poplars Daycare Nursery.	24 hours
P3	Unattended noise survey location approximately 30 m from the northern boundary of the Development and approximately 800 m to the south of the GWML.	2 hours 15 minutes
P4	Unattended noise survey location approximately 1.5 km to the north east of Wanborough Road, approximately 1.5 km to the south of the A420 and GWML and close to the eastern boundary of the Development. This location was deemed to be representative of the quietest parts of the existing site.	24 hours
A	Attended, short-term noise survey location close to the junction of Wanborough Road and Stratton Road. The meter was located approximately 4 m from the edge of Wanborough Road.	15 minutes
B	Attended, short-term noise survey location at Honeybone Walk approximately 30 m from the nearest carriageway of the A419 and approximately 50 m from the Merlin Way overpass. A noise barrier approximately 3 m high is located along the A419 at this point.	15 minutes
C	Attended, short-term noise survey location at the top of Trajan Close approximately 10 m from Merlin Way.	15 minutes
D	Attended, short-term noise survey location adjacent to White Cottage and Sunnyside along the A420 and GWML.	15 minutes
14.86	Due to the nature of the survey (i.e. unattended) it is not possible to accurately comment on the weather conditions throughout the entire survey period. However, whilst attending to meters and whilst undertaking the attended measurements, the weather conditions were observed to be overcast and cool, with no significant wind.	
14.87	The $L_{Aeq,T}$, $L_{A10,T}$, $L_{A90,T}$ and L_{AFMax} levels were measured at each position over 15-minute periods	
14.88	The sound level meters were located in an environmental case, with the microphone connected to the sound level meter using an extension cable. The microphone was fitted with the manufacturer's windshield.	
14.89	The surveys were undertaken during school term time, when typical traffic flows for the area can be expected.	
14.90	The instrumentation used for the sound survey are listed in Table 14.3 . Field calibrations were performed before and after the measurements, with no significant fluctuations recorded. Calibration certificates are available, upon request.	

Table 14.3: Instrumentation

Item	Manufacturer	Type	Serial Number	Laboratory Calibration Date*
Sound Level Meter	Rion	NL-52	00542903	31 July 2014

Pre-amplifier		UC59	42931	
½" Pre-polarised Microphone		NH-25	06480	
Sound Level Meter	Rion	NL-52	00542902	31 July 2014
Pre-amplifier		UC59	42930	
½" Pre-polarised Microphone		NH-25	06479	
Sound Level Meter	Rion	NL-52	00542901	31 July 2014
Pre-amplifier		UC59	42929	
½" Pre-polarised Microphone		NH-25	06478	
Sound Level Meter	Brüel & Kjær	2250	2626231	08 January 2014
Pre-amplifier		ZC 0032	2621212	16 January 2014
½" Pre-polarised Microphone		4189	11992	
Calibrator	Rion	NC-74	34746691	12 September 2014

* Calibration dates correct at time of survey.

Baseline Environmental Sound Climate

- 14.91 A summary of the unattended environmental sound survey results at Positions LT1, LT2, LT3 and LT4 are presented in **Table 14.4**. Time-history graphs detailing the full results of the sound survey can be found in **Appendix 14.2**.

Table 14.4: Summary of Attended Environmental Sound Survey Results

Position	Daytime (07:00 – 23:00 hours)		Night-Time (23:00 – 07:00 hours)		
	dB L _{Aeq,T}	Typical dB L _{A90,T}	dB L _{Aeq,T}	Typical dB L _{A90,T}	dB L _{AFMax}
P1	54	52	47	37	56
P2	52	52	42	39	53
P3	49*	47	N/A	N/A	N/A
P4	45	39	38	28	50

* Not for a full 16-hour period.

- 14.92 A summary of the attended environmental sound survey results at Positions ST1, ST2, ST3 and ST4 are presented in **Table 14.5**.

Table 14.5: Summary of Attended Environmental Sound Survey Results

Position	Start Time	Duration (hh:mm)	dB L _{Aeq,T}	dB L _{AFMax}	dB L _{A90,T}	dB L _{A10,T}
A	11:07	00:15	63	81	47	67
B	10:43	00:15	64	70	60	66
C	11:35	00:15	64	75	60	66

	D	13:10	00:15	70	82	59	74
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14.93 The dominant noise sources at the measurement positions are described in **Table 14.6**.

Table 14.6: Description of Dominant Noise Sources

Position	Dominant Noise Source
P1	Vehicular movements on the A419
P2	Vehicular movements on the A419
P3	Vehicular movements on the A419 and A420. Railway movements audible when occurring.
P4	Vehicular movements on the A419 and A420. Railway movements audible when occurring.
A	Vehicular movements on Wanborough Road and the A419.
B	Vehicular movements on the A419
C	Vehicular movements on Merlin Way Road and the A419.
D	Vehicular movements on the A420. Railway movements audible when occurring.

Scope and Methodology

Significance Criteria

- 14.94 In accordance with the NPPF, NPSE and PPG for noise, LOAEL and SOAEL levels are proposed for each noise and vibration source under assessment in this chapter.
- 14.95 The LOAEL and SOAEL levels have been related to the significance of effects based on the description detailed within the NPSE. **Table 14.7** details the relationship between the significance level, the proposed LOAEL and SOAELs, the associated impact and required response.

Table 14.7: Relationship Between Significance of Effect, Adverse Effect Level and Impact and Response

Level of Significance		Noise and Vibration Effect Level	Impact and Response
Significant	Major	SOAEL	Noise/vibration causes extensive and regular changes in behaviour and could have physiological or psychological effects. This level is unacceptable and should be prevented.
	Moderate		Noise/vibration causes a change in attitude and/or behaviour. This level should be avoided.
Not Significant	Minor	LOAEL	Noise/vibration is perceptible but causes a slight change in behaviour/attitude. Noise/vibration should be mitigated and kept to a minimum
	Negligible	NOEL	Noise/vibration has no effect and no specific measures are required.

- 14.96 The assessment of the proposals utilises a wide range of applicable standards and guidance. However, the principal guidance documents used to inform the derivation of appropriate LOAELs and SOAEL are described in **Table 14.8**.

Table 14.8: Assessment Methodologies

Assessment/Methodology	Reference Documents
Instrumentation and Measurement Procedures	BS 7445: Part 1:2003 BS 61672: Part 1:2013
Demolition and Construction Noise and Vibration Impacts	BS 5228-1:2014+A1:2014 BS 5228-2:2014+A1:2014
Internal and External Ambient Noise Levels	BS8233:2014 WHO Guidelines for Community Noise
Operational Road Traffic Noise	Department of Transport 1988: Calculation of Road Traffic Noise Design Manual for Roads and Bridges
Operational Vibration Levels	BS 6472-1:2008
Aircraft Noise	BS8233:2014 Aircraft Noise Index Study WHO Environmental Noise Guidelines

Demolition and Construction Noise

- 14.97 In order to assess the effect of demolition and construction noise at nearby noise sensitive receptors, LOAELs and SOAELs have been considered. These are detailed in **Table 14.9**.
- 14.98 The LOAEL and SOAELs are based on the guidance threshold values outlined in Table E.1 of BS 5228-1:2014.

Table 14.9: Demolition and Construction Noise Adverse Effect Levels

Day	Time (Hours)	Averaging Period, T	LOAEL (dB $L_{Aeq,T}$)	SOAEL (dB $L_{Aeq,T}$)
Monday to Friday	0700-1900	12 hours	65	75
Saturday	0800-1300	12 hours	65	75

- 14.99 For the assessment of low frequency construction noise, the appropriate Noise Rating (NR) level corresponding to the guidance internal sound levels within BS8233:2014 has been considered.
- 14.100 As per Paragraph 7.4 of BS8233:2014, although there is no direct relationship between dBA and NR, the approximate relationship applies (see Equation 2):

$$NR \approx dBA - 6 \quad (5)$$

- 14.101 Taking the guidance daytime internal sound level within dwellings of 35 dB $L_{Aeq,16hours}$, the approximate NR rating level is NR29. The 63 and 125 Hz target values that correspond to

NR29 have been used as criteria levels for the assessment of low frequency noise, with a +15 dB correction applied to account for an open window.

14.102 **Table 14.10** outlines the assessment criteria for low frequency construction noise.

Table 14.10: Low Frequency Construction Noise Assessment Criteria

Day	Time (Hours)	Description	63 Hz	125 Hz
Mondays to Fridays	0800-1800	LOAEL (dB $L_{Aeq,T}$)	73	62
		SOAEL (dB $L_{Aeq,T}$)	88	77
Saturdays	0800-1300	LOAEL (dB $L_{Aeq,T}$)	73	62
		SOAEL (dB $L_{Aeq,T}$)	88	77

Demolition and Construction Vibration

14.103 BS 5228-2:2009+A1:2014 suggests that for demolition and construction activities, it is considered more appropriate to provide guidance in terms of the Peak Particle Velocity (PPV), since this parameter is likely to be more routinely measured based upon the more usual concerns over potential building damage.

14.104 **Table 14.11** presents the suggested adverse effect levels for the human response to construction vibration as measured at the point of entry into the recipient in terms of PPV.

Table 14.11: Construction Vibration Adverse Effect Levels for Human Response to Vibration

Day	Time (Hours)
SOAEL	10
LOAEL	1

Operational Road Traffic Noise Affecting New Residential Dwellings

14.105 The assessment of noise due to the Proposed Development on the proposed residential areas is affected predominantly by noise from the surrounding road network

14.106 **Table 14.12** presents the proposed internal and external noise assessment levels for dwellings due to transportation noise. These levels have been derived from the guidance in BS 8233 and the WHO guidelines.

Table 14.12: Proposed LOAEL and SOAEL Levels for Transportation Noise Affecting New Dwellings

Receptor Type	Effect Level	Time Period, T	
		Daytime (07:00 – 23:00 hours)	Night-Time (23:00 – 07:00 hours)
Dwellings – Internal Habitable Spaces	LOAEL	35 dB $L_{Aeq,T}$	30 dB $L_{Aeq,T}$ 45 dB L_{AFMax} *
	SOAEL	50 dB $L_{Aeq,T}$	45 dB $L_{Aeq,T}$ 60 dB L_{AFMax} *
Dwellings – External	LOAEL	55 dB $L_{Aeq,T}$	N/A

Amenity Areas	SOAEL	70 dB $L_{Aeq,T}$
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* Based on 10 occurrences during the night-time period.

14.107 Construction details for the proposed residential uses are yet to be determined. However, a preliminary assessment of internal noise levels can be undertaken based on typical construction details.

14.108 **Table 14.13** details the typical sound reductions associated with typical building constructions.

Table 14.13: Typical Sound Reductions of Various Building Fabric Constructions

Typical Construction	Typical Attenuation (dB)
Conventional Double Glazing (4/16/4)	30 R_w
Non-Acoustic Trickle Ventilator	32 $D_{Ne,W}$
Brick/Block Cavity Wall	50 R_w
Tiled Roof with Mineral Wool Insulation and Plasterboard Ceiling	40-45 R_w

14.109 The above constructions and associated levels of attenuation form the basis of the assessment of internal sound levels.

Operational Road Traffic Noise Affecting Existing Noise Sensitive Receptors

14.110 The assessment of noise due to the proposed development on the existing sound climate in the surrounding areas is based on the change in sound levels at noise sensitive receptors due to a change in the volumes of road traffic generated by the proposed development.

14.111 The DMRB provides two magnitude scales of impact for the change in noise levels in the 'short-term' (opening year) and in the 'long-term' (future year). The 'long-term' future year assessment criteria have been used to assess the full and permanent effects of the Proposed Development. These are presented in **Table 14.14** in terms of adverse effect levels.

Table 14.14: Adverse Effect Levels as a Result of Changes in Noise Levels due to Operational Traffic

Adverse Effect Level	Increase in $L_{A10,18\text{hour}}$ Noise Levels due to Operational Road Traffic (dB)
SOAEL	10+
	5 - 9.9
LOAEL	3 - 4.9
	0.1 – 2.9
NOEL	0

Operational Vibration Levels Affecting Development and Non-Development Receptors

14.112 The DMRB covers the potential for airborne noise, from heavy goods vehicles, to cause vibration nuisance close to main roads. As an indication of the scale of impact relative to noise effects, the guidance in DMRB paragraph HA 213/11 Annex 6, paragraph A6.21 states that for a given level of noise exposure the percentage of people bothered "very much" or "quite a lot" by vibration is 10% lower than the corresponding figure for noise nuisance. On

average traffic induced vibration is expected to affect a very small percentage of people at exposure levels below 58 dB $L_{A10,18hr}$.

- 14.113 The significance of changes in traffic vibration can be considered proportional to the significance of changes in traffic noise. As such the assessment of vibration can be considered to be included within the assessment of airborne noise.
- 14.114 The assessment of vibration due to the Proposed Development on the existing vibration sound climate in the surround areas is based on the absolute vibration levels at vibration sensitive receptors due to a change in the volumes of road traffic generated by the Proposed Development.
- 14.115 **Table 14.15** presents the proposed Vibration Dose Values (VDV) in terms of adverse effect levels for both existing and future residential dwellings. These have been derived from guidance contained in BS6742-1:2008.

Table 14.15: Adverse Effect Levels for Vibration Levels at Existing Vibration Receptors

Adverse Effect Level	Vibration Dose Value $m.s^{-1.75}$	
	Daytime (07:00 – 23:00 hours)	Night-Time (23:00 – 07:00 hours)
SOAEL	0.4 to 0.8	0.2 to 0.4
LOAEL	0.2 to 0.4	0.1 to 0.2
NOEL	< 0.2	< 0.1

Sports and Recreational Uses Affecting New and Existing Noise Sensitive Receptors

- 14.116 The assessment of the noise impact of the proposed sports pitches has been assessed in terms of the change in noise levels at the receptor resulting from their use.
- 14.117 **Table 14.16** details the proposed adverse effect levels for the assessment of the proposed sports pitches. These levels have been based on the 'Sensitivity of Receptor to Noise Level Exposure' guidance contained in Table 7.10 of IEMA's Guidelines on Noise Impact Assessments.

Table 14.16: Proposed LOAEL and SOAEL for Noise from Sports and Recreational Uses

Relative Change in Sound Level (dB)	Relative Change (dB)	Effect Levels
Less than 2.9	Negligible	NOEL
3 to 4.9	Small	LOAEL
5 to 9.9	Medium	
Greater than 10	Large	SOAEL

Redlands Airfield

- 14.118 **Table 14.17** details the proposed adverse effect levels for aircraft noise associated with Redlands Airfield. The levels are taken from guidance detailed within the ANIS and BS8233:2014.

Table 14.17: Adverse Effect Levels for Noise Associated with Redlands Airfield

Adverse Effect Level	Daytime External Noise Levels, dB L _{Aeq,16hours}	Daytime Internal Noise Levels, dB L _{Aeq,16hours}
SOAEL	67	50
LOAEL	57	35

Limitations and Assumptions

- 14.119 The site engineer did not notice anything unusual in terms of the noise climate at the times of the attended surveys. This chapter refers, within the limitations stated, to the environment of the Site in the context of the surrounding area at the time of the inspections. Environmental conditions can vary, and no warranty is given as to the possibility of changes in the environment of the Site and surrounding area at differing times.

Environmental Assessment: Construction Phase

Demolition and Construction Noise

- 14.120 The demolition and construction phase of the proposed development is likely to include activities such as site levelling/clearance, ground excavation, concreting, piling, superstructure construction and external works, such as road construction. The internal building construction phase is not normally a significant source of noise and vibration.
- 14.121 An assessment of demolition and construction noise at varying distances from the site boundary has been undertaken, based on typical plant noise level data contained within Annex C of BS5228-1:2009+A1:2014. **Appendix 14.3** details the assumed construction activities and corresponding sound source levels.
- 14.122 As a detailed demolition and construction methodology is yet to be determined, the assessment considers a worst-case scenario, where each activity occurs continuously at a point on the site boundary closest to the receptor, for a 12-hour period and without any mitigation measures in place. These include screening, operational constraints or measures included within the Construction Environmental Management Plan (CEMP) in place.
- 14.123 **Table 14.18** details the results of the assessment for typical demolition and construction activities, calculated as the dB L_{Aeq,12hours} and with a minimum distance of 10 m from the activity to the nearest noise sensitive receptor.

Table 14.18: Calculated Indicative Demolition and Construction Activity Noise Levels at Receptors

Receptor	Site Preparation Works	Demolition, Foundation Works and Substructure	Building Erection Works and Superstructure	Road Works	Landscaping Works
	dB L _{Aeq,12hours}				
R1	81	80	81	82	73
R2	81	80	81	82	73
R3	62	61	63	63	55

R4	58	57	58	59	51
R5	52	51	52	53	44
R6	42	40	42	42	34
R7	42	40	42	42	34
R8	44	43	44	45	37
R9	45	43	45	46	37
R10	60	59	61	61	53
R11	49	48	49	50	41
R12	55	54	56	56	48
R13	51	50	52	52	44
R14	45	44	45	46	37
R15	57	55	57	57	49

14.124 Based on the calculated noise levels outlined in **Table 14.18**, **Table 14.19** assesses the potential effect of each of the considered demolition and construction phases at the assessment receptors, without mitigation. the assessment of significance effects is based on the significance levels outlined in **Table 14.7**.

Table 14.19: Assessment of Significance Effects for Demolition and Construction Activity Noise

Receptor	Site Preparation Works	Demolition, Foundation Works and Substructure	Building Erection Works and Superstructure	Road Works	Landscaping Works
R1	Major	Major	Major	Major	Moderate
R2	Major	Major	Major	Major	Moderate
All other Receptors	Negligible	Negligible	Negligible	Negligible	Negligible

14.125 It is therefore concluded that noise levels associated with demolition and construction activities are likely to have between negligible and major significance of effect upon sensitive receptors.

14.126 At the request of the EHD, the assessment of construction noise has also been undertaken in the 63 and 125 Hz octave bands, using the octave band sound level data available for the typical plant noise levels detailed within BS 5228-1:2009+A1:2014. The assessment has been undertaken at the nearest noise sensitive receptors to construction activities occurring at the Proposed Development, considered to be Receptor 1 (Poplars Daycare Nursery and Pre-School, Wanborough Road), Receptor 2 (Retained Residential Dwellings) and Receptors 15 (Marlborough House, Wanborough Road).

14.127 The sound level of each item of plant/equipment operating during the relevant construction phase in the 63 and 125 Hz octave bands has been calculated at the assessment receptors. The sound level of each item of plant/equipment in operation has then been logarithmically

summed to obtain an overall sound level corresponding to each construction phase at each assessment receptor.

14.128 **Tables 14.20 and 14.21** details the results of the assessment in both the 63 and 125 Hz octave bands.

Table 14.20: Results of the Assessment of Construction Noise in the 63 Hz Octave Band

Receptor	Site Preparation Works	Demolition, Foundation Works and Substructure	Building Erection Works and Superstructure	Road Works	Landscaping Works
R1	71	74	73	74	69
R2	86	90	89	90	85
R15	62	66	64	66	61

Table 14.21 Results of the Assessment of Construction Noise in the 125 Hz Octave Band

Receptor	Site Preparation Works	Demolition, Foundation Works and Substructure	Building Erection Works and Superstructure	Road Works	Landscaping Works
dB L _{Aeq,12hours}					
R1	71	74	73	74	69
R2	86	90	89	90	85
R15	62	66	64	66	61

14.129 Based on the predicted noise levels in the 63 and 125 Hz octave bands outlined above, **Tables 14.22 and 14.53** assesses the potential effect of each construction phase at the assessment receptors.

Table 14.22: Construction Noise at 63 Hz Assessed Against Significance Effects

Receptor	Site Preparation Works	Demolition, Foundation Works and Substructure	Building Erection Works and Superstructure	Road Works	Landscaping Works
dB L _{Aeq,12hours}					
R1	Negligible	Negligible	Negligible	Negligible	Negligible
R2	Moderate	Major	Major	Major	Moderate
R15	Negligible	Negligible	Negligible	Negligible	Negligible

Table 14.23: Construction Noise at 125 Hz Assessed Against Significance Effects

Receptor	Site Preparation Works	Demolition, Foundation Works and Substructure	Building Erection Works and Superstructure	Road Works	Landscaping Works
R1	Moderate	Moderate	Moderate	Moderate	Moderate
R2	Major	Major	Major	Major	Major
R15	Negligible	Minor	Moderate	Minor	Moderate

14.130 It is therefore concluded that low frequency noise associated with demolition and construction activities are likely to be between a negligible and major significance of effect upon sensitive receptors.

Demolition and Construction Vibration

14.131 Vibration during the demolition and construction phase is normally associated with piling activities. In respect to noise and vibration, the recommended piling method is Continuous Flight Auguring, as this does not include the use of driven piles.

14.132 The closest existing vibration sensitive receptors are likely to be a minimum of 10 m from the nearest demolition and construction works on the site boundary. BS 5228:2014 Part 2 provides some indicative vibration source levels associated with auger piling. These indicate that vibration levels of below 0.4 mm/s PPV, at a distance of 10 m. Based on this, vibration levels due to auger piling are likely to be below the proposed LOAEL.

14.133 It is therefore considered that effects arising from demolition and construction vibration are likely to be of negligible significance.

Environmental Assessment: Operation Phase

Operational Transportation Noise Affecting Development Receptors

14.134 The environmental sound survey established the sound climate at the site for the specific times and duration of the survey and at the survey locations. A computer noise model has been produced for the development and the surrounding road and rail network and verified using the result of the survey. Noise contour maps have been produced to assist with the assessment.

14.135 **Figure 14.2** presents the daytime sound level contours across the site, at a height of 1.5 above ground level for the 2036 Do Something scenario. **Figure 14.3** presents the night-time sound level contours across the site at a height of 4.0 m above ground level for the 2036 Do Something scenario. Calculations are based on the predicted traffic flows for the scenario, which include the proposed development and committed developments.

14.136 The sound level at the worst-case residential facades, located close to the surrounding road network, is likely to be between 55 and 64 dB $L_{Aeq,16hours}$ (daytime) and between 49 and 55 dB $L_{Aeq,8hours}$ (night-time).

14.137 However, the sound level at the majority of residential facades is likely to be between 43 and 55 dB $L_{Aeq,16hours}$ (daytime) and between 40 and 49 dB $L_{Aeq,8hours}$ (night-time).

14.138 The sound level in external amenity areas is likely to be between 40 and 61 dB $L_{Aeq,16hours}$ (daytime). External amenity areas are not expected to be used during the night-time period.

14.139 The results of the assessment indicate that noise levels are likely to be above the proposed LOAEL during the daytime at facades adjacent to the surrounding road network and are likely to be of moderate significance. Noise levels on facades at other locations are likely to meet the proposed LOAEL during the daytime period and are likely to be of negligible significance.

Operational Transportation Noise Affecting Non-Development Receptors

14.140 Major road links surrounding the site include Wanborough Road, the A419 and the A420.

14.141 **Figures 14.4 and 14.5** presents the change in the $L_{A10,18hour}$ sound levels between the 2036 Future Year with Committed Developments and Proposed Development (“Do Something”) and 2036 Future Year with Committed Developments (“Do Minimum”) scenarios, at a height of 1.5 m above ground level.

14.142 The change in the dB $L_{A10,18hour}$ sound level is likely to be no greater than +1 dB at all receptors and is likely to fall below the proposed LOAEL. Therefore, it is considered that the effect from operational transportation noise affecting non-development receptors is likely to be of negligible significance.

Operational Transportation Vibration Affecting Development and Non-Development Receptors – Road Traffic

14.143 The Vibration Dose Value (VDV) is strongly influenced by the magnitude of the vibration as opposed to the duration of the vibration event. Increasing the exposure duration by a factor of 16 is equivalent to a doubling of the vibration magnitude.

14.144 An increase in vibration levels would be attributable to an increase in the source of vibration (e.g. an increase in vehicular movements). Given the relationship between the VDV, magnitude and exposure duration, it is considered that a substantial increase in traffic flows would be required in order to significantly increase vibration levels.

14.145 Therefore, the overall vibration effects associated with operational transportation vibration is likely to be of negligible significance.

Operational Transportation Vibration Affecting Development and Non-Development Receptors – Railway Movements

14.146 The GWML is approximately 500 m to the north of the Proposed Development and the nearest proposed residential dwellings. Based on the distance between the railway line and the Proposed Development, ground-borne vibration from this source is considered to be of negligible significance and has therefore not been considered further.

Industrial and Commercial Noise Affecting New and Existing Noise Sensitive Receptor

14.147 The proposed schools and local centres have the potential to make use of fixed building services plant. At this stage of the application, the location and details of these are unknown.

14.148 The rating level of fixed plant associated with the proposed schools and local centres has the potential to be of major significance and should be controlled through careful design to ensure a significant impact does not occur.

14.149 At the detailed design stage, an assessment of the impact of noise from fixed building services plant should be undertaken. Without appropriate mitigation, the impact could have the potential to exceed the proposed SOAEL and have major adverse effects.

Sports and Recreational Uses Affecting New and Existing Noise Sensitive Receptors

14.150 The development allows for the provision of a sports hub, which is likely to include playing pitches and additional outdoor sports facilities. An assessment has been undertaken to determine the likely noise impact associated with the use of these areas.

14.151 The assessment considers a worst-case scenario, where all of the sports pitches are in use simultaneously. The cumulative sound level associated with the use of all pitches has been calculated at the nearest existing and proposed noise sensitive receptors. These are considered to be Receptor R13 (Mount Pleasant Farm), approximately 600 metres to the south east of the proposed pitches and Receptor 16 (Proposed Residential Dwellings), approximately 25 metres to the west of the proposed pitches.

14.152 Table 14.24 details the typical source levels associated with the use of sports pitches. Measurements were taken of a football game, at a distance of 10 m away from the pitch edge.

Table 14.24: Source Sound Levels Associated with the Use of Sports Pitches

Description	Source Sound Level (dB $L_{Aeq,5minutes}$) at Distance of 10 m
Football Game (kicking of ball and people shouting)	56

14.153 **Table 14.25** details the calculated sound levels at the assessment receptors and the resulting likely change in ambient sound levels. The change in sound level assessment considers the likely on-site daytime sound levels, as calculated for the 2036 Do Something assessment scenario. Sound levels associated with the use of the sports pitches are also illustrated in **Figure 14.6**.

Table 14.25: Summary of Impacts – Sports and Recreational Uses Affecting New and Existing Noise Sensitive Receptors

Description	Receptor R13	Receptor R16
Calculated Sports Pitch Sound Level at Receptor, dB $L_{Aeq,1hour}$	20	39
Calculated Ambient Sound Level at Receptor (2036 Do Something Scenario), dB $L_{Aeq,16hours}$	46	44
Calculated Cumulative Ambient Sound Level at Receptor, dB $L_{Aeq,16hours}$	46	45
Change in Ambient Sound Level at Receptor (dB)	<1	<2
Significance of Effect	Negligible	Negligible

14.154 The results of the assessment indicate that the change in ambient sound level at Receptors 13 and 16 are likely to be no greater than +2 dB and are therefore likely to be of negligible significance.

Redlands Airfield

14.155 Redlands Airfield is located at Redlands Farm in Wanborough, to the south east of the development and approximately 600 from the south-eastern site boundary. The airfield currently consists of three grass runways, a small aircraft hangar and an organic farm on land surrounding the main airfield area. The airfield is currently being used for skydiving, microlight flying and pilot training. The airfield is also open to visiting microlight aircraft. The runways in operation are described in **Table 14.26**. **Figure 14.7** illustrates the location and layout of the airfield.

Table 14.26: Redlands Airfield Runways

Runway Name	Length (m)	Width (m)
06/24 NORTH	700	11
06/24 SOUTH	320	11
17/35	320	9

14.156 Based on the consultation with Redlands Airfield and information available online, the following operational information has been ascertained:

- We understand that the airfield is currently used for skydiving experiences and for fixed-wing flight training, microlight flying and lessons;
- The airfield can operate at any time between sunrise and sunset Mondays to Saturdays and between 1000 and 2000 on Sundays;
- Microlights under 450 kg and one aircraft for skydiving are used on a regular basis, however the airfield is open to visiting microlights;
- Microlight operations are permitted 7 days a week. Skydiving flights occur on Fridays, Saturdays and Sundays between March and December with a maximum of two sessions held on any one day;
- Pilots are requested to avoid flying over Lotmead Farm and Wanborough villages, as well as other isolated dwellings located in close proximity to the airfield as these are considered noise sensitive;
- The minimum en-route approach altitude is 1500 ft. (approx. 457 m);
- Microlight aircraft can fly at a minimum legal altitude of 500 ft. (approx. 150m);
- The skydiving aircraft use only the northern runway (06/24 NORTH). The preferred microlight runway is the southern runway (06/24 SOUTH). Runway 17/35 is used only if necessary due to wind conditions. In order to consider the typical operation of the airfield, the use of this runway has been discounted from our assessment.

14.157 Aircraft are required to arrive and depart the airfield from the North, passing to the right of 'Twin Barns'. Apart from the arrival and departure procedure, aircraft have flexibility in terms on the flight patterns they are permitted to fly. This introduces a degree of uncertainty into the assessment, as aircraft noise levels across the proposed development will vary depending on factors such as overfly height, frequency and the flight path after take-off.

However, the assessment is considered to be robust based on the operational information available to us. **Figure 14.7** also illustrates the assessed departure and arrival paths for each runway at the airfield.

14.158 Based on the above operational information, the following assessment assumptions have been made:

- All flights are made during the daytime period (07:00 – 23:00 hours). No flights are made during the night-time period (23:00 – 07:00 hours);
- Six flights a day are made by the skydiving aircraft during the daytime period;
- Sixty take-offs and landings are made by microlight aircraft during the daytime period;
- Ten fixed-wing aircraft take off and landings are made by pilot training aircraft;
- Aircraft arrive and depart using the flight paths illustrated in Figure 14.7;
- All aircraft departing and leaving the airfield overfly the proposed development;
- Skydiving flights ascend to a height of 9,000 ft. following a circular flight path before descending and landing at the airfield in the shortest amount of time possible;
- Microlight aircraft ascend to their minimum flying height of 500 ft.;
- Skydiving aircraft use runway 06/24 NORTH and all microlights use runway 06/24 SOUTH;
- Two operational scenarios have been assumed:
 - Scenario 1 - All aircraft take off and land in an easterly direction during the daytime period;
 - Scenario 2 - All aircraft take off and land in a westerly direction during the daytime period.

14.159 It is understood that the aircraft used for skydiving is a GippsAero Airvan with a maximum take-off weight of approximately 1,800 kg. A variety of microlight aircraft are in use at the airfield which include the Pegasus 912. All microlights using the airfield are a maximum of 450 kg in weight. The fixed-wing aircraft used at the airfield for pilot training is the Ikarus C42 with a maximum take-off weight of approximately 450 kg.

14.160 Source sound level data for the aircraft is unavailable. Furthermore, there is no UK-based standard that covers the calculation of aircraft noise and as such there is no known UK library of sound data for different aircraft types. Therefore, source sound levels have been taken from DIN 45684-1 2013, a German standard that outlines a calculation procedure for aircraft noise. SoundPLAN v8.0 has a library of source data for a variety of planes. Based on take-off weights and other factors such as engine power, the source data for a similar aircraft has been used in the assessment. The source sound data used in the assessment are described in **Table 14.27** below.

Table 14.27: Source Sound Level Data Associated with Aircraft at Redlands Airfield

Aircraft	Direction	Source Sound Level Data	
		Sound Pressure Level, L _p dBZ	Sound Pressure Level, L _p dBZ
GippsAero Airvan	Take-Off	83.0	140.8
	Landing	73.0	130.8
Ikarus C42, Pegasus 912 Microlight	Take-Off	73.9	131.6
	Landing	63.9	121.6

- 14.161 **Figures 14.8 and 14.9** illustrate the calculated sound levels across the Proposed Development associated with aircraft movements at Redlands Airfield at a height of 1.5 m above ground level.
- 14.162 Calculations indicate that noise levels associated with aircraft activity at Redlands Airfield are likely to fall below the proposed LOAEL, regarded as the threshold for the onset of annoyance of aircraft noise. Aircraft noise levels in external amenity areas are therefore considered to be of negligible significance.
- 14.163 Based on the calculated external levels, an assessment of the internal noise level within proposed dwellings has been undertaken. The assessment is based on a typical sound reductions outlined in **Table 14.12**, with a 15 dB reduction to account for an open window.
- 14.164 Calculations indicate that internal noise levels associated with aircraft movements at Redlands airfield are likely to fall below the proposed LOAEL for internal noise levels, as outlined in **Table 14.11**, within dwellings across the majority of the proposed development.
- 14.165 The results of the assessment indicate that internal sound levels associated with the operation of Redlands Airfield are likely to fall below the proposed LOAEL for internal noise levels within dwellings with windows open. Therefore, internal sound levels are considered to be of negligible significance.

Environmental Assessment: Cumulative Effects

- 14.166 The cumulative traffic flow data incorporates committed development around the Application Site. A full list of committed developments is provided in Chapter 2 of the ES.
- 14.167 The 2036 Future Do Something (with the Proposed Development) scenarios includes traffic flows associated with the development in that year and therefore includes the developments that are likely to have been completed by that time. As such, the cumulative effects are included within the calculations and assessments of transportation noise.
- 14.168 The plant noise emission limits proposed in **Table 14.25** are likely to ensure that the effect of plant noise from the Proposed Development with other committed development on receptors in and around the Application Site is of negligible significance.

Mitigation and Monitoring

Demolition and Construction Noise and Vibration

- 14.169 As indicated by the results of the assessment detailed in **Tables 14.17** and **14.18**, if the considered phases of demolition and construction occur continuously on the site boundary for the entire 12-hour assessment period, it is likely that demolition and construction noise levels will be above the proposed LOAEL at the closest existing noise sensitive receptors and are likely to be of between negligible and major significance.
- 14.170 The assessment undertaken represents a worst-case scenario, where each demolition and construction phase is undertaken on the closest part of the site boundary to each noise sensitive receptor. It should be noted that it is unlikely that these works would occur across the entire site or on the site boundary at the same time. Furthermore, it is unlikely that the demolition and construction activities considered in the assessment would occur simultaneously and are likely to occur in phases. It should also be recognised that demolition and construction noise is short-term in nature and as such, a temporary exceedance of the LOAEL should not be considered significant.
- 14.171 Demolition and construction noise levels at the nearest noise sensitive receptors can be mitigated through careful phasing of the works, as well as controlling the operation time and duration of each activity in order to reduce noise levels at the receptors.
- 14.172 A CEMP will be produced for the proposed development. The CEMP will set out measures to minimise the adverse effects of demolition and construction noise and vibration and to reduce the significance of effect. Measures that can be incorporated within the CEMP are likely to include the following:
- Appropriate operational hours;
 - Considerate working hours for excessively noisy activities;
 - Ensuring the use of quiet working methods, the most suitable plant and reasonable hours of working for noisy operations, where reasonably practicable
 - Locating noisy plant and equipment as far away from dwellings as reasonably possible and where practical, carry out loading and unloading in these areas;
 - Screening plant to reduce noise which cannot be reduced by increasing the distance between the source and the receiver (i.e. by installing noisy plant and equipment behind large site buildings);
 - Orienting plant that is known to emit noise strongly in one direction so that the noise is directed away from dwellings, where possible;
 - Closing acoustic covers to engines when they are in use or idling; and
 - Lowering materials slowly, whenever practicable, and not dropping them.
- 14.173 It is possible for the CEMP to form part of an agreed working methodology under Section 61 of the CPA 1974.

- 14.174 The requirement for demolition and construction noise and vibration monitoring should be discussed and, if necessary, agreed with SBC. The exact methodology and location of the monitoring is typically agreed with the Local Authority through the submission of a Section 61 application before the commencement of any works.
- 14.175 It is therefore considered that whilst noise from demolition and construction activities has the potential to be of major adverse significance, with appropriate phasing of the works and the appropriate mitigation measures implemented within the CEMP, the significance of effects can be reduced at the nearest existing noise sensitive receptors to between **negligible and moderate significance**.

Operational Transportation Noise Affecting Development Receptors – Internal Noise Levels

- 14.176 The acoustic design of the external building fabric in relation to glazing elements and overheating and ventilation provisions are still to be confirmed.
- 14.177 The worst-case and best-case incident sound levels at the proposed development have been used to undertake an assessment of the likely future internal noise levels, in order to demonstrate the suitability of the site for residential development.
- 14.178 **Table 14.28** details the calculated internal noise levels at locations considered worst-case (close to the surrounding road network) and best-case (in the central area of the site). Calculations are based on an indicative composite sound reduction index of 30 dB R_w for the building façade, as described in **Table 14.24**. This includes conventional double glazing and ventilation through trickle ventilators. Windows have been assumed to be openable but closed for the purpose of the assessment.

Table 14.28: Calculated Internal Noise Levels in Proposed Dwellings

Period	Calculated Internal Noise Levels (dB)	
	Overlooking Wanborough Road	Central Site Area
Daytime (07:00 – 23:00 hours)	34 dB LAeq,16hours	13 dB LAeq,16hours
	25 dB LAeq,8hours	10 dB LAeq,8hours
Night-Time (23:00 – 07:00 hours)	26 dB LAFMax	20 dB LAFMax

- 14.179 The above assessment indicates that internal noise levels in dwellings are likely to fall below the proposed LOAEL during the daytime and night-time periods and are likely to be of negligible significance. Maximum sound levels during the night-time period are likely to fall below the proposed LOAEL and be of **negligible significance**.
- 14.180 A further assessment should be undertaken at the detailed design stage to inform the development of the layout and to determine the external building fabric requirements in order to meet the internal noise level criteria.

Operational Transportation Noise Affecting Development Receptors – External Noise Levels

- 14.181 The assessment of noise levels in external amenity areas has indicated that the LOAEL is likely to be exceeded in locations surrounding the road network and are likely to be of moderate significance.

14.182 Mitigation measures exist that are likely to reduce sound levels within worst-case located external amenity areas. These are to be confirmed at the reserved matters stage. Measures are likely to include:

- Locating external amenity areas to the rear of dwellings to ensure they are adequately screened from transportation sources;
- Set back of external amenity areas from Wanborough Road.

14.183 When discussing noise levels in external amenity areas, Paragraph 7.7.3.2 of BS8233:2014 states:

“For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited.”

14.184 In line with the guidance contained within BS8233:2014, the exceedance of the LOAEL within external amenity areas should be balanced against factors, such as the convenience of living in a desirable location.

14.185 Through careful design of the site and consideration of the mitigation measures and contextual information outlined above, noise levels in external amenity areas are likely to meet the proposed LOAEL and are therefore likely to be of **negligible significance**.

14.186 The exact details regarding site design, layout and external building fabric requirements should be confirmed at the reserved matters stage in order to meet the external noise level criteria.

Operational Transportation Noise Affecting Non-Development Receptors

14.187 The change in sound levels at existing non-development receptors as a result of the proposed development is likely to be no greater than +2 dB and is therefore likely to be of **negligible significance**. As such, it is likely that no further mitigation will be required.

Operational Transportation Vibration Affecting Development and Non-Development Receptors

14.188 Given the relationship between the VDV, the magnitude of the vibration event and exposure duration, it is considered that a substantial increase in traffic flows would be required in order to significantly increase vibration levels. This is considered to be of **no significance** and as such, it is likely that no further mitigation will be required.

14.189 Given the distance between the GWML and the proposed residential development, vibration levels are considered to be of no significant and as such, it is likely that no further mitigation will be required.

Industrial and Commercial Noise Affecting New and Existing Noise Sensitive Receptors

14.190 Noise from fixed plant at the proposed schools and local centres can be controlled through the use of a suitably worded planning condition attached to any subsequent granting of planning permission. The condition should be based on the measured background sound level at the appropriate noise sensitive receptors.

14.191 Mitigation measures exist that are likely to ensure noise emissions from fixed plant are suitably controlled. These include:

- Locating plant items within a specified enclosure;
- Selecting low noise-emission plant/equipment;
- Locating plant items away from nearby noise sensitive receptors.

14.192 With the use of a suitably worded planning condition and the consideration for the location, selection and enclosing of plant items, noise levels associated with fixed external plant are likely to be of **negligible significance**.

Sports and Recreational Uses Affecting New and Existing Noise Sensitive Receptors

14.193 The assessment of the proposed sports and recreational uses has been undertaken in terms of the likely cumulative ambient sound level and the resultant change to the ambient sound level at the nearest existing and future noise sensitive receptors.

14.194 The assessment indicated that the change in ambient sound levels at the nearest existing and future noise sensitive receptors associated with the use of the proposed sports pitches is likely to be no greater than +1 dB and is likely to be of **negligible significance**.

14.195 Considering the results of the assessment undertaken, the impact of noise from the proposed sports pitches is not likely to be significant and as such, it is likely that no further mitigation will be required.

Redlands Airfield

14.196 External noise levels resulting from aircraft movements is likely to fall below the LOAEL. With appropriate external building fabric specifications, it is likely that internal noise levels resulting from aircraft movements will fall below the proposed LOAEL and be of **negligible significance**. Therefore, it is considered that no further mitigation is required.

Summary of Residual Effects

14.197 A summary of the likely residual effects is provided in **Table 14.29** below.

Table 14.29: Summary of Residual Effects

Description of impact	Construction /Operational Phase	Significant effect	Mitigation	Residual Effect
Noise and Vibration from Demolition and Construction Activities	Construction	Negligible to Major	Phasing of Construction Works Implementation of measures in CEMP	Negligible to Moderate
Internal Noise Levels in Proposed Residential Dwellings	Operational	Negligible	Appropriately specified glazing and ventilation in affected dwellings	Negligible
Noise Levels in External Amenity Areas	Operational	Moderate	Location of external amenity areas to the rear of dwellings Set back of external areas from Wanborough Road	Negligible
Operational Transportation Noise at Existing Residential Receptors	Operational	Negligible	Not Applicable	Not Applicable
Operational Transportation Vibration at Existing and Future Residential Dwellings	Operational	Negligible	Not Applicable	Not Applicable
Noise from Fixed Building Services Plant at Proposed Local Centre and Sports Pavilion	Operational	Major	Control through suitable worded planning condition Consideration for the location, selection and enclosing of plant items	Negligible
Noise from Proposed Sports Pitches	Operational	Negligible	Not Applicable	Not Applicable
Nosie from Redlands Airfield	Operational	Negligible	Not Applicable	Not Applicable

15. Air Quality

Purpose and Parameters of the Assessment

- 15.1 This chapter identifies the Air Quality impacts associated with the Proposed Development and the likely significant effects upon sensitive receptors. The Development has the potential to adversely impact air quality during both the construction phase and operational phase. The main air pollutants of concern related to construction are dust and particulate matter (PM₁₀), whilst for road traffic they are nitrogen dioxide (NO₂) and particulate matter (PM₁₀ and PM_{2.5}).
- 15.2 This chapter describes: the assessment methodology; the baseline conditions at the Site and surroundings; the likely significant environmental effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; the likely residual effects after the mitigation measures have been employed, and the likely cumulative effects in conjunction with committed developments in the area.
- 15.3 Redlands Airfield is located to the south east of the Phase 1 site. In accordance with the Local Air Quality Management Technical Guidance 2016 (LAQM.TG(16) (**ref 15.1**), Paragraph 7.16, the impacts of airports only need to be considered in the UK where the passenger throughput is greater than 10 million passengers per annum and the annual mean background NO₂ concentration is greater than 25µg/m³. Neither is the case for Redlands Airfield; in particular, passenger numbers are well below the threshold. Further consideration of the impacts of Redlands Airfield on local air quality have therefore been scoped out of the assessment.
- 15.4 The proposed development is for 2,500 dwellings, 2,500sqm of employment (including the retention of 1,500sqm of existing floorspace at Lotmead Business Village), two 2FE Primary Schools and local centre, with access to the Southern Connector Road, A420 (through the NEV) and 200 homes only via Wanborough Road.
- 15.5 The transport assessment work was carried out in support of previous planning applications, which applied for 2,600 homes and 3,000sqm of employment. For clarity, this assessment is therefore based upon 2,600 homes and 3,000sqm rather than 2,500 homes and 2,500sqm of employment, which is now being applied for. This assessment therefore provides a worst case assessment of the development proposals.

Legislative and Policy Framework

The Air Quality Strategy

- 15.6 The Air Quality Strategy (2007) (**ref 15.2**) establishes the policy framework for ambient air quality management and assessment in the UK. The primary objective is to ensure that everyone can enjoy a level of ambient air quality which poses no significant risk to health or quality of life. The Strategy sets out the National Air Quality Objectives (NAQOs) and Government policy on achieving these objectives.
- 15.7 Part IV of the Environment Act 1995 (**ref 15.3**) introduced a system of Local Air Quality Management (LAQM). This requires local authorities to regularly and systematically review and assess air quality within their boundary, and appraise development and

transport plans against these assessments. The relevant NAQOs for LAQM are prescribed in the Air Quality (England) Regulations 2000 (**ref 15.4**) and the Air Quality (Amendment) (England) Regulations 2002 (**ref 15.5**).

- 15.8 Where an objective is unlikely to be met, the local authority must designate an Air Quality Management Area (AQMA) and draw up an Air Quality Action Plan (AQAP) setting out the measures it intends to introduce in pursuit of the objectives within its AQMA.
- 15.9 The LAQM.TG(16) (**ref 15.1**) issued by the Department for Environment, Food and Rural Affairs (Defra) for Local Authorities provides advice as to where the NAQOs apply. These include outdoor locations where members of the public are likely to be regularly present for the averaging period of the objective (which vary from 15 minutes to a year). Thus, for example, annual mean objectives apply at the façades of residential properties, whilst the 24-hour objective (for PM₁₀) would also apply within the garden. They do not apply to occupational, indoor or in-vehicle exposure.

The Clean Air Strategy 2019

- 15.10 The Clean Air Strategy aims to lower national emissions of pollutants, thereby reducing background pollution and minimising human exposure to harmful concentrations of pollution. The Strategy will create a stronger and more coherent framework for action to tackle air pollution. It also aims to support the creation of Clean Air Zones in order to reduce emissions from all sources of air pollution (**ref 15.6**).

EU Limit Values

- 15.11 The Air Quality Standards Regulations 2010 (**ref 15.7**) implement the European Union's Directive on ambient air quality and cleaner air for Europe (2008/50/EC) (**ref 15.8**) and includes limit values for NO₂. These limit values are numerically the same as the NAQO values but differ in terms of compliance dates, locations where they apply and the legal responsibility for ensuring that they are complied with. The compliance date for the NO₂ EU Limit Value was 1 January 2010, five years later than the date for the NAQO.
- 15.12 Directive 2008/50/EC (**ref 15.8**) consolidated the previous framework directive on ambient air quality assessment and management and its first three daughter directives. The limit values remained unchanged, but it now allows Member States a time extension for compliance, subject to European Commission (EC) approval.
- 15.13 The Directive limit values are applicable at all locations except:
- Where members of the public do not have access and there is no fixed habitation;
 - On factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply; and
 - On the carriageway of roads; and on the central reservations of roads except where there is normally pedestrian access.

Air Quality Objectives

- 15.14 The NAQOs for NO₂ and particulate matter (PM₁₀) set out in the Air Quality Regulations (England) 2000 (**ref 15.4**) and the Air Quality (England) (Amendment) Regulations 2002 (**ref 15.5**), are shown in **Table 15.1**.

Table 15.1: NO₂ and PM₁₀ Objectives

Pollutant	Time Period	Objective
NO ₂	1-hour mean	200µg/m ³ not to be exceeded more than 8 times a year
	Annual mean	40µg/m ³
Particulate Matter (PM ₁₀)	24-hour mean	50µg/m ³ not to be exceeded more than 35 times a year
	Annual mean	40µg/m ³

- 15.15 The objectives for NO₂ and PM₁₀ were to have been achieved by 2005 and 2004, respectively, and continue to apply in all future years thereafter. Analysis of long term monitoring data suggests that if the annual mean NO₂ concentration is less than 60µg/m³ then the one-hour mean NO₂ objective is unlikely to be exceeded where road transport is the main source of pollution. This concentration has been used to screen whether the one-hour mean objective is likely to be achieved (**ref 15.1**).
- 15.16 The Air Quality Strategy 2007 (**ref 15.2**) includes an exposure reduction target for smaller particles known as PM_{2.5}. These are an annual mean target of 25µg/m³ by 2020 and an average urban background exposure reduction target of 15% between 2010 and 2020.
- 15.17 Air quality directive 2008/50/EC (**ref 15.8**) also includes a national exposure reduction target, a target value and a limit value for PM_{2.5}, shown in **Table 15.2**. The UK Government transposed this new directive into national legislation in June 2010.

Table 15.2: PM_{2.5} Objectives

	Time Period	Objective/Obligation	To be Achieved by
UK Objectives	Annual mean	25µg/m ³	2020
	3 year running annual mean	15% reduction in concentrations measured at urban background sites	Between 2010 and 2020
European obligations	Annual mean	Target value of 25µg/m ³	2010
	Annual mean	Limit value of 25µg/m ³	2015
	Annual mean	Stage 2 indicative Limit value of 20µg/m ³	2020
	3 year Average Exposure Indicator (AEI) (a)	Exposure reduction target relative to the AEI depending on the 2010 value of the 3 year AEI (ranging from a 0% to a 20% reduction)	2020
	3 year Average Exposure Indicator (AEI)	Exposure concentration obligation of 20µg/m ³	2015

(a) The 3 year annual mean or AEI is calculated from the PM_{2.5} concentration averaged across all urban background monitoring locations in the UK e.g. the AEI for 2010 is the mean concentration measured over 2008, 2009 and 2010.

Planning Policy

National Policy

- 15.18 The revised National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how they are expected to be applied (**ref 15.9**). In relation to achieving sustainable development, paragraph 8 states that:

"Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives): ...

c) an environmental objective – to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."

- 15.19 So that sustainable development is pursued in a positive way, at the heart of the Framework is a presumption in favour of sustainable development. Paragraph 11 states that plans and decisions should apply a presumption in favour of sustainable development, which for decision-taking means:

"... d) where there are no relevant development plan policies, or the policies which are most important for determining the application are out-of-date, granting permission unless: ...

ii. any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole."

- 15.20 Paragraph 54 on planning conditions and obligations states:

"Local planning authorities should consider whether otherwise unacceptable development could be made acceptable through the use of conditions or planning obligations. Planning obligations should only be used where it is not possible to address unacceptable impacts through a planning condition."

- 15.21 Paragraph 102 on promoting sustainable transport states:

"Transport issues should be considered from the earliest stages of plan-making and development proposals, so that: ...

d) the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains; ..."

- 15.22 Paragraph 103 continues:

“Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health.”

15.23 Paragraph 170 on conserving and enhancing the natural environment states:

“Planning policies and decisions should contribute to and enhance the natural and local environment by: ...

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land stability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans, and...”

15.24 Paragraph 180 within ground conditions and pollution states:

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development.”

15.25 Paragraph 181 states that:

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

15.26 Paragraph 182 states that:

“Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed”.

Planning Practice Guidance

15.27 Planning Practice Guidance (PPG) (ref 15.10) was first published in March 2014 to support the NPPF. Paragraph 001, Reference 32-007-20140306 (revision date 06.03.2014) of the PPG provides a summary as to why air quality is a consideration for planning:

“... Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with EU Limit Values. It is important that the potential impact of new development on air quality is taken into account in planning where the national assessment indicates that relevant limits have been exceeded or are near the limit... The local air quality management (LAQM) regime requires every district and unitary authority to regularly review and assess air quality in their area. These reviews identify whether national objectives have been, or will be, achieved at relevant locations, by an applicable date... If national objectives are not met, or at risk of not being met, the local authority concerned must declare an air quality management area and prepare an air quality action plan... Air quality can also affect biodiversity and may therefore impact on our international obligations under the Habitats Directive... Odour and dust can also be a planning concern, for example, because of the effect on local amenity.”

15.28 Paragraph 002 of the PPG concerns the role of Local Plans with regard to air quality;

“... Drawing on the review of air quality carried out for the local air quality management regime, the Local Plan may need to consider;

- the potential cumulative impact of a number of smaller developments on air quality as well as the effect of more substantial developments;*
- the impact of point sources of air pollution...; and*
- ways in which new development would be appropriate in locations where air quality is or likely to be a concern and not give rise to unacceptable risks from pollution. This could be through, for example, identifying measures for offsetting the impact on air quality arising from new development including supporting measures in an air quality action plan or low emissions strategy where applicable.”*

15.29 Paragraph 005 of the PPG identifies when air quality could be relevant for a planning decision;

“... When deciding whether air quality is relevant to a planning application, considerations could include whether the development would;

- Significantly affect traffic in the immediate vicinity of the proposed development site or further afield. This could be by generating or increasing traffic congestion; significantly changing traffic volumes, vehicle speed or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; adds to turnover in a large car park; or result in construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more;*
- Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; or extraction systems (including chimneys) which require approval under pollution control legislation or biomass boilers or biomass-fuelled CHP plant; centralised boilers or CHP plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Areas;*

- *Expose people to existing sources of air pollutants. This could be by building new homes, workplaces or other development in places with poor air quality;*
- *Give rise to potentially unacceptable impact (such as dust) during construction for nearby sensitive locations; and*
- *Affect biodiversity. In particular, is it likely to result in deposition or concentration of pollutants that significantly affect a European-designated wildlife site, and is not directly connected with or necessary to the management of the site, or does it otherwise affect biodiversity, particularly designated wildlife sites.”*

15.30 Paragraph 007 of the PPG provides guidance on how detailed an assessment needs to be;

“Assessments should be proportionate to the nature and scale of development proposed and the level of concern about air quality, and because of this are likely to be locationally specific.”

15.31 Paragraph 008 of the PPG provides guidance on how an impact on air quality can be mitigated;

“Mitigation options where necessary will be locationally specific, will depend on the proposed development and should be proportionate to the likely impact... Examples of mitigation include;

- *the design and layout of development to increase separation distances from sources of air pollution;*
- *using green infrastructure, in particular trees, to absorb dust and other pollutants;*
- *means of ventilation;*
- *promoting infrastructure to promote modes of transport with low impact on air quality;*
- *controlling dust and emissions from construction, operation and demolition; and*
- *contributing funding to measures, including those identified in air quality action plans and low emission strategies, designed to offset the impact on air quality arising from new development.”*

15.32 Paragraph 009 of the PPG provides guidance on how considerations about air quality fit into the development management process by means of a flowchart. The final two stages in the process deal with the results of the assessment;

“Will the proposed development (including mitigation) lead to an unacceptable risk from air pollution, prevent sustained compliance with EU limit values or national objectives for pollutants or fail to comply with the requirements of the Habitats Regulations.”

15.33 If Yes:

“Consider how the proposal could be amended to make it acceptable or, where not practicable, consider whether planning permission should be refused.”

Local Policy

- 15.34 The Swindon Borough Council Local Plan (**ref 15.11**) was adopted in 2015 and provides the planning framework to deliver sustainable growth up to 2026 and beyond. The local plan includes planning policy EN7: Pollution which states:

“a. Development that is likely to lead to emissions of pollutants such as noise, light, vibration, smell, fumes, smoke, soot, ash, dust, grit or toxic substances that may adversely affect existing development and vulnerable wildlife habitats, shall only be permitted where such emissions are controlled to a point where there is no significant loss of amenity for existing land uses, or habitats.

b. Similarly; where development would be adversely affected by the emission of pollutants from an existing use; the proposal will only be permitted where the users of the future development are protected from loss of amenity from those emissions in accord with Policy DE1.”

Consultation

- 15.35 An informal Scoping Note was submitted to Swindon Borough Council (SBC) on 7th November 2018. The scoping detailed the proposed methodology for the air quality technical chapter. A response was received from SBC on the Scoping Note on 11th December 2018. With regards to air quality, SBC agreed with the air quality technical chapter methodology subject to comments provided in the Scoping Note. These comments included:

- Latest available SBC monitoring data (anticipated to be 2017) will be used to undertake the air quality assessment;
- The same methodology will be used as the 2016 assessment, taking into account updated guidance from the IAQM.

Study Area

- 15.36 For the construction phase assessment, the study area is defined as up to 350 m from the Site boundary and along the construction access route, in accordance with the Institute of Air Quality Management (IAQM) guidance on the assessment of construction dust effects (**ref 15.12**).
- 15.37 The operational study area for human health impacts extends to where there is a significant increase in road traffic resulting from the Proposed Development in accordance with the IAQM/Environmental Protection UK (EPUK) guidance (**ref 15.13**). A significant increase in traffic is defined as:
- A change of Light Duty Vehicles (LDVs) flows of more than 100 Annual Average Daily Traffic (AADT) within or adjacent to an AQMA or more than 500 AADT elsewhere.
 - A change of Heavy Duty Vehicles (HDVs) flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere.

Baseline Conditions

Baseline Data Collection

- 15.38 Information on existing air quality has been obtained by collating the results of monitoring carried out by the Council. Background concentrations for the Site have been defined using the national pollution maps published by Defra. These cover the whole country on a 1x1 km grid

LAQM

- 15.39 SBC has investigated air quality within its area as part of its responsibilities under the LAQM regime. SBC declared an AQMA in 2018 due to exceedances of the annual mean NO₂ objective on Kingshill Road, approximately 5km from the Site.

Swindon Borough Council Monitoring

NO₂

- 15.40 The Council operates one automatic monitor, which is not close to the Site. The Council also deploys diffusion tubes at several monitoring locations within Swindon. Data for diffusion tube monitoring in close proximity to the Site are presented in **Table 15.3**. The monitoring locations are shown in **Figure 15.1, Technical Appendix 15.5**.

Table 15.3: Measured NO₂ Concentrations, 2012 - 2017

Location	Type	Annual Mean (µg/m ³)					
		2012	2013	2014	2015	2016	2017
Swindon 9 – 31 Sandgate	Roadside	21.6	22.8	21.7	18.0	24.7	21.0
Swindon 20 – A420 South Marston*	Roadside	22.7	19.4	27.3	23.8	26.3	23.4
Swindon 27 – 66 Ermin Street	Roadside	26.6	30.5	31.2	29.4	28.7	28.3

Exceedances highlighted in bold.

* Used for model verification

- 15.41 2012-2016 data obtained from the SBC 2017 Air Quality Annual Status Report (ASR) (**ref 15.14**) 2017 data obtained from SBC Environmental Health Officer (EHO).
- 15.42 The closest monitoring location to the Site is Swindon 20 on the A420 South Marston, approximately 880 m from proposed residential areas within the Site and 75 m from the Site boundary. **Table 15.3** shows that measured annual mean NO₂ concentrations at the closest and most representative monitoring locations, including Swindon 20, were well below the objective between 2012 and 2017.

PM₁₀ and PM_{2.5}

- 15.43 There is no PM₁₀ or PM_{2.5} monitoring carried out in close proximity to the Site.

Background Concentrations

- 15.44 In addition to measured concentrations, estimated background concentrations for the study area have been obtained from the national maps provided by Defra (**Table 15.4**). The background concentrations are all well below the relevant objectives.

Table 15.4: Estimated Annual Mean Background Concentrations in 2017 and 2021

Year	Grid Reference	NO _x	NO ₂	PM ₁₀	PM _{2.5}
2017	417_185	23.7	16.6	16.8	11.7
	418_186	26.2	18.1	17.3	12.1
	419_186	21.1	14.9	15.8	11.2
	419_185	21.4	15.2	16.5	11.5
2021	417_185	19.6	14.0	16.3	11.3
	418_186	21.7	15.4	16.8	11.6
	419_186	17.8	12.8	15.3	10.7
	419_185	17.6	12.7	16.0	11.1
Objectives		-	40	40	25

Predicted Baseline Concentrations

- 15.45 The ADMS-Roads dispersion model has been run to predict NO₂, PM₁₀ and PM_{2.5} concentrations at each of the existing receptor locations identified in **Table 15.9** for the baseline scenarios. The predicted existing and future baseline concentrations of NO₂, PM₁₀ and PM_{2.5} are shown in **Table 15.5**.

Table 15.5: Predicted Baseline Concentrations of NO₂ in 2017 and 2022

Receptor	Annual Mean (µg/m ³)					
	2017			2022		
	NO ₂	PM ₁₀	PM _{2.5}	NO ₂	PM ₁₀	PM _{2.5}
R1	19.7	16.4	11.6	16.8	16.1	11.2
R2	21.9	16.8	11.8	17.9	16.3	11.3
R3	18.7	16.3	11.5	15.8	15.9	11.1
R4	20.4	16.6	11.7	17.5	16.2	11.3
R5	26.7	18.1	12.5	23.1	17.8	12.2
R6	28.6	18.7	13.0	25.1	18.6	12.7
R7	21.9	17.0	11.9	19.0	16.8	11.6
R8	47.8	20.0	13.9	45.1	20.4	13.8
R9	22.4	17.4	12.1	19.9	17.2	11.7
Objectives	40	40	25	40	40	25

Exceedances highlighted in bold

- 15.46 None of the predicted baseline concentrations exceed the relevant objectives in 2017 or 2022, except for R8 which exceeds the annual mean NO₂ objective in 2017 and 2022.

Scope and Methodology

Construction Phase

- 15.47 The IAQM has issued revised guidance on the assessment of dust from demolition and construction (**ref 15.12**). Within the IAQM guidance, an 'impact' is described as a change in pollutant concentrations or dust deposition and an 'effect' is described as the consequence of an impact.
- 15.48 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 surface characteristics, weather conditions and on-site activities. Impacts have the potential to occur when dust generating activities coincide with dry, windy conditions, and where sensitive receptors are located downwind of the dust source.
- 15.49 Separation distance is also an important factor. Large dust particles (greater than 30µm), responsible for most dust annoyance, will largely deposit within 100m of sources. Intermediate particles (10-30µm) can travel 200-500m. Consequently, significant dust annoyance is usually limited to within a few hundred metres of its source. Smaller particles (less than 10µm) are deposited slowly and may travel up to 1km; however, the impact on the short-term concentrations of PM₁₀ occurs over a shorter distance. This is due to the rapid decrease in concentrations with distance from the source due to dispersion.
- 15.50 The IAQM guidance recommends that the risk of dust generation is combined with the sensitivity of the area surrounding the site to determine the risk of dust impacts from

construction and demolition activities. Depending on the level of risk (high, medium, low or negligible) for each activity, appropriate mitigation is selected.

- 15.51 In accordance with the IAQM 2014 guidance, the dust emission magnitude is defined as either large, medium or small (**Table 15.6**) taking into account the general activity descriptors on site and professional judgement.
- 15.52 The sensitivity of the study area to construction dust impacts is defined based on the examples provided within the IAQM 2014 guidance (**Table 15.7**), taking into account professional judgement.

Table 15.6: Risk Criteria for Dust Emission Magnitude

Dust Emission Magnitude	Activity
Large	Demolition >50,000m ³ building demolished, dusty material (e.g. concrete), on-site crushing/screening, demolition >20m above ground level
	Earthworks >10,000m ² site area, dusty soil type (e.g. clay), >10 earth moving vehicles active simultaneously, >8m high bunds formed, >100,000 tonnes material moved
	Construction >100,000m ³ building volume, on site concrete batching, sandblasting
	Trackout >50 HDVs out / day, dusty soil type (e.g. clay), >100m unpaved roads
Medium	Demolition 20,000 - 50,000m ³ building demolished, dusty material (e.g. concrete) 10-20m above ground level
	Earthworks 2,500 - 10,000m ² site area, moderately dusty soil (e.g. silt), 5-10 earth moving vehicles active simultaneously, 4m - 8m high bunds, 20,000 - 100,000 tonnes material moved
	Construction 25,000 - 100,000m ³ building volume, on site concrete batching
	Trackout 10 - 50 HDVs out / day, moderately dusty surface material, 50 -100m unpaved roads
Small	Demolition <20,000m ³ building demolished, non-dusty material, <10m above ground level, work in winter
	Earthworks

Dust Emission Magnitude	Activity
	<2,500m ² site area, non-dusty soil, <5 earth moving vehicles active simultaneously, <4m high bunds, <20,000 tonnes material moved
	Construction
	<25,000m ³ , non-dusty material
	Trackout
	<10 HDVs out / day, non-dusty soil, < 50m unpaved roads

Table 15.7: Area Sensitivity Definitions

Area Sensitivity	People and Property Receptors
High	>100 dwellings, hospitals, schools, care homes within 50m 10 – 100 dwellings within 20m Museums, car parks, car showrooms within 50m PM10 concentrations approach or are above the daily mean objective.
Medium	>100 dwellings, hospitals, schools, care homes within 100m 10 – 100 dwellings within 50m Less than 10 dwellings within 20m Offices/shops/parks within 20m PM ₁₀ concentrations below the daily mean objective.
Low	>100 dwellings, hospitals, schools, care homes 100 - 350m away 10 – 100 dwellings within 50 – 350m Less than 10 dwellings within 20 - 350m Playing fields, parks, farmland, footpaths, short term car parks, roads, shopping streets PM ₁₀ concentrations well below the daily mean objective.

- 15.53 Based on the dust emission magnitude and the area sensitivity, the risk of dust impacts is then determined (**Table 15.8**), taking into account professional judgement.

Table 15.8: Risk of Dust Impacts

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

- 15.54 Based on the risk of dust impacts, appropriate mitigation is selected from the IAQM 2014 guidance using professional judgement.

Significance Criteria

- 15.55 The construction impact significance criteria are based on IAQM 2014 guidance. The guidance recommends that no assessment of the significance of effects is made without mitigation in place, as mitigation is assumed to be secured by planning conditions, legal requirements or required by regulations.
- 15.56 With appropriate mitigation in place, the residual effect of construction impacts on air quality is assessed as not significant.

Operational Road Traffic Impacts

Sensitive Locations

- 15.57 Relevant sensitive locations are places where members of the public might be expected to be regularly present over the averaging period of the objectives. For the annual mean and daily mean objectives that are the focus of this assessment, sensitive receptors will generally be residential properties, schools, nursing homes, etc. When identifying these receptors, particular attention has been paid to assessing impacts close to junctions, where traffic may become congested, and where there is a combined effect of several road links.
- 15.58 Based on the above criteria, nine existing properties have been identified as receptors for the assessment. These locations are described in **Table 15.9** and shown in **Figure 15.1, Technical Appendix 15.5**. Receptors were modelled at a height of 1.5m representing ground floor exposure. In addition, one worst-case receptor location has been included within the Proposed Development, shown in **Figure 15.1, Technical Appendix 15.5**. The location within the Site has been selected to represent a location where impacts from existing and development traffic are likely to be greatest. Concentrations have also been predicted at the Swindon 20 diffusion tube in order to verify the modelled results. **Technical Appendix 15.1** provides further details of the verification method.

Table 15.9: Description of Receptor Locations

Receptor	Location
R1	58 Lytchhett Way
R2	21 to 26 Kingfisher Drive
R3	8 The Drive
R4	6 Keble Close
R5	92 Weedon Road
R6	1 Oxford Road
R7	1 Lock Cottages, A420
R8	Nythe Farm
R9	3 Wanborough Road
PR1	Proposed Residential Receptor adjacent to South-western Site Access

Impact Predictions

- 15.59 Predictions have been carried out using the ADMS-Roads dispersion model (v4.1.1.0). The model requires the user to provide various input data, including the AADT flow, the proportion of Heavy Duty Vehicles (HDVs), road characteristics (including road width and street canyon height, where applicable), and the vehicle speed. It also requires meteorological data. The model has been run using 2017 meteorological data from the Lyneham meteorological station, which is considered suitable for this area. **Technical Appendix 15.2** provides further information on model inputs.
- 15.60 AADT flows and the proportions of HDVs for roads within 250 m of the Development, existing receptors and the Swindon 20 monitoring site, as well as road links where the Development generates significant volumes of traffic (see **Paragraph 15.36**), were provided by PBA. Traffic flows were calculated from counts carried out for the project. Traffic speeds were based on local speed restrictions, taking into account congestion and proximity to a junction. Traffic data used in this assessment are summarised in **Technical Appendix 15.3**. The following scenarios have been modelled (see Transport Chapter for more detailed information):
- 2017 existing baseline – for model verification;
 - future baseline – including committed developments without and with the completed development in place.
- 15.61 Emissions were calculated using the Emission Factor Toolkit (EFT) v8, which utilises NO_x emission factors taken from the European Environment Agency COPERT 5 emission tool. The traffic data were entered into the EFT, along with speed data to provide combined emission rates for each of the road links entered into the model.
- 15.62 The Development is expected to be completed in 2040, however, the first year of residential occupation on the Site is expected to be 2022. As vehicle emissions are expected to reduce year on year with the introduction of the Euro 6/VI emission standards, a worst-case assessment has been undertaken for the earliest year of development occupation. Traffic data provided for the completed development in 2036 (agreed transport assessment model year based on the Swindon Strategic Highway Model) have been combined with 2021 emissions factors (for the 2022 first year of occupation) and background concentrations. As the future 2036 baseline traffic flows have been used in the assessment of the first year of occupation in 2022, the assessment is considered to be highly conservative as the volumes of traffic predicted to be on the roads in 2036 is greater than in 2022 and emissions per vehicle are higher in 2022 than 2036. Further information on road traffic vehicle emission factors is provided in **Technical Appendix 15.4**.

Significance Criteria

- 15.63 The relevant objectives for human health are set out in **Table 15.1** and **Table 15.2**. There is no official guidance in the UK on how to assess the significance of air quality impacts of a new development. The approach developed by the IAQM and EPUK, which considers the change in air quality as a result of a proposed development on existing receptors, has therefore been used (**ref 15.13**).

- 15.64 The guidance sets out three stages (**Table 15.10**): determining the magnitude of change at each receptor, describing the impact, and assessing the overall significance. Impact magnitude relates to the change in pollutant concentration; the impact description relates this change to the air quality objective.

Table 15.10 Impact Descriptor for Individual Receptors

Long-term Average Concentration at Receptor in Assessment Year	% Change in Concentration with Development in Relation to Objective/Limit Value			
	1*	2-5	6-10	>10
>110% ^a	Moderate	Substantial	Substantial	Substantial
>102% - ≤110% ^b	Moderate	Moderate	Substantial	Substantial
>95% - ≤102% ^c	Slight	Moderate	Moderate	Substantial
>75% - ≤95% ^d	Negligible	Slight	Moderate	Moderate
≤75% ^e	Negligible	Negligible	Slight	Moderate

Where concentrations increase the impact is described as adverse, and where it decreases as beneficial.

* Percentage change rounded to nearest whole number. Where the percentage change is less than 0 (i.e. less than 0.5%) the impact will be negligible.

^a NO₂ or PM₁₀: > 43.8µg/m³ annual mean; PM_{2.5} >27.4µg/m³ annual mean; PM₁₀ >35.0µg/m³ annual mean (days).

^b NO₂ or PM₁₀: > 41.0 – ≤ 44µg/m³ annual mean; PM_{2.5} > 25.6 – ≤27.4µg/m³ annual mean; PM₁₀ >32.8 – ≤35.0 µg/m³ annual mean (days).

^c NO₂ or PM₁₀: > 37.8 – ≤41.0µg/m³ annual mean; PM_{2.5} >23.6 – ≤25.5µg/m³ of annual mean; PM₁₀ >30.2 – ≤32.8µg/m³ annual mean (days).

^d NO₂ or PM₁₀: >30.2 – ≤37.8µg/m³ annual mean; PM_{2.5} >18.9 – ≤23.75µg/m³ annual mean; or <24 – ≤ 30.4µg/m³ annual mean (days).

^e NO₂ or PM₁₀: ≤30 µg/m³ annual mean; PM_{2.5} ≤18.75 µg/m³ annual mean; PM₁₀ ≤24.2µg/m³ annual mean (days).

- 15.65 The guidance states that the assessment of significance should be based on professional judgement, taking into account factors including:
- the number of properties affected by slight, moderate or substantial air quality impacts and a judgement on the overall balance;
 - the magnitude of the changes and the descriptions of the impacts at the receptors i.e. **Tables 15.10** findings;
 - whether or not an exceedance of an objective or limit value is predicted to arise in the operational study area (where there are significant changes in traffic) where none existed before or an exceedance area is substantially increased;
 - the uncertainty, comprising the extent to which worst-case assumptions have been made; and
 - the extent to which an objective or limit value is exceeded.
- 15.66 Where impacts can be considered in isolation at an individual receptor, moderate or substantial impacts (i.e. per **Table 15.10**) may be considered to be a significant environmental effect, whereas negligible or slight impacts would not be considered significant. The overall effect however, needs to be considered in the round taking into

account the changes at all of the modelled receptor locations, with a judgement made as to whether the overall air quality effect of the Development is significant or not.

- 15.67 There is no official guidance in the UK on how to assess the significance of air quality impacts of existing sources on a new development. The assessment of proposed receptors has therefore been limited to predicting air quality at the Site and the significance of this is based on whether the NAQOs, outlined in **Table 15.1**, for each pollutant are exceeded or not.

Limitations and Assumptions

- 15.68 There are many components that contribute to the uncertainty in predicted concentrations. The model used in this assessment is dependent upon the traffic data that have been input which will have inherent uncertainties associated with them. There is then additional uncertainty as the model is required to simplify real-world conditions into a series of algorithms.
- 15.69 A disparity between national road transport emissions projections and measured annual mean concentrations of nitrogen oxides (NO_x) and NO₂ has been identified in recent years. Whilst projections suggest that both annual mean NO_x and NO₂ concentrations from road traffic emissions should have fallen significantly over the past 6 – 8 years, at many monitoring sites levels have remained relatively stable, or have shown a slight increase.
- 15.70 The complete development modelling has been based on 2021 emission factors and background concentrations, whilst utilising traffic flows for 2036. The model has been verified against 2017 monitoring data. This is considered to provide an appropriately conservative assessment taking into account the uncertainties regarding future vehicle emission factors.

Environmental Assessment: Construction Phase

- 15.71 The main potential effects during demolition and construction are dust deposition and elevated PM₁₀ concentrations. The following activities have the potential to cause emissions of dust:
- Site preparation including delivery of construction material, erection of fences and barriers;
 - Earthworks including digging foundations and landscaping;
 - Materials handling such as storage of material in stockpiles and spillage;
 - Movement of construction traffic including haulage, vehicles and plant movements;
 - Construction and fabrication of units; and
 - Disposal of waste materials off-site.
- 15.72 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. The main determinants of unmitigated dust annoyance are the weather and the distance to the nearest receptor.

- 15.73 Based on the IAQM criteria (**Table 15.6**), the risk of dust emissions is considered to be medium as the construction of the Proposed Development will be phased and therefore the whole site will not be under construction all at once. The study area is considered to be of medium sensitivity (**Table 15.7**), as development properties will be present as the development is constructed. Appropriate mitigation corresponding to a medium risk site is therefore required during the construction phase (**Table 15.8**).

Environmental Assessment: Operation Phase

Existing Receptors

- 15.74 Predicted annual mean concentrations of NO₂, PM₁₀ and PM_{2.5} at existing receptors in 2022 with and without the completed development in place are presented in **Table 15.11 – 15.13**.

Table 15.11: Predicted Annual Mean Concentrations of NO₂ (µg/m³), % Change and Impact at each Receptor

Receptor	2022 Without Development ^a	2022 With Development ^a	Change (%)	Impact
R1	16.8	16.8	0	Negligible
R2	17.9	17.9	0	Negligible
R3	15.8	15.9	0	Negligible
R4	17.5	17.6	0	Negligible
R5	23.1	23.3	0	Negligible
R6	25.1	25.4	0	Negligible
R7	19.0	19.7	0	Negligible
R8	45.1	45.3	0	Negligible
R9	19.9	20.6	0	Negligible
Objective	40		-	

Exceedances highlighted in bold

^a Concentrations in µg/m³

Table 15.12: Predicted Annual Mean Concentrations of PM₁₀ (µg/m³), % Change and Impact at each Receptor

Receptor	2022 Without Development ^a	2022 With Development ^a	Change (%)	Impact
R1	16.1	16.1	0	Negligible
R2	16.3	16.3	0	Negligible
R3	15.9	15.9	0	Negligible
R4	16.2	16.2	0	Negligible
R5	17.8	17.9	0	Negligible

Receptor	2022 Without Development ^a	2022 With Development ^a	Change (%)	Impact
R6	18.6	18.7	0	Negligible
R7	16.8	17.0	0	Negligible
R8	20.4	20.4	0	Negligible
R9	17.2	17.3	0	Negligible
Objective	40		-	

^a Concentrations in $\mu\text{g}/\text{m}^3$

Table 15.13: Predicted Annual Mean Concentrations of PM_{2.5} ($\mu\text{g}/\text{m}^3$), % Change and Impact at each Receptor

Receptor	2022 Without Development ^a	2022 With Development ^a	Change (%)	Impact
R1	11.2	11.2	0	Negligible
R2	11.3	11.3	0	Negligible
R3	11.1	11.1	0	Negligible
R4	11.3	11.3	0	Negligible
R5	12.2	12.2	0	Negligible
R6	12.7	12.7	0	Negligible
R7	11.6	11.7	0	Negligible
R8	13.8	13.8	0	Negligible
R9	11.7	11.8	0	Negligible
Objective	25		-	

^a Concentrations in $\mu\text{g}/\text{m}^3$

- 15.75 The predicted NO₂, PM₁₀ and PM_{2.5} annual mean concentrations in 2022 without and with the Development in place are below the relevant objectives at all existing receptor locations, except for R8 where the annual mean NO₂ objective is exceeded whether or not the development goes ahead.
- 15.76 None of the predicted annual mean NO₂ concentrations exceed 60 $\mu\text{g}/\text{m}^3$ and therefore exceedance of the 1-hour mean NO₂ objective is unlikely.
- 15.77 None of the predicted annual mean PM₁₀ concentrations exceed 32 $\mu\text{g}/\text{m}^3$ and therefore the 24-hour mean PM₁₀ objective is not predicted to be exceeded.
- 15.78 The changes in annual mean NO₂, PM₁₀ and PM_{2.5} concentrations are all 0% of the objective when rounded to the nearest whole number.
- 15.79 Using the criteria set out in **Table 15.10**, the impact on annual mean NO₂, PM₁₀ and PM_{2.5} concentrations is described as negligible at all receptor locations. In addition, the annual

mean of 32µg/m³ equating to 35 days above 50µg/m³ for PM₁₀ is described as negligible at all receptor locations.

Proposed Receptors

- 15.80 Predicted annual mean concentrations of NO₂, PM₁₀ and PM_{2.5} at proposed receptors within the development Site are presented in **Table 15.14**.

Table 15.14: Predicted Annual Mean Concentrations of NO₂, PM₁₀ and PM_{2.5} for Proposed Receptors within the Proposed Development

Receptor	NO ₂ Annual Mean (µg/m ³)	PM ₁₀ Annual Mean (µg/m ³)	PM _{2.5} Annual Mean (µg/m ³)
PR1	18.2	17.8	12.0
Objectives	40	40	25

Exceedances highlighted in bold.

- 15.81 Predicted annual mean concentrations of NO₂, PM₁₀ and PM_{2.5} are all well below the relevant objectives at the modelled proposed receptor location (PR1). As this proposed receptor represents a worst-case location, concentrations elsewhere within the Development are expected to be lower than those for PR1.

Effect Significance

- 15.82 The air quality effects of road traffic generated by the Development are considered to be not significant as the impact at all existing receptor locations is predicted to be negligible. This judgement is made based on the assessment criteria set out in **Paragraph 15.63**, in particular, that a conservative assessment has been carried out for the full completed development.
- 15.83 Furthermore, air quality for future occupants of the Site will be acceptable as there are no predicted exceedances of the relevant air quality objectives within the Site.

Environmental Assessment: Cumulative Effects

Construction Phase

- 15.84 There are a number committed developments in the vicinity of the Site which could be constructed over the same time period as the proposed Development. A list of the developments that have been considered in terms of cumulative effects are identified at Table 2.1 in Chapter 2 of this ES.
- 15.85 Similar construction phase impacts could occur from any of the developments, with similar mitigation measures applied. With mitigation in place, the cumulative effect would be similar to that from the Development alone, and therefore considered not significant.

Operational Phase

- 15.86 The traffic data for the future year baseline and with development scenarios assessed includes committed developments in the area (see **Chapter 11 – Transportation** for more detailed information). The assessment has therefore predicted the cumulative concentrations arising from the committed developments in the area.

Mitigation and Monitoring

Construction Phase

- 15.87 The following standard medium risk mitigation measures from the IAQM 2014 guidance (ref 15.12) are recommended. These should be included within a Construction Environmental Management Plan (CEMP) and agreed with Local Authority.

Communication

- Display the name and contact details of persons accountable on the site boundary.
- Display the head or regional office information on the site boundary.

Management

- Record all dust and air quality complaints, identify causes and take measures to reduce emissions.
- Record exceptional incidents and action taken to resolve the situation.
- Carry out regular site inspections to monitor compliance with the dust management plan and record results.
- Increase site inspection frequency during prolonged dry or windy conditions and when activities with high dust potential are being undertaken.
- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible.
- Erect solid screens or barriers around dusty activities or the site boundary at least as high as any stockpile on site.
- Avoid site run off of water or mud.
- Produce a Construction Logistics Plan to manage the delivery of goods and materials.
- Only use cutting, grinding and sawing equipment with dust suppression equipment.
- Provide an adequate supply of water on site for dust suppressant.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use water sprays on such equipment where appropriate.
- No on-site bonfires and burning of waste materials on site.

Construction

- Sand and other aggregates to be stored in bunded areas and not be allowed to dry out, unless required for a particular process.

Trackout

- (i) Use water assisted dust sweepers on the site access and local roads.
- (ii) Avoid dry sweeping of large areas.
- (iii) Vehicles entering and leaving the site to be covered to prevent escape of materials.
- (iv) Record inspection of on-site haul routes and any subsequent action, repairing as soon as reasonably practicable.
- (v) Install hard surfaced haul routes which are regularly damped down.
- (vi) Install a wheel wash with a hard-surfaced road to the site exit where site layout permits.

Operational Phase

- 15.88 The effects of development traffic for the Development are judged to be not significant. No additional traffic mitigation is therefore required to directly reduce the impacts of the development.
- 15.89 Nonetheless, a Travel Plan will be produced for the Development with the aim of reducing the number of vehicle trips made to and from the Site. In addition, the Proposed Development will include electric vehicle charging points in accordance with SBC standards for the New Eastern Villages (NEV).

Summary of Residual Effects***Construction Phase***

- 15.90 With appropriate mitigation in place, the residual effect of construction is assessed to be not significant on existing and proposed human health receptor locations.

Operational Phase

- 15.91 The operational residual air quality effects of the Development are judged to be not significant on existing and proposed human health receptor locations.

16. Archaeology and Cultural Heritage

Purpose and Parameters of the Assessment

- 16.1 This chapter has been prepared by an Associate at the Environmental Dimension Partnership (EDP), who is a Member of the Chartered Institute for Archaeologists (CIfA) and considers the 'likely significant effects' upon both designated and non-designated heritage assets, including the potential for both direct and indirect effects as a result of the Proposed Development.
- 16.2 The chapter has been informed by a number of reports which include, desk-based assessments, geophysical surveys and trial trenching, across the available areas of the site, some areas were not accessible and further details are provided below in the 'Assumptions and Limitations' section. The surveys were requested by the Archaeological Advisor to the LPA and the Conservation Officer. These reports are appended to this ES chapter at **Appendix 16.1 to 16.4**.
- 16.3 This chapter is supported by a number of Plans, including **Figure 16.1** (Location of Designated and Non-Designated Heritage Assets (Wiltshire HER) (June 2017)); **16.2** (Plan Illustrating the Results of Geophysical Survey (After AS 2014) (June 2017)) and **16.3** (Plan Showing the Development of Buildings within the Masterplan Application Site (June 2017)).

Legislative and policy framework

- 16.4 The following topic-specific policies and legislation are relevant to this assessment and have been taken into account in respect of this assessment:

Key National Legislation

- 16.5 The Ancient Monuments and Archaeological Areas Act (1979) (**Ref 16.1**) addresses the designation and management of scheduled monuments (SM).
- 16.6 Designation of archaeological and historic sites as scheduled monuments applies only to those which are deemed to be of national importance and is generally adopted only if it represents the best means of protection. The contents of the Act do not confer any protection on the 'setting' of scheduled monuments, just their physical remains.

National Planning Policy Guidance

- 16.7 National planning guidance for England is set out in the NPPF (MHCLG, Feb 2019; **Ref 16.2**), where *Section 16 Conserving and Enhancing the Historic Environment* sets out national planning guidance of relevance to heritage matters.
- 16.8 Paragraph 189 concerns planning applications, stating that: "In determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum the relevant historic environment record should have been consulted and the heritage assets assessed using appropriate expertise where necessary. Where a site on which

development is proposed includes, or has the potential to include, heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where necessary, a field evaluation.”

- 16.9 Paragraph 193 considers the weighting given within the planning decision with regard to impacts on designated heritage assets, stating that: *“When considering the impact of a proposed development on the significance of a designated heritage asset, great weight should be given to the asset’s conservation (and the more important the asset, the greater the weight should be). This is irrespective of whether any potential harm amounts to substantial harm, total loss or less than substantial harm to its significance.”*
- 16.10 Paragraph 194 considers the level of harmful effects on designated heritage assets and states that: *“Any harm to, or loss of, the significance of a designated heritage asset (from its alteration or destruction, or from development within its setting), should require clear and convincing justification. Substantial harm to or loss of*
- (a) Grade II listed buildings, or grade II registered parks or gardens, should be exceptional; and
 - (b) Assets of the highest significance, notably scheduled monuments, protected wreck sites, registered battlefields, grade I and II* listed buildings, grade I and II* registered parks and gardens, and World Heritage Sites, should be wholly exceptional”.
- 16.11 With regard to the decision-making process, paragraphs 195 and 196 are of relevance. Paragraph 195 states that: “Where a proposed development will lead to substantial harm to (or total loss of significance of) a designated heritage asset, local planning authorities should refuse consent, unless it can be demonstrated that the substantial harm or total loss is necessary to achieve substantial public benefits that outweigh that harm or loss, or all of the following apply:
- (a) The nature of the heritage asset prevents all reasonable uses of the site;
 - (b) No viable use of the heritage asset itself can be found in the medium term through appropriate marketing that will enable its conservation
 - (c) Conservation by grant-funding or some form of not for profit, charitable or public ownership is demonstrably not possible; and
 - (d) The harm or loss is outweighed by the benefit of bringing the site back into use.”
- 16.12 Paragraph 196 states that: “Where a development proposal will lead to less than substantial harm to the significance of a designated heritage asset, this harm should be weighed against the public benefits of the proposal including, where appropriate, securing its optimum viable use.”
- 16.13 The threshold between ‘substantial’ and ‘less than substantial’ harm has been clarified in the courts. Whilst the judgement relates specifically to the impact of development proposals on a listed building, Paragraphs 24 and 25 of *Bedford BC v Secretary of State for Communities and Local Government* [2013] EWHC 2847 remain of relevance here in the way they outline the assessment of ‘harm’ for heritage assets: “What the inspector was

saying was that for harm to be substantial, the impact on significance was required to be serious such that very much, if not all, of the significance was drained away. Plainly in the context of physical harm, this would apply in the case of demolition or destruction, being a case of total loss. It would also apply to a case of serious damage to the structure of the building. In the context of non-physical or indirect harm, the yardstick was effectively the same. One was looking for an impact which would have such a serious impact on the significance of the asset that its significance was either vitiated altogether [i.e. destroyed] or very much reduced.”

- 16.14 As such, for the ‘harm’ to be ‘substantial’ – and therefore require consideration against the more stringent requirements of Paragraph 195 of the NPPF compared with Paragraph 196 - the proposal would need to result in the asset’s significance either being “vitiating altogether or very much reduced”. Quite evidently, this represents a very high threshold to be reached.
- 16.15 With regard to non-designated heritage assets, Paragraph 197 states that: “The effect of an application on the significance of a non-designated heritage asset should be taken into account in determining the application. In weighing applications that directly or indirectly affect non-designated heritage assets, a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset.”

Local Policy

- 16.16 The Swindon Borough Local Plan 2026 (Ref 16.3) was formally adopted by Swindon Borough Council (SBC) on 26 March 2015 and is the principal planning policy document for the Borough, providing the development strategy to deliver sustainable growth to the year 2026. Policy addressing the historic environment is contained in *Policy EN10: Historic Environment and Historic Assets* which states:

“a. Swindon Borough’s historic environment shall be sustained and enhanced. This includes all heritage assets including historic buildings, conservation areas, historic parks and gardens, landscape and archaeology.

b. Proposals for development affecting heritage assets shall conserve and, where appropriate, enhance their significance and setting. Any harm to the significance of a designated or non-designated heritage asset, or their loss, must be justified. Proposals will be weighed against the public benefits of the proposal, whether it has been demonstrated that all reasonable efforts have been made to sustain the existing use, find new uses, or mitigate the extent of the harm to the significance of the asset; and whether the works proposed are the minimum required to secure the long-term use of the asset.

c. Any alterations, extensions or changes of use to a listed building, or development in the vicinity of a listed building, shall not be permitted where there will be an adverse impact on those elements which contribute to their special architectural or historic significance, including their setting.

d. Scheduled monuments and other nationally important archaeological sites and their settings will be preserved in situ, and where not justifiable or feasible, provision to be made for excavation and recording. Development proposals affecting archaeological remains of less than national importance will be conserved in a manner appropriate to

their significance. An appropriate assessment and evaluation should be submitted as part of any planning application in areas of known or potential archaeological interest.

e. Development within or which would affect the setting of the Borough's Conservation Areas will conserve those elements which contribute to their special character or appearance.

f. Features which form an integral part of a Park or Garden's historic interest and significance will be conserved and development will not detract from the enjoyment, layout, design, character, appearance or setting of them, including key views into and out from, or prejudice future restoration.

g. Any development proposal that would affect a locally important or non-designated heritage asset, including its setting, will be expected to conserve its significance, and any harm should be weighed against the public benefits of the proposal, including securing its optimum viable use."

- 16.17 The supporting text of this policy provides further clarification (contained within paragraphs 4.393-4.397) under the heading Scheduled Monuments and Archaeology:

"4.395 Development affecting the Borough's archaeological heritage must preserve in-situ archaeological remains and landscapes of acknowledged significance (as shown on the Policies Map) and protect their settings. Investigation via evaluation or other discovery may uncover additional sites to which this policy will apply."

Local Policy – Supplementary Planning Guidance

- 16.18 The Borough Council also has an adopted Archaeology SPG (**Ref 16.4**) relating to archaeological assets which was written in 2004 and therefore is not compliant with the NPPF, but which has however been carried forward in association with the new Local Plan.

- 16.19 The Swindon Borough Council New Eastern Villages Planning Obligations SPD (October 2016) (**Ref 16.5**), outlines guidance for the delivery of development in the New Eastern Villages. Guidance relating to the historic environment in relation to Lotmead villages specifically, is as follows:

- "The provision of on-site green infrastructure proportionate to the scale of the new village. Land required in order to preserve Scheduled Monuments and other nationally/ regionally important undesignated archaeological sites and their settings in situ should not be accounted for as public open space
- To protect, acknowledge and enhance on-site historical landscape features, heritage and archaeological assets and existing green-infrastructure (Policy NC3, part (c)). This includes the historic route of the Roman Road, the Scheduled Monument and associated Heritage Park.
- To protect historical landscape features, heritage and archaeological assets and existing green-infrastructure (Policy EN1)
- Contributions towards heritage display and storage solutions (Policy EN10)."

- 16.20 The above policies and guidance will be considered further below as appropriate.

Other Material Considerations – Lotmead Appeal, Inspector Recommendations

- 16.21 The Application Site was recently subject to two planning appeals (Ref APP/U3935/W/16/3154437 and, APP/U3935/W/16/3154441) relating to previous planning applications on the Site. With reference to heritage matters, the Inspector concluded that in terms of both the original and updated schemes as submitted for the 'Masterplan' and 'Phase 1' applications, that the identified heritage assets, comprising Wanborough Scheduled Monument and the non-designated Lotmead Farmhouse, the proposals '*...would not ensure that the historic environment is protected, acknowledged and enhanced*' and that '*The proposals would not conserve the setting and the significance of the heritage asset would be harmed without justification.*' (Para 10.51). As such, it was determined that the development would be in conflict with Policies NC3 and EN10.
- 16.22 The Inspectors report concluded that in respect to the proposed housing to the west of the drive to Lotmead Farm and due to the nature of the development at the southern edge of the proposal to the east of the drive, the development would cause harm to the significance (albeit to a lesser extent to the east) of the SM, as these areas were considered to form part of its setting.
- 16.23 The level of harm identified with respect to Lotmead Farmhouse is expressed in Para 10.55 thus '*In accordance with the Framework the indirect effect on the significance of the non-designated heritage asset has to be weighed in the balance taking account of the scale of the harm and the significance of the asset. I attach between small and moderate weight to the harm in the Masterplan and Phase 1 appeal original schemes and a small degree of weight in respect of the Masterplan amended scheme.*'
- 16.24 It was acknowledged by the inspector that some low-density housing would be generally acceptable to west of the access to Lotmead Farm, but that the change would be harmful to the rural approach.
- 16.25 Due to a level of harm being identified by the Inspector in terms previous planning submissions, this new application has sought to address this through the careful masterplanning of the Site which is explained in detail below but has come about through further consultation with the LPA and updating of the proposed layout of the development.

Consultation

- 16.26 Extensive consultation and engagement with the archaeological advisor to the LPA, the Conservation Officer and Historic England has taken place throughout the project, since 2016.
- 16.27 Pre-application consultation has continued with the LPA particularly in respect of the scale and extent of the proposed developable area and boundary treatment of the developable area in the proximity of heritage assets. In that regard the cross section contained within the Design and Access Statement which accompanies the planning application (see Design and Access Statement, Section 5.2) illustrates the interface between the SM and the housing and was agreed during pre-application consultation with SBC on 9th November 2018 which has informed this chapter.

- 16.28 Further to this to inform the pre-application consultation an Informal Scoping Note was provided to the LPA on 9th November 2018 covering the proposed ES Structure and methodologies for the technical chapters (**Appendix 1.1**). A response on each topic chapter was provided by the LPA on 11th December 2018 (**Appendix 1.2**), confirming that the baseline that was updated in 2017 does not require further update for the purposes of this ES chapter.

Study Area

- 16.29 The study area for the archaeological assessment was based on the site area plus 500m to allow for any contextual information to be included. In terms of the potential for assets which may receive an effect through changes within their setting, the scoping exercise extended up to c.2km from the site boundary.

Scope and Methodology

Desk-based Assessment

- 16.30 An archaeological desk-based assessment was originally drafted in January 2014. It is now at version 'g' and has been updated in light of several rounds of consultation in respect of the previous planning applications and the appeal process, but also in relation to the additional information provided by the surveys undertaken for the northern access routes. The current version 'g' is reproduced as **Appendix 16.1** and also includes any new information for the surrounding area as curated by the HER from an updated search in March 2017. Within this appendix are all of the fieldwork reports from the various phases of work undertaken for the two previous applications.
- 16.31 The report was undertaken in accordance with the *Standard and Guidance for Historic Environment Desk-based Assessment* issued by the Chartered Institute for Archaeologists (CIfA 2014) (**Ref 16.6**). It involved consultation of the available archaeological and historical information from documentary and cartographic sources which included records, documents, maps and photographs curated by the Wiltshire and Swindon Historic Environment Record (HER); the Wiltshire and Swindon History Centre; the National Heritage List for England; the Historic England Archive. To date the number of site visits undertaken in respect of heritage and archaeology matters is in excess of 50.
- 16.32 A second Desk-based assessment was undertaken in February 2016 (updated in June 2017) (**Appendix 16.1; Appendix EDP 7**) at the request of the archaeological advisor to the LPA, to draw together the additional information as the result of the addition of the northern access routes to the previously submitted planning applications. This work includes the results of a geophysical survey and trial trenching. The assessment also contains assessments for additional listed buildings that were identified by the Conservation Officer, over and above those within the originally agreed scope.

Assessment of Standing Buildings

- 16.33 As part of the original (2014) Desk-based assessment the Conservation Officer requested that an assessment of the significance of the standing buildings was undertaken. This assessment and consideration of the contribution that the setting of the buildings makes to their significance is included within **Appendix 16.1** (Appendices 3 and 7 within this).

Heritage Setting Assessment

- 16.34 A Heritage Setting Assessment in respect of Wanborough Roman Town was requested by Historic England to support the planning application, as it lies partially within the redline. The guidance provided within '*Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets*' published by Historic England in 2015 (**Ref 16.7**) was used to compile this report, and the report is appended as Appendix 16.2 (*Heritage Setting Assessment (April 2017)*). This report was also updated in April 2017 in light of consultee comments and to allow for the updating of the monument condition survey and it is this version 'd' that forms **Appendix 16.2**.
- 16.35 The setting assessment undertaken as part of the baseline assessment (**Appendix 16.2**) considered the nature and significance of any effects through potential changes within the settings of designated heritage assets, as defined in Annex 2 of the Revised NPPF. In that regard, the site walkover undertaken as part of the baseline assessment, also considered where appropriate, the contribution (if any) made by the land within the site to the settings of designated heritage assets within an surrounding the site.
- 16.36 The Heritage Setting Assessment also includes a condition survey of the SM which records the improvements to the management of the monument over the last 3 years as a result of the involvement of the applicant and the cooperation of the landowner. The condition survey has formed the basis of a Management Plan (agreed in draft with Historic England) which has and continues to bring significant benefits to the condition of the monument as a direct result of the application. This will be discussed further below.
- 16.37 Since the issue of the of the version 'd' of the Heritage Setting Assessment, Historic England have issued a new version of their guidance '*Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets*' published by Historic England in 2017 (**Ref 16.8**), and as such the assessment undertaken within this ES chapter follows this guidance.
- 16.38 Setting is defined as 'the surroundings in which a heritage asset is experienced'. It must be recognised from the outset that 'setting' is not a heritage asset and cannot itself be harmed. Its importance relates to the contribution it makes to the significance of the designated heritage asset.
- 16.39 Historic England guidance identifies that "*change to heritage assets is inevitable, but it is only harmful when significance is damaged*" (HE 2015) (**Ref 16.9**).
- 16.40 In that regard, 'significance' is defined in Annex 2 of the NPPF as "*the value of a heritage asset to this and future generations because of its heritage interest. That interest may be archaeological, architectural, artistic or historic*".
- 16.41 As such, when assessing the indirect impact of proposals on designated heritage assets, it is not a question of simply determining whether setting would be affected, but rather a question of whether change within an asset's 'setting' would lead to a loss of 'significance' based on the above 'heritage interest' as defined in the NPPF.
- 16.42 Historic England guidance (2017) identifies an approach to assessing setting in relation to development management which is based on a five-step procedure; i.e.:
- (i) Identify which heritage assets and their settings are affected;

- (ii) Assess the degree to which these settings and views contribute to the significance of the heritage asset(s) or allow significance to be appreciated;
- (iii) Assess the effects of the Proposed Development, whether beneficial or harmful, on the significance or on the ability to appreciate it;
- (iv) Explore ways to maximise enhancement and avoid or minimise harm; and
- (v) Make and document the decision and monitor outcomes.

16.43 Steps 1 and 2 were undertaken for all assets within the baseline assessment (**Appendix 16.2**).

16.44 Having established the baseline, the following guidance is provided with reference to Step 3 with regard to the potential for effects upon 'setting'; i.e.: *"In general, the assessment should address the attributes of the proposed development in terms of its:*

Location and siting;

Form and appearance;

Wider effects; and

Permanence"

16.45 As such the assessment within this chapter will focus on assessing the likely impact upon the identified assets significance as a result of the form of development proposed being implemented and bearing in mind that the HE guidance states that: "Setting is not itself a heritage asset, nor a heritage designation, although land comprising a setting may itself be designated". It continues by adding that: "Conserving or enhancing heritage assets by taking their settings into account need not prevent change; indeed change may be positive...."

16.46 This ES chapter will also identify what steps have been taken to maximise enhancement and avoid or minimise harm as required by Step 4 of the guidance in terms of the inherent mitigation as a result of the development of the Parameter Plans for the site and/or any additional mitigation proposals that might be required. Step 5 will be the responsibility of the LPA following any planning consent.

Geophysical Survey

16.47 The geophysical survey was undertaken in three phases, the first focussing on the area of the Wanborough Roman town SM, the second covering the wider Lotmead Farm Villages site and the third focussing on those areas of the northern access routes where access was possible.

16.48 A detailed magnetometer and limited earth resistance survey was conducted on the southern part of the site, including parts of the SM, by Archaeological Surveys Ltd, in May and June 2013 (**Appendix 16.1; Appendix EDP 1** within that report). The survey area covered approximately 16ha across nine separate land parcels. The methodology for this investigation was agreed in advance with Historic England through the approval of a project design, prepared by Archaeological Surveys Ltd, in order to secure a Section 42

Licence for Geophysical Survey on Scheduled Monuments. In broad terms, the methodology comprised a detailed magnetometer and limited earth resistance survey completed in accordance with best practice guidelines. It should be noted that as the SM does not form part of the land to be developed this survey was not necessary in terms of planning consent but was however undertaken to inform the management of the SM in the long term.

16.49 A second detailed magnetometer survey was conducted across the wider application site, by Archaeological Surveys Ltd, from November 2013 to March 2014 (**Appendix 16.1; Appendix EDP 2** within that report). The survey area covered approximately 130ha and the methodology for this investigation was agreed in advance with the LPA archaeological advisor.

16.50 A third phase of survey focussed on the northern access routes and was undertaken by Archaeological Surveys Ltd in October 2016 (**Appendix 16.1; Appendix EDP 7 - Appendix 1**) the extent and methodology of this work was again agreed with the archaeological advisor in advance of the work commencing.

Trial Trenching

16.51 A programme of trial trenching was undertaken over three separate phases and comprised the excavation of a total of 346 trenches across the application site (excluding the scheduled monument), by Headland Archaeology Ltd between 2014 and 2016. The methodology for these investigations was agreed in advance with the LPA archaeological advisor who also monitored the works throughout. The results of this work formed three separate reports covering the former Masterplan Application (**Appendix 16.1; Appendix EDP 5**), the former Phase 1 Application (**Appendix 16.1; Appendix EDP 6**) and finally for the northern access routes (**Appendix 16.1; EDP Appendix 7 – Appendix 2** – within that report).

16.52 The trial trench evaluation demonstrated a strong correlation with the results of the geophysical survey with three sites of archaeological significance being identified (Sites 1-3, **Figure 16.2**). On occasion anomalies suggested by the geophysical survey were not identified during the trial trenching. It is possible that some of the geophysical ‘features’ existed only within the subsoil and were not detectable during machining. A small number of features identified during the trial trenching were not identified through geophysical survey, these generally comprised smaller and discrete features.

Defining Sensitivity, Magnitude and Significance of Effects

16.53 As far as this assessment is concerned, **Tables 16.1, 16.2** and **16.3** (below) set out the criteria which have been employed in attributing ‘sensitivity’ to archaeological and cultural heritage assets, identifying the magnitude of likely impact upon them and assessing the significance of the resulting effects in EIA terms.

16.54 The significance of effect has been assessed with reference to the sensitivity of the receptor (heritage asset) affected and the magnitude of impact. The sensitivity of heritage asset receptors was defined using the criteria in **Table 16.1**, which is based on those established by the Highways Agency in its Design Manual for Roads and Bridges (HA 2007) (**Ref 16.10**). This is an industry standard assessment methodology, and the only one adopted by a Government agency

Table 16.1: Sensitivity of Receptor

Receptor	Sensitivity of Receptor			
	High	Medium	Low	Negligible
World Heritage Site				
Scheduled Monument				
Grade I or II* Listed Building				
Grade I or II* Registered Park or Garden				
Registered Battlefield				
Other Nationally important archaeological asset				
Grade II Listed Building				
Grade II Registered Park or Garden				
Conservation Area				
Other asset of Regional or County importance				
Locally important asset with cultural or educational value				
Heritage site or feature with no significant heritage value or interest				

16.55 The classification of the magnitude of impact on heritage assets is rigorous and based on consistent criteria. This takes account of such factors as the physical scale and type of disturbance to them and whether features or evidence would be lost that are fundamental to their historic character, integrity and therefore significance. Both physical and non-physical (e.g. visual) changes to heritage assets were considered. The magnitude of impact is assessed using the criteria in **Table 16.2**.

Table 16.2: Magnitude of Impact

Scale of change	Magnitude of Impact				
	High	Medium	Low	Negligible	No Impact
	Change to a heritage asset so that it is completely altered (Beneficial or Adverse) or destroyed (Adverse)				
		Change to a heritage asset so that it is significantly modified (Beneficial or Adverse)			
			Change to a heritage asset so that it is noticeably different (Beneficial or Adverse)		
				Change to a heritage asset that hardly affects it (Beneficial or Adverse)	
					No change to an asset

16.56 Table 6.2 is intended to measure changes in terms of all effects on significance whether that be physical or in terms of any changes within an assets setting. These changes can be beneficial or adverse. r

16.57 Following the evaluation of sensitivity of specific cultural heritage receptors and the magnitude of the impact, the significance of the effect is assessed using the criteria shown in **Table 16.3** below.

Table 16.3: Significance of Effect Assessment Matrix

		Sensitivity of Receptor			
		High	Medium	Low	Negligible
Magnitude of Impact	High	Major	Moderate or Major	Minor or Moderate	Minor
	Medium	Moderate or Major	Moderate	Minor	Negligible or Minor
	Low	Minor or Moderate	Minor	Negligible or Minor	Negligible or Minor
	Negligible	Minor	Negligible or Minor	Negligible or Minor	Negligible
	No Impact	Neutral	Neutral	Neutral	Neutral

16.58 The assessment matrix defined in Table 16.3 is not intended to be ‘prescriptive’, but rather it allows for the employment of professional judgement to determine the most appropriate level of effect for each heritage asset which is identified.

16.59 Only those effects defined as ‘Major’ or ‘Moderate’ are considered to be significant in terms of the EIA Regulations. All other effects are deemed to be ‘not significant’.

16.60 A number of heritage assets have been scoped out of this Chapter on the basis that the detailed assessments presented within the appendices identify that specific assets will not be affected by the development of the site, in terms of either direct or indirect effects on their significance, In addition to which other assets have been scoped out on the basis of their very limited or non-existent heritage significance.

Defining Mitigation Measures

16.61 In terms of heritage assets two forms of mitigation are possible that being ‘Primary Mitigation’ whereby the mitigation of heritage effects has been included as part of the design process. For example, the setting back of development or the restriction of heights of structures where they are adjacent to sensitive heritage assets.

16.62 Secondary Mitigation comprises additional works or protections that may be attached as planning conditions to any consent to ensure the appropriate treatment of archaeological deposits within the site or indeed the preservation of any areas in situ via positive management. This work would normally be set out in a Written Scheme of Investigation (WSI) or Heritage Management Plan (HMP) to be agreed with the LPA in advance of construction.

Assumptions and Limitations

16.63 The assessment set out in this report has been undertaken on the basis of the author’s professional experience. However, the assessment of impacts on heritage assets is often

subjective, especially in relation to setting issues, as there is no accepted definition of what the setting of an individual heritage asset might comprise.

- 16.64 The assessments undertaken to inform this chapter do not include a small area of land within the redline that forms part of the western access route (Site 4; **Figure 16.2**). The omission of this data to inform the planning application has been agreed with the Archaeological Advisor as access is not possible. However, detailed assessment of the available archaeological information for this area has been undertaken within the supporting assessments and it has been agreed that further surveys will be undertaken as Secondary Mitigation subject to a planning consent.

Baseline Conditions

Designated Heritage Assets

Durocornovium – Archaeological Background

- 16.65 There is a single designated heritage asset within the boundary of the Application Site. The scheduled monument of *Durocornovium* (formally designated as ‘Site of Roman town, West of Wanborough House’) (SM No. 1004684) covers an area of c.25ha adjacent to Wanborough Road, of which c.8.4ha lies within the south west part of the site (**Figure 16.1**).
- 16.66 The settlement was known to antiquarians of the 17th century and was ‘surveyed’ in the 19th century. The site was identified as *Durocornovium* in the 20th century, after which time it was subject to a series of modern investigations.
- 16.67 The earliest formal investigations were undertaken in the 1920s when a series of test pits were excavated at diverse locations to establish the extent of settlement activity. From the 1950s to 1970s, the expansion of Swindon and upgrading of the local roads and infrastructure led to several programmes of extensive archaeological investigations. The most substantial phase of which began in 1966 and continued for 10 years, mainly concentrating on the line of Ermin Street and the adjacent Roman settlement to either side (WCAS 2004 *ibid*).
- 16.68 These investigations established that the Roman settlement of *Durocornovium* originated in the decade after the conquest of AD43, possibly with a military connection. There is some evidence that industrial activity was associated with the settlement’s earliest phases. Intensive building appears to have taken place during the 2nd and 3rd centuries, although the majority of the evidence for settlement appears to relate to the late 3rd and 4th centuries. By this time, the settlement is understood to have covered a wide area (estimated at c.25-30ha), with the main concentration of buildings fronting onto Ermin Street, and an expanse of buildings built on a formal system of side roads extending towards the *mansio* site (**Figure 16.2**), which lies within the Application Site. The western limits of the settlement area are suggested by the discovery of cremation and inhumation burials (cemeteries) to the south of Ermin Street, while, broadly speaking, the limits of the town are understood to be defined by a spread of dark soil associated with Roman occupation debris. However, recent investigations have suggested that the settlement now extends further to the north-west and south east (see below).

- 16.69 Since 2004 further investigations have been undertaken within the area of known Roman settlement which, among other features, recorded archaeologically significant deposits of dark earth adjacent to the line of Ermin Street which are likely to date to the late Romano-British period.
- 16.70 The geophysical survey undertaken to inform the Lotmead Farm development in 2013, focussed on the location of the scheduled monument (**Appendix 16.1; Appendix EDP 1**). Whilst there has never been any intention to develop the area of the monument, the survey was undertaken to understand its extent and significance and in terms of its future management.
- 16.71 The survey revealed evidence of several phases of archaeological activity within the scheduled area, with a large number of positive anomalies that relate to ditches associated with enclosures, boundaries and roads or tracks within the town. In the area containing the *mansio* (**Figure 16.2**), the magnetometer survey located a large number of cut features, but no anomalies that could be identified as associated with structural remains. An earth resistance survey was carried out within this area to establish the location and extent of the remains of the *mansio* and associated bath house.
- 16.72 The results identified substantial structural remains, with the *mansio* building being some 50m by 34m, containing a courtyard surrounded by an ambulatory corridor and small rooms. It appears that the north eastern side of the *mansio* may have been truncated and there is evidence for wall foundations linking the building to a bath house further to the south west. The layout of the bath house is less clear; however, the results show a complex of high resistance anomalies relating to structural remains, and a low resistance response, that may be associated with a depression. Again, it should be noted that this detailed survey was not undertaken to inform the planning applications but to inform the management of the scheduled area within the application area.
- 16.73 Away from the core of the Roman settlement, fewer geophysical responses were visible suggesting the scheduled boundary where it is located within the Application Site encompasses the majority of the Roman remains.
- 16.74 The subsequent trial trenching exercise did not include the scheduled area, as it has never been within the developable area of the proposed scheme. However, there was a need to verify if the features that form the scheduled area of the town extended for any distance outside of it.
- 16.75 The evaluation report for the former Phase 1 Application is within **Appendix 16.1 (Appendix EDP 6)**. Trenches 01 and 02 were located to the north of Area E of the scheduled monument. These focussed on geophysical anomalies which extended to the north and out of the scheduled area.
- 16.76 Within Trench 01 and continuing into Trench 02 was a linear ditch of Roman date, which was noted on the geophysical survey and was a continuation of a ditch from within Area E of the monument. Two pits of Roman date were also recorded within Trench 01. The survival of these features was poor due to truncation with the ditch being 0.53m deep and the pits 0.12m deep. These features extended for 30m to the north of the monument and no further archaeological features were record by either phase of evaluation in this area.

- 16.77 Adjacent to Area F of the monument a number of features were recorded of Roman date, most of which, were previously indicated by the geophysical survey. However, the large ditch noted within Trenches 15 and 18 was not detected by the geophysics. A second linear feature in Trench 36 was also not detected. This suggests that the fill characteristics of these features are not amenable to detection by gradiometry, and may indicate a date before or after the main phase of Roman activity on the site.
- 16.78 Many of the geophysical anomalies that were interpreted as being potential linear features in this area were not in fact associated with real archaeological features. This suggests that the natural geology has certain properties that can lead to a 'false positive' interpretation of a set of geophysical results.
- 16.79 Securely dated Romano-British features are mainly confined to the southern and western side of the development area adjacent to Area F of the monument. This activity is primarily noted within Trenches 1, 2 (Area E) and 12-18 (Area F), with a possible extension of activity to the north in Trenches 26 and 27. The majority of these features date to the early part of the Roman period and main occupation of the Roman town.
- 16.80 The features consisted of field/boundary ditches, as to be expected on the fringes and marginal areas around a substantial settlement area. The exceptions to this are in Trenches 12, 13 and 14, where activity more usually associated with occupation was noted. This included a greater concentration of features and of material culture, probably relating to the presence of waste-heaps along the edge of the town which over time has generated the 'dark earth' noted in earlier excavations. The recovery of tile and box-flue fragments provide evidence for the demolition and clearance of Romano-British buildings in the surrounding area and indicates that there is a higher level of archaeological complexity within the adjacent scheduled area.
- 16.81 In Trench 12 a burial was recorded and was interpreted as an isolated occurrence, but a cemetery would not be unusual on the edge of a settlement site. The presence of a human skull within the nearby ditch [1503] in Trench 15 may also indicate the possibility of a cemetery site in this location; equally the human remains could have been imported from elsewhere and disposed of with the rubbish and therefore may represent isolated instances.
- 16.82 The archaeological features range in depth from 0.1 to 0.6m and extend for approximately 100m to the north of Area F. However, the densest features are within trenches 12, 13 and 14 and these are within 30m of the boundary of the monument.
- 16.83 The geophysical survey and the trial trenching have confirmed that there is no evidence of any substantial activity extending northwards from the boundary of the scheduled monument over and above the features identified above. This is likely to be due to the nature of the landscape. Even in the present day, with extensive drainage, the farmland is prone to flooding in winter, and rapid parching during the summer months. This is likely to have been the same, if not worse during the Roman period, rendering this large swathe of land un-workable.

Durocornovium – Setting Assessment

- 16.84 With regard to the setting of the Roman Town a Heritage Setting Assessment (**Appendix 16.2**) was undertaken at the request of Historic England to support the planning application.
- 16.85 The assessment process was undertaken in accordance with best practice guidance (at that time) prepared by Historic England, including '*Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets*' published by Historic England in 2015 and *Seeing the History in the View and Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment* (Ref 16.11), as well as through the application of professional judgement.
- 16.86 The monument is divided into eight areas, labelled A-H (**Figure 16.1**) for the purposes of the setting assessment, which concluded that due to their physical separation, intervening topography and distance from the Proposed Development it would have no effect on the setting and significance of Areas A, B, C, G and H.
- 16.87 Areas D, E and F are located on the north eastern side of Wanborough Road, Areas D and F are partially within the application site, with area E being wholly within it.
- 16.88 The Heritage Setting Assessment (**Appendix 16.2**) concludes that in terms of the potential for the development proposals to have an effect on the significance of the monument through changes within its setting, that, the setting of the monument or the current experience is of a series of small hedged 19th century enclosures, adjacent to modern highways, and as a part of a pick your own business. This experience, and indeed these landscape features, make no contribution to the significance of the Roman Town, as the experience of them contributes nothing to or aids the appreciation of its significance represented by its wholly buried remains.
- 16.89 However, in term of the recent planning appeals (ref APP/U3935/W/16/3154437 and, APP/U3935/W/16/3154441) in respect of the previous planning applications on the site, the Inspector concluded that in terms of both the original and updated schemes for both the 'Masterplan' and 'Phase 1' applications that with regard to the Wanborough Scheduled Monument and the non-designated Lotmead Farmhouse the proposals '*...would not ensure that the historic environment is protected, acknowledged and enhanced*' and that '*The proposals would not conserve the setting and the significance of the heritage asset would be harmed without justification.*' (Para 10.51). As such, it was determined that the development would be in conflict with Policies NC3 and EN10.
- 16.90 The level of harm identified is expressed in Para 10.55 thus '*In accordance with the Framework the indirect effect on the significance of the non-designated heritage asset has to be weighed in the balance taking account of the scale of the harm and the significance of the asset. I attach between small and moderate weight to the harm in the Masterplan and Phase 1 appeal original schemes and a small degree of weight in respect of the Masterplan amended scheme.*'
- 16.91 As such a level of harm has been identified by the Inspector in terms of the original and amended planning submissions, which, as set out below, have now been addressed through changes to the parameter plans.

16.92 In summary the scheduled monument of *Durocornovium* (formally designated as 'Site of Roman town, West of Wanborough House') (SM No. 1004684), is an asset of National Importance or High sensitivity (Table 16.1) whereby its significance could be directly or physically affected by the Proposed Development, or through changes within this part of its setting that contribute to that significance.

16.93 Were the development not to go ahead or in consideration of the 'do nothing' scenario, then over time the significance of the SM within the Application Site, in the absence of a management plan, will erode as a result of the continuation of farming and piecemeal changes within its setting.

Other Designated Heritage Assets

16.94 There are no listed buildings within the Application Site although there are five Grade II listed buildings within the vicinity, these comprise

- Lower Earls court Farmhouse (LB1023277), located c.200m to the east;
- Marston Farmhouse (LB 299721), located c.780m to the north west;
- The outhouse to the north of Nythe Farmhouse (LB1023430), located c.340m to the north west;
- Longleaze Farm House (LB1299729), located c.200m north of the eastern access route;
- Lock Keepers Cottage (LB1355939), located c.50m to the east of the western access route; and
- Earls court Manor (LB1023276), located c.680m to the south east.

16.95 Longleaze Farmhouse, Lock Keepers Cottage and Earls court Manor were identified through consultation as also requiring assessment in terms of the potential for impact on their significance through changes within their setting. This assessment is contained within **Appendix 16.1; Appendix EDP 7**). The remaining designated heritage assets are assessed within the main text of **Appendix 16.1**.

16.96 With regard to all of the above it has been assessed that none of these listed buildings has a relationship with the land that forms the Application Site. The elements of their settings, which contribute to their heritage significance, are focused on their immediate farmstead complexes and street scenes with which they are associated. As the Application Site forms no part of their setting it follows that residential development within it will have no effect on the significance of the listed buildings. Therefore, these listed buildings do not represent a constraint to the form of development proposed and are not therefore assessed further.

Non-Designated Heritage Assets

Palaeolithic - Iron Age (c.500,000 BC – AD 43)

16.97 Flint tools dated to the Mesolithic period were recovered as residual finds from later Iron Age features within Site 1 (**Figure 16.2**). However, in this area, an isolated feature contained further flints of this date was dated as a Mesolithic pit. Further flint finds

ranging in date from the Late Neolithic to Early Bronze Age were also recovered from later deposits and indicate low level of background activity throughout the early to mid-prehistoric period in this area.

- 16.98 This adds to the previously recorded find spots of three fragments of Neolithic stone axes for the wider area, two of which were recovered from the area of the Roman settlement while a further fragment has been recorded to the north of the Application Site (HERSU18NE105).
- 16.99 Three possible prehistoric roundhouses were identified during a programme of geophysical survey (**Appendix 16.1, Plan EDP 4**; EW17060 2), to the north west of the site, in a field parcel through which the western access road is proposed to be located but which sits within a different application area in respect of the wider New Eastern Villages.
- 16.100 Further north, the same programme of geophysical survey (**Appendix 16.1, Plan EDP 4**; EW17060, 3) identified pits and ditches and possible kilns, likely to represent late prehistoric settlement and industrial activity. Possible earthwork features (HERSU18NE609) were previously identified within this field parcel. Again, the western access road extends into this area of activity but this area is not within the Application Site.
- 16.101 Within the Application Site, the results of the recent geophysical surveys (**Appendix 16.1**) identify three areas of previously unknown archaeological activity (Sites 1-3 **Figure 16.2**). The activity, located across the land to the north east of Lotmead Farm, appears to represent discrete concentrations of prehistoric settlement focussing on the braided river channels of the River Cole and the Dorcan Stream and comprises areas of ring ditches and enclosures.
- 16.102 Site 1 is a settlement located at the confluence of two watercourses and is focussed upon a broadly rectangular enclosure containing a probable central dwelling enclosed by a further circular enclosure ditch. The pottery assemblage suggests that occupation began in the Early Iron Age, possibly as early as the 7th century BC and continued into the 1st century BC; the site was probably seasonally wet or flooded and there appears to have been a close relationship between activity on the site and the various water features around it.
- 16.103 Evidence for further structures within the rectangular enclosure was identified both through geophysical survey and trial trenching. Discrete features possibly representing post-holes were found on the interior of the enclosure, but the shallow depth of these features suggests that a significant degree of truncation has taken place and the contemporary ground surface is likely to have been removed.
- 16.104 Further circular ring-ditches, believed to represent the location of roundhouses, are present to the southwest and north-east of the rectangular enclosure. In addition to the circular ring-ditches, the possible remains of a rectangular timber structure were identified.
- 16.105 A number of small sub-square enclosure features were also identified within Sites 1 and 2. It could not be ascertained whether these features were contemporary with the presumed roundhouses and fulfilled a different – i.e. non-domestic – function; or if they

represented a chronological change. The pottery dating evidence was not defined enough to establish a chronology for the structures or sites.

- 16.106 The extremely close proximity of some ring-ditches to others suggests that they were not contemporary and represent different phases of activity. Likewise, instances of two and sometimes three overlapping ring-ditches suggests multiple periods of construction, use, decay and reconstruction on the same site. This is particularly evident at the eastern end of Trench 224 (**Appendix 16.1; Appendix EDP 5**) where the presence of a historic watercourse and associated damp conditions appear to have led to numerous rebuilds of the roundhouse, the structure being rebuilt slightly further from the watercourse each time.
- 16.107 The identification of alluvial deposits in the area of Site 2 follows a linear pattern associated with the presence of the watercourse on the south-eastern edge of the site. The evaluation results suggest that a more dispersed group of enclosures existed at this location. However, it is possible that the settlement extends beyond the evaluated area to the south and west out of the boundary of the Lotmead Villages site.
- 16.108 A larger number of the sub-square enclosures were present in Site 2, which adds importance to the question of whether these are contemporary with, but represent a functional difference (e.g. stock enclosures) to the circular ring-ditches, or if they represent a chronological change and represent an occupation site of a different period to Site 1.
- 16.109 Site 3, although apparently Iron Age in date, differs in certain characteristics from Sites 2 and 3. Both the geophysical survey and trial trenching failed to identify conclusive evidence for ring-ditches within the enclosure present, and yet the enclosed area contains a greater density of discrete features suggestive of occupation. The presence of a human burial within the enclosure and the general absence of animal bone (compared to the other sites) also calls into question the function of the enclosure. Considering that only one burial was identified within the enclosure it seems unlikely that the deposition of the dead was the primary function of the site - the burial may have been interred post-abandonment – but a domestic function may also be less likely.
- 16.110 Assessment of the finds assemblage for the three sites indicates a relatively low status community occupying small settlements adjacent to watercourses. The types of pottery suggest that occupation began in the Early Iron Age, possibly as early as the 7th century BC and continued into the 1st century BC. The presence of a small quantity of 1st century AD Roman pottery may suggest a continuation of occupation into the early Roman period, or alternatively, the use of the site for farmland associated with the development of the adjacent Roman town of *Durocornovium*.
- 16.111 The 'Phase 1' trial trenching (**Appendix 16.1; Appendix EDP 6**), forming part of the Application Site to the south and east of Lotmead Farmhouse, recorded limited evidence for Bronze Age activity in the area of the later Roman town adjacent to its north east edge. The surveys that were undertaken within the northern access routes (**Appendix 16.1; Appendix EDP 7**) found no evidence for prehistoric activity in these areas.

16.112 The updated HER search that was undertaken in March 2017 returned no further information in respect of the prehistoric period for the Application Site and its surroundings.

Romano-British (AD43 – 410)

- 16.113 The area of the scheduled monument (see Designated Heritage Assets above) largely covers the known area of Roman settlement activity within the Application Site. Geophysical survey within the wider Application Site has not identified the existence of significant Roman features north of the scheduled area and as such the Roman town of *Durocornovium* is essentially limited to the area immediately adjacent to the Wanborough Road as defined by the scheduled area in respect of the Application Site.
- 16.114 Prior to the recent evaluation of the Application Site, the Wiltshire HER contained only evidence for uncontextualised Roman artefacts recorded during informal investigations such as metal detecting. A single coin is recorded on the northern edge of the site (HERSU28NW311) and pottery sherds are recorded in the centre of the site (HERSU28NW310), and on the southern edge (HERSU28NW309). Further pottery sherds are recorded to the immediate north of the western access route (HERSU18NE333).
- 16.115 Geophysical survey undertaken in 2006 to inform the Swindon Local Plan included two areas within the Application Site (**Appendix 16.1, Plan EDP 4** EW16910, 1 and 2) neither of which identified any archaeological features. Former field boundaries, of possible Roman date, were identified in an area through which the western access route is proposed (Appendix 16.1; Plan EDP4, EW16910, 3).
- 16.116 The geophysical surveys undertaken to inform the planning applications for Lotmead Farm Villages identified only limited evidence for the continuation of features out of the scheduled monument.
- 16.117 Subsequent trial trenching for the 'Phase 1' evaluation (**Appendix 16.1; Appendix EDP 6**) to the south and east of Lotmead Farmhouse demonstrated, that limited Roman activity extend to the north of the scheduled monument in Areas E and F but that this activity is concentrated in an area of c.30m to the north of the area now defined by the SM. The trenching undertaken in the wider Application Site (**Appendix 16.1; Appendix EDP 5**) identified only one securely dated Romano-British feature - a possible field boundary.
- 16.118 The presence of Roman pottery of predominantly mid to late 1st century AD within apparent Iron Age features suggests a small degree of overlap between the establishment of *Durocornovium* and the earlier Iron Age settlements (Sites 1-3), and perhaps a period of Romanisation of the local population within their indigenous settlements prior to their eventual abandonment. Alternatively, the small quantity of Roman pottery sherds may have been deposited post-abandonment and relate to Roman activity in the far hinterland of the town. What is clear is that there was a radical shift in the focus of settlement in this area at around or shortly after the time of the Roman conquest.
- 16.119 The reasons for this shift are not clear. They may be economic, indicating civilian settlement in the area gravitating towards the supposed military site that founded the town, and to the trade flowing along the road between Cirencester and Silchester.

16.120 The evidence from all phases of evaluation (no additional evidence for Roman activity was provided by the surveys undertaken for the northern access routes) suggest that there is no evidence that significant Roman settlement features extend more widely across the Application Site from the location of the SM. It is possible that this is partly a result of the flood-prone nature of the land which is likely to have prevented the spread of settlement activity.

Early Medieval (AD 410 -1066)

16.121 While early medieval remains have been recorded in the southern part of Wanborough parish (VCH 1970), There are no early medieval heritage assets identified on the HER within the Application Site or within the immediate vicinity.

16.122 The surveys undertaken across the Lotmead Farm Villages site recorded no evidence for early medieval activity.

Medieval (AD 1066 – 1485)

16.123 A single reference to this period is recorded on the HER within the Application Site, relating to the find spot of a medieval gold coin (HERSU18NE450) from within the SM.

16.124 More widely, the site of a medieval farmstead is recorded to the west at Nythe Farm (HERSU18NE462) and a further medieval farm complex is recorded to the east at Earlescote Manor (HERSU28NW451).

16.125 The location of the Application Site, on flood-prone land between two known medieval farmsteads, suggests that the land within it was undeveloped and probably in agricultural use throughout the medieval period. The Victoria County History (VCH 1970) describes the northern part of Wanborough parish during the medieval period, as an area of meadows and common lands.

16.126 The surveys undertaken to inform the previous Lotmead Farm Villages planning applications recorded no evidence for medieval activity.

Post-medieval - Modern (AD 1485 – present)

16.127 An assessment of the standing buildings within the Application Site is contained within Appendix 16.1 (Appendix EDP3), none of which are identified as possessing any historic value by the HER. This work was undertaken in line with Level 1 building record as set out in the *English Heritage guidance Understanding Historic Buildings: A Guide to Good Practice* (EH 2006) (Ref 16.12).

16.128 The bulk of the standing buildings within the Application Site are focused on the Lotmead Farm complex located in the south west portion of the site (**Appendix 16.1; Appendix 4** buildings 1-13). The earliest buildings within the farm complex, comprise the main farmhouse and outbuilding (1) and the associated courtyard complex to the north east (2). The assessment concluded that an 18th to 19th century date seems likely for these structures but that the farmhouse may have had earlier origins. However, later alterations have diminished its significance and as such the building is of no more than low importance.

16.129 It is clear that the limited significance the farmhouse has is derived from its historic fabric. However, as set out within HE guidance (**Ref 16.8**) its setting may also contribute to that

significance and this has been defined as comprising its surrounding domestic grounds, and the associated courtyard complex to the north.

- 16.130 The domestic grounds were designed to enclose the farmhouse and create a physical separation between it and the wider farm and farmland and therefore are important in recognising the asset as an example of a typical 18th or 19th century farmhouse standing detached from its working farm complex. It is clear that the orientation of the main range was not designed to take advantage of views over either the wider landscape to the south or the courtyard complex to the north.
- 16.131 The broadly contemporary courtyard complex to the north was not intended to be appreciated from the farmhouse, due to the presence of a wall, but it is still considered to make a contribution to the farmhouse's significance by virtue of their shared associations and relationship as part of an historic dairy farm.
- 16.132 Similarly, the enclosed farmland to the immediate south of the farmhouse was not intended to be appreciated from the building, as it fronts to the north, but still makes some contribution to its heritage significance as it retains a degree of landscape form and character broadly contemporary with the farmhouse, until the modern tree plantation is reached to the south.
- 16.133 However, within the Inspector's Report for the recent planning appeals (**Ref** APP/U3935/W/16/3154437 and, APP/U3935/W/16/3154441) the setting of the farmhouse was more widely defined and included the area to the south of the tree screen.
- 16.134 The complex of farm buildings (2), is arranged around two courtyards, to the north east of the farmhouse. The buildings form an E-shaped arrangement in plan, defined by rows of brick-built cowhouses or loose boxes with a barn located centrally on the north east range to serve the separate cattle yards. The courtyard is first depicted on the OS map of 1886 and its form and construction indicates a mid-19th century date.
- 16.135 The substantial alteration to the fabric of the buildings within the courtyard is a result of their conversion to offices. This and the widespread prevalence of this type of 19th century courtyard complex means that these buildings are considered to form a heritage asset of no more than local importance.
- 16.136 The wider working farm complex which surrounds the courtyard range, by virtue of its modern form, is considered to make no contribution to the heritage significance of the buildings. The only element of their setting which is considered to make a contribution to their significance is the associated farmhouse (1) to the south west.
- 16.137 The remaining buildings within the Lotmead Farm complex (**Appendix 16.1; Appendix 4** buildings 3-13) largely comprise 20th century structures associated with the working farm or the businesses within the site, none of these buildings is considered to be of any heritage significance or importance and are not considered further within this Chapter.
- 16.138 Within the wider Application Site, a pair of large, late 20th century, steel-framed cattle barns are located within the north east portion of the Application Site, approached by a track from the main Lotmead Farm complex. These structures are considered to be of no heritage significance or importance and are not considered further within this Chapter.

- 16.139 The remaining buildings within the Application Site comprise a series of residential dwellings located its south west edge, adjacent to Wanborough Road. They comprise a semi-detached pair of 19th century brick cottages (**Appendix 16.1; Appendix 4, 14**) off the main access road to Lotmead Farm, a semi-detached pair of early 20th century brick cottages (**Appendix 16.1; Appendix 4, 15**) and a further semi-detached pair of late 20th century residential properties (**Appendix 16.1; Appendix 4,16**).
- 16.140 While the late 20th century properties are clearly of no heritage importance, the 19th century and early 20th century buildings presumably represent worker's cottages associated with the dairy farm to the north east. However, they exhibit little architectural interest and have experienced significant alteration to their external openings and roof coverings such that they are considered to be of negligible heritage importance.
- 16.141 The elements of the setting of these buildings which contribute to their limited significance is defined by their immediate residential grounds, and their locations, on the main road, deliberately peripheral to the associated Lotmead Farm complex to the north east and as such makes a very limited contribution to their heritage significance.
- 16.142 Beyond the buildings as described above there are no previously recorded archaeological finds or deposits from the post-medieval or modern periods within the Application Site. The geophysical surveys and trial trenching undertaken in connection with the Lotmead applications found no evidence of any significant finds or features that could be attributed to these periods other than the buried remains of former field boundaries and ridge and furrow cultivation which are of no heritage value.

Environmental Assessment

- 16.143 The following paragraphs identify and describe each impact that is likely to arise, as a result of the Proposed Development of the Application Site, on both the designated and non-designated heritage assets identified. The impact will be assessed in terms of effects during construction, where direct impacts may be anticipated, and also the operational phases where indirect impacts, in terms of an assets setting, may be anticipated and whether these effects are adverse or beneficial. The extent and form of the Proposed Development are described in detail in Chapter 4.

Environmental Assessment: Construction Phase

- 16.144 The effects from the construction phase will be direct, or physical, within the boundary of the Proposed Development where groundworks are proposed for buildings or infrastructure.

Designated Heritage Assets

Scheduled Monument

- 16.145 The only designated heritage asset with the potential to receive an effect, as set out above, is Wanborough Roman Town (SM1004684) which is of national or high importance (**Table 16.1**).
- 16.146 The monument comprises eight areas and the majority of Area D, Area E and part of Area F (**Figure 16.1**) sit within the Application Site. The SM has been subject to geophysical

survey but no further evaluation has been undertaken, nor is it proposed, as these areas will be retained in their current form. As such, the monument will receive no physical or direct impact from the construction phase of the Proposed Development.

- 16.147 In terms of the contribution made to the significance of the SM by its setting, any effects in this regard are discussed within the in the 'Operational Impacts' section as these will be indirect. Any effects as a result of the construction phase will be temporary, and as such, will have no long term or permanent effects on the monument over and above this identified in the 'Operational' section.
- 16.148 Access may be required for construction traffic using the existing access to Lotmead Business Park that runs between Areas E and F of the SM. The road where it adjoins the Wanborough Road will need to be upgraded to facilitate the new development and the upgrading has been designed to avoid any physical impact to areas E and F (**Figure 4.1**). As such, the monument will receive no physical or direct impact from the construction of the upgraded access.
- 16.149 In summary, the SM is of *high sensitivity* due to its national importance. The anticipated magnitude of change is considered to have no impact given that no physical or direct impacts are expected during construction. Therefore, the overall effect, without mitigation, is *neutral* and **not significant**. Effects are therefore, not significant

Listed Buildings

- 16.150 The listed buildings located in the wider landscape to the west and east of the Application Site are all listed at Grade II and are of high importance. They comprise three listed farmhouses (LB1023277, LB1299721 and LB1299729), Lock Keepers Cottage (LB1355939), Earls court Manor (LB1023276) and a Grade II listed outhouse within a farmstead complex (LB1023430). Given their physical distance from the Application Site, none will receive a physical or direct impact from the construction phase of the development.
- 16.151 In summary, these listed buildings are of *high sensitivity*. The anticipated magnitude of change is considered to have no impact given that no physical or direct impacts are expected during construction. Therefore, the overall effect, without mitigation, is *neutral* and **not significant**. Effects are therefore, not significant
- 16.152 in respect of any potential for an effect the contribution made to their significance by their setting, any effects in this regard are discussed within the in the 'Operational Impacts' section.

Non-Designated Heritage Assets

- 16.153 Within the Application Site, three areas of prehistoric archaeological activity (**Figure 16.2**) have been identified through the programme of evaluation undertaken to inform the planning application.
- 16.154 Site 1 is located in the north and contains the remains of several phases of Iron Age settlement activity which appear to be closely related to the natural geomorphology of the Iron Age course of the River Cole. As such these remains are of regional and have a *medium sensitivity*.
- 16.155 The Application Site is outline however, as proposed within the Parameter Plans (**Figures 4.2 – 4.6**), Site 1 will be affected by proposed housing, SuDS and ecological areas although

the majority of Site 1 will remain undeveloped as it lies within the flood zone of the River Cole. Depending on the need for and extent of any ground level modification and infrastructure requirements, it is anticipated that there will be a level of impact, assessed as *medium adverse*, as not all of the area represented by Site 1 will be affected in this way allowing the majority of Site 1 to be preserved in situ. This will result in a *moderate effect* on the significance of the non-designated heritage assets represented by Site 1 from the construction phase of the Application Site.

- 16.156 Site 2 (**Figure 16.2**) is located on the eastern extreme of the Application Site within an area identified on the Parameter Plans for housing. Site 2 contains the remains of Iron Age settlement activity considered to be of local or *low sensitivity* due to its poor condition and limited extent.
- 16.157 The groundworks required for the construction of housing plus any associated infrastructure across the area of Site 2 will comprise a high magnitude of change, and (worst case) has the potential to destroy all of the archaeological deposits present. Due to the *high adverse impacts* that are anticipated, the effect is assessed to be *moderate* on the significance of these non-designated heritage assets.
- 16.158 Site 3 is located in the central area of the Application Site. Site 3 contains the remains of Iron Age settlement activity considered to be of local or *low sensitivity*, due to its poor condition and limited extent. Within this area housing is proposed the groundworks for which and any associated infrastructure will destroy the archaeological deposits present and as such, a *high adverse impact* will result in a *moderate effect* on the significance of these non-designated heritage assets.
- 16.159 In addition to Sites 1-3, geophysical survey and trial trench evaluation identified a number of features thought to date to the Bronze Age (**Appendix 16.1; Appendix EDP 6**) in the area to the immediate north of the SM, these remains are of low or *local sensitivity*. The exact nature of these deposits is not known but it is probable that they represent settlement activity predating the establishment of the Roman town. The location of these features is within an area of proposed open space adjacent to the monument. As such deposits will receive **no impact** from the construction phase, resulting in *negligible effects*, and are therefore not significant and are not discussed further.
- 16.160 The geophysical survey and trial trenching (**Appendix 16.1**) undertaken to inform this ES Chapter establishes that there is limited evidence within the Application Site for archaeological activity of Roman date outside of the scheduled area. Activity is limited to a potential burial and a ditch, located immediately to the north of Area F of the SM. These features may be related to archaeological deposits within the SM but are disturbed/truncated and as such can only be considered to be of *medium sensitivity* are unlikely to be of schedulable quality.
- 16.161 The ground works required for the construction of housing and associated infrastructure to the north of Area F have the potential to remove the identified archaeological deposits and as such, a *high adverse impact* will result in a *moderate effect* on the significance of these non-designated heritage assets.
- 16.162 However, careful design of the parameter plans (i.e. primary mitigation) within this area to the north of Area F of the SM has allowed for c.56m of undeveloped land immediately

adjacent to the SM which will be landscaped to improve both views and discreet screening. This will allow for any archaeological deposits within this area to be preserved *in situ* should they be found to relate to the SM. North of this will be access and gardens such that the south facing elevations will be c.62m from the edge of the SM. On this basis it is highly unlikely that any archaeological deposits potentially relating to the SM will be encountered within the footprint of the proposed housing. However, to verify this position further trenching will be undertaken in this area as part of the mitigation strategy which is discussed further below.

- 16.163 Adjacent to Area E the geophysical survey and trial trenching (**Appendix 16.1**) established that there is limited evidence for archaeological activity of Roman date extending out of the scheduled area. This activity comprised the truncated remains of ditches which, given their poor preservation, are considered to be of low importance/sensitivity. No development is proposed in the area to the north of Area E and as such there will be a *neutral effect* on the significance of these non-designated heritage assets. Effects are therefore, not significant.
- 16.164 There are no non-designated heritage assets within the Application Site relating to the early medieval or medieval periods.
- 16.165 The non-designated heritage assets within the Application Site that date to the post-medieval and modern periods relate to the existing buildings within the site. The remains of post medieval field boundaries and the remains of ridge and furrow cultivation are of negligible importance in archaeological terms. Effects are therefore, not significant and are not considered further.
- 16.166 The Parameter Plans propose that all modern structures that currently comprise Lotmead Business Village and farm (**Figure 16.3**, structures 5-13) will be removed to facilitate the development. These structures are considered to have no heritage value and therefore there will be *no effect* from the construction phase of the Application Site. Effects are therefore, not significant.
- 16.167 Lotmead Farmhouse (**1, Figure 16.3**) and the associated courtyard complex to the north (**2, Figure 16.3**), as well as the modern house to the east (**4, Figure 16.3**) will be retained. The assessment of these structures (**Appendix 16.1** and Appendix EDP 7 of that report) determined that they are of, at most, regional importance in terms of Lotmead Farmhouse, resulting in the Farmhouse being of *Medium to Low sensitivity*. The remainder being of local or *low to negligible sensitivity* to change. However, there will be *negligible to no effects* from the construction phase (i.e. direct effects) as these buildings will be retained in their current form. Effects are therefore, not significant.
- 16.168 Outside of the farm complex are a number of existing residential structures located on the south west edge of the Application Site. These comprise a semi-detached pair of 19th century brick cottages (**14, Figure 16.3**), a semi-detached pair of early 20th century brick cottages (**15, Figure 16.3**) and a further semi-detached pair of late 20th century residential properties (**16, Figure 16.3**).
- 16.169 These late 20th century properties are of no heritage importance which exhibit little architectural interest with significant alteration to their external openings and roof coverings, such that they are considered to be of negligible heritage importance with *no*

effects anticipated from the construction phase particularly as they will be retained in their current form. Effects are therefore, not significant.

16.170 In summary, the non-designated archaeological deposits identified within the Application Site are of Regional to Local importance or *Medium to Low sensitivity* (**Table 16.1**) whereby their significance could be directly or physically affected by the Proposed Development, or through changes within those parts of their setting (with regard to the post medieval; buildings within the Application Site) that contribute to that significance.

16.171 Were the development not to go ahead or in consideration of the 'do nothing' scenario, then over time the limited significance of the buried archaeological deposits would be eroded by the ongoing agricultural practices and the need to maintain field drainage. In terms of the any contribution made by the setting of the non-designated buildings within the Application Site this will no doubt change over time due to the addition of extensions or removal of structures and other changes within those parts of the setting that contribute to their significance.

16.172 In terms of the contribution made to their significance by their setting, any effects in this regard are discussed within the in the 'Operational Impacts' section.

Environmental Assessment: Operational Phase

Designated Heritage Assets

Scheduled Monument

16.173 The only designated heritage asset within or adjacent to the Application Site is Wanborough Roman Town (SM1004684) which has been assessed as high importance of high sensitivity (Table 16.1).

16.174 For the operational phase, only indirect effects are considered in terms of the potential for effects on the significance of the monument through changes within its setting. It is concluded within the Heritage Setting Assessment (Appendix 16.2) that there would be no harm to the significance of the SM from the Proposed Development. The assessment acknowledges that there will be a change to the landscape surrounding the monument but given that the heritage asset is entirely buried, the Proposed Development is not assessed as affecting its significance.

16.175 Subsequently, the Inspector's Report in respect of the planning appeals concluded that development that was proposed to the west of the drive to Lotmead Farm and the nature of the development at the southern edge of the development to the east would cause harm to the significance of the SM due to these areas forming part of its setting.

16.176 As such the Parameter Plans (Figures 4.X to 4.X) that set out the parameters for the Proposed Development illustrate that no housing is proposed near Areas E and D of the SM and a set-back of 62m had been applied to Area F. The Character Areas identified within the Design and Access Statement considers the boundary treatment of the developable areas nearest to Area F, are designed in such a way that the transitions from the nominal edge of the scheduled area to the first elevations of the proposed housing is designed in such a way that the monument can continue to be appreciated in its current form and setting with an appropriate layout and good landscape design providing subtle

screening in terms of the new housing within 'Wanborough Green. The cross section contained within the Design and Access Statement (See Section 5.2) illustrates the interface between the SM and the housing and was agreed during pre-application consultation with SBC on 9th November 2018.

- 16.177 As such the harm identified within the Inspector's Report, which falls in the 'less than substantial' category as defined by Para 196 of the NPPF, has been mitigated, as part of the Primary Mitigation, by design in respect of the revised planning application and no further mitigation will be required in terms of the setting effects identified.
- 16.178 In summary, the SM is of high sensitivity and will receive a low magnitude of change; resulting in minor/no significant effects by virtue of the primary mitigation inherent to the design of the Proposed Development.

Listed Buildings

- 16.179 The listed buildings located in the wider landscape to the west and east of the Application Site are all listed at Grade II and are of high importance. They comprise three listed farmhouses (LB1023277, LB1299721 and LB1299729), Lock Keepers Cottage (LB1355939), Earls court Manor (LB1023276) and a Grade II listed outhouse within a farmstead complex (LB1023430).
- 16.180 None of these listed buildings has a functional relationship with the Application Site and the elements of their settings which contribute to their heritage significance are focused on their immediate farmstead complexes. As such, the operation phase of the Application Site will have a *neutral effect*. Effects are therefore, not significant.

Non-Designated Heritage Assets

- 16.181 Where the archaeological deposits identified within Sites 1-3 will be removed by the construction phase of the Application Site, all effects will have taken place during this phase therefore neutral effects are anticipated as a result of the operational phase. Effects are therefore, not significant
- 16.182 Lotmead Farmhouse (1, **Figure 16.3**) and the associated courtyard complex to the north (2, **Figure 16.3**), as well as the modern house to the east (4, **Figure 16.3**) will be retained. The assessment of buildings 1 and 2 (**Appendix 16.1; Appendix EDP 3**) determined that they are of regional/local or *low significance*.
- 16.183 With regard to any indirect effects from the operational phase of the Proposed Development, this will be in terms of any effects on their significance through changes within their setting. The setting of Lotmead Farmhouse is limited to its immediate grounds and the paddock to the south and the continuing relationship to the former buildings to the north (2, **Figure 16.3**).
- 16.184 However, the Inspectors Report in respect of the recent planning appeals on the site acknowledged that some low-density housing to the west of the access to Lotmead farm would be generally acceptable, as set out within the heritage setting assessment, but the change to the rural approach would be harmful. The Council in its case had also identified the density of the proposed housing and the proximity of a proposed 5 storey maker building as harmful, thus requiring a balanced judgement in terms of the planning balance as required by Para 197 of the NPPF.

- 16.185 The Parameter Plans (**Figures 4.2 to 4.6**) that inform this ES illustrate that housing previously proposed on the parcel of land west of the access to Lotmead Business Park has now been removed (Primary Mitigation), ensuring that the rural access to the non-designated farmhouse remains as it is currently experienced. As such, the effects upon this receptor are assessed as *neutral* with no further mitigation is proposed in this regard. Effects are therefore, not significant
- 16.186 The Parameter Plans restrict the height of the buildings adjacent to and surrounding the retained buildings of the Lotmead Business Village, these will now all be of maximum two storeys in height (Primary Mitigation).
- 16.187 The development of the Application Site will introduce new built form replacing and changing the character of the retained buildings, but as these do not contribute to the significance of Lotmead Farmhouse their removal and replacement will have a neutral effect. Effects are therefore, not significant. Further to this, the proposed new buildings will not affect those key relationships that have been identified as making a positive contribution to the significance of the non-designated Lotmead Farmhouse.
- 16.188 In summary, Lotmead Farmhouse (1) and the building range to the north (2) are of low sensitivity and will receive a low magnitude of change; resulting in minor/negligible significant effects by virtue of the primary mitigation inherent to the design of the Proposed Development. As such, no further mitigation is proposed in terms of Lotmead Farmhouse.
- 16.189 Outside of the farm complex are a number of existing residential structures located on the south west edge of the Application Site. Of these the setting of the semi-detached pair of 19th century brick cottages (14, Figure 16.3) has been identified as contributing to their negligible heritage significance. previously defined within Appendix 16.1 (Appendix EDP 3) The significance of building 14 will receive a small/slight effect from the operational phase as it is located immediately adjacent to the access to Lotmead Business Village and there will need to be modification of the land surrounding the house to create the new access. This change will have negligible adverse effect on its significance resulting in a negligible significance of effect

Environmental Assessment: Cumulative Effects

- 16.190 The LPA has assessed the cumulative impacts of the NEV as part of the evidence base which informed the Swindon Local Plan 2011-2026. A package of transport infrastructure measures has been developed to accommodate the NEV as a whole. Given that the Cumulative scenario has already been tested by the Council, as part of the overall consideration of the NEV, it is not considered necessary to repeat this assessment.
- 16.191 In terms of the currently proposed and consented schemes that form part of the wider New Eastern Villages the following sites have been considered in relation to the potential for cumulative effects in respect of heritage matters in combination with the Lotmead Villages proposal.
- 16.192 In terms of the designated heritage assets with the potential to receive an effect from the Proposed Development, this is limited to a single asset, the Wanborough SM. With regard to the potential for cumulative effects, the SM does not extend into any of the sites listed

above as it is too distant and indeed too well screened for these sites to form any part of its setting. The Proposed Development has addressed any adverse effects on the SM through Primary Mitigation, and due to the provision of a Draft Heritage Management Plan, a beneficial effect in the long term has been identified in respect of the SM. As such there will be no adverse cumulative effects from the developments listed above. However, residents of these sites will also benefit from the positive management of the SM as this will include space for visitors to experience the SM and understand its interpretation as part of the PYO enterprise.

16.193 As the Proposed Development will have no effect on the Listed Buildings identified in wider area surrounding it (LB1023277, LB1299721, LB1299729, LB1355939 and LB1023430) there can be no cumulative effects in respect of the development sites listed above.

16.194 With regard to the identified non-designated heritage assets Archaeological Sites 1,2 and 3, the identified Bronze Age features and the unknown archaeological features in Sites 4 and 5, are discrete areas of archaeological activity within the Proposed Development and do not extend (or are not expected to extend) beyond the site boundaries. As such there can be no cumulative effects from the development sites listed above. However, if these contain archaeological remains of the same date range then cumulatively the information they provide with help to better understand the nature and settlement pattern during the Iron Age for this area of Wiltshire.

16.195 The non-listed buildings, Lotmead Farm (1) the adjacent farm offices (2) and the cottage on Wanborough Road (14) are located centrally and on the southern edge of the Proposed Development site. None will receive any physical effect from the Proposed Development or indeed from the development sites listed above. Their setting is limited to the immediate areas surrounding them which in respect of buildings 1 and 2 the effects of the Proposed Development have been mitigated as part of the Primary Mitigation. The effect on building 14 is negligible such that no mitigation was considered appropriate. With regard to the potential for cumulative effects, the sites listed above are too distant and too well screened to form any part of the settings of these buildings, such that there can be no cumulative effects.

Mitigation and Monitoring

Construction and Operation

Designated Heritage Assets

16.196 In respect of Wanborough Roman Town scheduled monument, the Parameter Plans (**Figure 4.2 to 4.6**) have taken account of the harm identified by the Inspectors Report as a result of the recent appeals on the site. As such, housing has been removed from the area to the west of the drive to Lotmead Farm and the area to the east planned and landscaped in such a way that the current experience of the SM in this location will be maintained. Screening and an ample set back from the built form have been proposed such that both the current setting will be maintained and any below ground archaeological deposits that may be related to the SM can be retained in situ.

16.197 A further phase of evaluation (Secondary Mitigation) in respect of the below ground remains to the north of Area F will be undertaken to evaluate, if and to what extent, the

deposits recorded within the previous trial trenching in this area either relate to the SM or if they extend more widely. The results of this work may result in additional mitigation being proposed in this area. Both the additional trenching and the need for any further mitigation can be secured by planning condition. A draft mitigation strategy is included here as **Appendix 16.4** (*Outline Mitigation Strategy (May 2017)*), which includes provision for the additional work required to the north of Area F of the SM (Site 5; **Figure 16.2**).

- 16.198 The mitigatory measures which are inherent to the Proposed Development (primary mitigation through design) will ensure that the SM receives neutral effects from the Proposed Development of the Application Site. Effects are therefore, not significant. As such, no further mitigation is proposed in terms of the Operational Phase of the development.
- 16.199 In addition to the positive primary mitigation measures, the sensitivity and importance of the monument has been acknowledged throughout the evolution of the project and to date, additional work has been undertaken, over and above that required for the planning application, to better understand the SM with the view of improving its management as part of the development of Lotmead Farm Villages.
- 16.200 The area of the SM within the Application Site boundaries was poorly understood in terms of its buried remains. On that basis, two forms of geophysical survey were undertaken (**Appendix 16.1; Appendix EDP 1**) to better inform its management and to determine if any significant features extended out of the scheduled area.
- 16.201 In addition to this, a condition survey (**Appendix 16.2**) was undertaken for the *whole* monument in 2014 and updated in 2017. This identified that there have been significant improvements in the management of the monument between 2014 and 2017 in terms of the removal of crops and hedges from what the geophysical surveys identified as the most sensitive areas. This survey has formed the basis of a Heritage Management Plan (**Appendix 16.3** (*Heritage Management Plan (April 2017)*)), which is currently in draft form, and will inform the future management of the monument.
- 16.202 As such the archaeological works completed to date and the ongoing provision of a Heritage Management Plan have already produced a medium beneficial effect (**Table 16.2**) in terms of the monuments significance and will continue to do so under the provisions of the Heritage Management Plan. In terms of future management, it is anticipated that those sensitive areas of the monument will continue to be farmed in such a way that the below ground remains will be preserved in their current state and that the understanding or the experience of the monument will be much improved, by the provision of information in the form of on-site boards and via the pick your own business in the form of leaflets and through its website. These changes will also provide a medium beneficial effect in terms of the visitor experience and understanding of the monument, which cannot currently be experienced in any form. Given the high sensitivity of the monument this will result in a long term **major beneficial effect**.
- 16.203 There is no mitigation required in respect of the listed buildings in the wider area surrounding the Application Site as it forms no part of their setting and as such their significance will not be affected by the construction or operation phases.

Non-Designated Heritage Assets

- 16.204 Where any groundworks for the construction of the housing or supporting infrastructure are proposed within Sites 1-3 (**Figure 16.2**) there will be an agreed programme of archaeological work (Secondary Mitigation) undertaken prior to the commencement of any works in these areas. The nature and scope of this work will be agreed with the archaeological advisor prior to the works commencing, nonetheless, a draft Outline Mitigation Strategy is included here as **Appendix 16.4** (*Outline Mitigation Strategy (May 2017)*). This will also include provision for those areas where additional evaluation is required on the western access route (Site 4; **Figure 16.2**) due to no access being currently available to this area and to the north of Area F of the SM (Site 5; **Figure 16.2**).
- 16.205 The works in respects of Sites 1-3 will require the full strip of the affected areas and the excavation of all exposed deposits followed by a programme of archaeological reporting and publication. The need for these works will be secured by condition attached to the planning consent. For Sites 4 and 5 additional trial trenching will be required in the first instance to establish the need for and extent of any further mitigation.
- 16.206 Any finds recovered from the Application Site will be deposited with the local museum as set out within the Outline Mitigation Strategy. The developer will be required to prove funds for the curation and storage of this and any site records.

Summary of Residual Effects

- 16.207 11.178 The residual effects (**Table 16.4**) described below are the likely impacts that will remain following implementation of the mitigation measures as described above. Only those assets where a residual effect is considered likely are addressed.

Construction and Operation

Designated Heritage Assets

- 16.208 There will be no direct or indirect effects on the SM as a result of the Proposed Development therefore no specific mitigation, over and above the primary mitigation measures identified, is required in order to protect its significance. The archaeological works completed to date and the provision of a draft Heritage Management Plan in relation to the SM have already produced a major beneficial effect and will continue to do so under the provisions of the Heritage Management Plan. When assessed in terms of the high importance of the SM the residual effect of both the construction and operational phases of the Application Site will be **major beneficial**.

Non-Designated Heritage Assets

- 16.209 The ground works required for the construction of housing and associated infrastructure within Sites 1-3 will completely remove the identified archaeological deposits present, and as such, a high adverse impact will result in a moderate effect on the significance of these non-designated heritage assets. The excavation and recording recommended by way of mitigation will preserve these features by record, therefore the residual impact will be reduced to a **minor significance of effect**.
- 16.210 The ground works required for the construction of new infrastructure in terms of the western access route (Site 4) and the area to the north of Area F (Site 5) will potentially remove any archaeological deposits present and as such, a high adverse impact will result

in a minor or moderate effect on the significance of these non-designated heritage assets, should they exist. The excavation and recording recommended by way of mitigation will preserve these features by record so therefore the residual impact will be reduced to a **negligible or minor significance of effect**.

16.211 **Table 16.4** summarises the impacts relating to designated and non-designated heritage assets.

Table 16.4 – Summary Table of Archaeological and Heritage Significance and Effects

Description of Likely Significant Effects	Significance of Effect (without Mitigation) (High / Medium / low / negligible)	Effects (Beneficial or Adverse) (B/A), (Permanent or Temporary) (P/T), (Direct or Indirect) (D/I), (Short Term, Medium, Long Term) (ST, M, LT), (Local, Regional, National) (L, R, N)					Description of Mitigation/ Enhancement Measures	Description of Residual Effects	Significance (Major, Moderate, Slight, Negligible or Nil)	Residual Effects				
		(B/A)	(P/T)	(D/I)	ST/M/LT	(L/R/N)				(B/)	(P/)	(D/I)	ST/M/LT)	(L//N)
Wanborough Roman Town Scheduled Monument (SM1004684)	High	B/P/D/LT/N					Surveys; Draft Heritage Management Plan; provision of information	Medium Beneficial	Moderate/ Major	B/P/D/LT/N				
Listed Buildings in wider area surrounding site LB1023277 LB1299721 LB1299729 LB1355939 LB1023430	High	None					NA	NA	NA	NA				

Archaeological sites 1, 2 and 3	Medium/Low	A/P/D/LT/L+R	Excavation, recording and reporting	Preservation by record	Slight	A/P/D/LT/L+R
Non-listed buildings, Lotmead Farm (1) and office block (2)	Low	None	NA	NA	NA	NA
Bronze Age features	Low	None	NA	NA	NA	NA
Unknown Archaeological Features (Site 4)	Low	A/P/D/LT/L	Excavation, recording and reporting	Preservation by record	Negligible	A/P/D/LT/L
Roman Archaeological Features (Site 5)	Low/Medium	A/P/D/LT/L	Excavation, recording and reporting	Preservation by record	Minor/Negligible	A/P/D/LT/L
Non-listed building (14) adjacent to access road	Low	A/P/I/LT/L	NA	NA	Negligible	A/P/I/LT/L

17. Summary and Conclusions

- 17.1 This chapter of the ES presents a summary of the key environmental issues associated with the Proposed Development, as identified via the environmental impact assessment work undertaken. The content of this summary section is taken from the individual ES chapters.
- 17.2 The EIA process has been carried out with reference to accepted methods covering, for example: the approach to surveys and defining baseline conditions; methods for assessment; definitions and criteria for identifying and determining key potential impacts; and ascribing significance levels to possible environmental effects. Consultation has also played a key role in this, with stakeholders and statutory bodies inputting to the methodologies and scope of assessments undertaken to ensure that all relevant issues have been fully considered. This ES is a full and detailed summary of the assessments carried out and the ES clearly identifies significant effects, where these are considered likely to occur, as well as any necessary mitigation measures to reduce such effects to acceptable levels.
- 17.3 In preparing the EIA it is acknowledged that there are elements of the scheme for which full details are not available (i.e. for the Outline application element). The ES has therefore provided a realistic worst-case assessment based on the information that is available at this stage, and is based on stated assumptions and professional judgement, including, where applicable, topic-based definitions of the worst-case assumption (**Chapters 6-16**).
- 17.4 A summary of the significant effects identified in **Chapters 6-16** prior to additional mitigation being applied, is provided in **Table 17.1** below. Where proposed, the additional mitigation to address the significant effects arising is included, and the significance of the residual effect following mitigation, is provided.
- 17.5 In some cases non-significant effects prior to additional mitigation are also recorded where, following the application of additional mitigation, the residual effect are of significant benefit (which in this case applies to the socio-economic benefits arising from a significant contribution of housing; improvements to fluvial flooding from the implementation of the proposed flood restoration scheme and SuDs; and improvements to the SM though the implementation of a Heritage Management Plan).
- 17.6 Significant residual effects are highlighted in **Table 17.1** in **bold text**.
- 17.7 Where there are differing significant effects between construction and operation phases on a receptor these are shown separately.

Table 17.1: Summary of Predicted Significant Effects, with Associated Mitigation Measures and Residual Effects

Description of impact/ activity /receptor	Phase (C/O)	Significant effect	Possible mitigation measures	Residual effect
Chapter 7, Land Use and Agriculture				
Loss of or reduction in	C	Major adverse – significant	Implementation of a Soil resources and Management	Minor adverse – not significant

quality of soil resource			Plan	
Loss of farm holding	C	Major adverse – significant	None available within the Proposed Development	Major adverse – significant
Chapter 8, Socio-economics and Human Health				
Expenditure of new local residents	O	Moderate Beneficial	No mitigation required	Moderate Beneficial
Increased access to affordable housing and market homes	O	Major Beneficial	No mitigation required	Major Beneficial
Chapter 9, Water Resources				
Impact on fluvial flooding	C	Moderate/ Slight Adverse	CEMP/ Flood warning and evacuation plan and temporary works to control construction impacts	Negligible
Impact on surface water flooding	C	Moderate/ Slight Adverse	CEMP/ Flood warning and evacuation plan and temporary works to control construction impacts	Negligible
Impact on Water Quality	C	Significant/ Moderate Adverse	CEMP/ Flood warning and evacuation plan and temporary works to control construction impacts	Negligible
Impact on fluvial flooding and occupants of the Site	O	Moderate/Substantial Beneficial	Floodplain Restoration scheme (inherent to the scheme) and SuDS to mitigate rainfall runoff into channel and flood risk	Moderate/ Substantial Beneficial
Impact on surface water flooding	O	Slight/Moderate Beneficial	SuDS to reduce surface water discharge to greenfield or lower rates. Floodplain Restoration scheme (inherent to the scheme) to mitigate surface water risk.	Slight / Moderate Beneficial
Chapter 10,				

Ground Conditions				
Damage to the built environment and the ground (in relation to ground movements from compressible/shrinkable soil)	O	Moderate Adverse	Appropriate ground investigation identification/ implementation of any ground improvement, remediation/mitigation together with appropriate design and construction techniques.	Moderate Beneficial
Chapter 11, Transportation				
No significant effects identified by virtue of highway measures inherent to the Proposed Development and delivery of the identified highway infrastructure improvements which will serve the wider NEV development.				
Chapter 12, Ecology and Conservation				
River Cole LWS/River Cole and associated aquatic fauna	C	Significant, adverse	Buffering/pollution prevention measures delivered through CEMP	Neutral – Not Significant
Hedgerow network and trees	C	Significant, adverse (worst case scenario only)	Temporary demarcation and buffering delivered through CEMP	Neutral – Not Significant
Small serotine maternity roost	C	Significant, adverse	Standard avoidance measures delivered through CEMP	Neutral – Not Significant
Medium population great crested newt	C	Significant, adverse	Trapping, capture and exclusion under Natural England derogation licence	Neutral – Not Significant
High population of grass snake	C	Significant, adverse	Trapping, capture and exclusion delivered through CEMP	Neutral – Not Significant
River Cole LWS/River Cole and associated aquatic fauna	O	Significant, adverse	Design and operation of appropriate SUDS; partial-restoration of floodplain	Negligible Benefit - Not significant
Hedgerow network and trees	O	Significant, adverse (worst case scenario only)	Habitat enhancement and creation (2:1 planting of tree stock)	Negligible Benefit - Not significant
Small serotine maternity roost	O	Significant, adverse	Habitat enhancement and creation for roosting and	Negligible Benefit - Not significant

		foraging bats		
Medium population great crested newt	O	Significant, adverse	Creation and management of dedicated receptor site	Negligible Benefit - Not significant
High population of grass snake	O	Significant, adverse	Creation and management of dedicated receptor site	Negligible Benefit - Not significant
Chapter 13, Landscape and Visual*				
Loss of open Agricultural Land on Application Site		Moderate adverse (significant)	Green Infrastructure Implementation	Minor Adverse - Not Significant
Single Public Right of Way in westernmost part of Application Site – Route Diversion		Moderate/minor beneficial	Diversion agreed with Local Authority. Green Infrastructure implementation provides enhanced local PRoW network	Moderate beneficial Significant
Change in Local Landscape Character (Vale of White Horse)		Moderate adverse Significant	Green Infrastructure implementation	Moderate/minor adverse - Not Significant
Residential Receptors: Wanborough		Major/Moderate adverse Significant	Green Infrastructure implementation	Moderate adverse - Significant
Residential Receptors: Hinton Parva		Moderate adverse Significant	Green Infrastructure implementation	Moderate/minor adverse Not Significant
Residential Receptors: Individual Properties (Wanborough Road)		Major/moderate adverse Significant	Green Infrastructure implementation	Moderate/minor adverse - Not Significant
Viewpoint 1		Major / Moderate adverse	Green Infrastructure implementation	Major/moderate adverse - Significant
Chapter 14, Noise				
Noise and Vibration from Demolition and Construction	C	Negligible to Major	Phasing of Construction Works Implementation of	Negligible to Moderate

Activities			measures in CEMP	
Noise Levels in External Amenity Areas	O	Moderate	Location of external amenity areas to the rear of dwellings	Negligible
			Set back of external areas from Wanborough Road	
Noise from Fixed Building Services Plant at Proposed Local Centre and Sports Pavilion	O	Major	Control through suitable worded planning condition Consideration for the location, selection and enclosing of plant items	Negligible
Chapter 15, Air Quality				
No significant effects identified				
Chapter 16, Archaeology and Cultural Heritage				
Wanborough Roman Town Scheduled Monument (SM1004684)		Moderate/ Major Beneficial	Surveys; Draft Heritage Management Plan; provision of information	Moderate/ Major Beneficial

C = Construction, O = Operation

**The residual effects summarised for Landscape and Visual relate to the likely effects at 10 years of operation.*

Cumulative Effects Summary

- 17.8 **Chapters 7-16** have identified the potential environmental effects arising from the Proposed Development on a topic by topic basis, with consideration of different effects from different topics on the same receptor and in-combination with other relevant projects at the receptor level. The level of assessment is specific to each of the Chapters and is not repeated here. Significant intra-cumulative effects are not summarised in **Table 17.1** above as the level of significance for in-combination projects is no different (greater than) the significant effects identified for the Proposed Development on its own.
- 17.9 With regard to inter-project cumulative effects, it can be summarised that the Proposed Development in conjunction with the wider NEV development will have significant effects upon: the landscape character of the Vale Landscape (moderate adverse); visual effects upon the Lowland Vale (moderate/minor adverse); visual effects upon the Scarp of the Downs (moderate adverse). By virtue of the significant increase in housing that will come forward as the wider NEV develops, moderate to major beneficial cumulative effects are also likely from a socio-economic perspective.

- 17.10 The inter-project cumulative effects arising from the construction and operation of the Proposed Development in conjunction with other schemes within the wider NEV are acceptable when considered within the context of the Local Plan (allocating the land for development) and the NEV Supplemental Planning Documents (which aim to ensure a consistent approach is applied to all NEV developments).

Summary of Residual Significant Adverse Effects

- 17.11 Significant adverse effects remain post-mitigation in respect of landscape change and visual effects and the loss of agricultural land and farm holding associated with the existing dairy farm. These effects are assessed in detail in **Chapters 7 and 13** and are summarised at **Table 17.1**.

Land-Use and Agriculture

- 17.12 The Proposed Development will result in the permanent loss of circa 160ha of agricultural land which is currently used for grazing of a dairy herd amounting to approximately 240 milking cows. The Proposed Development will also impact associated buildings, resulting in the demolition of buildings such as the cubicle sheds and milking parlour.
- 17.13 **Chapter 7** assesses that the loss of this farm holding will have a **major significant adverse effect** such that it will cease to operate. However the allocation of the site for residential development has established that this is acceptable.

Landscape & Visual

- 17.14 The allocation of the site has established an accepted understanding that the site will be developed and that this will result in a loss of undeveloped agricultural fields and a resultant change to the character of the landscape and visual amenity. Significant landscape and visual effects (in EIA terms) are inherent in the development of the greenfield site.
- 17.15 **Chapter 13** finds that there would be **significant adverse effects** on views for a number of individual residential properties situated along Wanborough Road which are very close to Lotmead Farm. By Year 10, these effects would persist even once landscaping has been established.

Summary of Residual Significant Beneficial Effects

- 17.16 Significant beneficial residual effects remain or are achieved post-additional mitigation, in respect of increasing access to affordable and market housing, reducing fluvial flood risk, improving visual appearance and connection public rights of ways, and benefit through the introduction of a heritage management plan for the SM. The beneficial effects are assessed in detail in **Chapters 8, 9, 13 and 16**, and are summarised in **Table 17.1** above.

Socio-Economics and Human Health

- 17.17 The Assessment undertaken at **Chapter 8** finds that the Proposed Development will lead to a number of beneficial effects in relation to socio-economic and human health considerations.
- 17.18 The expenditure of new local residents at local retail and leisure businesses within the local and wider impact area is found to be **moderate beneficial**.
- 17.19 The development will increase access to both affordable and market housing and this is assessed as **major beneficial**.

Water Resources

- 17.20 During the operational phase, **Chapter 9** finds that impact on fluvial flooding will be improved through a floodplain restoration scheme and SuDS to mitigate rainfall and runoff into channel and flood risk. This is considered to be a **moderate to substantial benefit**.

Landscape and Visual

- 17.21 The assessment at **Chapter 13** of the Environmental Statement focuses on those residual effects of the development which would persist after the implementation of mitigation measures and would remain at year 10 of operation of the Proposed Development.
- 17.22 With regard to landscape and visual effects the proposed development will achieve beneficial residual effects. In the westernmost part of the site a single public right of way will be diverted, the route of which has been agreed with SBC. The diverted route will incorporate new green infrastructure planting and will provide new connections to Swindon, neighbouring settlements and the countryside. As the new planting continues to mature the visual and perceptual qualities of the new linkages will improve. The overall level of residual effect on this route is assessed as **moderate beneficial** and **significant**.

Archaeology and Cultural Heritage

- 17.23 The Assessment at **Chapter 16** finds that the development will have direct or indirect effects on the Scheduled Monument as a result of the Proposed Development. The archaeological works completed thus far and the partial implementation of the draft Heritage Management Plan at the 'Pick Your Own' site has already resulted in beneficial effects. When assessed against the high importance of the SM, the residual effect is found to be **major beneficial**.

Glossary and Abbreviations

AADT:

Annual Average Daily Traffic

AAWT:

Average Annual Weekday Traffic

Acoustic Environment:

Sound at the receiver from all sound sources as modified by the environment.

ADMS:

Air Dispersion Modelling System

Agricultural Land Classification (ALC):

The system devised and introduced by the Ministry of Agriculture, Fisheries and Food to classify agricultural land according to the extent to which its physical or chemical characteristics impose long-term limitations on agricultural use. Land is graded from 1 (excellent quality) to 5 (very poor quality), with Grade 3 subdivided into agricultural Subgrades 3a and 3b.

Ambient Sound:

Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far. Comprises of the residual sound and the specific sound when present.

ANIS:

Aircraft Noise Index Study

AQAP:

Air Quality Action Plan

AQMA:

Air Quality Management Area

A-Weighting:

Octave band and 1/3 octave band filters that correlate to the response of the human hearing system to sound pressure levels at different frequencies.

Background Sound:

The level of sound measured in the absence of extraneous noise sources

Background Sound Level ($L_{A90,T}$):

A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using a fast time-weighting and quoted to the nearest whole number of decibels.

Best and most versatile land (BMV):

Land defined as grade 1, 2 or 3a of the Agricultural Land Classification. This land is considered the most flexible, productive and efficient and is most capable of delivering crops for food and non-food uses.

BGS:

British Geological Survey

BS:

British Standard

CEMP:

Construction Environmental Management Plan - a document reporting a series of interventions to control the impact of Construction.

CIFA:

Chartered Institute for Archaeologists

Clay (C):

An inorganic component of soil derived from the weathering of rock. It comprises particles less than 0.002mm in equivalent diameter.

CPA:

Control of Pollution Act, 1974

CRN:

Calculation of Railway Noise

CRTN:

Calculation of Road Traffic Noise

Decibel (dB):

A logarithmic unit used to describe the ratio between the measured level and a reference level of 0 dB. The ratio can be sound pressure, intensity or power.

dBA:

A-Weighted Decibel Level

DEFRA:

Department of the Environment, Food and Rural Affairs

DfT:

Department for Transport

Diffusion Tube:

A passive sampler used for collecting NO₂ in the air

DMRB:

Design Manual for Roads and Bridges (Highways England Guidance)

Do Minimum:

Committed 2036 Local Plan developments / NEV infrastructure package

Do Something:

Do minimum 2036 plus Development (Full build out / NEV infrastructure package)

EA:

Environment Agency

EDP:

Environmental Dimension Partnership Ltd

EFT:

Emission Factor Toolkit

EHO:

Environmental Health Officer

EIA:

Environmental Impact Assessment

Element Normalized Level Difference ($D_{n,e}$):

The ration of the sound power incident on a reference area to the sound power transmitted through the test specimen

EPA:

Environmental Protection Act, 1990

EPUK:

Environmental Protection UK

Equivalent Continuous A-Weighted Sound Pressure Level ($L_{Aeq,T}$):

Value of the time-averaged A-weighted sound pressure level, in decibels (dB), of a continuous steady sound for the duration of the specified time interval, T.

ES:

Environmental Statement

EU:

European Union

Façade Level:

The sound pressure level at a distance of 1 metre from the façade

Fast Time Weighted:

The speed at which the instrument responds to changes in amplitude of the measured signal. The response time of a fast time-weighted instrument is 0.125 seconds.

Field capacity days (FCD):

A meteorological parameter used to quantify the duration of the period when soils are wet. Soils usually return to field capacity during the autumn or early winter. The field capacity period, measured in days, ends in the spring when evapotranspiration exceeds rainfall and a moisture deficit

begins to accumulate in the soil. Opportunities for mechanised fieldwork are then possible without damaging the soil.

Free-Field Level:

The sound pressure level measured away from any reflective surfaces.

Frequency (f):

The number of cycles of pressure fluctuations within a given period of time. Measured in Hertz.

FTP:

Framework Travel Plan - the overarching document that sets out a framework of travel plan measures for a series of occupiers. It is one of a range of measures designed to reduce car use, setting out a series of transport interventions to encourage sustainable travel options.

GCA:

Ground Conditions Assessment

Gleying:

The process in which anaerobic conditions arising from poorly drained soils result in the reduction of iron and other elements in the soil, causing soils to turn a largely grey-brown or grey colour, with ochreous mottles in localised aerated zones.

Grade 1:

Excellent quality agricultural land with no or very minor limitations to agricultural use. A very wide range of agricultural and horticultural crops can be grown, commonly including top fruit, soft fruit, salad crops and winter-harvested vegetables. Yields are high and less variable than on land of lower quality.

Grade 2:

Very good quality agricultural land with minor limitations that affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown. However, on some land in the grade there may be reduced flexibility due to difficulties with the production of more demanding crops, such as winter-harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1.

Grade 3:

Land with moderate limitations. This affects the choice of crops that can be grown, the timing and type of cultivation, and harvesting or yield levels. The yields of more demanding crops are generally lower or more variable than on land in Grades 1 and 2.

Grade 4:

Poor quality agricultural land with severe limitations that significantly restrict the range of crops and/or level of yields. It is mainly suited to grass with occasional arable crops (e.g. cereals and forage crops), the yields of which are variable. In moist climates, yields of grass may be moderate to high, but there may be difficulties in utilisation. The grade also includes very droughty arable land.

Grade 5:

Very poor quality agricultural land with very severe limitations that restrict use to permanent pasture or rough grazing.

GWML:

Great Western Main Line

HDC:

Halborough District Council

HDV:

Heavy Duty Vehicle; a vehicle with a gross vehicle weight greater than 3.5 tonnes. Includes Heavy Goods Vehicles and buses

HE:

Highways England

HER:

Historic Environment Record

Hertz (Hz):

The unit of frequency or pitch of a sound. One hertz is equal to one cycle per second.

HGV:

Heavy Goods Vehicles – all motorised vehicles in excess of 7.5t

HMP:

Heritage Management Plan

HMSO:

Her Majesty's Stationary Office

IAQM:

Institute of Air Quality Management

IEMA:

Institute of Environmental Management and Assessment

Indirect Effects:

Effects that result indirectly from the proposed project as a consequence of the direct effects, often occurring away from the site, or as a result of a sequence of interrelationships or a complex pathway. They may be separated by distance or time from the source of the effects.

Indoor Ambient Noise:

The noise level within a room or building that is composed of noise from sources inside and outside the building but excludes noise from activities of the occupants.

 $L_{10,T}$:

The noise level exceeded for 10 % for a given time interval, T. Generally used to describe traffic noise.

 L_{Amax} :

The maximum A-weighted level measured during a given time period.

LAQM:

Local Air Quality Management

LB:

Listed Building

LOAEL:

Lowest Observed Adverse Effect Level

LPA:

Local Planning Authority

Mitigate:

To reduce the severity – in terms of this assessment, the measures implemented to reduce the impact of the additional development traffic.

Moisture Deficit (potatoes) (MDp):

The calculated deficit between the water supplied by average summer rainfall at that location and the quantity of water required to grow a crop of potatoes, assumed to root to 70cm depth (without suffering from a lack of water). The larger the moisture deficit, the greater the likelihood of yields being reduced by droughtiness. In practice the deficit has to be met from soil water reserves, irrigation and/or by the crop wilting; the last reduces yields.

Moisture deficit (wheat) (MDw):

As above but for a wheat crop assumed to root to a depth of 120cm.

MNR:

Marine Nature Reserve

MUGA:

Multi-Use Games Area

NAQO:

National Air Quality Objective as set out in the Air Quality Strategy and the Air Quality Regulations

NO₂:

Nitrogen Dioxide

NO_x:

Nitrogen oxides, generally considered to be nitric oxide and NO₂. Its main source is from combustion of fossil fuels, including petrol and diesel used in road vehicles.

NOEL:

No Observed Effect Level

Noise Rating (NR):

A method for rating the acceptability of indoor environments with respect to noise, based on a series of curves. Sound pressure levels measured in octave bands are compared with the curves to determine the NR. Higher frequencies are given heavier noise ratings than lower frequencies and is the highest NR curve touched by the measured octave band spectrum.

NPPF:

National Planning Policy Framework

NPSE:

Noise Policy Statement for England

NNR:

National Nature Reserve

Octave Band:

Band of frequencies where the upper limit of the band is twice the frequency of the lower limit. E.g., the 1000 Hz band contains noise energy at all frequencies from 707 to 1414 Hz.

OS:

Ordnance Survey

Partition:

Total surface of the separating partition between the source and receiving rooms.

PBA:

Peter Brett Associates LLP (now part of Stantec)

PCU:

Passenger Car Unit – the standard unit for measuring the volume of traffic - a car is 1 passenger car unit, other vehicles are rated in terms of car-units depending upon their impact upon the traffic stream.

Percentile Level ($L_{AN,T}$):

The A-Weighted Sound Pressure Level which is exceeded for N% of the specified time interval. E.g., the $LA_{90,1\text{hour}}$ is the A-weighted sound level exceeded for 90% of 1 hour.

PICs:

Personal Injury Collisions (formerly known as Personal Injury Accidents)

 $PM_{10}/PM_{2.5}$:

Small airborne particles less than 10/2.5 μm in diameter

PPG:

Planning Practice Guidance

PPV:

Peak Particle Velocity

Receptor:

A location where the effects of pollution may occur

Sand (S):

Soil particles from 0.06mm-2.0mm in equivalent diameter. Fine sand particles are from 0.06mm-0.2mm; medium sand from 0.2mm-0.6mm; and coarse sand from 0.6mm-2.0mm.

SAC:

Special Area of Conservation

SBC:

Swindon Borough Council

SEL:

Single Event Level

Sensitivity:

A term applied to specific receptors, combining judgements of the susceptibility of the receptor to the specific type of change or development proposed and the value related to that receptor.

SHM:

'Swindon Strategic Highway Model'

Silt (Z):

Soil particles from 0.002mm to less than 0.06mm in equivalent diameter.

Slowly permeable layer (SPL):

A layer at least 15cm in thickness with the upper boundary within 80cm of the ground surface and with soils that impede the downward movement of excess rainfall.

SM:

Scheduled Monument

SOAEL:

Significant Observed Adverse Effect Level

Soil:

The upper layer of the earth's crust, in which plants grow. It consists of weathered rock, organic matter, air spaces and water. Descriptions usually identify the relevant characteristics of its (usually) horizontal layers in terms of their significance for soil characteristics and crop growth, usually to a depth of 1.2m.

Soil moisture deficit:

The difference between the maximum amount of water potentially stored in drained soil and the amount remaining after some of the water has been transpired by growing vegetation.

Soil structure:

The combination or aggregation of soil particles into larger compound units (known as peds) with pore spaces and channels between that allow the flow of air and water and the penetration of roots. The secondary units are characterised and classified on the basis of size, shape and degree of development.

Soil texture:

The relative proportion of the various size fractions of particles in a soil (sand, silt and clay).

Sound Energy:

The energy present in a sound field that causes mechanical vibration in any medium through which a sound wave passes. Measured in Joules (j).

Sound Energy Level:

The logarithm of the ratio of the sound energy (J) to the reference sound energy level (J₀). The reference value for sound energy is 1 pJ. Defined as:

$$L_J = 10 \log \left(\frac{J}{J_0} \right)$$

Sound Exposure Level (LAE):

The level of sound, equal to 1 second of duration, that has the same sound energy as the actual noise event considered. Is also referred to as the SEL, or the LAX. Defined as:

$$L_{AE} = L_{Aeq} + 10 \log_{10}(t)$$

Sound Power (LW):

The total sound energy radiated by a source, in all directions. Measured in watts (W).

Sound Power Level (LW):

The logarithm of the ratio of the sound power (W) to the reference sound power level (W₀). The reference value for sound power is 1 pW. Defined as:

$$L_{AE} = L_{Aeq} + 10 \log_{10}(t)$$

Sound Pressure:

The difference between the pressure caused by a sound wave and the ambient pressure of the medium the sound wave is passing through. Measured in Pascals.

Sound Pressure Level (L_p):

The logarithm of the ratio of a given sound pressure (p) to the reference sound pressure (p₀). The reference value for sound pressure is 20 μPa. Defined as:

$$L_p = 20 \log \left(\frac{p}{p_0} \right)$$

Sound Sources:

Sounds generated by nature or human activity.

SPA:

Special Area of Conservation

SPG:

Supplementary Planning Guidance

Subgrade 3a:

Good quality agricultural land that is capable of consistently producing moderate to high yields of a narrow range of arable crops, especially cereals, or moderate yields of a wide range of crops including cereals, grass, oilseed rape, potatoes, sugar beet and the less demanding horticultural crops.

Subgrade 3b:

Moderate quality agricultural land that is capable of producing moderate yields of a narrow range of crops, principally cereals and grass, or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year.

Subsoil:

Weathered soil layer extending between the natural topsoil and the unweathered basal layer (geological parent material) below, or similar material on which topsoil can be spread. Subsoil has lower organic matter and plant nutrient content than topsoil. In most cases topsoils require a subsoil to perform one or a number of natural soil functions.

Susceptibility:

The ability of a defined landscape or visual receptor to accommodate the specific proposed development without undue negative consequences.

SSSI:

Site of Special Scientific Interest

STP:

Synthetic Turf Pitches

TA:

Transport Assessment - a comprehensive review of transport issues relating to a Proposed Development, submitted in support of a planning application.

Topsoil:

Upper layer of a soil profile, usually darker in colour (because of its higher content of organic matter) and more fertile than subsoil, and which is a product of natural biological and environmental processes.

VDV:

Vibration Dose Value

Wetness class (WC):

Soil wetness is classified according to the depth and duration of waterlogging in the soil profile. Six wetness classes are identified, ranging from very well drained to very poorly drained.

Wetness limitation:

A soil wetness limitation exists where the soil water regime adversely affects plant growth or imposes restrictions on cultivations or grazing by livestock.

WHO:

World Health Organisation

WSI:

Written Scheme of Investigation

Zone of Theoretical Visibility (ZTV):

A map, usually digitally produced, showing areas of land within which a development is theoretically visible.

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