Water Eaton

PR6a : Land East of Oxford Road

Environmental Statement (Main Report)

Bellway | STRATEGIC LAND

Christ Church Oxford

WE / ES / P01

Document title:	Environmental Statement - WE/ES/P01
Project:	Water Eaton - PR6a Land east of Oxford Road
Client:	Bellway Homes Limited and Christ Church, Oxford
Job number:	477898
File location:	J:\JOBS\Bellway, Christ Church_Water Eaton_PR6a

Date	Coordinated by	
28/04/2023	Savills	P Traves

Environmental Statement Contents

Non-Technical Summary

Environmental Statement Chapters

Environmental Statement Figures

Environmental Statement Appendices – WE/ESA/P01

1.1 Assessor information
2.1 Soils and Agricultural Land Quality
2.2 Phase 1 Geo-environmental report (text only)
3.1 Soil management plan
4.1 EIA scoping request
4.2 EIA scoping opinion
5.1 Transport Assessment - committed development list
6.1 Assessment Inputs
6.2 Air Quality Figures
6.3 Construction Phase Assessment Methodology
6.4 Operation Phase Assessment Results
6.5 Sensitivity Analysis Results
7.1 Glossary of noise terminology
8.1 Flood risk assessment
8.2 Foul Drainage and Utilities Assessment
9.1 Ecological baseline
9.2 Shadow Habitats Regulations Assessment
9.3 Biodiversity Improvement and Management Plan
10.1 Photoviewpoints
10.2 Wirelines
10.3 Landscape Strategy
10.4 LVIA
11.1 Archaeology and Heritage Assessment Report
11.2 Archaeological Geophysical Survey
11.3 Trial Trench Evaluation Phase 1
11.4 Trial Trench Evaluation Phase 2
12.1 Baseline Survey. DOC-16-16913-5A-20210625-SMK-PR6A-BLS-01
12.2 Lighting Parameters. DOC-16-16913-5A-20210625-JB-PR6A-PP-01
12.3 Illumination Impact Assessment. DOC-16-16913-5A-20220804-SMK-PR6-IIP-01
13.1 Walking, Cycling and Horse Riding Review

1 Environmental Statement for Water Eaton

1.1.1 This Environmental Statement has been prepared on behalf of Bellway Homes Limited and Christ Church, Oxford (the Applicant's) for an outline planning application seeking planning consent for the proposed development of Site PR6a, Land East of Oxford Road. The land is allocated in the Cherwell District Council Partial Review Local Plan (Adopted 2020). The Site and the proposal is known as Water Eaton.

1.1.2 The location of the Application Site is shown below on Figure 1.1.

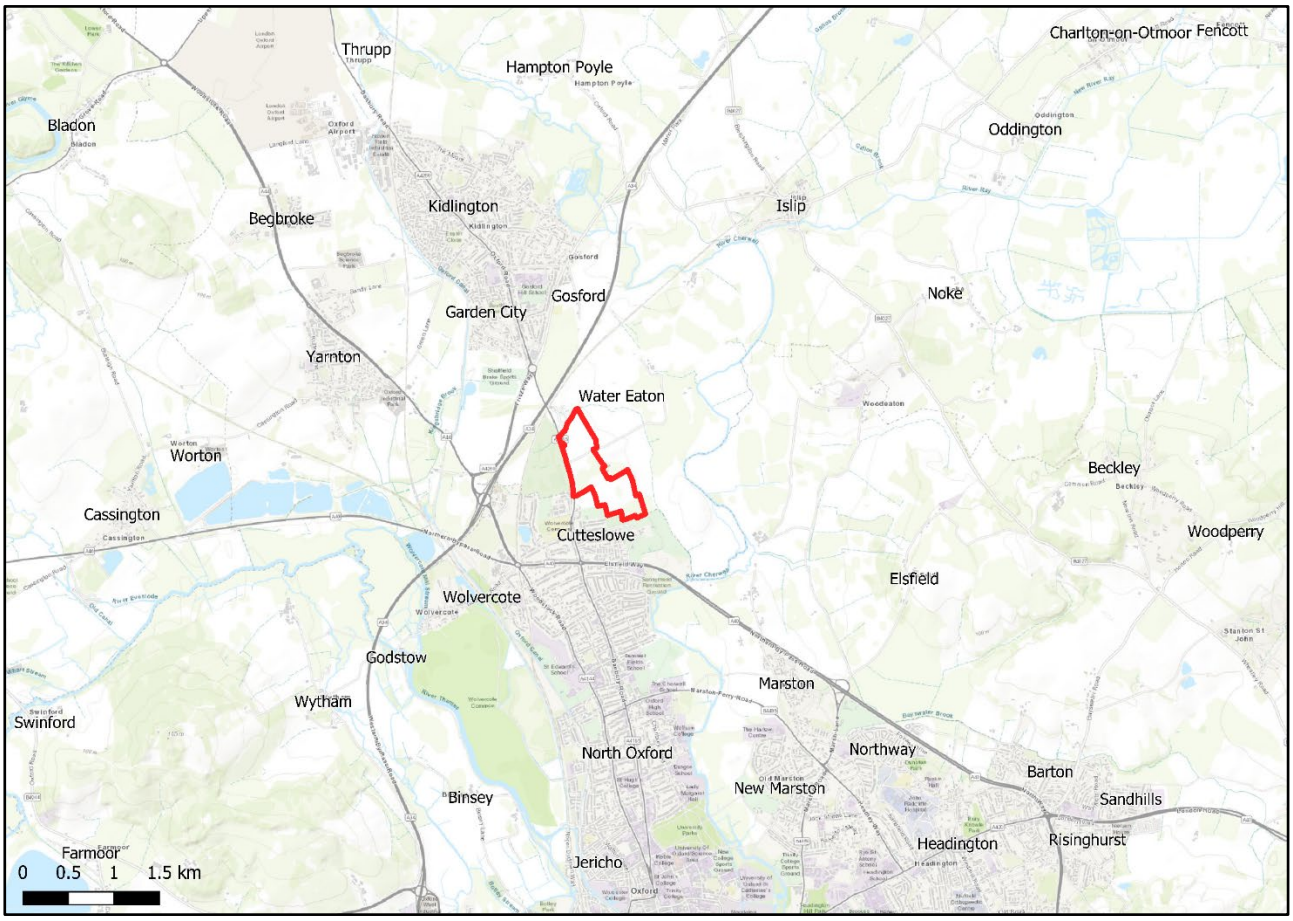

Figure 1.1 Site location (World Topographical Map, Copyright © Esri. All rights reserved.)

1.1.3 The description of the proposed development, as identified on the planning application form is:

"Outline application (with all matters except access reserved for future consideration) for the demolition of existing buildings and the erection of up to 800 dwellings (Class C3); a two form entry primary school; a local centre comprising: convenience retailing (not less than 350sqm and up to 500sqm (Class E(a))), business uses (Class E(g)(i)) and/or financial and professional uses (Class E(c)) up to 500sqm, café or restaurant use (Class E(b)) up to 200sqm; community building (Class E and F2); car and cycle parking); associated play areas, allotments, public open green space and landscaping; new vehicular, pedestrian and cycle access points; internal roads, paths and communal parking infrastructure; associated works, infrastructure (including Sustainable Urban Drainage, services and utilities) and ancillary development. Works to the Oxford Road in the vicinity of the site to include, pedestrian and cycle infrastructure, drainage, bus stops, landscaping and ancillary development."

Planning context

1.1.4 The Site is included in the Cherwell Local Plan as Policy PR6a Strategic Allocation. Policy PR6a allocates the Site for mixed-use development including around 690 dwellings, a two form entry primary school, a local centre and recreation space. The strategic allocation is for land to the east of the A4165 Oxford Road, as shown below.

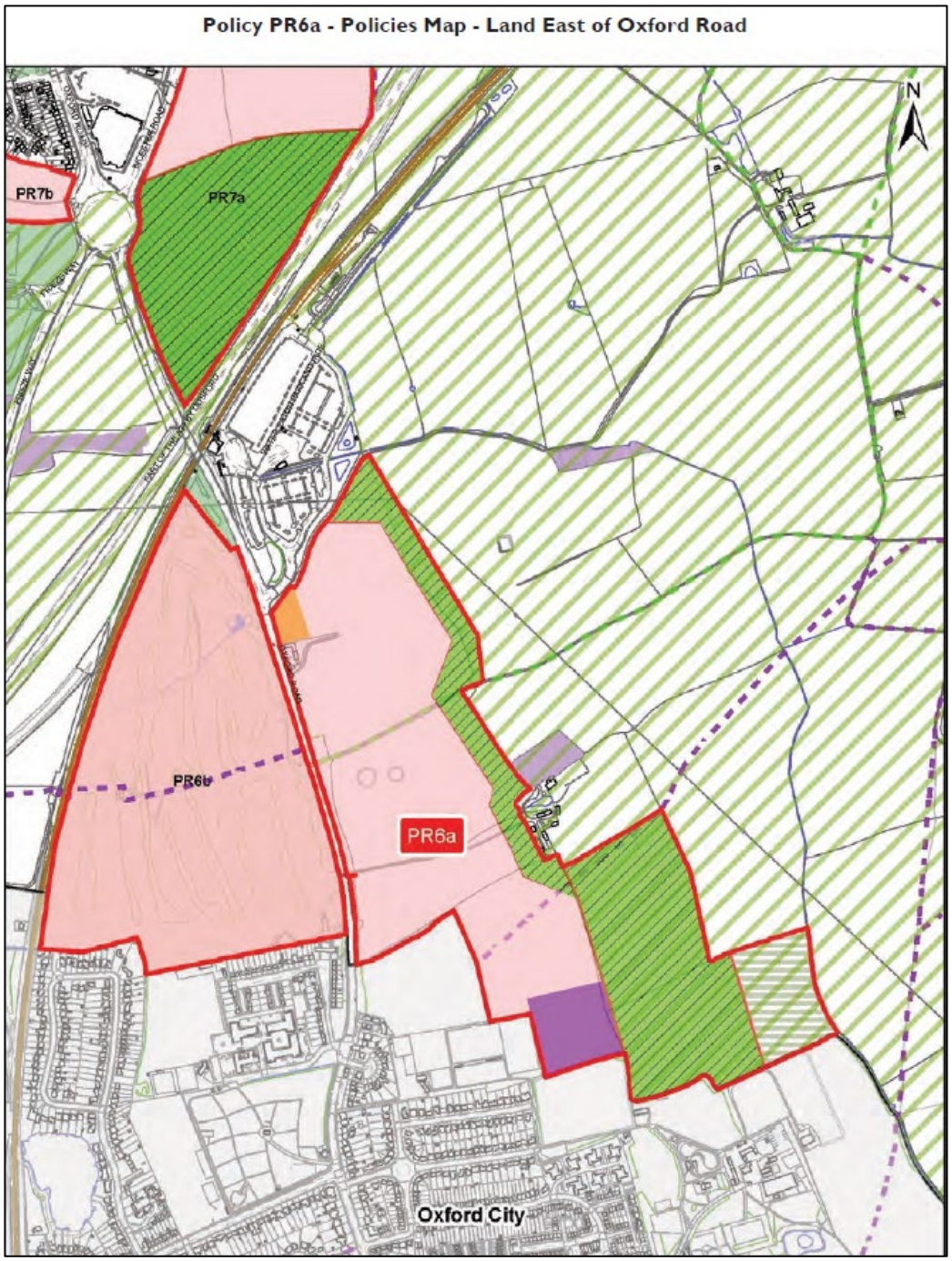

Figure 1.2 Extract from The Cherwell Local Plan 2011-2031 (Part 1) Partial Review

1.1.5 The planning application proposes development within the red line boundary on Figure 1.3 below (see separate Figure 2.1), which covers an area of 45.8 hectares (ha). Policy PR6a (8) requires 3ha of land to be retained in agricultural use on the south eastern edge of the allocation (identified by horizontal green lines shown on Figure 1.2 above). The corresponding area of land is not included in the planning application boundary shown below. Also excluded, is Pipal Cottage, a property alongside Oxford Road to the south of the Oxford Parkway Park and Ride site. The farm outbuildings next to Pipal Cottage are included in the application area. Land within Oxford Road that is required for highway improvements is included in the red line.

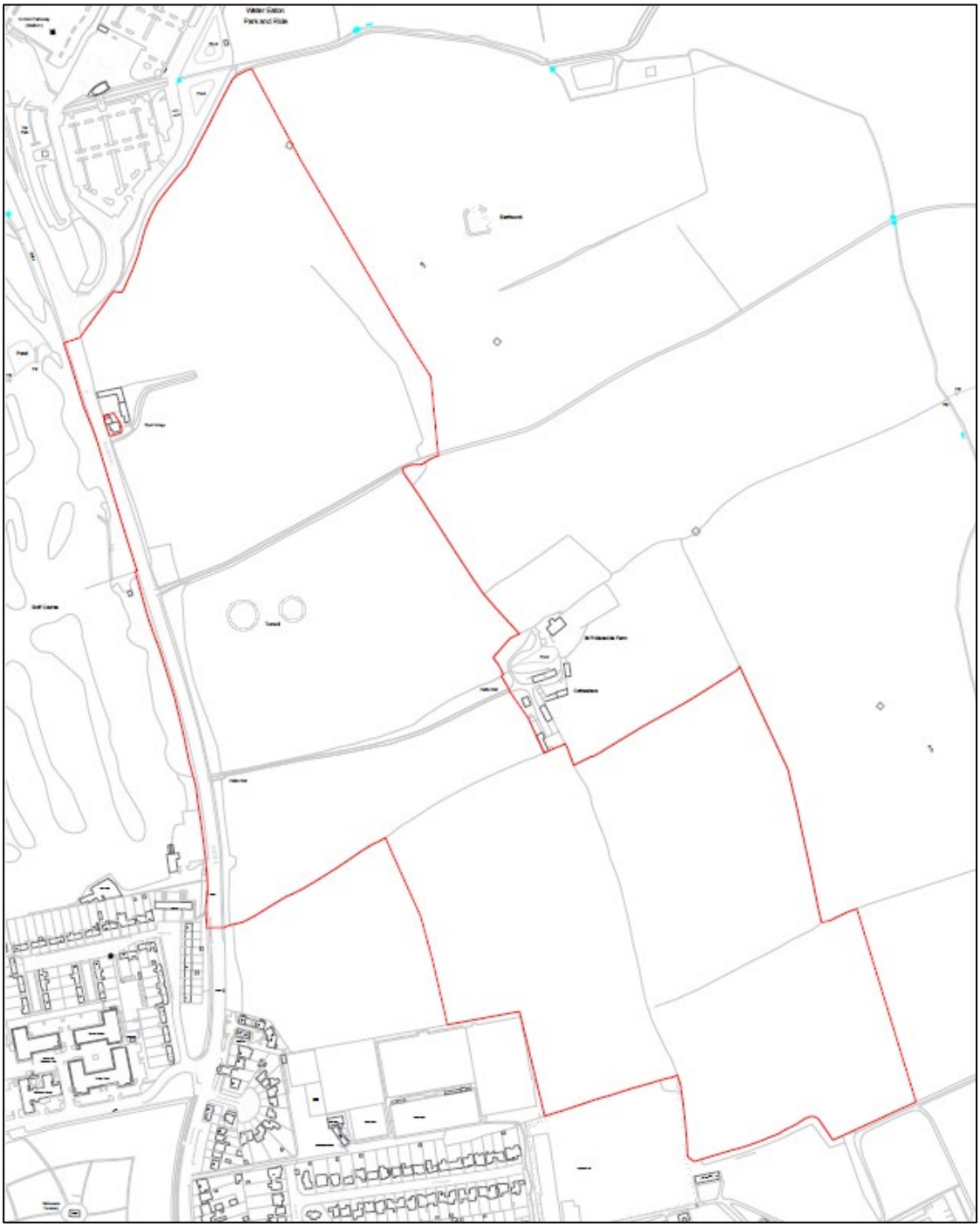

Figure 1.3 Planning application area

Environmental Impact Assessment

1.1.6 Environmental Impact Assessment (EIA) is a process that formally considers the construction and operational aspects of a proposal that may have significant effects on the environment. The findings of an EIA are described in a written report known as an Environmental Statement (ES). An ES provides environmental information about the scheme, including a description of the development, its predicted environmental effects and the measures proposed to mitigate adverse effects: information that is taken into account in the planning decision.

1.1.7 This document is the ES submitted with the planning application for the Proposed Development and sets out the results of the EIA undertaken. This ES is prepared in accordance with The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (the 'EIA Regulations'). A separate Non-Technical Summary (NTS) provides a summary of the main findings of the ES.

1.1.8 During the preliminary stages of the EIA process, a request was made to the Council for its EIA Scoping Opinion. The purpose of this is to identify what the Council considers to be the main environmental issues associated with the Proposed Development (Appendix 4.1). The Council consulted with statutory consultees and issued a formal EIA Scoping Opinion in June 2021 (see Appendix 4.2).

1.1.9 EIA has been undertaken for the Proposed Development described in Chapter 3 and illustrated by Figures 3.1, 3.2 and 3.3. These are definitive 'Parameter Plans' that provide certainty for the extent of development that may be approved.

1.1.10 Subsequently, when the Council is deciding whether to grant planning permission, it can do so in the full knowledge of any significant effects predicted, and take this into account in the decision making process. EIA is a procedure, rather than a requirement to demonstrate no adverse effects. In cases where an assessment predicts that adverse effects could occur, planning legislation does not direct that permission should therefore be refused.

1.1.11 A grant of outline planning permission would require the further submission of details for approval (Reserved Matters). Subsequent applications should be in general conformity with the plans approved at the outline stage. However, if the details contained in any subsequent applications would result in environmental effects that are not identified at the time of the principle decision, further assessment may be necessary.

1.2 This Environmental Statement

1.2.1 This ES comprises the main report, figures, supporting appendices and a separate NTS. Following this introductory chapter, the main ES is organised as follows:

1. Introduction
2. Site description
3. Description of development
4. Approach to assessment
5. Traffic, access and movement
6. Air quality
7. Noise and vibration
8. Drainage and flood risk
9. Biodiversity
10. Landscape and visual effects
11. Heritage

12. Lighting
13. Population
14. Climate change
15. Cumulative Effects
16. Summary of mitigation, residual effects and interaction

1.2.2 Chapter 2 provides a description of the Site and its context, and how this has influenced the scheme assessed. Chapter 3 explains each element of the Proposed Development and, with Figures 3.1, 3.2 and 3.3, defines the physical and operational aspects assessed by the EIA.

1.2.3 The alternative options considered during the scheme design process, in relation to the points raised during the consultation process, are explained in Chapter 4. Environmental issues assessed in the EIA process are then reported in Chapters 5 to 14, with the majority of associated figures provided separately, although some are within the text of the Chapters. Chapter 15 provides commentary on the potential effects when considered in cumulation with other schemes in the vicinity, as requested by Cherwell District Council (CDC) in the EIA Scoping Opinion. Chapter 16 provides a summary of the mitigation and residual effects.

1.2.4 The framework used to express the predicted significance of the environmental effects identified and assessed is explained in each ES chapter. Effects can either be positive or negative and can be temporary or permanent.

Mitigation measures

1.2.5 Those elements of the scheme design introduced to mitigate potential adverse effects are set out in Chapter 3 or identified within the relevant topic chapter. Mitigation can be categorised into two types, ‘inherent’ and ‘additional’ mitigation. Inherent mitigation is a fundamental part of the scheme and can generally be represented in the plans provided, as explained in Chapter 3 and represented in Figures 3.1, 3.2 and 3.3.

1.2.6 Additional mitigation is generally not capable of being shown in the plans because, for example, it may involve contributions to the provision of off-Site measures, or require controls on the construction or operation of the Proposed Development that cannot be shown visually. The delivery of additional mitigation measures can be secured through the imposition of planning conditions or legal obligations associated with a grant of planning permission for the Proposed Development.

1.2.7 Securing the required infrastructure would be the subject of planning obligations comprising a proportionate contribution (land / works / financial support) towards strategic infrastructure and to provide the development parcel infrastructure (secured by Section 106 legal obligation).

1.2.8 Together, the completion of legal obligations and Section 278 highway agreements demonstrate the Applicant’s commitment to deliver mitigation, and the Council's ability to control the delivery of necessary infrastructure.

The project team

1.2.9 Those working on the project design and the EIA of the Proposed Development are as follows:

- i-transport: Transport, access and movement;
- Planning & Environmental Consultants: Air Quality;
- DICE Environmental: Noise and Vibration;
- Glanville: Drainage and flood risk;
- EDP: Biodiversity; LVIA; Heritage;

- Hoare Lea: Lighting;
- Turley: Climate Change;
- Savills: Population effects, EIA co-ordination, planning consultancy.

1.2.10 The EIA has been coordinated by Savills with the technical assessments and input undertaken by the project team. An outline of the qualifications/experience of the assessors is provided in Appendix 1.1.

Availability of information

1.2.11 The Environmental Statement and other planning application documents can be viewed and downloaded via the Council's planning applications website:

https://www.cherwell.gov.uk/info/9/planning-and-building

or inspected by arrangement during normal office hours at the Council's office - telephone 01295 227001.

1.2.12 A copy of the ES on USB Flash Drive is available at a charge of £25.00. Enquiries in respect of these, or printed copies of the Non-technical Summary, ES or Appendices should be made to Savills – oxfordplanning@savills.com / telephone 01865 269000.

2 Site description

2.1.1 The Site is to the east of Oxford Road. Currently, the land is in agricultural use, predominantly as arable fields (ES Appendix 2.1). Two surfaced tracks off Oxford Road cross the Site from west to east. One is a private road access to the Water Eaton Estate and a bridleway, the second provides access to St Frideswide's Farm.

2.1.2 The Site is crossed by two Public Rights of Way (PRoW). PRoW 229/9/30 is a bridle path that leads east from Oxford Road on the same alignment as the Water Eaton Estate access. PRoW 229/8/10 is a footpath that crosses the southern part of the Site. Both paths provide connections to Water Eaton approximately 1.2 km north-east of the Site.

2.1.3 Field boundaries across the Site include some mature native hedgerows, and some sections of post and wire fencing. The majority of the hedgerows are regularly managed (c.1.5 m high). A small number of species-poor hedgerows are present, alongside the track leading to the Water Eaton estate, and along the southern and eastern boundaries of the south-western field.

2.1.4 Owing to their species diversity and maturity, the hedgerows are considered to be of Local ecological value, forming a key component of the local habitat network and green infrastructure. Field surveys have confirmed that these habitats support, or are likely to support, a range of species, including nesting birds and foraging/commuting bats.

2.1.5 Two small areas of broad-leaved woodland are present within the western edge of the Site alongside Oxford Road, and there are sparsely scattered hedgerow trees. Ecological surveys have recorded a barn owl roost at St Frideswide's Farm and a bat roost is also confirmed on site.

2.1.6 Across the Site, field ditches and the topography allow surface water to drain in an easterly direction. These connect with a network of drainage ditches that ultimately discharge into the River Cherwell. The Cherwell River flows in a southerly direction to join the River Thames south of Oxford City. The Site is located in Flood Zone 1, where there is a low risk of flooding.

2.1.7 The Oxfordshire Historic Environment Record records three non-designated heritage assets within the boundary of the Site. These comprise two round barrows (recorded as funerary monuments of prehistoric date). The recorded remains of the two round barrows comprised their surrounding ditches and parts of their internal mounds. Based on the recorded stratigraphy, finds and carbon 14 evidence, the barrows have been dated to the early Anglo-Saxon period. The third asset noted is a post-medieval milestone on the western boundary. This has not been located during walkover surveys.

2.1.8 A study of ground conditions has been prepared and used to conduct a preliminary Conceptual Site Model (CSM) of the potential level of risk posed to human health or controlled waters associated with the development of the Site (ES Appendix 2.2). The assessment of contamination risk is based on the source-pathway-receptor concept, i.e., if one of these elements is absent, no significant risk is considered to be present.

2.1.9 The CSM shows that the overall risk to the health of construction workers and future residents is “Very Low”, and “Low” with respect to use of the land for agriculture. A “Medium” level risk is identified to surface water, attributed to the drainage from adjacent off-site uses.

2.1.10 The Site and surroundings are located within a surface water Nitrate Vulnerable Zone (Cherwell (Ray to Thames) and Woodeaton Brook, Thames (Leach to Evenlode)), and within a Drinking Water Safeguard Zone, but not within a Drinking Water Protected Area.

2.1.11 Further site investigation has been undertaken to verify the earlier findings, see 4.1.23.

2.2 Local context

2.2.1 The western boundary of the Site includes Oxford Road and the northern boundary adjoins Oxford Parkway Park and Ride site. To the east, the Site boundary crosses an open field, then follows field boundaries around St. Frideswide's Farm to the south, where the southern boundary adjoins Cutteslowe Park, Banbury Road North Sports Ground, and an adjacent field. The land to the south of the Site boundary is within the administrative area of Oxford City Council.

2.2.2 The Site is bounded by the A4165 (Oxford Road) to the west, Oxford Parkway Park and Ride to the north, Cutteslowe to the south and agricultural land to the east. Two tracks provide access to Water Eaton and the surrounding farms, and St Frideswide's Farm which borders the Site.

2.2.3 Oxford Road is a two-way single carriageway road, with a southbound bus lane, and shared cycling/pedestrian facilities on both sides of the carriageway. It is lit and is subject to a 40mph speed limit in the vicinity of the Site. This section of Oxford Road connects the A4260 and Bicester Road with the A40 to the south. From the Wolvercote Roundabout junction on the A40, the A44 links with the A34.

2.2.4 The A34 trunk road forms part of the strategic road network. It connects the M3 in Hampshire with the M40 to the north. The A34 can be accessed from the application Site via Oxford Road and either the A4260 and A44 (north from the Site), or via the A40 and A44 (south from the Site).

2.2.5 Oxford Road benefits from continuous shared footway/cycleways on both sides of the carriageway. This network allows for pedestrian and cyclist movements to the north for Oxford Parkway Park and Ride, and to the south, connection with the Cutteslowe neighbourhood as well as Oxford City Centre (5 km).

2.2.6 The nearest railway station to the site is Oxford Parkway, approximately 350 m northwest of the Site boundary. Parkway Station provides a connection to Oxford Railway Station, located within the City.

2.2.7 There are good public transport linkages from the Site via bus with regular services to Woodstock, Gosford, Kidlington, Bicester and Oxford City. The nearest bus stops are located approximately 200 m northwest of the site boundary at Oxford Parkway and in the vicinity of the southwestern part of the Site at the junction of Jordan Hill on Oxford Road. Further bus stops are also located further south on Oxford Road.

2.2.8 The Site is crossed by two Public Rights of Way. PRoW 229/9/30 is a bridle path that runs from Oxford Road across to the east, and PRoW 229/8/10 is a footpath that crosses the southern part of the Site. Both paths lead towards Water Eaton, approximately 1.2 km north-east of the Site. On the western side of Oxford Road, footpath 229/10/30 crosses North Oxford golf course to a footbridge over the railway.

2.2.9 The nearest designated heritage asset to the Site is St Frideswide's Grade II* listed building situated c.50 m east of the Site at its closest point. It has a Grade II listed garden wall, which is located c.10 m to the north east of the farmhouse.

2.2.10 Pipal Cottage and its associated farm outbuildings are non-designated heritage assets situated alongside Oxford Road on the western boundary of the Site. Pipal Cottage is not included in the planning application, the outbuildings are included. These are visible from the public Bridleway

within the Site.

2.2.11 Further away, some 1 km north east of the Site, there is a group of six listed buildings at Water Eaton Manor, close to the River Cherwell.

2.2.12 The two Public Rights of Way provide connections to Water Eaton approximately 1.2 km north-east of the Site and the network of path to the east of the River Cherwell.

2.2.13 The nearest designations for nature conservation are Port Meadow with Wolvercote Common and Green SSSI, and the Oxford Meadows SAC which are located 2 km south west of the Site. Pixey and Yarnton Meads SSSI is located 2.5 km west of the Site to the west side of the A34.

2.3 Sensitive receptors

2.3.1 Environmental features of the Application Site and adjacent areas to be considered in the design and assessment of the proposals have been identified as:

- Surface water drainage;
- Oxford Road and existing access to properties;
- Public Rights of Way (BR 229/9/30 & FP 229/8/10);
- Trees / hedgerows;
- Heritage assets;
- Adjacent uses – Oxford Parkway Station and Water Eaton Park & Ride; residential, and recreation uses; and,
- Land west of Oxford Road - CDC Local Plan Allocation PR6b.

3 The scheme assessed

3.1.1 The EIA has assessed the development of:

- Demolition of existing buildings (outbuildings to the east of Pipal Cottage);
- Improvements to Oxford Road;
- Footpaths and cycle links, with vehicle, pedestrian and cycle access from Oxford Road;
- The construction and occupation of up to 800 dwellings;
- A 2-form entry primary school;
- A local centre;
- Formal and informal open space; and
- Sustainable drainage.

3.1.2 Parameter Plans (Figures 3.1, 3.2 & 3.3) show the distribution of land uses, the building heights assessed, and the access strategy for vehicles, cycling and pedestrians. They reflect the outline nature of the application and define the development principles for the Proposed Development that would govern the detail provided in subsequent planning applications for the approval of reserved matters (appearance, layout, scale, and landscaping).

3.1.3 Access is a matter for which detailed approval is sought. Figures 3.4 and 3.5 show the plans that have been submitted to CDC for approval and used in this assessment.

3.1.4 Figure 3.6 shows a copy of the Illustrative Masterplan. The masterplan is not submitted for approval at this stage and is shown in the ES to indicate how the scheme could be delivered in detail.

Proposed uses

3.1.5 Figure 3.1 shows the principal land use across the Site would be residential development, which would provide for a range of dwelling types suitable for people of different ages and lifestyles, including affordable housing. The mix of unit types, sizes and details of tenure have been considered extensively during preparation of the development proposals, but are not matters that are submitted for approval with this outline planning application. The precise details would be subject to discussion and agreement with CDC, and would be secured through planning obligations.

3.1.6 A local centre would be developed on-site to create floor space available for the provision of health care services, local retail, and/or community uses. Its general location within the Site will be within the area shown on the parameter plan. This will ensure that it is well related to the new residents of Water Eaton, as well as being easily accessible to those that will reside to the west side of Oxford Road when that land is developed (PR6b site).

3.1.7 A serviced site for a two-form entry (2FE) primary school is positioned in a central location within the Site. This school would be accessed via the primary street running through this part of the Proposed Development. It is not in the location indicated on the CDC Policy Map for PR6a. Further explanation is given below at paragraphs 4.7.6-7.

3.1.8 In terms of height, the residential buildings would range between 2 and 4 storeys (Figure 3.2). The development fronting Oxford Road is assessed as being up to four storey (14 m), with some key buildings at ‘gateway’ locations (indicated by the star annotation on the plan) having landmark features up to 18 m from finished ground level (5 storeys). The development in the area each side of the primary road through the Site is shown as up to 11.5 m above finished ground level, with the new homes reduced in height (up to 10 m high) to the east and south.

The upper height for the primary school development is set at 11 metres. The school building would only require a small part of the area shown for the school as most of the site would be set out as open space for play and sport.

Access and movement

Movement within the proposals

3.1.9 Walking and cycling will be prioritised ahead of car movement, a cycle route through the centre of the Site would provide a direct route from the adjacent Park and Ride through to the south of the Site and connect with Cutteslowe Park. Between these key nodes for movement, a further leisure route for use by pedestrians and cycles would be set within the green corridor on the eastern side of the Site.

3.1.10 Whilst the exact position of the school building within the site will be confirmed at the detailed design stage, the Parameter Plan reflects the design intention for it to be positioned within easy walking distance of the local centre. This would enable car parking at the local centre to co-function as a 'park and stride' point for pupils.

3.1.11 The local centre would be in a location that is convenient for access from Oxford Road/cycle superhighway, residents in Water Eaton and PR6b, and would promote combined purpose trips.

Access to the local network

3.1.12 The alterations to Oxford Road and access junctions, footpath and cycle paths, bus stops shown on Figures 3.1, 3.4 and 3.5, can be summarised as:

1. Pedestrian and cycle access connection to Oxford Parkway access road.
2. A 'left-in, left-out' priority T-junction for vehicles, with cycle and pedestrian routes.
3. The existing St Frideswide's Farm and Water Eaton accesses from Oxford Road to be closed to vehicular traffic and to be turned into pedestrian / cycle accesses (bridleway access for the Water Eaton access). Alternative vehicular access arrangements to the properties, associated buildings and agricultural land served from these accesses will be provided from the proposed Oxford Road site accesses and street network within the site (which would be set at reserved matters stage);
4. A traffic signal-controlled crossing of Oxford Road for pedestrians and cyclists (Toucan Crossing) linking the public rights of way that cross Sites PR6a and PR6b.
5. Bus stops located near Oxford Road Toucan crossing, local centre and public rights of way.
6. The junctions for vehicle access to Water Easton envisage future access to PR6b from Oxford Road (Figure 15.2).
7. Pedestrian and cycle connection with adjacent development.
8. Connection with public footpaths.
9. Provision for connection into Cutteslowe Park.

Open space

3.1.13 The eastern edge of the Site will become a strategic habitat and leisure green corridor connecting the Oxford Parkway Park and Ride in the north to Cutteslowe Park in the south (Green infrastructure parameter plan 58B, Figure 3.3).

Drainage

3.1.14 The surface water drainage strategy is designed to ensure that the Proposed Development achieves pre-developed conditions (i.e. greenfield runoff rates) through sustainable drainage techniques. It is proposed to utilise detention basins and wetlands as the primary form of runoff storage on the Site (Green infrastructure parameter plan 58B, Figure 3.3). At-source techniques such as rainwater harvesting, green roofs, bioretention systems, pervious pavements and tree

pits will be incorporated throughout the Proposed Development. Swales, filter strips or filter drains will be considered as means of flow conveyance through the Site in-place of conventional pipe networks wherever practical. No surface water storage features will be located within the boundaries of the proposed school site, as per Oxfordshire County Council's school standards.

3.1.15 It is considered that the development proposed will reduce pollution risk by replacing the current agricultural use, which can represent a source of nutrient input to surface waters. The SuDS features proposed also adequately mitigate surface water pollution risk by collecting runoff in detention basins and then treating using filter strips, swales or other techniques as detailed above.

Household waste

3.1.16 When completed and occupied, there would be an increase in the volume of household waste collected at the kerbside. According to WasteDataFlow statistics from the Department for Environment, Food and Rural Affairs (DEFRA), the amount of household waste collected per resident is 394kg, of which some 45% is recycled, slightly under the target to recycle at least 50% of waste generated by households. Based on the DEFRA statistics, the amount of household waste arising from the Proposed Development could be in the order of 745 tonnes annually.

Climate Change and Energy Use

3.1.17 In terms of planning, addressing climate change is one of the core land use planning principles which the National Planning Policy Framework expects to underpin both plan-making and decision-taking. It recognises that planning plays a key role in minimising vulnerability, providing resilience and managing the risks associated with climate change.

3.1.18 An effective approach to reducing greenhouse gas emissions from new development is the use of efficient designs and insulation products to achieve high levels of thermal efficiency – the 'fabric first' approach. New homes and buildings that benefit from the latest heating systems, very high levels of thermal insulation of walls, floors, ceilings, windows and doors can achieve a substantial reduction of CO_2 emissions.

3.1.19 For the residential development, the focus of the design would limit the energy consumption and CO_2 emissions through optimising the building performance together with energy efficiency measures following the steps of the energy hierarchy, as set out below. It would meet the requirements of UK Building Regulations in force at the time when detailed designs are submitted for approval by:

- Using less energy / demand reduction;
- Supplying energy efficiently; and,
- Using renewable energy.

3.1.20 In addition, energy demand and requirements can be improved through careful building siting, design and orientation. Climate change and sustainability mitigation and adaptation considerations have been considered to promote sustainable transport, management of surface water drainage, and planting and landscape measures resilient to predicted climate change, for which, relevant aspects are described in each assessment. Chapter 14 reports the outcome of the assessment of likely significant environmental effects arising from the Proposed Development in relation to climate change and how these effects can be reduced.

Displacement of current use on the Site

3.1.21 The scheme would displace the current use as agricultural land and the outbuildings next to Pipal Cottage are proposed to be demolished as part of the Proposed Development.

Site remediation

3.1.22 Historically the Site has been used for agriculture, which has a low to medium risk associated with the potential for contamination. In the event that contaminated material is identified during site preparation, the contractor would follow standard procedures to:

- notify the Environmental Health department of the discovery.
- secure the area / take action to prevent the release of contamination.
- appoint a specialist to carry out the necessary analysis to identify the substance and appropriate containment/disposal options.
- dispose of the material in accordance with applicable legislation after obtaining the necessary consents and / or licenses.
- record waster transfer / disposal certificates.

Traffic Movements during Construction

3.1.23 An indicative level of traffic movements has been developed based on the likely construction activities and previous experience from the Applicants in similar projects. HGV movements would be principally associated with the delivery of plant and materials, and the removal of construction waste. In addition, construction personnel and visitors to the site would also generate car and van movements as they arrive and depart.

3.1.24 For the construction phase of the Proposed Development, in respect to the residential development, there would be approximately 20 HGV movements per day. For the local centre, and the primary school, there is expected to be approximately 5 HGV movements each per day (over a shorter construction period). All construction traffic for the Proposed Development would be expected to access the Site via Oxford Road. Construction traffic will be managed via a Construction Traffic Management Plan (CTMP). Oxford Road connects to the strategic road network via the A34 and A44 to the north and the A40, which runs in an east-west orientation.

Construction Compounds

3.1.25 The safe storage and use of fuels for the plant would be a priority in site management. Drainage within the temporary secure site compounds where construction vehicles would park and where any diesel fuel would be stored, would be directed to an oil interceptor to prevent pollution should any spillage occur. Diesel storage and refuelling would be within a designated area or a self-bunded tank in accordance with the Oil Storage Regulations. All oil storage tanks should be self-bunded to equal the quantity of oil held. This is regarded as industry standard practice and also includes mandatory legal requirements which are considered as integral to the development. Spill kits and mandatory spill reporting would also form part of the management regime in line with standard procedures.

3.1.26 Water used during construction would be sourced from existing grid connections, or, where this is not possible, water would be supplied by tankers. Primary uses for water during the construction phase would include: use in welfare facilities; dust suppression; cleaning (of plant, materials, surfaces etc.); wheel wash; commissioning/testing of water supply services, and the commissioning of mains and heating systems.

Construction Environmental Management Plan (CEMP)

3.1.27 This would be prepared to control construction activities on site and the contractors would adhere to the Considerate Constructors Scheme. The CEMP, secured through an appropriately worded planning condition, would set out how the works would be constructed and implemented to ensure amongst other things, the protection of local amenity, highway operation and the environment. Should further mitigation measure be identified for the construction phase, the CEMP can be a mechanism for the implementation of these measures. The CEMP would be agreed with the Council prior to commencement of works at the Site and the appointed contractor would be required to comply with the CEMP.

3.1.28 A Soil Management Plan has been prepared – see Appendix 3.1. The permanent loss of agricultural land would occur as each stage of the construction is progressed. Mitigation for the change in use from agricultural to built development is limited to reuse of the soils in an appropriate manner to re-establish some of the existing functions of the soil, principally for storing and cycling water and carbon, and for supporting habitats, biodiversity and landscape planting.

3.1.29 The disturbance of ground during the construction works will be undertaken in accordance with current best practice guidance and legislation. This will be supplemented by the preparation and adoption of detailed site-specific monitoring and management to be defined in the Construction and Environmental Management Plan, a Site Waste Management Plan, a Materials Management Plan for soils, earthworks and any remediation necessary, along with a Construction Code of Practice (Considerate Constructor).

3.1.30 These measures will be designed to minimise waste, reduce off-site disposal and importation of materials, limit construction movements as far as reasonably practicable, and position haul roads sensitively to minimise impacts to neighbours and the public. Works methods and plant will be selected to minimise light, noise, dust and vibration where this may have the potential to impact upon neighbours and the public.

Construction waste and management

3.1.31 The Buildings Research Establishment (BRE) has developed benchmarking to aid in the estimation of construction waste arising at the design stage of a new development. The benchmarks are derived from data reported from a range of completed projects which are used to inform the BRE SMARTWaste Tool. These benchmarks have been used to forecast the construction waste that would potentially be generated when developing the proposal.

3.1.32 In total, approximately 7,000 tonnes of waste may arise from the construction of the built development. This assume no minimisation, reuse or recycling has taken place. It is therefore the baseline figure from which a reduction in waste arising can be established.

3.1.33 In order to minimise the volume of waste generated, a Site Waste Management Plan (SWMP), forming part of the CEMP, would be prepared. The CEMP (which should be prepared in discussion with the appointed contractor) would be agreed with the Council prior to commencement of works at the site and the appointed contractor(s) would be required to comply with the requirements of the CEMP. Such adherence would ensure that significant adverse effects from the management of waste would be unlikely.

3.1.34 An estimate of GHG emissions over the duration of the construction period is provided in Table 14.26 in section 5 of ES Chapter 14.

4 The approach to assessment

4.1 EIA scoping

4.1.1 In April 2021, a request for the formal EIA Scoping Opinion of CDC was submitted on behalf of the Applicants (Appendix 4.1). The request was accompanied by an EIA Scoping Report that set out the proposed study of environmental issues for the Proposal. CDC adopted an EIA Screening Opinion in June 2021. A copy of CDC's letter and consultation responses to the scoping request can be found in Appendix 4.2.

4.1.2 A summary of the comments received and any additional specific matters identified by the consultees is provided below.

Table 4.1 EIA Scoping consultation

Topic	Consultee / Summary of comments / advice	ES Reference
Cherwell District Council (CDC) Environmental Protection - Noise	Satisfied with approach.	N/A
CDC Environmental Protection - Contamination	Advises that the potential for land contamination should be considered	ES Appendix 2.2
CDC Environmental Protection – Air Quality	Requests damage cost calculation in assessment and the inclusion of EV charging points.	Chapter 6 ES 6.11.6
CDC Conservation Officer	EIA should include comprehensive assessment of heritage impacts, impacts on views of horse riders and hydrological impacts on St.Frideswide's, requires parameter plan and a site visit.	Chapter 10 ES 10.2.11. Chapter 8, Parameter plans
Oxfordshire County Council (OXCC) Strategic Comments	Interested in cumulative impacts of allocated sites, expects an innovative proposal.	ES 5.6.1 Chapter 15
OXCC Transport Comments	Expected to assess the following road links: Oxford Road, A4260, A40, A34, A44 and A4165. Requires further assessment on sensitive links, WCHAR should be in the EIA and PRoW should be integrated in site.	Chapter 5 ES 5.2.4. Figures.3.1, 3.3, 3.4.
OXCC Flood Comments	Require water quality assessment, surface water management strategy and runoff to be managed at source. Must meet SuDS standards.	Chapter 8 ES 8.9.7
OXCC Education Comments	More education provision required on higher dwelling end, potential for significant impacts on demand. Must consider travel patterns to local schools. OXCC pupil place plan to be used for school place planning.	Chapter 13 ES 13.5.19
OXCC Property Comments	Refer to OXCC guidance for school site delivery.	N/A
OXCC Archaeology Comments	Survey results to be included in heritage chapter.	Chapter 11 ES 11.1.1
OXCC Minerals & Waste Comments	Design site to safeguard rail depot. Consider construction waste management and reuse/recycling.	Chapter 3 ES 3.1.31
OXCC Public Health Comments	Should complete separate HIA.	Document reference WE/HIA/P01

Thames Water	Satisfied.	N/A
Highways England	TA should assess impacts to A34 and Wolvercote roundabout. Access strategy required for the site.	Chapter 5 ES 5.5.42
Environment Agency	Flood Zones need updating, no development in FZ3. May require basic hydraulic model, discuss with EA.	Chapter 8 ES 8.3.19
Historic England	Consider list of heritage assets attached in comment. Photomontages and sectional elevations should be considered. Impact of drainage patterns on heritage remains should be considered.	Chapter 11 Section 4

4.1.3 As part of the scoping exercise and subsequent assessment work, a number of issues are considered as unlikely to give rise to significant environmental effects and as such, are addressed in the assessment as described below.

Waste

4.1.4 The Council provides for the sustainable management of household waste. In relation to the future capacity to deal with waste, this includes planned housing and population growth. As the Site is allocated for housing development in the Local Plan, the needs of its future residents for waste collection, recycling and disposal are taken into account by waste management planning.

4.1.5 An estimate of quantities and types of waste produced during the construction and operation phases is included in the ES as required by EIA Schedule 4, 1.(d). This is estimated using the Building Research Establishment SmartWaste Database. This provides a benchmark from which waste reduction measures can be appraised.

4.1.6 The development, predominantly on a greenfield site, will not generate any unusual or complex waste requiring specialist control or management and is therefore unlikely to result in significant adverse effects to the environment. The issue of waste disposal is therefore not considered further in this assessment.

Human health

4.1.7 The subject of human health is addressed in a number of the proposed topic areas. Protection of human health is considered within the assessments of transport and traffic, air quality, noise and vibration, in relation to relevant published standards and thresholds.

4.1.8 The assessment considers the potential indirect contribution towards health improvement through access to housing, community facilities including education, recreation/physical activity, the ability to utilise sustainable transport (minimising individual car use), and securing the benefits from the economic investment. It is attentive to the potential determinants of health, and consistency with local plan policy. Therefore, as human health is covered off in proposed topic areas as above, it is not considered appropriate to have a specific chapter on the topic.

Accidents and Disasters

4.1.9 The potential for accidents or disasters resulting from the occupation and use of the Proposed Development is considered to be negligible. This judgement is based on the following information.

4.1.10 Potential emergency situations are considered by the Thames Valley Local Resilience Forum and published in their community risk register. The register focuses on nine categories of serious risk that are most likely and could result in an emergency. These are considered below in relation to the Proposed Development.

4.1.11 The Proposed Development is not considered specifically vulnerable to five of the identified risks: influenza disease, animal disease, loss of critical infrastructure, industrial accidents and

fuel shortages. There are no expected significant effects in relation to these and they are not considered in the EIA. The other four risks are considered in turn.

4.1.12 RIVER FLOODING – Whilst the Site is in an area that is at a low risk from flooding, a flood risk assessment has been undertaken for the proposal as it covers an area of more than 1 hectare. A drainage strategy has been prepared to demonstrate that the development does not result in flooding on the Site, St. Frideswide's Farm or elsewhere down river.

4.1.13 SEVERE WEATHER - Resilience of the proposals to future climate change impacts is reported in the description of the proposal. Specific matters such as wind loading for the building designs is dealt with under the building regulations and the detail will not be available at the planning submission stage.

4.1.14 ENVIRONMENTAL POLLUTION – The land has been used for agriculture, and the drainage of surface water from the Site has the potential to lead to pollution. This is considered in the assessment in relation to the River Cherwell and wildlife receptors.

4.1.15 TRANSPORT ACCIDENTS – The proposal delivers new junctions on a section of Oxford Road and roads within the development. These are designed to approved highway standards and subject to appropriate speed limits. There are no expected significant effects in relation to these. A transport assessment accompanies the planning application. The baseline transport information in the EIA refers to the road traffic accident history reported in the TA.

4.1.16 The potential extent of a reservoir breach has been considered with reference to the flood risk information published by the Environment Agency. Water from a breach of the Farmoor Reservoir (7 km south west) follows the course of the River Thames and would not affect the application Site.

4.1.17 It is not considered that major accidents or disaster during construction are likely but the aspects above will be kept under review. Upon completion the potential for accidents or disasters affecting the development and resulting in adverse effects on human health, cultural heritage or the environment is considered to be negligible.

4.1.18 Oxfordshire Emergency Planning Unit also considers specific sites in Oxfordshire in relation to the potential for radiation incidents at Culham or Harwell Science Centres to affect members of the public. There is very low likelihood (one in one billion years) of an off-site radiation emergency at Culham, and it is expected that decommissioning of the Harwell reactors will be complete by 2025.

4.1.19 Therefore the ES does not contain a specific assessment of potential accidents and disasters.

Soils and Agricultural Land

4.1.20 A site survey of agricultural quality has been undertaken, as shown in ES Appendix 2.1. This shows the majority of the agricultural land that would be affected is Grade 3b (87%), with a smaller area of Grade 3a (7%) and Grade 2 land (6%), and some non-agricultural (Appendix 2.1, page 6, Table 1).

4.1.21 The primary measures to mitigate the impacts on soil resources during the site preparation, earthworks and construction activities are to store and re-use surplus soils in a sustainable manner (for 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. This approach ensures that the quality of soils retained on-site and exported off-site (if required) is maintained by good soil handling and storage, particularly to avoid compaction and biodegradation of soils that are in storage. A Soil Management Plan is included at ES Appendix

3.1.

4.1.22 It is not considered that there would be any significant effect on soils, agricultural land resources, or agricultural business, and therefore the ES does not include any further assessment of soil and agricultural land.

Ground conditions

4.1.23 Site investigation has been undertaken during 2022 to assess the likely nature and extent of any ground gas contamination that might be present. No significant ground gas contamination was discovered on-site. This aligned with the lack of any direct sources confirmed during intrusive investigation, and the innocuous site history identified by the desk studies. A conceptual model of the potential sources, pathways and receptors of contamination has been prepared, which concluded the overall risk to the future on-site receptors can be described as 'Very Low to Medium'. Should any potentially contaminated areas be identified during demolition or construction work, detailed intrusive investigation works would be carried out to determine any potential impact.

Material Assets

4.1.24 There is mains electricity, potable water, telecommunications, and foul and surface water drainage services on site and nearby. An overhead electricity line crosses the northern corner of the Site. Whilst upgraded services and provision across the Site are needed, it is not envisaged that the construction will have any significant effects on material assets.

4.2 Continued consultations

4.2.1 As part of the process of preparing the outline planning application, the Applicants and the consultant team have met on a monthly basis with officers of the Council, Oxfordshire County Council and Oxford City Council (March 2021 to January 2023). Issues covered in these meetings included:

- Masterplanning: draft parameter plans, illustrative masterplan, green infrastructure;
- Education: consideration of alternative sites for the school on-site;
- Transport: proposals for the Oxford Road corridor, sustainable transport;
- Archaeology: identification of buffer zones around the barrows;
- Local Centre / Community Building: Consideration of the proposed location;
- Consideration of issues relating to Ecology, Flood Risk and Drainage, Landscape Impact Assessment, Air Quality, Foul Drainage and Utilities, Lighting Impact Assessment.
- Community Engagement: Programmes and details of planned events.

4.3 Assessment of effects

4.3.1 An appropriate way to link a planning permission to proposals that have been subject to EIA is through a set of development Parameter Plans that are included as part of the formal planning application. Parameter Plans define the development 'envelope' and assumptions that are subject to EIA, and upon which the planning decision is based. This approach seeks to ensure that the scheme assessed contains sufficient detail to identify, predict and assess the significance of the main environmental impacts (based on a cautious, or 'worst case' approach) and is representative of the development to be approved.

4.3.2 The primary study area for the EIA covers the physical extent of the Site shown on Figure 2.1. It is defined by the area of land to be used, the nature of the environmental conditions and the

manner in which impacts are likely to be generated. Each assessment topic defines its wider study area geographically in relation to the assessment of the Proposed Development and for the consideration of cumulative effects. These Areas of Influence are described in Table 4.2 below.

4.3.3 The temporal scope considers the construction phase, and thereafter when the development is completed and occupied (often referred to as the 'operational' phase). For example, the assessment of landscape and visual effects considers residual effects at a future time when the landscaping within the scheme has had 15 years to mature.

4.3.4 It is envisaged that construction will commence in 2024 with the final housebuilding completed by 2031. The Proposed Development is designed as a permanent provision, i.e., decommissioning is not an aspect considered in the EIA.

4.3.5 In order to determine the scope of the EIA, the process has identified:

- the key characteristics of the Site and the establishment of the environmental baseline through a series of desk and field studies;
- any further survey work required (delayed due to Covid-19);
- initial consideration of the potential sources and nature of environmental impacts; and
- definition of the assessment methodologies to be used (where available).

4.3.6 In addition, the EIA studies are interconnected with the following key documents that have been prepared as part of the planning application: Design and Access Statement; Energy Strategy; Green Infrastructure Strategy; Biodiversity Metric Calculation; Lighting Assessment; and Health Impact Assessment.

4.4 Approach to the assessment as part of a wider Local Plan Allocation

4.4.1 This section provides a description of how the EIA assesses the Proposed Development and how it relates to the comprehensive development of the Local Plan Policy PR6a Allocation. The strategic allocation extends to approximately 48 hectares.

4.4.2 The PR6b allocation is located to the west of the Site, on the opposite side of Oxford Road, covering a golf course. The Proposed Development has been designed to accord with the delivery of the PR6b allocation, with the proposed layout providing a means of shared access to Oxford Road via a new junction (Figure 15.2).

4.4.3 The consideration of cumulative effects can be found in Chapter 15.

4.5 Climate change

4.5.1 UK Climate Projections 2018 (UKCP18) is the official source of climate projections in the UK. It is funded by the Department for Environment, Food and Rural Affair (Defra), the Department for Business, Energy and Industrial Strategy, the Met Office and the Environment Agency.

4.5.2 The UKCP18 Projections highlight that the general trends of climate change in the 21st century show a progressive increase in mean air temperatures during summer and winter, a reduction in the rate of precipitation during the summer months but an increase during the winter months, with a slight reduction in average wind speed in the summer and a small increase during the winter.

4.5.3 The potential impact of climate change on the findings of the assessment by each specialist consultant is presented within an additional section of each technical chapter in the ES. Utilising

the UKCP18, each chapter has considered how potential climate change may alter the predicted effects for the receptors in the assessment with reference to the 2020s (the construction period); the 2050s (medium term); and the 2080s (long-term). In accordance with *'Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation'* (IEMA 2020), the highest emissions scenario (RCP8.5, 50th percentile) is used for the future scenarios.

4.5.4 ES Chapter 14, Climate Change, reports the outcome of the assessment of likely significant environmental effects arising from the construction and operation of the Proposed Development in relation to climate change.

4.6 Alternatives

4.6.1 The Site is included in the Cherwell Local Plan Partial Review as Policy PR6a Strategic Allocation. Policy PR6a allocates the Site for mixed-use development including around 690 dwellings, a two form entry primary school, a local centre and recreation space. The strategic allocation extends to approximately 48 hectares of land to the east of the A4165 Oxford Road, shown by Figure 1.2. The Applicants have prepared a development proposal in response to the PR6a allocation.

4.6.2 The Local Plan Partial Review supplements the adopted Cherwell Local Plan (2015) and is the culmination of a lengthy period of preparation, evidence gathering and consultation. It was developed through a detailed process involving technical research, key stakeholder and community consultation and a sustainability appraisal of sites and policies prior to its adoption. This is considered to be a robust process that determined the Site is suitable for the Proposed Development.

4.6.3 The Partial Review includes a clear vision for how Oxford's unmet housing needs will be met within Cherwell. To achieve this, six residential development areas are identified in an area extending north from Oxford (either side of the A4165 Oxford Road) and along the A44 corridor.

4.6.4 Given the identification of the Application Site as one of the Strategic Allocations, and the policy context assigned to the location, it is not deemed appropriate to consider alternative sites.

4.7 Design iteration

Alternative development scenarios and design iterations

4.7.1 Whilst the Site is allocated by Policy PR6a as an appropriate location to accommodate the development proposed, a series of development scenarios have evolved for the Site that seek to accommodate both the aspirations of the Applicants and the requirements of CDC and other stakeholders. A series of baseline studies have been undertaken in order to inform the design framework within which the layout has evolved, the results of which are referenced in various sections of this ES.

Site constraints and opportunities

4.7.2 The process of design development is underpinned by the outcomes of this baseline work and leads to a series of constraints and opportunities for the Site being identified which has informed the evolution of the design. A summary of those that have informed the scheme are described in ES Section 2.3.

Masterplan development and consultation

4.7.3 Following the adoption of the Local Plan, a vision prepared for the Site effectively became a precursor to the current proposals. More recently, during 2021 the Applicants have been

working together with a consultant team to bring forward an Allocation-wide masterplan.

4.7.4 This site wide masterplan work has informed the contents of the Outline Planning application and sets out the design principles for the Proposed Development. The design evolution and engagement process has influenced a number of important elements of the scheme during this stage.

4.7.5 Having completed an initial set of technical studies, investigations and surveys, a series of meetings were arranged with CDC officers to discuss the emerging design concepts, strategies, principles and quantum of development. Key issues included school provision, the potential public open space provision, and the variety of landscape typologies that might be delivered within the masterplan concept, with particular attention given to the form and nature of the formal sports provision.

4.7.6 With the primary school and local centre being key community components of the Proposed Development, the design strategy focused on locating these centrally in order to maximise the number of people within a 5-minute walk from these facilities. This also provides an opportunity for the shared use of facilities for example parking and community uses such as using the school building at the weekends.

4.7.7 The design strategy looked to differ from the local plan arrangement due to poor walkable school catchment and a lack of synergy between the local centre and the school. The proposed layout places the local centre and school closer together to allow synergistic uses and greater community benefit from the new facilities. The proposed layout also places the local centre and school centrally in the Site to be able to improve the catchment and encourage more sustainable forms of travel such as walking or cycling.

4.7.8 Advice of the arboricultural consultant concerning the vegetation alongside the Oxford Road corridor has been informed by pre-application discussions with CDC's Tree Officer with regard to tree loss, retention, categorisation, and also mitigation across the whole of the application site. As part of this engagement, a site meeting was convened to provide a practical understanding of tree matters directly relating to the Oxford Road. At the onsite meeting with CDC Case Officer and Arboricultural Team Leader, it was agreed that tree groups lining the Oxford Road required individual survey to allow for a better understanding of the trees' indicative root protection areas (RPA's). The survey then took place in August 2022, and divided groups into individual trees at key access points along the Oxford Road.

4.7.9 Subsequently, two potential layouts for the Oxford Road were assessed against the tree constraints data and presented to CDC in January 2023 to provide an understanding of the potential implications of their implementation. As part of the package of information, proposals were also submitted to illustrate what is proposed in terms of new tree planting and green infrastructure on the Oxford Road frontage.

4.7.10 The main heritage assets relating to the Site are the two barrows which are being retained in a green square within the centre of the development. Green corridors will run through the development, following the routes of existing hedgerows, PRoW and overland drainage routes.

4.7.11 Although the enquiry by design favoured a foot-bridge crossing Oxford Road, it was considered that a network of footways and cycleways to link the development with Oxford and the Park & Ride would be more suitable.

5 Transport

5.1 Introduction

5.1.1 This chapter of the ES has been prepared by i-Transport LLP and assesses the likely significant effects of the Proposed Development on the environment in respect of Transport and Access.

5.1.2 The chapter describes:

- The assessment method;
- The baseline conditions at the Site and surroundings;
- The future baseline;
- Mitigation within the submitted design;
- The potential environmental effects and mitigation measures at both construction and operational phases;
- The likely residual effects after these measures have been implemented;
- The likely implications of climate change;
- Cumulative effects; and
- Summary

5.1.3 The adopted Cherwell Local Plan 2011-2031 Partial Review – Oxford's Unmet Housing Need (Ref 5.1) Policy PR6a allocates the Site for mixed-use development including around 690 dwellings, a two-form entry primary school, a local centre and recreation space.

5.1.4 The Development includes the following key land uses:

- Up to 800 homes;
- A primary school (two form entry);
- A local centre; and
- Formal and informal open space.

5.1.5 A Transport Assessment (TA) (Report Ref: ITB16565-102) has been produced as a separate document. The TA and this Transport chapter of the ES tests:

- 800 dwellings – 50% private and 50% affordable;
- Primary school – 2-form entry;
- Local centre including:
    - Shops / retail (use class E a) – 500sqm;
    - Business uses (use class E g i) - 500sqm
    - Financial / professional (use class E c) – 500sqm;
    - Café or restaurant (use class E b) – 200sqm; and
    - Community building use (class E and F2 b) - 400 sqm.

5.1.6 The Transport Assessment primarily identifies the Development's compliance with national and local transport policy in terms of a) its accessibility by non-car modes, b) the provision of safe and acceptable access; and c) setting out whether any significant impacts from the Development can be mitigated to an acceptable degree.

5.1.7 A Framework Travel Plan (FTP) (Report Ref ITB16565-103) has also been produced for the Development (which sets out the measures that will be introduced to reduce single occupancy car journeys). In addition a Framework Innovation Plan FIP) (Report Ref ITB16565-103) has also been produced for the Development.

5.1.8 It is not the intention of the Transport Assessment to fully assess the environmental impact of the Development. The assessment of the environmental impact of the additional traffic and transport demands generated by the Development requires assessment against different criteria. Therefore, the assessment set out in this Chapter has been undertaken against the criteria set out in the Institute of Environmental Assessment's (IEA) Guidelines for the Environmental Assessment of Road Traffic (Ref 5.2).

5.1.9 Of relevance to the assessment is that the Local Plan Partial Review also allocates land on the west side of Oxford Road for residential development (Policy PR6b – 670 dwellings). The PR6b site sits opposite the Site.

5.2 Assessment methodology

5.2.1 This section of the ES chapter identifies the assessment criteria and methodology.

Scoping Opinion

5.2.2 The scope of the Transport chapter is based upon the comments within the Scoping Opinion Ref:21/01635/SCOP) dated 9 June 2021.

5.2.3 National Highways (NH) stated it would be concerned with proposals that have the potential to impact the safe and efficient operation of the strategic road network, in this case the A34 and in particular for this site, the A34 Bicester Road junction and A34 Peartree Interchange. The ES submission and Transport Assessment will need to consider any potential impacts to the A34. NH request that the impact of the development on the Wolvercote Roundabout junction is also robustly assessed because, although it is not on the SRN, it already has capacity issues in the weekday peak hours and further development traffic could result in significant blocking back, potentially onto the A34 mainline.

5.2.4 Oxfordshire County Council (OXCC) as highway authority have also assessed the submission. The scoping note sets out that the applicant will be following IEA guidance, which the County Council recommend. When undertaking the traffic assessment, the following considerations will need to be evaluated in line with Guidelines for the Assessment of Road Traffic; Severance; Driver Delay; Pedestrian delay; Pedestrian amenity; Fear and intimidation and Accidents and safety. OXCC anticipate:

- The following links to be assessed as part of the assessment – Oxford Road; A4260 Kidlington; A40; A34; A44 and A4165 Banbury Road;
- Strategic schemes and mitigation schemes will be discussed through the planning process. It is expected that the construction phase will have the largest environmental impact so must be assessed fully. Any traffic growth on the local network above a 30% increase should be studied further. Sensitive links being affected by the development showing a 10% increase will also need further assessment;
- The EIA to include a review of the walking and cycling network; and
- Public rights of way through the site should be integrated with the development and improved to meet the pressures caused by the development whilst retaining as far as possible their character where appropriate.

Planning Policy and Guidance

National Planning Policy Framework

5.2.5 The National Planning Policy Framework (NPPF) (Ref 5.3) sets out the Government's planning policies for England and how these are expected to be applied.

5.2.6 Promoting sustainable transport is covered in Section 9 of the new NPPF (paragraphs 104 – 113). Paragraphs 110 – 113 consider development proposals.

5.2.7 Paragraph 104 states that:

Transport issues should be considered from the earliest stages of plan-making and development proposals, so that:
a) the potential impacts of development on transport networks can be addressed;
b) opportunities from existing or proposed transport infrastructure, and changing transport technology and usage, are realised – for example in relation to the scale, location or density of development that can be accommodated;
c) opportunities to promote walking, cycling and public transport use are identified and pursued;
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; and
e) patterns of movement, streets, parking and other transport considerations are integral to the design of schemes, and contribute to making high quality places.

5.2.8 Paragraph 110 states that:

In assessing sites that may be allocated for development in plans, or specific applications for development, it should be ensured that:
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;
c) the design of streets, parking areas, other transport elements and the content of associated standards reflects current national guidance, including the National Design Guide and the National Model Design Code; and
d) 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 degree.

5.2.9 Paragraph 111 states that:

Development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe.

5.2.10 Paragraph 112 states that:

Within this context, applications for development should:
a) give priority first to pedestrian and cycle movements, both within the scheme and with neighbouring areas; and second – so far as possible – to facilitating access to high quality public transport, with layouts that maximise the catchment area for bus or other public transport services, and appropriate facilities that encourage public transport use;
b) address the needs of people with disabilities and reduced mobility in relation to all modes of transport;
c) create places that are safe, secure and attractive – which minimise the scope for conflicts between pedestrians, cyclists and vehicles, avoid unnecessary street clutter, and respond to local character and design standards;
d) allow for the efficient delivery of goods, and access by service and emergency vehicles; and
e) be designed to enable charging of plug-in and other ultra-low emission vehicles in safe, accessible, and convenient locations.

5.2.11 Paragraph 113 states that:

All developments that will generate significant amounts of movement should be required to provide a travel plan, and the application should be supported by a transport statement or transport assessment so that the likely impacts of the proposal can be assessed.

5.2.12 Therefore, development should provide opportunities for sustainable travel; achieve safe access; and should only be prevented where the residual cumulative impacts are 'severe'.

National Planning Practice Guidance (March 2014)

5.2.13 The PPG is a government published web-based planning guidance resource that was launched in March 2014 and replaced several previous guidance documents, including the DfT's 'Guidance for Transport Assessment' (2007).

5.2.14 In relation to Transport, the NPPG identifies that:

"Travel Plans, Transport Assessments and Statements are all ways of assessing and mitigating the negative transport impacts of Development in order to promote sustainable Development. They are required for all Developments which generate significant amounts of movements." (Ref: NPPG ID42 – 002)"

5.2.15 Transport Assessments and Statements can be used to establish transport impacts and whether the residual transport impacts of a proposed Development are likely to be 'severe', which may be a reason for refusal, in accordance with the NPPF.

5.2.16 In addition, the NPPG provides advice on when Transport Assessments, Transport Statements and Travel Plans are required and, what they should contain. Details regarding the overarching principles and information relating to each document are provided within the NPPG. It is identified in the guidance that the environmental effects of traffic should be assessed particularly in relation to proximity to environmentally sensitive areas such as air quality management areas or noise sensitive areas.

Local Planning Policy - Current Planning Policy

The Cherwell Local Plan 2011 - 2031 (Part1) (Adopted July 2015) (Ref: 5.5)

5.2.17 The Cherwell Local Plan sets out the vision and strategy for development throughout Cherwell through to 2031. The document defines and responds to challenges the District faces regarding development, economic growth, and infrastructure needs.

The Cherwell Local Plan 2011 - 2031 (Part1) Partial Review - Oxford's Unmet Housing Need (Adopted September 2020)

5.2.18 The Site is allocated for strategic residential led mixed use development in Policy PR6a - Land East of Oxford Road.

5.2.19 Policy PR6a includes key delivery, planning application and place shaping requirement. These are set out below for ease of reference:

5.2.20 Key Delivery Requirements include:

- Construction of 690 dwellings;
- The provision of a primary school with two forms of entry;
- The provision of a local centre;
- The provision of facilities for formal sports, play areas and allotments;
- The provision of public open green space as an extension to Cutteslowe Park including land set aside for the creation of wildlife habitats and for nature trail/circular walks accessible from the new primary school; and
- The creation of a green infrastructure corridor incorporating a pedestrian, wheelchair and all-weather cycle route along the site's eastern boundary. The route will connect Cutteslowe Park with Oxford Parkway Railway Station/Water Eaton Park and Ride and provide connection with the public rights of way network.

5.2.21 Planning application requirements include:

- A comprehensive Development Brief agreed with Cherwell District Council in advance of the planning application and prepared in consultation with Oxfordshire County Council (OXCC) and Oxford City Council (OCC). The Development Brief requirements include a number of items that have a bearing on transport / highway matters, including:
- Outline site layout which includes the sites for the required school and the local centre;
- Two points of vehicular access / egress from Oxford Road;
- An outline scheme for public vehicular, cycle, pedestrian, and wheelchair connectivity within the site, to the built environment of Oxford, to Cutteslowe Park, to the allocated site to the west of Oxford Road (policy PR6b) enabling connection to OCC's allocated 'Northern Gateway' site, to Oxford Parkway and Water Eaton Park and Ride, and to existing or new points of connection off-site and to existing or potential public transport services;
- Protection and connection of existing public rights of way and an outline scheme for pedestrian and cycle access to the surrounding countryside;
- Design principles which seek to deliver a connected and integrated urban extension to Oxford and which respond to historic setting of the city; and
- An outline scheme for vehicular access by the emergency services;
- A Transport Assessment and Travel Plan including measures for maximising sustainable transport connectivity, minimising the impact of motor vehicles on new residents and existing communities, and actions for updating the Travel Plan during construction of the development; and
- A single comprehensive, outline scheme shall be approved for the entire site. The scheme shall be supported by draft Heads of Terms for developer contributions and a Delivery Plan demonstrating how the implementation and phasing of the development shall be secured comprehensively and how individual development parcels, including the provision of supporting infrastructure will be delivered.

5.2.22 The place shaping principles include:

- A layout, design and appearance for a contemporary urban extension to Oxford city that responds to the 'gateway' location of the site, is fully integrated and connected with the existing built environment, maximises the opportunity for sustainable travel into Oxford, provides a high-quality, publicly accessible and well-connected green infrastructure and ensures a sensitive relationship with the site's Cherwell Valley setting.

OXCC's Local Transport and Connectivity Plan (Ref: 5.6)

5.2.23 The Local Transport and Connectivity Plan (LTCP) is OXCC's statutory Local Transport Plan and was adopted by full council on 12 July 2022. It sets out OXCC's vision for developing a world leading, innovative and carbon neutral transport system with a focus on how people move safely and quickly around their communities, Oxford city, and the county.

5.2.24 OXCC plan to achieve this by:

- Reducing the need to travel;
- Discouraging individual private vehicle journeys; and
- Making walking, cycling, public and shared transport the natural first choice.

5.2.25 OXCC are now working to implement the policies in the LTCP and develop the part 2 supporting strategies. These include:

- The Central Oxfordshire Travel Plan (Ref 5.7);
- Oxford Traffic Filters - OXCC have decided to prioritise the Oxford city traffic filters at Cabinet in November 2022. Six traffic filters – designed to reduce traffic, make bus journeys faster and make walking and cycling safer – will be trialled in Oxford after improvement works to Oxford railway station are complete. The traffic filters will be implemented under an experimental traffic regulation order (ETRO) for a minimum period of six months.. A long-term decision about the traffic filters will be made towards the end of the trial based on monitoring data collected and feedback from consultation;
- Developing and supporting implementation of a local toolkit of transport interventions that support the 20-minute neighbourhood approach and work to the principles of the healthy streets approach. It endorses the principle that everyday facilities appropriate to a local community can be found within a short (20 minute) return walk or cycle trip from home; and
- Parking Standards (Ref 5.8) - In January 2023 OXCC adopted new parking standards which cover edge of Oxford city sites such as the Water Eaton site.

Guidance / Best Practice

5.2.26 New streets need to be designed having regard to DfT's 'Manual for Streets' (Ref 5.9), OXCC's Street Design Guide (Ref 5.10) and Walking and Cycling Design Guides (Ref: 5.11), Healthy Streets Approach (Ref 5.12), LTN 1/20 (Ref 5.13) and the Department for Transports Inclusive Mobility (Ref 5.14).

5.2.27 OXCC adopted the 'Implementing 'Decide & Provide': Requirements for Transport Assessments in September 2022 (Ref 5.15). The 'decide and provide' approach to transport planning decides on a preferred vision of the future and then provides the means to work towards that whilst also accommodating uncertainty about the future. This offers the opportunity for more positive transport planning and helps implement the LTCP transport user hierarchy by considering walking, cycling and public transport upfront.

5.2.28 OXCC's document details how the 'decide and provide' approach is to be implemented through the transport assessments and infrastructure delivery mechanisms which accompany planning applications for proposed development.

Assessment Methodology

5.2.29 It has been agreed with OXCC that the North Oxford VISSIM Model is an appropriate tool to test the impact of the Proposed Development as well as the cumulative impact of all PR sites on the operation of the local and strategic highway network. It has a base year of 2018.

5.2.30 The North Oxford VISSIM model also has a 2023 Forecasting Year supplied by OXCC. Application of committed developments and appropriate growth has been used to establish the 2025 Year of Opening traffic flows to test the impacts of the Proposed Development. In addition a 2031 Forecast Year has been established to test the cumulative impacts of all the PR sites.

5.2.31 The IEA prepared 'Guidelines for the Environmental Assessment of Road Traffic (Guidance Note No. 1)'. These have been used as the basis for the method of assessment of the environmental effects of traffic in this Chapter. In addition, and where appropriate, reference will be made to the Design Manual for Roads and Bridges (DMRB) Volume 13 Environmental Assessment (Ref 5.16) published by the Department for Transport. The method for each effect

assessed is set out below.

5.2.32 With regard to the environmental impacts of road traffic that require assessment, this Chapter considers two distinct phases in accordance with best practice as set out in the IEA guidelines. The assessments will consider construction traffic and operational traffic, with the impact of HGV's during both phases also assessed. The following matters are referred to in the guidance:

- Community severance;
- Driver delay (based upon the findings of the Transport Assessment);
- Pedestrian delay (based upon the findings of the Transport Assessment);
- Pedestrian amenity;
- Accidents and safety; and
- Fear and intimidation of road users and pedestrians.

5.2.33 Dust and dirt are referred to in the guidance. The air quality chapter addresses this aspect.

5.2.34 Hazardous loads are also referred to in the guidance. There should be no hazardous loads associated with the Proposed Development and therefore the effect of the proposed development will have no impact and this is scoped out at this stage.

5.2.35 The sensitivity, magnitude and significance criteria are set out in the generic assessment method tables in Chapter 4.

5.2.36 The IEA guidance notes that a critical feature of an environmental assessment is determining whether a given impact is significant. Having quantified the magnitude of the impact (i.e., the level of change) there are various ways of interpreting whether or not this is considered significant. For many effects there are no simple rules or formulae which define thresholds of significance and there is, therefore, a need for interpretation and judgement on the part of the assessor (i-Transport), backed-up by data or quantified information wherever possible.

5.2.37 Based on the above the following significance criteria has been used in this Chapter with moderate or substantial effects being considered significant in ES terms.

Significance criteria	**Description of criteria**
Substantial beneficial	Significant local scale or moderate to significant regional scale improvement in transport terms
Moderate beneficial	Moderate local scale improvement in transport terms
Minor beneficial	Minor local scale improvements in transport terms
Negligible	No appreciable impact in transport terms
Minor adverse	Moderate local scale adverse impact in transport terms
Moderate adverse	Moderate changes in transport terms, severe temporary adverse impact on transport terms
Substantial adverse	Substantial changes in transport terms. Permanent adverse impact in transport terms.

5.2.38 With reference to the above guidance, the approach used to assess the impact of the Development in relation to these matters is set out below.

5.2.39 The air quality and noise effects of changes in traffic flow are considered in Chapters 6 and 7 respectively.

5.2.40 The IEA guidelines recommend that the Environmental Assessment should be undertaken at the year of opening of the Development or its first full year of operation. This is because the greatest environmental change will generally occur when the Development traffic forms the largest proportion of the existing flow on the adjoining network. Accordingly, the assessments in this chapter align with a Year of Opening of 2025 (on the basis that the Development is completed/ fully occupied at that point). In addition, for the full cumulative analysis a Future Year 2031 assessment has also been completed.

5.2.41 The IEA guidelines recommend that highway links should be separately assessed when:

- Traffic flows have increased by more than 30% (or the number of HGVs will increase by more than 30%); or
- Other sensitive areas are affected by traffic increases of at least 10%.

5.2.42 The trip generation of the Proposed Developments for the morning and evening peaks is set out in the Transport Assessment. For the purpose of the ES Chapter, this has been factored to 24-hours using the factors derived from the Automatic Traffic Counters on local road links and then assigned to the local highway network using the agreed distribution/assignment model. Annual Average Daily Traffic (AADT) flows have been derived.

Community Severance

5.2.43 Severance is the perceived division that can occur within a community when it becomes separated by a major traffic route. The assessment of severance pays full regard to specific local conditions, in particular the location of pedestrian routes to key local facilities and whether crossing facilities are provided or not.

5.2.44 The IEA Guidelines suggests that a 0-30%, 30-60% and 60-90% and ≥90% increase in traffic flow will respectively have a ‘negligible’ ‘slight’, ‘moderate’ and ‘substantial’ change in severance. However, allowance needs to be made for the presence of existing crossing facilities.

Driver and Pedestrian Delay and Pedestrian Amenity

5.2.45 Traffic delays to non-Development traffic can occur:

- At the Site entrance where there will be additional turning movements;
- On the highways serving the Site where there may be additional vehicular flow; and
- At key junctions on the highway network.

5.2.46 Values for driver delay are based upon computer assessment programmes including Junctions 10 for roundabouts and for priority junctions and LINSIG for traffic signal-controlled junctions and VISSIM micro simulation models. The IEA Guidance notes that each package produces estimates of vehicle time and delay through junctions and hence, by testing each junction for the baseline conditions and with the Development, it is possible to estimate increased vehicle delays.

5.2.47 The Development will bring about changes in the number of vehicle and pedestrian movements. In terms of pedestrian delay, any increase in traffic levels can lead to increases in delay to pedestrians seeking to cross a road.

5.2.48 The IEA guidelines recommend that rather than rely on thresholds of pedestrian delay the assessor should use judgement to determine whether there will be a significant impact on pedestrian delay.

5.2.49 In terms of pedestrian amenity, the IEA Guidelines broadly define this as the relative

pleasantness of a journey. It is affected by traffic flow, traffic composition, pavement width and separation from traffic. A tentative threshold for changes in pedestrian amenity is where traffic flows are halved or doubled.

Accidents and Safety

5.2.50 The IEA Guidance identifies that assessment of existing link road accident rates can be obtained from Highway Authority records and the assessment uses personal injury accident data for the most recently available five-year period which have been obtained. A summary of the accidents is included within the Transport Assessment.

5.2.51 The impact of the additional traffic from the Development is discussed in terms of the magnitude of increase, the existing accident record and the effect of off-site highway and transportation works.

Fear and Intimidation of Road Users and Pedestrians

5.2.52 A further impact that traffic may have on pedestrians is fear and intimidation. This impact is dependent on the volume of traffic, its HGV composition and its proximity to people and / or the lack of protection caused by factors such as narrow pavement widths. The IEA guidelines notes that whilst this has been recognised as an important environmental impact for many years, there are no commonly agreed thresholds for estimating levels of danger, or fear and intimidation from known traffic and physical conditions.

5.2.53 The IEA guidelines suggest thresholds based on average hourly vehicle flows over 18-hours, the 18-hour total HGV flows and vehicle speeds could be used as a "first approximation" of the potential for fear and intimidation as shown in Table 5.1 below.

Table 5.1 Fear and Intimidation Thresholds

Degree of Hazard	Average Traffic Flow over 18-Hour Day (vehicle / hour)	Total 18-hour HGV flow	Average speed over 18-Hour Day (mph)
Extreme	1800+	3000+	20+
Great	1200-1800	2000-3000	15-20
Moderate	600-1200	1000-2000	10-15

5.2.54 The IEA guidelines make it clear that in respect of fear and intimidation other factors need to be included such as proximity to traffic, pavement widths and there will need to be judgement to be exercised in determining the degree of fear and intimidation. Special consideration should be given to areas where there are likely to be particular problems such as high-speed sections of road and locations of turning points and accesses. Areas exposed to higher-than-average levels of school children and the elderly or other vulnerable groups should be separately identified.

Scope

5.2.55 The North Oxford VISSIM model is a micro-simulation model representing a large study area. The model is primarily formed of four key corridors including a 7km section of the A34 corridor, a 11km section of the A40 corridor, a 11km section of the A44-A4144 corridor and a 12km section of the A4260-A4165 corridor. The model extent is shown in the image below and covers the key links and junctions requested by NH and OXCC.

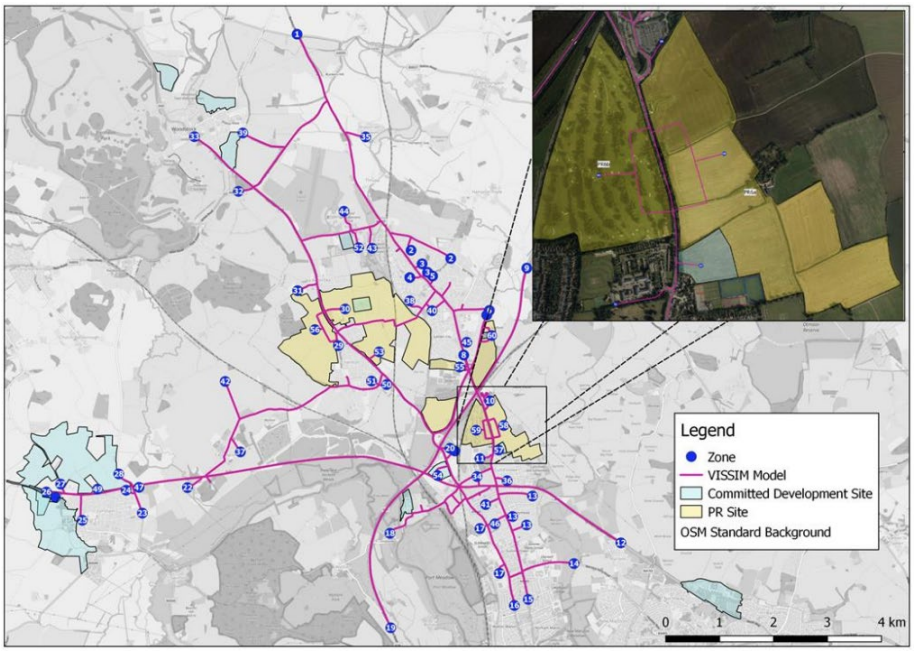

Figure 5.4 Study area

Assumptions & Limitations

5.2.56 Whilst there are no particular limitations identified within the assessment it should be noted that the basis of the traffic assessment used in this chapter is from a 2018 base traffic model. Whilst this remains within the time period identified as suitable in WEBTAG the surveys were undertaken prior to the COVID-19 pandemic. It is undoubtedly the case that over the period of the pandemic travel behaviour has evolved with lasting changes seen since the removal of restrictions particularly in weekday peak hour traffic volumes. Therefore, the assessment presented provides a worst-case of the anticipated future year network conditions given that it is forecast on top of pre-pandemic traffic flows.

5.2.57 During the assessment of effects there are often judgements requiring professional judgement. The competencies and qualifications of the Chapter authors mean they are competent in making these judgements.

Consultation

5.2.58 Pre application discussions / correspondence, covering a variety of matters including transport and access and the scope of the Transport Assessment, have taken place with the local planning authority, Cherwell District Council (CDC), the local highway authority, Oxfordshire County Council (OXCC), Oxford City Council (OCC) as the neighbouring planning authority and National Highways (NH) as the highway authority responsible for the strategic road network – namely the A34 in the vicinity of the site.

5.2.59 Discussions have taken place with Gosford and Water Eaton Parish Council (GWEPC) to identify and understand local transport issues and concerns. This has informed the transport strategy for the Development.

5.2.60 In addition, emerging Development proposals were reviewed by The Design Review Panel in September 2021 and March 2022.

5.2.61 The community involvement has included:

- An Enquiry by Design event held in July 2021;
- Initial public consultation exercise held in October 2021;
- Update public consultation (on line) during June / July 2022; and
- Public consultation on the draft planning application during December 2022 / January 2023.

5.2.62 The process has included discussions / communications with the Harbord Road Residents Association.

5.2.63 Comments received from the community engagement process have informed the transport strategy for the Development.

5.3 Baseline Conditions

Current Baseline

Site Location

5.3.1 The Site is located on the east side of the A4165 Oxford Road in northern Oxford.

5.3.2 Oxford Parkway Station / Park and Ride is situated immediately to the north of the site whilst Cutteslowe and Cutteslowe Park are situated to the south of the Site.

5.3.3 Immediately to the south of the Site is the St Frideswide Farm site. This site sits just in Oxford City and the City Council granted planning consent in August 2022 for a development of some 134 dwellings accessed from the east side of the A4165 Banbury Road.

Local Highway Network

A4165 Oxford Road / Banbury Road

5.3.4 The A4165 Oxford Road borders the site's western boundary and is a single carriageway road (with southbound bus lane), subject to a 40mph speed limit, running in a north-south direction from the Kidlington Roundabout to the North Oxford Golf Club. There are shared footway / cycleways on both sides of the carriageway.

5.3.5 Oxford Parkway Station and Park and Ride is located to the north of the Site and has a signal-controlled access junction from Oxford Road. A controlled crossing with tactile paving is provided to enable safe crossing across the Station / Park and Ride access road. A controlled crossing of Oxford Road is provided to the north of the signals and there is a pedestrian refuge island and tactile paving circa 90m south of the signals to enable users to cross Oxford Road.

5.3.6 Oxford Road turns into the A4165 Banbury Road from the golf club and then leads south to the Cutteslowe roundabout. Banbury Road is a single carriageway road, subject to a 30mph speed limit with the southbound bus lane also continuing for the duration. It features sections of shared footway / cycleway and periodic toucan crossings and pedestrian refuge islands. When the footway is not shared use, the bus lane is signposted to share with cyclists.

5.3.7 There has been a recent Traffic Regulation Order (TRO) consultation by OXCC on changing the speed limit along Oxford Road and through Kidlington roundabout to 30mph. The 30mph TRO was approved by OXCC in early 2023. This means that once the TRO is implemented by OXCC that the Site frontage will be subject to a 30mph limit ensuring an uninterrupted 30mph speed limit between Oxford & Kidlington.

Kidlington Roundabout

5.3.8 The Kidlington roundabout is a 5-arm roundabout junction between the A4165 Oxford Road

(south eastern arm) the A4260 and Bicester Road. It is situated just to the south of Kidlington. The A4260 Oxford Road leads north into Kidlington. OXCC has emerging proposals, funded through the Growth Fund deal, to improve Kidlington roundabout for pedestrians and cyclists.

Cutteslowe Roundabout

5.3.9 The Cutteslowe roundabout is a 4-arm roundabout junction between the A4165 Banbury Road (northern arm) the A40 Oxford ring road and the A4165 Banbury Road leading into Oxford city centre via the A4144 St Giles. There is a controlled crossing of the A40 western arm of the Cutteslowe roundabout.

Public Rights of Way

5.3.10 A network of footpath and bridleways are located within and around the PR6a site leading to surrounding areas.

5.3.11 The public rights of way include:

- Bridleway 229/9/30 running east from Oxford Road along the Water Eaton access track; and
- Public Footpath 229/8/10 running to the south of St Frideswide Farm.

5.3.12 In addition, Public Footpath 229/10/30 routes west from Oxford Road across the North Oxford golf club (PR6b site) and across the railway line to the west.

Cycling

5.3.13 There are two national cycle routes in close proximity to the site:

- Sustrans: Varsity Way - Route 51 Oxford to Cambridge runs across the site's western frontage, along the A4165 Oxford Road/ Banbury Road; and
- Sustrans: Shakespeare Cycleway – Route 5 Stratford-upon-Avon to London runs east of the site, accessible via the A40 or A4165 Banbury Road.

5.3.14 In the vicinity of the site are a number of principal quiet routes (no.1, 9, 10 and 12) and connecting quiet routes. The A40 (Northern Bypass Road), to the west, is currently undergoing improvements to incorporate cycle lanes.

Public Transport

5.3.15 The nearest bus stops to the site are located approximately 200m northwest of the site boundary at Oxford Parkway and in the immediate vicinity of the southwestern boundary of the site at the junction of Jordan Hill on Oxford Road. Further bus stops are also located further south on Oxford Road / Banbury Road.

5.3.16 There are two main bus operators in Oxford - Stagecoach and the Oxford Bus Company. Bus services local to the site are mainly operated by Stagecoach. A number of buses route along Oxford Road including:

- Stagecoach 2 / 2 a - Oxford city Centre to Kidlington Via Oxford Road / Banbury Road, Summertown;
- Stagecoach 700 - Thornhill Park & Ride to Kidlington Via Churchill, JR Hospital, Summertown, Oxford Parkway ; and
- Stagecoach S5 - Oxford – Bicester.

5.3.17 In summary, Oxford Road forms a high frequency bus corridor with bus services throughout the day linking the Site with a number of key destinations including Oxford city centre, Churchill Hospital, John Radcliffe Hospital and Kidlington.

5.3.18 The nearest railway station to the site is Oxford Parkway situated immediately to the north of the site. It is on the line between Oxford and Bicester and provides frequent services to destinations including Oxford, London Marylebone and Bicester.

5.3.19 A summary of 2018 baseline traffic flows (annual average daily traffic flows) on the highway network in the vicinity of the Site is provided in Table 5.2 below.

Table 5.2 2018 Baseline AADT Two-Way Traffic Flows

Link	Location	Total Vehicles	HGV Flow	HGV %
1	A420 Oxford Road (between Kidlington Roundabout and Sainsburys)	20599	1231	6%
2	Bicester Road (north of Kidlington Roundabout)	11578	446	4%
3	Oxford Road (between Kidlington Roundabout and Park and Ride)	21326	1288	6%
4	A4260 Frieze Way (south of Kidlington Roundabout)	14134	308	2%
5	Oxford Road (between Kidlington Roundabout and The Broadway)	8438	0	0%
6	Oxford Road (between Park and Ride and proposed PR6b access)	19872	1150	6%
7	Oxford Road (between proposed PR6b access and proposed PR6a access)	19872	1150	6%
8	Oxford Road (between proposed PR6a access and proposed signal junction)	19872	1150	6%
9	Oxford Road (between proposed signal junction and St Frideswide Farm (Croudace) Proposed Access)	19872	1150	6%
10	Oxford Road (between St Frideswide Farm (Croudace) Proposed Access and Five Mile Drive)	19872	1150	6%
11	Banbury Road (between Five Mile Drive and Harbord Road)	20297	1296	6%
12	Banbury Road (between Harbord Road and Harefields	20009	1296	6%
13	Banbury Road (between Harefields and Cutteslowe Roundabout)	21550	1320	6%
14	A40(E) (east of Cutteslowe Roundabout)	34174	1667	5%
15	Banbury Road (between Cutteslowe Roundabout and Davenant Road)	18698	1094	6%
16	A40(W) (between Cutteslowe Roundabout and Blandford Avenue)	24952	632	3%

Personal Injury Accident Data

5.3.20 Personal Injury Accident (PIA) data has been obtained from Oxfordshire County Council for the latest five-year period between 1 January 2017 and 30 June 2022. The data covers a study area consisting of the Oxford Road corridor including both Kidlington Roundabout and Cutteslowe Roundabout.

5.3.21 Some 12 recorded injury accidents occurred along the Oxford Road / Banbury Road corridor between the Kidlington and Cutteslowe Roundabouts within the vicinity of the Site. These are summarised below:

- A car lost control on a wet road and swerved into oncoming traffic colliding with another car causing slight injuries;
- A car failed to see and slow down for upcoming queuing traffic ahead, causing a rear end shunt of two cars in front resulting in slight injuries;

- A further rear end shunt was caused at the Oxford Parkway signal junction when it appeared a driver pressed the accelerator instead of the brake to slow for a car waiting at a red light causing slight injuries;
- A collision with a pedestrian was caused at the puffin crossing and involved an ambulance travelling with blue lights striking the pedestrian causing slight injuries.
- A cyclist intending to turn left into Oxford Parkway fell off their bike into a car that had slowly moved off to turn left, this caused slight injuries to the cyclist;
- A fatal accident occurred at the Oxford Parkway junction when a HGV was turning left on the slip road but a cyclist entered from the cycle track at the toucan crossing causing the rider to come off their bike;
- An incident occurred south of the Oxford Parkway junction when a car stopped suddenly causing a bus behind to brake harshly resulting in slight injuries to a bus passenger;
- A cyclist was travelling within the bus lane but failed to look properly and did not slow in time for a bus that had stopped to let a passenger off, this caused a slight injury to the cyclist;
- A slight injury was caused to a passenger that was leaving a stationary bus but caught their leg on the step edge causing them to trip;
- A slight injury accident occurred when a car entered Banbury Road from Five Mile Drive and moved straight into the bus lane but in doing so, collided with a car reversing out of their driveway;
- A further slight incident was cause when a car reversed out of their driveway; they failed to give way to a cyclist traveling on the shared use cycle track; and
- A motorcyclist was overtaking moving traffic but failed to see a cyclist ahead moving into the centre of the road to turn right into Harefield Road, causing a collision and slight injuries to the cyclist.

5.3.22 Following the fatality at the Park and Ride junction, immediate changes have been made to the configuration of the junction, including the shortening of the left turn filter. It is understood that OXCC has set up a working group, looking at cycle safety across the Oxford area and that as part of the findings from this group, that the temporary measures will be made permanent in due course.

5.3.23 A cluster of incidents have also occurred at the Kidlington and Cutteslowe roundabouts, albeit the majority of these were minor accidents:

- The primary reason for the accidents at Kidlington Roundabout were due to either rear end shunts by cars slowing down to enter the roundabout or cars failing to give way to cyclists already travelling on the roundabout. Seven accidents involved cyclists, three of which resulted in serious injuries. Five incidents were caused by vehicles failing to give way to cyclists and two were caused by cyclists entering the road into the path of vehicles. OXCC's proposals to improve the junction should assist with safety improvements at the junction; and
- Some 14 accidents occurred at Cutteslowe Roundabout with one being classed as serious and the rest slight. Four accidents including the serious accident were all caused by intoxicated drivers failing to keep control of their vehicle. Three accidents were rear end shunts occurring on approach to the roundabout and five accidents involved cyclists, two of which were attempting to use the crossing on the western arm of the roundabout, however cars failed to slow in time.

5.3.24 As set out earlier in this section OXCC has approved a 30mph TRO covering the Oxford Road (so there would be a 30mph speed limit between Kidlington and Oxford) and an improvement scheme at Kidlington roundabout which will deliver safety benefits.

5.3.25 Additionally, the package of improvements that the PR sites (including PR6a) are likely to assist in bringing forward on the Oxford Road / Banbury Road corridor including the Cutteslowe roundabout will deliver safety benefits.

Future Baseline

5.3.26 The IEA guidelines states that the greatest environmental change will generally be when the development traffic is at the largest proportion of total flow. IEA therefore recommends that that the environmental assessment should be undertaken at the year of opening of the Development.

5.3.27 The Development Year of Opening is assumed to be 2025. The 2025 baseline traffic flows (which include committed development) are provided in Table 5.3 below. The list of committed developments included and agreed with OXCC for the VISSIM model are listed in Appendix 5.1.

Table 5.3 2025 + Committed Development (Baseline) AADT Two Way Traffic Flows

Link	Location	Total Vehicles	HGV Flow	HGV %
1	A420 Oxford Road (between Kidlington Roundabout and Sainsburys)	24177	1224	5%
2	Bicester Road (north of Kidlington Roundabout)	12549	455	4%
3	Oxford Road (between Kidlington Roundabout and Park and Ride)	21754	1183	5%
4	A4260 Frieze Way (south of Kidlington Roundabout)	19031	380	2%
5	Oxford Road (between Kidlington Roundabout and The Broadway)	8893	0	0%
6	Oxford Road (between Park and Ride and proposed PR6b access)	20318	1175	6%
7	Oxford Road (between proposed PR6b access and proposed PR6a access)	20225	1175	6%
8	Oxford Road (between proposed PR6a access and proposed signal junction)	20225	1175	6%
9	Oxford Road (between proposed signal junction and St Frideswide Farm (Croudace) Proposed Access)	20219	1175	6%
10	Oxford Road (between St Frideswide Farm (Croudace) Proposed Access and Five Mile Drive)	20544	1175	6%
11	Banbury Road (between Five Mile Drive and Harbord Road)	21033	1183	6%
12	Banbury Road (between Harbord Road and Harefields	20752	1183	6%
13	Banbury Road (between Harefields and Cutteslowe Roundabout)	22294	1199	5%
14	A40(E) (east of Cutteslowe Roundabout)	38055	1474	4%
15	Banbury Road (between Cutteslowe Roundabout and Davenant Road)	19767	960	5%
16	A40(W) (between Cutteslowe Roundabout and Blandford Avenue)	29184	570	2%

Sensitive Receptors

5.3.28 The following are considered sensitive receptors in the overall study area:

- Oxford Road (between Kidlington Roundabout and Cutteslowe roundabout) – due to the recent fatality at the Park and Ride junction, high pedestrian / cycle flows along Oxford Road and crossing movements between the Proposed Development and the PR6b site

5.4 Mitigation Within the Submitted Design

Design

5.4.1 There are a number of key destinations / facilities on Site (such as the local centre and the primary school) which means that many journeys can be contained on site without impacting on and creating demand on the existing highway network.

5.4.2 The scheme delivers a well-connected, walkable 20-minute neighbourhood with facilities within the development that reduce the need for travel. In summary:

- All of the Water Eaton site / residential areas are within an 800m walk distance of the local centre / primary school;
- All of the PR6b site is within an 800m walk distance of the Water Eaton local centre / primary school;
- The public realm and open spaces are within an easy walking distance of the residential areas; and
- The new bus stops on Oxford Road are centrally located and easily accessed from the Water Eaton site and PR6b.

5.4.3 Water Eaton is designed to be a walkable neighbourhood which puts pedestrians and cyclists first. A network of footpaths and cyclepaths are proposed, along with Primary Streets, Secondary Streets, Residential Streets and Rural Edge Streets. The street adjacent to the school is proposed as a School street which will be temporarily closed off for the majority of traffic during the mornings and afternoons during school days. Mobility hub(s) will also be included within the Site.

5.4.4 OXCC's North Oxford Corridor plan includes proposals for a walking / cycling super highway along the A4165 Oxford Road / Banbury Road (including the Site frontage) to improve cycling connections between Cherwell District / Kidlington and Oxford city.

5.4.5 Key aspects of the site access design are summarised below:

- The A4165 Oxford Road being subject to a 30mph speed limit along the site frontage (as per the approved TRO);
- A walking / cycling super highway along the eastern side of A4165 Oxford Road - the proposals accommodate a 2.5m wide segregated cycle lane and a 2.0m footway (there is a 3m verge separation between segregated cycle lane footway and the Oxford Road carriageway / bus lane (suitable for appropriate street trees and planting));
- The existing Oxford Road west side shared use footway / cycleway to remain available for pedestrians and cyclists – this would eventually be upgraded to the cycle super highway dimensions as and when PR6b comes forward for development;
- This will then allow for OXCC's final cycle superhighway aspiration having southbound cyclists one way along the east side of Oxford Road and northbound cyclists one way along the west side of Oxford Road;

- The southern vehicular access to the site as a 3 arm Cycle Optimised Protected Signals (CYCLOPS) junction, capable of accommodating a fourth / western arm for an access into PR6b;
- The northern vehicular access to the site as a left in left out priority junction with a full set back for cycle crossing;
- The existing accesses to St Frideswide's Farm and Water Eaton from Oxford Road are to be closed to vehicular traffic and to be turned into pedestrian / cycle accesses (bridleway access for the Water Eaton access). Alternative vehicular access arrangements to the properties, associated buildings and agricultural land served from these accesses will be provided (both during and after construction) from the proposed Oxford Road site accesses and street network within the application site only (which would be set at reserved matters stage and designs will need to allow for the type of agricultural vehicles and manoeuvres expected in a safe manner);
- A toucan crossing of Oxford Road between the Water Eaton bridleway and the public right of way going through the PR6b site;
- Floating bus stops i.e in set in front of the cycle route, on Oxford Road near the proposed toucan crossing and retention of the southbound bus lane; and
- A pedestrian / cycle access into the recently approved St Frideswide Farm (The Croudace site) development to the south of the site.

5.4.6 Following discussions with OXCC and the bus operators it is agreed that it is appropriate for the bus services to stay on Oxford Road and not to route into either the Water Eaton site or PR6b.

5.4.7 As set out above, new bus stops are proposed on Oxford Road to ensure that future residents are within a reasonable walk distance of the bus stops –bus stops are proposed near the proposed Toucan crossing near the Water Eaton bridleway – the southbound bus stop is just to the south of the crossing and the northbound bus stop just to the south of the crossing.

5.4.8 For residents living in the southern part of the site, the nearest bus stops are the existing bus stops on Oxford Road near the St Frideswide Farm (Croudace) site (accessed via the pedestrian / cycle link through the St Frideswide Farm (Croudace) site.

5.4.9 All of the Water Eaton site / residential areas are within an 800m walk distance of the new / existing Oxford Road / Banbury Road bus stops, whilst all of the PR6b site is within an 800m walk distance of the new Oxford Road bus stops.

5.4.10 A mobility hub is also proposed close to the proposed Oxford Road bus stops / local centre offering the ability for cycle parking to be provided near the bus stops. Cycle parking and scooter parking / other forms of micromobility parking is proposed in the vicinity of the new bus stops on Oxford Road, to assist in the transfer of trips to sustainable modes.

5.4.11 This ensures that appropriate access to bus services is provided for future residents through:

- Oxford Road forming a high frequency bus corridor providing direct routes to a number of key destinations including Oxford city centre, Churchill Hospital, John Radcliffe Hospital and Kidlington;
- Bus stops (existing / or new) being within the walkable 20-minute neighbourhood concept (ie within a circa 10-minute / 800m walk distance of residential areas); and
- Cycle parking and scooter parking being provided in the vicinity of the new bus stops on Oxford Road to ensure maximum accessibility to the new bus stops for future residents.

5.4.12 Residents will be able to access Oxford Parkway Station via the Oxford Road cycle super highway and the Parkway junction with Oxford Road – it is a reasonable walk and cycle distance for residents. This will provide the opportunity for access to a number of destinations including Oxford Station (city centre), London Marylebone and Bicester.

5.4.13 In summary, the site is located adjacent to high frequency public transport (Oxford Road high frequency bus corridor and Oxford Parkway rail station) – future residents will have the opportunity to access a range of destinations by public transport.

Construction

5.4.14 Appropriate management of any demolition and construction traffic will be undertaken, including:

- The use of appropriate and approved routes for construction vehicles including approved routing plans;
- The management of working hours and delivery times to minimise disturbance caused by traffic (e.g. avoiding deliveries during peak hours);
- Covering loads coming to and leaving the development;
- Provision of wheel washing / vehicle cleaning facilities on site; and
- Inspection of local highway network and cleaning as necessary.

5.4.15 The above measures will be secured by a suitably worded planning condition for a Construction Environment Management Plan and Construction Traffic Management Plan should it be required.

5.5 Potential Environmental Effects of the Scheme

Construction Phase Effects

5.5.1 A survey was undertaken of a large strategic scheme at Camborne. At the time of the survey there were some 260 dwellings under construction. Whilst this site was located in Cambridgeshire the surveyed movements associated with a strategic site buildout are a suitable proxy to base the equivalent movements on for similar sites elsewhere within the country. Therefore, the data obtained from surveying this site has been used to determine an estimate for construction related movements at Water Eaton whilst the site is under construction.

5.5.2 It is assumed that some 100 dwellings per annum will be completed at Water Eaton. The Camborne site had some 260 dwellings under construction (at the time of the survey being undertaken) so it has been pro-rated down to 100 dwellings anticipated at Water Eaton .

5.5.3 Therefore Water Eaton will be generating approximately the following construction vehicle movements:

- Up to around 18 vehicle movements per hour (of which 5 are HGVs) – on the basis of 10 hour days; and
- Total of around 168 vehicle movements per 10 hour day (of which 46 are HGVs)

5.5.4 The IMA guidelines recommend that highway links should be separately assessed when:

- Traffic flows have increased by more than 30% (or the number of HGVs will increase by more than 30%); or
- Other sensitive areas are affected by traffic increases of at least 10%.

5.5.5 The majority of these movements will be onto the Oxford Road. The 2025 plus committed daily flows are around 20,500 vehicles including around 1,200 HGVs. Total construction traffic is less than a 10% increase. Nevertheless, to provide an absolute worst-case assessment the following assessment has been undertaken:

- 2025 plus committed development with full buildout of the Water Eaton site and full construction (i.e. construction phase) – this is worst case assessment of construction i.e. assuming construction towards the end of the development build.

5.5.6 The above scenario considering construction traffic can be considered an absolute worst case scenario as the peak construction movements are highly unlikely to coincide with the peak operational phase traffic associated with the final phase of buildout.

5.5.7 The 2025 plus committed development traffic flows and the 2025 plus committed development plus PR6a (construction traffic and development traffic) traffic flows along with % increases is shown in Table 5.4 below.

Table 5.4 2025 plus Committed Development Traffic Flows, 2025 plus Committed Development plus PR6A (Construction and Development Traffic) Traffic Flows with % Increases

Link	Location	2025 + Committed Development			2025 + Committed Development + PR6a (Dev + Construction)			Percentage Increase	
		Total Vehicles	HGV Flow	HGV %	Total Vehicles	HGV Flow	HGV %	Total Vehicle Increase %	HGV Increase %
1	A420 Oxford Road (between Kidlington Roundabout and Sainsburys)	24177	1224	5%	24523	1224	5%	1%	0%
2	Bicester Road (north of Kidlington Roundabout)	12549	455	4%	12578	455	4%	0%	0%
3	Oxford Road (between Kidlington Roundabout and Park and Ride)	21754	1183	5%	22693	1229	5%	4%	4%
4	A4260 Frieze Way (south of Kidlington Roundabout)	19031	380	2%	19565	426	2%	3%	11%
5	Oxford Road (between Kidlington Roundabout and The Broadway)	8893	0	0%	8923	0	0%	0%	0%
6	Oxford Road (between Park and Ride and proposed PR6b access)	20318	1175	6%	21264	1221	6%	4%	4%
7	Oxford Road (between proposed PR6b access and proposed PR6a access)	20225	1175	6%	21170	1221	6%	4%	4%
8	Oxford Road (between proposed PR6a access and proposed signal junction)	20225	1175	6%	20923	1221	6%	3%	4%
9	Oxford Road (between proposed signal junction and St Frideswide Farm (Croudace) Proposed Access)	20219	1175	6%	21480	1221	6%	6%	4%
10	Oxford Road (between St Frideswide Farm (Croudace) Proposed Access and Five Mile Drive)	20544	1175	6%	21796	1175	5%	6%	0%
11	Banbury Road (between Five Mile Drive and Harbord Road)	21033	1183	6%	22214	1183	5%	5%	0%
12	Banbury Road (between Harbord Road and Harefields	20752	1183	6%	21916	1183	5%	5%	0%
13	Banbury Road (between Harefields and Cutteslowe Roundabout)	22294	1199	5%	23440	1199	5%	5%	0%
14	A40(E) (east of Cutteslowe Roundabout)	38055	1474	4%	38295	1474	4%	1%	0%
15	Banbury Road (between Cutteslowe Roundabout and Davenant Road)	19767	960	5%	20415	960	5%	3%	0%
16	A40(W) (between Cutteslowe Roundabout and Blandford Avenue)	29184	570	2%	29536	570	2%	1%	0%

5.5.8 All the links assessed have a less than 10% increase in total traffic flows. As such it is not necessary to separately assess each link further. All effects relating to community severance, driver delay, pedestrian delay, pedestrian amenity, accidents and safety and fear and intimidation will be negligible at the construction phase.

Operational Phase Effects

5.5.9 The trip generation of the Proposed Development in its operational phase (fully built out and after the construction phase has finished) for the morning and evening peak hours is summarised in Table 5.5 below.

Table 5.5 Proposed Development Traffic Generation – Morning and Evening Peak Hours

	Morning Peak Hour			Evening Peak Hour		
	Arrivals	Departures	Two-Way	Arrivals	Departures	Two-Way
Development	61	140	201	140	78	218

5.5.10 The 2025 plus committed development traffic flows and the 2025 plus committed development plus PR6a (development traffic) traffic flows along with % increases is shown in Table 5.6 below.

Table 5.6 2025 plus Committed Development Traffic Flows, 2025 plus Committed Development plus PR6A (Development Traffic) Traffic Flows with % Increases

Link	Location	2025 + Committed Development			2025 + Committed Development + PR6a			Percentage Increase	
		Total Vehicles	HGV Flow	HGV %	Total Vehicles	HGV Flow	HGV %	Total Vehicle Increase	HGV Increase %
1	A420 Oxford Road (between Kidlington Roundabout and Sainsburys)	24177	1224	5%	24512	1224	5%	334	1%
2	Bicester Road (north of Kidlington Roundabout)	12549	455	4%	12567	455	4%	18	0%
3	Oxford Road (between Kidlington Roundabout and Park and Ride)	21754	1183	5%	22605	1183	5%	851	4%
4	A4260 Frieze Way (south of Kidlington Roundabout)	19031	380	2%	19499	380	2%	468	2%
5	Oxford Road (between Kidlington Roundabout and The Broadway)	8893	0	0%	8923	0	0%	30	0%
6	Oxford Road (between Park and Ride and proposed PR6b access)	20318	1175	6%	21175	1175	6%	856	4%
7	Oxford Road (between proposed PR6b access and proposed PR6a access)	20225	1175	6%	21081	1175	6%	856	4%
8	Oxford Road (between proposed PR6a access and proposed signal junction)	20225	1175	6%	20834	1175	6%	609	3%
9	Oxford Road (between proposed signal junction and St Frideswide (Croudace) Proposed Access)	20219	1175	6%	21391	1175	5%	1171	6%
10	Oxford Road (between St Frideswide Farm (Croudace) Proposed Access and Five Mile Drive)	20544	1175	6%	21715	1175	5%	1171	6%
11	Banbury Road (between Five Mile Drive and Harbord Road)	21033	1183	6%	22156	1183	5%	1123	5%
12	Banbury Road (between Harbord Road and Harefields	20752	1183	6%	21875	1183	5%	1123	5%
13	Banbury Road (between Harefields and Cutteslowe Roundabout)	22294	1199	5%	23399	1199	5%	1105	5%
14	A40(E) (east of Cutteslowe Roundabout)	38055	1474	4%	38266	1474	4%	211	1%
15	Banbury Road (between Cutteslowe Roundabout and Davenant Road)	19767	960	5%	20403	960	5%	636	3%
16	A40(W) (between Cutteslowe Roundabout and Blandford Avenue)	29184	570	2%	29536	570	2%	352	1%

5.5.11 The IMA guidelines recommend that highway links should be separately assessed when:

- Traffic flows have increased by more than 30% (or the number of HGVs will increase by more than 30%); or
- Other sensitive areas are affected by traffic increases of at least 10%.

5.5.12 All the links assessed have a less than 10% increase in total traffic flows. As such it is not necessary to separately assess each link further. All effects relating to community severance, driver delay, pedestrian delay, pedestrian amenity and accidents and safety will be negligible at the operational phase.

Additional Mitigation

5.5.13 The following walking and cycling routes are identified:

- Oxford Road / Banbury Road Routes
  - Route 1 - Site to Kidlington via Oxford Road (taking in Oxford Parkway / Park and Ride, Sainsbury's, Kidlington town centre and Gosford Hill School);
  - Route 2 - Site to Summertown and Oxford city via Oxford Road / Banbury Road (taking in Summertown, The Cherwell School; and Oxford city centre);
- Potential Cutteslowe Park Cycle Link; and
- Other routes to key destinations.

5.5.14 These are discussed in more detail below.

Oxford Road / Banbury Road Routes

5.5.15 Away from the site frontage, the Oxford Road / Banbury Road corridor improvements will be for OXCC as local highway authority to deliver funded through proportionate financial contributions from the Water Eaton site and the other PR sites impacting on the corridor as well as Growth Fund deal funding.

Route1 - Site to Kidlington via Oxford Road

5.5.16 The section of Oxford Road between the site and Kidlington roundabout is being discussed with OXCC. OXCC has emerging improvement proposals including:

- Improvements to the Oxford Parkway / Park and Ride junction to facilitate safer pedestrian and crossing movements; and
- Improvements to the existing shared use footways / cycleway on either side of Oxford Road as far as Kidlington roundabout to provide directional segregated cycle lanes and footways either side – this may include a bus gate north of the A34 / rail bridges (so that the bus lane can be removed over the bridges) and a 6m carriageway to enable 2m cycleways and 2m footways either side of the carriageway to be provided in the available highway.

5.5.17 The Development will assist in bringing forward the above improvements through a proportional contribution secured in a S106 agreement (other PR sites impacting on the corridor will also need to make their proportional contribution).

5.5.18 OXCC has emerging proposals, funded through the Growth Fund deal to improve Kidlington roundabout, providing significantly improved facilities for pedestrians and cyclists through the junction to improve connectivity between Kidlington, the Water Eaton site and Oxford.

5.5.19 These improvements link into the NCN Route 51 which routes on the Oxford Road (minor) and

the existing shared use cycle facilities on Oxford Road routing into Kidlington.

5.5.20 The route enhancements therefore make an appropriate and safe and walking and cycling route between the Water Eaton site and Oxford Parkway / Park and Ride, Sainsbury's, Kidlington town centre and Gosford Hill School.

Route 2 -Site to Summertown and Oxford city via Oxford Road / Banbury Road

5.5.21 The section of Oxford Road / Banbury Road between the site and Cutteslowe roundabout is being discussed with OXCC. OXCC has emerging improvement proposals including upgrading the existing shared use footway / cycleways on either side of Oxford Road / Banbury Road as far as Cutteslowe roundabout to provide directional segregated cycle lanes and footways either side – this is likely to include 2m directional cycleways and 2m footways either side of the carriageway (with any narrowing at pinch points) and a 9m carriageway (including a 3m southbound bus lane) to be provided in the available highway.

5.5.22 The Cutteslowe roundabout which accommodates the A40 northern ring road only has limited pedestrian and cycling facilities especially for north south movements. The junction is being discussed with OXCC. OXCC is considering a number of options for improvements including an additional controlled crossing on the A40 eastern arm to improve the north south movement, widening of all pedestrian and cycle facilities around the junction and on junction crossings which may require some of the carriageway especially on the A40 eastbound approach to the junction and traditional 4 arm signal control at the junction. OXCC is reviewing the options and once a preferred option is identified OXCC is likely to undertake an element of public consultation.

5.5.23 The Development will assist in bringing forward the above improvements through a proportional contribution secured in a S106 agreement (other PR sites will also need to make their proportional contribution).

5.5.24 To the south of Cutteslowe roundabout there are options for onward travel into Summertown via Banbury Road (or NCN Route 51 which routes through quiet streets to the east) or to the city centre via Banbury Road, NCN Route 51 or NCN 5 to the west.

5.5.25 As an alternative to routing through Cutteslowe roundabout, NCN 51 routes away from Banbury Road to the east and utilises Harefields (a quiet street) before routing over the A40 on a pedestrian / cycle bridge and using quiet streets to link to Summertown and Oxford city centre. This route will be available for future residents

5.5.26 The route enhancements therefore make an appropriate and safe and walking and cycling route between the Water Eaton site and Summertown, the Cherwell School; and Oxford city centre.

Potential Cutteslowe Cycle Park Link

5.5.27 During the Enquiry by Design event in July 2021and at subsequent public consultation events the desire for a potential cycle link through Cutteslowe Park to connect the Site to the existing pedestrian / cycle bridge over the A40 (east of the Cuttleslowe roundabout) was identified. The suggestion for the cycle link was raised by the local residents whilst noting at the moment cycling is prohibited, but people do still cycle and so suggested this was explored further, noting a number of issues including the City's byelaws

5.5.28 The Water Eaton team has undertaken some design work and identified a potential route on the west side of the park. The potential route is currently with OCC (the land owner of Cutteslowe Park) for review and comments before any further consultation with interest groups.

5.5.29 Should OXCC and OCC wish to take forward the scheme then the Water Eaton site can make a proportional contribution secured in a S106 agreement (other PR sites will also need to make their proportional contribution) for OXCC or OCC to deliver.

Other Routes

5.5.30 Pedestrians and cyclists can connect to the North Oxford employment area via the existing highway network / Five Mile Drive (or via the existing footpath / the PR6b site when that comes forward).

5.5.31 Cyclists can connect to Headington (including the John Ratcliffe Hospital) via the existing highway network including the cycleway on the A40 ring road.

5.5.32 Cyclists can connect to Cowley via the existing highway network including the cycleway on the A40 ring road or through the city centre via NCN 51 and 57.

5.5.33 Appropriate and safe walking and cycling routes between the Water Eaton site and North Oxford Headington and Cowley are therefore achieved.

Public Transport

5.5.34 Oxford Road forms a high frequency bus corridor with bus services throughout the day linking the Site with a number of key destinations including Kidlington, Summertown, Oxford city centre, Headington, John Radcliffe Hospital and Kidlington.

5.5.35 It is also worth noting that OXCC has bus improvement proposals. These include a new service connecting North of Oxford to Eastern Arc area, with a frequency of 4 buses per hour: Oxford Parkway – Summertown – Marston Ferry Road – John Radcliffe hospital (West Wing roundabout only) – Brookes University – Old Road – The Slade – Hollow Way – Cowley Centre – Church Cowley Road – Donnington Bridge Road – Redbridge P&R.

5.5.36 Bus accessibility for the Development would be further enhanced when OXCC delivers these bus service improvements.

5.5.37 In summary, the site will bring forward the following measures aimed at reducing the need to travel and encouraging trips to be undertaken via sustainable modes. This includes:

- The provision of a primary school with two forms of entry, thus internalising primary school trips;.
- The provision of a local centre, internalising local trips to day to day facilities;.
- Delivery of a southbound cycle superhighway along the frontage of the site, providing a new facility for residents of PR6A and B as well as improving connectivity between Kidlington and Oxford city centre, for existing residents and future residents of other PR sites to the north. (Ref Infrastructure Delivery Plan (IDP) scheme 9 & 9a);.
- Delivery of a central spine road with dedicated pedestrian and cycle facilities and connection to Water Eaton Park and Ride and Oxford Parkway (Ref IDP scheme 25);.
- The opportunity for the spine road to be delivered as a School Street, with limited access during drop off and pick up periods, to encourage trips to the school to be undertaken by active modes;.
- The creation of a green infrastructure corridor incorporating a pedestrian, wheelchair and all-weather cycle route along the site's eastern boundary. The route will connect Cutteslowe Park with Oxford Parkway Railway Station/Water Eaton Park and Ride and provide connection with the public rights of way network. (Ref IDP scheme 25);
- Limited vehicular access to / from Oxford Road to discourage car use;
- Reduced car parking across the site to discourage car usage;

- Delivery of car club vehicle spaces to reduce car ownership across the site.
- Enhancing the existing public rights of way which cross the site (Bridleway 229/9/30 and Footpath 229 8/10)), to encourage pedestrian, cycling and active travel modes. (Ref IDP scheme 13);
- An outline scheme for pedestrian and cycle access to the surrounding countryside and onward connections to PRoW to encourage pedestrian, cycling and active travel modes;
- Design principles which seek to deliver a connected and integrated urban extension to Oxford and which respond to historic setting of the city; and
- A Travel Plan including measures for maximising sustainable transport connectivity, minimising the impact of motor vehicles on new residents and existing communities, and actions for updating the Travel Plan during construction of the development.

Off-site works and contributions

5.5.38 The following works and or contributions, in line with the Appendix 4 IDP are proposed as part of the PR6a transport mitigation package and will be secured through a Section 106 agreement:

- Proportional contribution towards the Park and Ride at London-Oxford airport (Ref IDP scheme 3);
- Improved / amended bus lane provision on the A4165 between Kidlington roundabout and past the new housing development sites (Ref IDP scheme 4a);
- Upgrade of outbound bus stop on A4165 opposite Parkway (Ref IDP scheme 8d);
- Contribution towards the cycle superhighway along the A4260 and Oxford Road towards Oxford city centre (Ref IDP scheme 9 & 9a);.
- New public bridleways suitable for pedestrians, all weather cycling, wheelchair use and horse riding and connecting with existing public rights of way network (Ref IDP scheme 13) ;
- Kidlington roundabout provision of ped/cycle crossing at roundabout (Ref IDP scheme 18);
- Pedestrian/cycle / wheelchair accessibility from PR6a to Water Eaton Park / Oxford Parkway (Ref IDP scheme 25); and
- Ped/cycle/wheelchair accessibility across A4165 from PR6b to PR6a (Ref IDP scheme 28)

5.5.39 In addition, a contribution towards a cycle route through the Cutteslowe Park, providing a dedicated cycle link between the site and the A40 overbridge, providing better access to the Park and Ride and Parkway station and Summertown School is proposed.

Residual Effects

5.5.40 For completeness a short commentary is provided under each matter.

Community Severance, Pedestrian Delay Pedestrian Amenity and Accidents and Safety

5.5.41 The following will assist in overcoming any effects potentially offering beneficial effects:

- The approved 30mph TRO for Oxford Road between Kidlington and Oxford city by reducing vehicle speeds;
- The delivery of the segregated pedestrian/ cycle facilities along the Oxford Road site frontage and the toucan crossing of Oxford Road to connect the west side of Oxford Road / PR6b with the Site;
- The delivery of the verge between the carriageway / bus lane and the segregated

footway / cycleway along the site frontage;
- Cyclops site access junction and left in / left out with full set back for pedestrians and cyclists
- OXCC's proposed improvements at the Kidlington roundabout;
- Contributions to improvements to Oxford Road north of the site, Banbury Road south of the site and the Cutteslowe roundabout; and
- Contributions to wider pedestrian / cycle improvements

Driver Delay

5.5.42 The Transport Assessment has identified that the impact of development generated traffic on the operation of the local and strategic network is not significant. This includes the A34 Bicester Road junction, A34 Peartree Interchange, Wolvercote Roundabout junction Oxford Road; A4260 Kidlington; A40; A34; A44 and A4165 Banbury Road

Fear and Intimidation of Road Users and Pedestrians

5.5.43 It is noted that the 2025 plus committed development plus Development traffic along Oxford Road / Banbury Road is at around 22,150 vehicles AADT (1,183 HGVs AADT).This would put the average traffic flows over an 18 hour day (vehicles per hour at 1,060 vehicles and a total 18 hour HGV flow of 1,017 vehicles.

5.5.44 With reference to Table 5.1 the above 18 hour flows (paragraph 5.5.43) would indicate the fear and intimidation degree of hazard at moderate adverse. However, the IEA guidelines make it clear that in respect of fear and intimidation other factors need to be included such as proximity to traffic, pavement widths and there will need to be judgement to be exercised in determining the degree of fear and intimidation. Special consideration should be given to areas where there are likely to be particular problems such as high-speed sections of road and locations of turning points and accesses. Areas exposed to higher-than-average number of school children and the elderly or other vulnerable groups should be separately identified.

5.5.45 Having regard to the above, the assessor's judgement is as follows:

- The 30mph TRO for Oxford Road between Kidlington and Oxford city will reduce vehicle speeds;
- The delivery of the segregated pedestrian/ cycle facilities along the Oxford Road site frontage and the toucan crossing of Oxford Road to connect the west side of Oxford Road / PR6b with the Site will assist through improved and wider facilities;
- The delivery of the verge between the carriageway / bus lane and the segregated footway / cycleway along the site frontage reduces proximity to traffic; and
- The segregated footway / cycle provision along Oxford Road / Banbury Road widens facilities for both pedestrians and cyclists.

5.5.46 The residual effects will range from moderate beneficial (site frontage) to minor adverse (remainder of Oxford Road / Banbury Road).

Implications of Climate Change

5.5.47 The Local Transport and Connectivity Plan (LTCP) is OXCC's statutory Local Transport Plan and was adopted by full council on 12 July 2022. It sets out OXCC's vision for developing a world leading, innovative and carbon neutral transport system with a focus on how people move safely and quickly around their communities, Oxford city, and the county.

5.5.48 The LTCP outlines a clear vision to deliver a net-zero Oxfordshire transport and travel system that enables the county to thrive while protecting the environment and making Oxfordshire a

better place to live for all residents. In order to track the delivery of the vision, the LTCP includes a set of headline targets. These include the following targets:

- By 2030 the targets are to:
  - Replace or remove 1 out of every 4 current car trips in Oxfordshire;
  - Increase the number of cycle trips in Oxfordshire from 600,000 to 1 million cycle trips per week;
  - Reduce road fatalities or life changing injuries by 50%
- By 2040 the targets are to:
  - Deliver a net-zero transport network;
  - Replace or remove an additional 1 out of 3 car trips in Oxfordshire;
- By 2050 the targets are to:
  - Deliver a transport network that contributes to a climate positive future; and
  - Have zero, or as close as possible, road fatalities or life-changing injuries

5.5.49 OXCC plan to achieve this by:

- Reducing the need to travel;
- Discouraging individual private vehicle journeys; and
- Making walking, cycling, public and shared transport the natural first choice.

5.5.50 OXCC are now working to implement the policies in the LTCP and develop the Part 2 supporting strategies.

5.5.51 The LTCP includes guidance for new developments, and from this, 12 transport / connectivity objectives have been set in the Transport Assessment. The objectives and a summary of how each have been met is provided below.

- Deliver a well-connected, walkable 20-minute neighbourhood with facilities within the development that reduce the need for travel.
  - Objective met - the scheme delivers a well-connected, walkable 20-minute neighbourhood with facilities within the development that reduce the need for travel. All of the Water Eaton site / residential areas are within an 800m walk distance of the local centre / primary school;
- Deliver direct and safe connections which prioritise access on foot, bike or bus to/from neighbouring communities and places of employment, retail, education and leisure facilities.
  - Objective met - Water Eaton is designed to be a walkable neighbourhood which puts pedestrians and cyclists first. The development also assists in bringing forward the Oxford Road / Banbury Road cycle superhighway.
- Deliver excellent access to transport interchanges;
  - Objective met – excellent access to the new / existing Oxford Road / Banbury Road bus stops, mobility hub(s) and Oxford Parkway / Park and Ride achieved
- Provide frequent, reliable and easily accessible public transport to local facilities, employment and nearby town centres;
  - Objective met – the site is located adjacent to high frequency public transport (Oxford Road high frequency bus corridor and Oxford Parkway rail station) – new bus stops are proposed on Oxford Road and future residents will have the opportunity to access a range of destinations by public transport.
- Provide easy access to a network of open and green spaces (within a 10-minute

walk) to enhance health and wellbeing;
    - Objective met – the masterplan and parameter plans ensure that easy access to a network of open and green spaces is provided.
- Roads and junctions connecting to developments need to prioritise walking, cycling and public transport and be futureproofed in line with the Innovation Framework;
    - Objective met – provided through the Oxford Road cycle super highway, the southern access Cyclops junction and the northern access left in left our arrangement with full set back;
- New streets to be designed having regard to with DfT's 'Manual for Streets', OXCC's Street Design Guide and Walking and Cycling Design Guides, Healthy Streets Approach, LTN 1/20 and the Department for Transports Inclusive Mobility;
    - Objective met – the access and street design has regard to all of the above guidance
- Provide a comprehensive safe, convenient well landscaped and inclusive network for cycling, walking and public transport which offer direct, continuous and uninterrupted routes to facilities;
    - Objective met – through the Oxford Road cycle superhighway (3m verge between carriageway and footway / cycleway) and 9m planting to the east as well as the footpath / cyclepath and street design overall
- Consider appropriate filtered permeability and low traffic areas, making cycling and walking routes more direct and attractive than using a car;
    - Objective met – through the northern access left in left our arrangement with full set back and the school street concept
- Provide mobility hub(s) to improve interchange opportunities, connectivity and accessibility;
    - Objective met – mobility hub(s) proposed in the vicinity of the local centre and Oxford Road bus stops.
- Provide appropriate parking throughout, including:
    - Cycle parking that has regard to OXCC's best practice requirements and guidance;
    - At the time of a reserve matter application Bellway will agree the level of car and motorcycle parking provided across the site with OXCC, having due regard to OXCC's parking standards, applicable at that time.
    - An effective network of EV charging and access to an electric car club;
    - Appropriate visitor parking provision spaces that can be used flexibly during the master planning stage;
    - Parking control measures to avoid overspill parking onto streets and design to discourage any pavement parking from occurring;
    - It is envisaged that a controlled parking zone will be required to ensure that there is no overspill on-street parking from the nearby Oxford Parkway Station / Park and Ride site.
- Provide effective digital connectivity to enable home working and include flexible work/office space.
    - Objective met – through the Framework Travel and Innovation Plans

5.5.52 Potential climate change is unlikely to alter the predicted effects in this chapter of the ES. Indeed, the Development provides positively in terms of infrastructure and financial contributions to assist OXCC meetings its LTCP vision and targets.

5.6 Cumulative Effects

5.6.1 As agreed with OXCC, the North Oxford VISSIM model is to be used to assess the cumulative impact of development generated traffic from the relevant Local Plan Partial Review PR sites. In addition to the Development, the other PR sites included are:

- Policy PR6b – 670 dwellings;
- Policy PR7a – Land South East of Kidlington- 430 dwellings;
- Policy PR7b – Land at Stratfield Farm - 120 dwellings;
- Policy PR8 - Begbroke - 2,000 dwellings, new secondary school and other community facilities; and
- Policy PR9 -Land West of Yarnton - 540 dwellings.

5.6.2 A 2031 model has been used for the cumulative analysis. The method is detailed and included in the Transport Assessment and allows for planned infrastructure and modal shift.

5.6.3 The 2031 plus committed development plus PR sites (excluding the Development – PR6a) and the 2031 plus committed development plus PR sites (excluding the Development – PR6a) plus PR6A (development traffic) traffic flows along with % increases is shown in Table 5.7 below.

Table 5.7 2031 plus Committed Development Traffic Flows plus PR sites (excluding the Development – PR6a), 2031 plus Committed Development plus PR sites (excluding the Development – PR6a) plus PR6A (Development Traffic) Traffic Flows with % Increases

Link	Location	2031 + Committed Development + PR Sites (excluding PR6a)			2031 + Committed Development + PR Sites + PR6a			Percentage Increase	
		Total Vehicles	HGV Flow	HGV %	Total Vehicles	HGV Flow	HGV %	Total Vehicle Increase	HGV Increase %
1	A420 Oxford Road (between Kidlington Roundabout and Sainsburys)	21734	1251	6%	22068	1251	6%	334	2%
2	Bicester Road (north of Kidlington Roundabout)	12251	404	3%	12269	404	3%	18	0%
3	Oxford Road (between Kidlington Roundabout and Park and Ride)	20425	1259	6%	21276	1259	6%	851	4%
4	A4260 Frieze Way (south of Kidlington Roundabout)	17517	259	1%	17986	259	1%	468	3%
5	Oxford Road (between Kidlington Roundabout and The Broadway)	8120	0	0%	8150	0	0%	30	0%
6	Oxford Road (between Park and Ride and proposed PR6b access)	20412	992	5%	21269	992	5%	856	4%
7	Oxford Road (between proposed PR6b access and proposed PR6a access)	18929	1282	7%	19786	1282	6%	856	5%
8	Oxford Road (between proposed PR6a access and proposed signal junction)	19421	1282	7%	20030	1282	6%	609	3%
9	Oxford Road (between proposed signal junction and St Frideswide's Farm (Croudace) Proposed Access)	20609	1267	6%	21780	1267	6%	1171	6%
10	Oxford Road (between St Frideswide's Farm (Croudace) Proposed Access and Five Mile Drive)	21048	1267	6%	22219	1267	6%	1171	6%
11	Banbury Road (between Five Mile Drive and Harbord Road)	21276	1289	6%	22399	1289	6%	1123	5%
12	Banbury Road (between Harbord Road and Harefields	21089	1289	6%	22212	1289	6%	1123	5%
13	Banbury Road (between Harefields and Cutteslowe Roundabout)	22367	1289	6%	23472	1289	5%	1105	5%
14	A40(E) (east of Cutteslowe Roundabout)	33023	1549	5%	33234	1549	5%	211	1%
15	Banbury Road (between Cutteslowe Roundabout and Davenant Road)	17774	908	5%	18410	908	5%	636	4%
16	A40(W) (between Cutteslowe Roundabout and Blandford Avenue)	26374	617	2%	26726	617	2%	352	1%

5.6.4 All the links assessed show that the Development has a less than 10% increase in total traffic flows. As such it is not necessary to separately assess each link further. All effects relating to community severance, driver delay, pedestrian delay, pedestrian amenity, and accidents and safety will be negligible at the operational phase. In terms of fear and intimidation, the effects will range moderate beneficial (site frontage) to minor adverse (remainder of Oxford Road / Banbury Road).

5.6.5 Table 5.8 summarises the infrastructure identified in Appendix 4 of the IDP and has been included within the mode shift mitigation strategy modelled. Schemes that have been omitted from the list are either due them not being necessary to mitigate the impacts of the PR sites, or are no longer being pursued by OXCC, such as the expansion of the Water Eaton Park and Ride. The PR6a site will deliver or provide a proportional contribution towards the infrastructure items highlighted grey.

Table 5.8 Summary of Appendix 4 of IDP mitigation included in the modelling

Ref	Scheme	Comment*
1	Potential for new rail halt at Begbroke	Land reserved in masterplan for PR8
3	P&R at Oxford airport	Mode shift accounted for in model
4a	Improved bus lanes on A4165 between Kidlington roundabout and past new housing sites	Included in Oxford Road improvement promoted by PR6a and 6b
6c	A44 southbound bus lane between Spring Hill junction at Begbroke and Pear Tree Interchange	Included in the model as part of the growth fund scheme
7	4 buses per hour between Oxford and Begbroke	Limited mode shift accounted for in model but did not include all of potential catchment.
8d	Upgrade of outbound bus stop on A4165 opposite Parkway	As part of mitigation package
9	Cycle superhighway along the A4260/A4165 to/from Oxford Parkway	Design work progressing as part of PR6a application.
10	Pedestrian and cycle improvements linking Kidlington, Begbroke and Yarnton: Potential closure of Sandy Lane to form green cycle/pedestrian route linking A44 and the A4260.	Included in site master planning – part of Network Rail / PR8 proposals
12	Walking/cycling/wheelchair accessibility from land at Stratfield Farm (PR7b) to key facilities on the A4165, including proposed sporting facilities at PR7a	Included in site master planning of PR7b
13	New public bridleways suitable for pedestrians, all weather cycling, wheelchair use and horse riding and connecting with existing public rights of way network	Included in site master planning
14	Walking/cycling/ wheelchair accessibility from PR7b to PR8, including suitable crossing over the Oxford Canal	Included in site master planning of PR7b and PR8
15	New public bridleway / green link connecting PR7b with PR8 across Oxford canal and exploration of links with the wider PRoW east of A4165	

Ref	Scheme	Comment*
16	Wheelchair accessible pedestrian / cycle bridge over Oxford canal linking PR7b to PR8	Included in site master planning of PR7b and PR8
17	Sandy Lane – pedestrian and cycle new link over railway	Included in site master planning – PR8. To be applied for by Network Rail as part of closure of level crossing
17a	Sandy Lane ped/cycle railway bridge	Included in site master planning – PR8. To be applied for by Network Rail as part of closure of level crossing
18	Kidlington roundabout provision of ped/cycle crossing at roundabout	Growth fund scheme included
19	Connectivity from PR9 to local facilities within Yarnton	Included in site master planning – PR9 -
20	New walk and cycle routes from PR9 through Yarnton	Included in site master planning – PR9
21	Cycle and pedestrian improvements on A44, including ped/cycle crossing facilities	Included but extent and design of works to be agreed.
23	Reduction of speed limit and pedestrian/cycle crossing at key locations along A44 from Sandy Lane to Cassington Rd	Included in traffic modelling
24	Footpaths / cycleways within proposed development sites that link new development to existing and proposed networks	Included in site master planning
25	Pedestrian/cycle / wheelchair accessibility from PR6a to Water Eaton Park / Oxford Parkway	Included in site master planning
26	Ped/cycle/wheelchair accessibility from PR6b to employment opportunities at Oxford Northern Gateway	Routes through PR6b included in site master planning
27	Upgrade existing footbridge over railway linking PR6b to Northern Gateway	Subject to land ownership and liaison with stakeholders, including Network Rail
28	Ped/cycle/wheelchair accessibility across A4165 from PR6b to PR6a	Included in proposed design of upgrades to A4165
29	Footway along southbound carriageway of Bicester Road	Included in site master planning PR7a
30	Ped/cycle/wheelchair accessibility to Oxford Parkway across to Bicester Road and to formal sports pitches on site	Included in site master planning PR7a
31	Vehicular spine route through PR8 capable of being used by buses	Included in site master planning PR8
32	Highway works to Kidlington roundabout to enable site access for PR7b	Included in site master planning PR7b
33	Ped/cycle bridges over railway and Oxford Canal	Provided for in site master planning PR8/PR7b but subject to liaison with stakeholders

5.6.6 The modelling analysis concludes:

- The Growth Fund works, and the infrastructure associated with the PR sites and the resulting modal shift clearly identifies an improved ability for vehicles to travel through the network;
- The Growth Fund infrastructure and mode shift mitigation would have a positive impact on the delay vehicles experience across the network;
- With all Growth Fund works and mode shift implemented in 2031, there is negligible impact on average vehicle speeds across the network;
- The addition of the developments and their mitigation provide an overall benefit at junctions, with reduced queuing. Where queuing does increase, this is not of a magnitude that would result in a material effect on the highway network. For example, no junctions are blocked as a result of the PR developments and their mitigation coming forward;
- A detailed review of the junction modelling Level of Service (LOS) output at junctions within the study area indicates that there are 12 junctions that are predicted to have a LOS of D or greater (>35s to 55s delay on a signalised junction, >25s to 35s delay on a non-signal junction) within the Model extents. Where the LOS has worsened as a result of the mitigation scenario further assessment has been undertaken on each arm of the junction. The detailed assessment identifies that in general, there will be betterment or an operating level commensurate with future year forecasts before the PR sites are included. There are no residual effects which would be considered severe;
- The works set out in the IDP of the Local Plan provide the basis for the development of a sustainable transport network which further develops the existing strategy and will support the proposed allocations through limiting the need to travel by car and offering a genuine choice of transport modes in accordance with the NPPF;
- A range of mitigation measures included within the IDP have be tested within the model and it is evident that the provision of active travel opportunities and public transport interventions, along with changes in travel behaviour arising from the delivery of enhancements to the sustainable and active travel networks will mitigate the impacts arising from the PR sites;
- OXCC's Local Transport and Connectivity Plan (LTCP), adopted July 2022, outlines a clear vision to deliver a net-zero Oxfordshire transport and travel system by 2040, reducing private vehicle use, and prioritising walking, cycling, and public transport. The delivery of additional infrastructure and interventions planned by OXCC will further support sustainable travel and reduce car traffic across the network.

5.7 Summary

5.7.1 This chapter of the ES assesses the likely significant effects of the Proposed Development on the environment in respect of Traffic and Transport.

5.7.2 A Transport Assessment has been prepared in consultation with the officers of the local highway authority, OXCC, in addition to those at NH.

5.7.3 National policy states that in assessing sites that may be allocated for Development in plans, or specific applications for Development, it should be ensured that:

- appropriate opportunities to promote sustainable transport modes can be – or have been – taken up, given the type of Development and its location;
- safe and suitable access to the Site can be achieved for all users;
- the design of streets, parking areas, other transport elements and the content of associated standards reflects current national guidance, including the National Design Guide and the National Model Design Code; and
- 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 degree.

5.7.4 An assessment of the environmental impact of the additional traffic generated by the Proposed Development has been undertaken against the criteria set out in the IEMA Guidelines for the Environmental Assessment of Road Traffic and the following matters have been assessed:

- Community severance;
- Driver delay (based upon the findings of the Transport Assessment);
- Pedestrian delay (based upon the findings of the Transport Assessment);
- Pedestrian amenity;
- Accidents and safety; and
- Fear and intimidation of road users and pedestrians.

5.7.5 The IEMA guidelines recommend that highway links should be separately assessed when:

- Traffic flows have increased by more than 30% (or the number of HGVs will increase by more than 30%); or
- Other sensitive areas are affected by traffic increases of at least 10%. Set out the key findings of the assessment.

5.7.6 There are a number of features inherent within the design that add mitigation including internalisation of journeys within the Site, sustainable access strategy and construction related conditions.

5.7.7 The effects of the absolute worst case of the construction phase of the Proposed Development are negligible in terms of community severance, driver delay, pedestrian delay, pedestrian amenity and accidents and safety.

5.7.8 The effects of the operational phase of the Proposed Development are negligible in terms of community severance, driver delay, pedestrian delay, pedestrian amenity, accidents and safety, fear and intimidation of road users and pedestrians. The impact of the development on the operation of the local highway network and strategic highway network is not significant. In terms of fear and intimidation, the effects will range moderate beneficial (site frontage) to minor adverse (remainder of Oxford Road / Banbury Road).

5.7.9 Additional mitigation is identified relating to contributions to wider pedestrian and cycle improvements in the North Oxford corridor area (including Oxford Road / Banbury Road, Kidlington roundabout and Cutteslowe roundabout).

5.7.10 The improvements potentially offer beneficial effects to community severance, pedestrian delay pedestrian amenity and accidents and safety.

5.7.11 The residual cumulative impacts on driver delay are not significant and modal shift may assist in some areas.

5.7.12 A summary of the assessment is set out in Table 5.9.

Table 5.9 Summary of effects

Potential Effect	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
Construction phase				
Community Severance	Negligible	All - suitably worded planning condition for a Construction Environment Management Plan and Construction Traffic Management Plan	Negligible	Temporary – not significant
Driver Delay	Negligible		Negligible	Temporary – not significant
Pedestrian Delay	Negligible		Negligible	Temporary – not significant
Pedestrian Amenity	Negligible		Negligible	Temporary – not significant
Accidents and Safety	Negligible		Negligible	Temporary – not significant
Fear and Intimidation	Negligible		Negligible	Temporary – not significant
Operation phase				
Community Severance	Negligible	All - Containment of journeys within site 20 minute neighbourhood and access to public transport Sustainable access strategy – delivery of Oxford Road / Banbury Road cycle superhighway and cycle friendly access arrangements along the site frontage Contributions to Oxford Road / Banbury Road cycle superhighway Contributions to other sustainable IDP measures Framework Travel Plan Framework Innovation Plan	Negligible – moderate beneficial	Permanent - not significant
Driver Delay	Negligible		Negligible – moderate beneficial	Permanent - not significant
Pedestrian Delay	Negligible		Negligible – moderate beneficial	Permanent - not significant
Pedestrian Amenity	Negligible		Negligible – moderate beneficial	Permanent - not significant
Accidents and Safety	Negligible		Negligible – moderate beneficial	Permanent - not significant
Fear and Intimidation	Moderate adverse		Minor adverse – moderate beneficial	Permanent - not significant
Cumulative effects				
Community Severance	Negligible	All – Growth Fund works, and the infrastructure associated with the PR sites and the resulting modal shift clearly identifies an improved ability for vehicles to travel through the network. The IDP of the Local Plan provide the basis for the development of a sustainable transport network. it is evident that the provision of active travel opportunities and public transport interventions, along with changes in travel behaviour arising from the delivery of enhancements to the sustainable and	Negligible – moderate beneficial	Permanent - not significant
Driver Delay	Negligible		Negligible – moderate beneficial	Permanent - not significant
Pedestrian Delay	Negligible		Negligible – moderate beneficial	Permanent - not significant
Pedestrian Amenity	Negligible		Negligible – moderate beneficial	Permanent - not significant
Accidents and Safety	Negligible		Negligible – moderate beneficial	Permanent - not significant
Fear and Intimidation	Moderate adverse		Minor adverse – moderate beneficial	Permanent - not significant

Potential Effect	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		active travel networks will mitigate the impacts arising from the PR sites. OXCC's (LTCP) outlines a clear vision to deliver a net-zero Oxfordshire transport and travel system by 2040, reducing private vehicle use, and prioritising walking, cycling, and public transport. The delivery of additional infrastructure and interventions planned by OXCC will further support sustainable travel and reduce car traffic across the network.		

5.8 References

5.8.1 The references used in this chapter are listed below:

5.1: The adopted Cherwell Local Plan 2011-2031 Partial Review – Oxford's Unmet Housing Need
5.2: Institute of Environment Assessment (IEA) 'Guidelines for the Environmental Assessment of Road Traffic (Guidance Note No. 1)
5.3: National Planning Policy Framework (NPPF)
5.4: National Planning Practice Guidance (March 2014)
5.5: The Cherwell Local Plan 2011-2031 (Part 1 – July 2015)
5.6: Oxfordshire County Council's Local Transport and Connectivity Plan (LTCP)
5.7: Central Oxfordshire Travel Plan
5.8: Oxfordshire County Council's Parking Standards (January 2023)
5.9: Manual for Streets
5:10: Oxfordshire County Council's Street Design Guide
5.11: Oxfordshire County Council's Walking and Cycling Design Guide
5.12: Healthy Streets Approach
5:13: LTN 1/20
5.14: Department for Transport Inclusive Mobility
5.15: Oxfordshire County Council's 'Implementing 'Decide & Provide': Requirements for Transport Assessments (September 2022)
5.16: Design Manual for Roads and Bridges Volume 13 Environmental Assessment

6 Air quality

6.1 Introduction

6.1.1 This chapter of the ES has been produced by Planning and Environmental Consultants (PEC) Ltd and sets out the air quality impacts associated with the Proposed Redevelopment at Land East of Oxford Road.

6.1.2 The proposed development lies within Cherwell District Council (CDC) but is also adjacent to Oxford City Council's (OCC) area of administration.

6.1.3 The Proposed Development is located within close proximity to a number of major road links and is partially located adjacent to the OCC Air Quality Management Area (AQMA). As such, there is the potential that the development will introduce future site users to poor air quality. Additionally, due to the scale of the proposals the development has the potential to cause air quality impacts at nearby sensitive locations during the construction and operational phases. As such, an Air Quality Assessment was required to quantify baseline conditions, consider the suitability of the site for the proposed end-use and assess potential impacts as a result of the development.

6.1.4 The chapter has been prepared with due regard to the requirements of CDC and OCC Environmental Health Department's. Reference should be made to the following appendices for details of the proposed methodology, assessment inputs, including ADMS-Roads parameters, traffic data and model verification process:

- Appendix 6.1 - Assessment Inputs
- Appendix 6.2 – Figures
- Appendix 6.3 – Construction Phase Assessment Methodology
- Appendix 6.4 – Construction Phase Road Vehicle Exhaust Impact Assessment
- Appendix 6.5 – Sensitivity Analysis Impact Assessment; and

6.2 Legislative and Policy Context

European Legislation

6.2.1 European Union (EU) air quality legislation is provided within Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidated previous legislation which was designed to deal with specific pollutants in a consistent manner and provided new air quality objectives for particulate matter with an aerodynamic diameter of less than 2.5µm (PM2.5).

National Planning Policy

6.2.2 **The National Planning Policy Framework (NPPF) -** was published on 24th July 2018 (updated on 20th July 2021) and sets out the Government's core policies and principles with respect to land use planning, including air quality. The implications of the NPPF have been considered throughout this assessment.

6.2.3 **The National Planning Practice Guidance (NPPG) -** launched by the Department for Communities and Local Government on 6th March 2014 (updated 1st November 2019) to support the NPPF. The NPPG will be reviewed, and the relevant guidance considered as necessary throughout the undertaking of the air quality assessment.

UK Legislation

6.2.4 **The Air Quality Standards (Amendment) Regulations 2016** - these Regulations amend the Air

Quality Standards Regulations 2010 and transpose the EU Directive 2008/50/EC into UK law. Air Quality Limit Values (AQLVs) were published in these regulations for 7 pollutants, as well as Target Values for an additional 6 pollutants.

6.2.5 **Air Quality Strategy (AQS) 2007** - Sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK. It also sets standards and objectives for ten main air pollutants to protect health, vegetation and ecosystems.

6.2.6 **Part IV of The Environment Act 1995** - requires UK government to produce a national Air Quality Strategy (AQS) which contains standards, objectives and measures for improving ambient air quality. The most recent AQS was produced by the Department for Environment, Food and Rural Affairs (DEFRA) and published in July 2007. The AQS sets out Air Quality Objectives (AQOs) that are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedances over a specified timescale. These are generally in line with the AQLVs, although the requirements for compliance vary slightly.

National Guidance

6.2.7 The Chapter was undertaken in accordance with a number of guidance documents as detailed below:

- Department for Environment Food and Rural Affairs (DEFRA) (2016): Local Air Quality
- Management Technical Guidance LAQM TG(22).
- IAQM (2014): Guidance on the Assessment of Dust from Demolition and Construction; and
- IAQM & Environmental Protection UK (EPUK) (2017): Land-use Planning & Development Control: Planning for Air Quality.

6.2.8 Table 6.1 presents the Air Quality Objectives (AQOs) detailed within the relevant legislation will be considered further during the preparation of the Air Quality Chapter.

Table 6.1 Air Quality Objective

Pollutant	**Air Quality Objective**	
	Concentration (µg/m3)	**Averaging Period**
NO_2	40	Annual mean
	200	1-hour mean; not to be exceeded
PM_{10}	40	Annual mean
	50	24-hour mean; not to be exceeded
$PM_{2.5}$	25	Annual mean

6.2.9 Table 6.2 summarises the advice provided in DEFRA guidance LAQM TG(22) on where the AQOs for pollutants considered within this report apply.

Table 6.2 Examples of Where the Air Quality Objectives Apply

Averaging Periods	Objectives Should Apply At	Objectives Should Not Apply
Annual mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless used as a permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
24-hour mean	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be shorter than either the 24- or 8-hour relevant mean.
1-hour mean	All locations where the annual mean and 24- and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably expect to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access

Local Planning Policy

6.2.10 Cherwell District Council's (CDC) Local Plan 2011- 2031 was adopted in December 2016 and contains policies to help deliver the spatial vision for the district. A review of The Cherwell Local Plan indicated the following policy in relation to air quality that is relevant to this assessment:

- Policy ESD 10 – Protection and Enhancement of Biodiversity and the Natural Environment

6.2.11 The Oxford Local Plan 2016 - 2036 was adopted in June 2020 and is a part of Oxford's Local Plan. It contains a vision for Oxford and contains policies against which all planning applications are judged. A review of The Oxford Core Strategy 2036 indicated the following policy in relation to air quality that is relevant to this assessment:

- Policy RE6: Air Quality;
- Policy RE7: Managing the Impact of Development
- Policy M2: Assessing and Managing Development

6.2.12 Reference has been made to these policies during the undertaking of this Air Quality Assessment

by assessing pollutant concentrations across the Site and determining potential air quality impacts as a result of the Proposed Development.

6.3 Assessment Methodology

6.3.1 The following sections detail the applied assessment methodology for the:

- Construction Phase Assessment; and
- Operational Phase Assessment

Construction Phase Dust Risk Assessment

6.3.2 There is the potential for fugitive dust emissions to occur as a result of construction phase activities. These have been assessed in accordance with the methodology outlined within the Institute of Air Quality Management (IAQM) document 'Guidance on the Assessment of Dust from Demolition and Construction.

6.3.3 Activities on the Site have been divided into four types to reflect their different potential impacts. These are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout.

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

- Annoyance due to dust soiling;
- Harm to ecological receptors; and
- The risk of health effects due to a significant increase in exposure to PM_{10}

6.3.5 A desk top survey will be undertaken to identify human and ecological receptors within the relevant assessment buffers specified by the IAQM guidance. Should sensitive receptors not be present within the relevant distances then negligible impacts would be expected and further assessment is not necessary.

6.3.6 Following the identification of sensitive receptors, a site is then allocated a risk category which is assigned to each activity, based on the scale and nature of the works, as well as the sensitivity of the area to dust impact**.**

6.3.7 The assigned magnitude and sensitivity will then determine the overall risk and appropriate mitigation measures to be employed during construction phase activities. The full IAQM methodology is provided in **Appendix 6.3.**

Operational Phase Road Vehicle Impact Assessment

6.3.8 Potential air quality impacts across the Proposed Development and at sensitive receptors within close proximity to the Site have been assessed on a quantitative basis, by calculating NO_2, PM_{10} and $PM_{2.5}$ levels across the Proposed Development and at sensitive locations with and without the development using the ADMS-Roads dispersion modelling software. The ADMS modelling software package is widely accepted within the UK by the Local Authorities, the Environment Agency and DEFRA.

6.3.9 The assessment of operational phase impacts has considered the following scenarios:

- **Scenario 1:** Existing Baseline year 2019, for verification purposes against latest 2019 CDC and OCC ratified Air Quality Monitoring data ;
- **Scenario 2 (DM)**: Anticipated 2025 Opening Year baseline and relevant cumulative flows;
- **Scenario 3 (DS):** Anticipated 2025 Opening Year baseline and relevant cumulative flows, plus predicted operational flows associated with the proposed development

Assessment of Impact Magnitude

Construction Phase

6.3.10 Table 6.3 sets out the scale of sensitivity that has been applied to the human receptors identified and considered within the construction phase assessment. These criteria assume a worst-case approach for undertaking the construction phase assessment. The assessment methodology stages, can be outlined as follows:

Table 6.3 Examples of Where the Air Quality Objectives Apply

Sensitivity	Dust Soiling Effects	Health Effects
High	Locations where users can reasonably expect enjoyment of a high level of amenity; or the appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. Indicative examples include dwellings, museums and other culturally important collections, medium and long-term car parks and car showrooms.	Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, relevant location would be one where individuals may be exposed for eight hours or more in a day). Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment
Medium	Locations where users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or the appearance, aesthetics or value of their property could be diminished by soiling; or the people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. Indicative examples include parks and places of work.	Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). Indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.
Low	Locations where the enjoyment of amenity would not reasonably be expected; or the property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. Indicative examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.	Locations where human exposure is transient. Indicative examples include public footpaths, playing fields, parks and shopping streets.

6.3.11 The assessment of magnitude of impacts associated with fugitive dust emissions during the construction phase has been undertaken using the criteria set out in Table 6.3.1 within Appendix 6.3.

Operational Phase

6.3.12 Given that the receptor sensitivity is considered to be consistent across all receptors in the operational phase assessment ('High' as outlined within Table 6.3). The impact magnitude will not need to be moderated to produce the effect significance, i.e. for this assessment, the impact magnitude effectively equals the significance of effect. The methodology proposed for assessing effect significance is described below.

Significance Criteria

Construction Phase

6.3.13 The assessment of significance for the construction phase, pre-mitigation, is based on the matrix presented in Table 6.4.

Table 6.4 Construction Phase Significance Matrix

Receptor Sensitivity		Magnitude of Impact		
		Large	Medium	Low
Demolition	High	Major	Moderate	Moderate
	Medium	Major	Moderate	Minor
	Low	Moderate	Minor	Negligible
Earthworks	High	Major	Moderate	Minor
	Medium	Moderate	Moderate	Minor
	Low	Minor	Minor	Negligible
Construction	High	Major	Moderate	Minor
	Medium	Moderate	Moderate	Minor
	Low	Minor	Minor	Negligible
Trackout	High	Major	Moderate	Minor
	Medium	Moderate	Minor	Negligible
	Low	Minor	Minor	Negligible

6.3.14 Step 4 of the construction phase assessment (full details outlined within Appendix 6.3) determines the significance of any residual impacts, once the pre-mitigation effects have been determined and the appropriate mitigation measures identified. For almost all construction activity, the aim should be to control effects through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be **'Negligible'.**

Operational Phase

6.3.15 Receptors potentially sensitive to changes in NO_2, PM_{10} and $PM_{2.5}$ concentrations have been identified within 200m of the affected highway network road sources. LAQM (TG22) provides the following examples of where annual mean AQOs should apply:

- Residential properties;
- Schools;
- Hospitals; and,
- Care homes.

6.3.16 The sensitivity impact significance of each receptor was defined in accordance with the criteria shown in Table 6.5. These are based upon the guidance provided within the Environmental Protection UK (EPUK) and IAQM guidance 'Land-Use Planning and Development Control: Planning for Air Quality.

Table 6.5 Operational Phase Significance of Effect Criteria for Existing Receptors

Long Term Average Concentration	% Change in Concentration Relative to AQO			
	1	2-5	6-10	>10
75% or less of AQO	Negligible	Negligible	Minor	Moderate
76 - 94% of AQO	Negligible	Minor	Moderate	Moderate
95 - 102% of AQO	Minor	Moderate	Moderate	Major
103 - 109% of AQO	Moderate	Moderate	Major	Major
110% or more of AQO	Moderate	Major	Major	Major

6.3.17 The criteria shown in Table 6.5 is EPUK and IAQM guidance with sensitivity descriptors included

to allow comparisons of various air quality impacts. It should be noted that changes of 0%, i.e. less than 0.5%, will be described as negligible in accordance with the EPUK and IAQM guidance. Following the prediction of impacts at discrete receptor locations utilising the criteria in Table 6.5, the EPUK and IAQM document states that this framework is to be used as a starting point to make a judgement on significance of effect but other influences might need to be accounted for.

6.3.18 Whilst impacts might be determined as 'minor', 'moderate' or 'major' at individual receptors, overall effect might not necessarily be deemed as significant in some circumstances. The following factors are also considered when determining the overall significance of a development in addition to using professional judgement and reasoning as far as practicable:

- Number of properties affected by significant air quality impacts and a judgement on the overall balance;
- Where new exposure is introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective will be relevant;
- The percentage change in concentration relative to the objective and the descriptions of the impacts at the receptors;
- Whether or not an exceedance of an objective is predicted to arise or be removed in the study area due to a major increase or decrease; and,
- The extent to which an objective is exceeded e.g. an annual mean NO_2 concentration of 41µg/m^3 should attract less significance than an annual mean of 51µg/m^3.

6.3.19 These factors were considered, and an overall significance determined for the impact of operational phase road traffic emissions. It should be noted that the determination of significance relies on professional judgement and reasoning should be provided as far as practicable. This has been considered throughout the assessment when defining predicted impacts.

Significance of Impacts – Ecological Receptors

6.3.20 The Proposed Development has the potential to impact on the nearby Site of Special Scientific Interest (SSSI) and Special Protection Area (SPA) designations as a result of road traffic exhaust emissions associated with vehicles travelling to and from the application site and when considered in combination with total predicted vehicle flows.

6.3.21 With regard to the assessment on ecological receptors, the IAQM guidance and the Environmental Agency (EA) guidance[1] suggest that detailed modelling is undertaken to predict concentrations and the results at receptors compared with the EA screening criteria for insignificance.

6.3.22 This guidance also introduces the following terms:

- Process contribution (PC) - Predicted pollutant concentration or deposition rate as a result of emissions from the proposed development only; and
- Predicted environmental concentration (PEC) - Total predicted pollutant concentration as a result of emissions from the proposed development and existing baseline levels (PC plus baseline levels).

6.3.23 When considering impacts at the Oxford Meadows SSSI/SAC and nearby LWS and the emissions meet both of the following criteria, impacts can be considered insignificant and no further assessment is required, if:

- The short-term PC is less than 10% of the short-term environmental standard; and

[1] www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit, Environment Agency

- The long-term PC is less than 1% of the long-term environmental standard.

6.3.24 Should the PC not exceed the screening criteria, the EA states that detailed dispersion modelling is not required to consider air quality impacts associated with the proposed development on ecological receptors.

Assumption and Limitations

6.3.25 In undertaking the operational phase assessment of the application site and wider surrounding area, there are a number of limitations and constraints affecting the outputs from this work. These include:

- **Data uncertainty -** due to possible errors in input data, including emission estimates, operational procedures, land use characteristics and meteorology; and
- **Variability** – potential randomness of measurements used.

6.3.26 These potential uncertainties in model results were minimised as far as practicable and worst-case inputs used in order to provide a robust assessment. This included the following:

- **Choice of model** - ADMS-Roads (v5.2) is commonly used for atmospheric dispersion modelling and results have been verified against nearby monitoring data to ensure predictions are as accurate as possible;
- **Meteorological data** - Modelling was undertaken using an annual meteorological data set from the most representative meteorological station observation to the site to take account of local conditions;
- **Emission rates** - Emission Factor Toolkit v.11.0 was utilised in line with the current best practice approach; and
- **Variability** - All model inputs are as accurate as possible and worst-case conditions were considered as necessary in order to ensure a robust assessment of potential pollutant concentrations.

6.3.27 The limitations stated above are standard limitations associated with atmospheric dispersion modelling assessments. Based on the controls and assumptions detailed above it is considered that the assessment is both robust in its conclusions and completed in line with current industry standard practice

6.4 Baseline conditions

Current Baseline

Local Air Quality Management

6.4.1 As required by the Environment Act (1995), CDC has undertaken Review and Assessment of air quality within their area of administration. This process concluded that concentrations of NO_2 are above the AQO within the district. As such, four AQMAs have been declared, the nearest of which to the development is described as follows:

- "AQMA 3 – Five residential properties on Bicester Road, Kidlington to the north of the Water Eaton Lane signalled junction."

6.4.2 The Proposed Development is located approximately 1.1km south west of AQMA 3. As such there is potential for the development to cause adverse impacts to air quality within this area. This AQMA has therefore been considered further within this assessment.

6.4.3 CDC has concluded that concentrations of all other pollutants considered within the AQS are

currently below the relevant AQOs and as such no further AQMAs have been designated.

6.4.4 Additionally, OCC has undertaken Review and Assessment of air quality within their area of administration. This process concluded that concentrations of NO_2 are above the AQO within the district. As such, one AQMA has been declared, described as:

- ″The City of Oxford AQMA – The whole of the administrative area of Oxford City Council."

6.4.5 The Proposed Development is located adjacent to The City of Oxford AQMA. As such there is potential for the development to cause adverse impacts to air quality within these areas. This AQMA has therefore been considered further within this assessment.

6.4.6 OCC has concluded that concentrations of all other pollutants considered within the AQS are currently below the relevant AQOs and as such no further AQMAs have been designated.

6.4.7 Reference should be made to Figure 6.1 within Appendix 6.2 for the locations of the AQMAs with respect to the Proposed Development.

Air Quality Monitoring

6.4.8 Monitoring of pollutant concentrations is undertaken by CDC using only periodic methods, currently there are no automatic monitoring sites within their administration. CDC utilises passive diffusion tubes for NO_2 monitoring. A review of the most recent monitoring data available indicated that there are four diffusion tubes located in the vicinity of the proposed development. Recent NO_2 monitoring results from these locations are shown in Table 6.6.

Table 6.6 CDC NO_2 Monitoring Results

Site Name	Type	NGR (m)		Annual Mean NO_2 Concentration ($\mu g/m^3$)		
		X	Y	2017	2018	2019
Bicester Road (2)	Roadside	450267	213511	41.0	37.9	33.6
Oxford Road	Roadside	449122	213947	28.8	28.9	24.7
Bramley Close	Roadside	450322	213587	26.7	26.3	24.0

6.4.9 As indicated in Table 6.6, the annual mean AQO of 40 $\mu g/m^3$ for NO_2 was exceeded at the diffusion tubes at Bicester Road in 2017. This is due to its roadside location within an AQMA. Reference should be made to Figure 6.2 within Appendix 6.2 for a graphical representation of the monitoring locations.

6.4.10 Monitoring of pollutant concentrations is undertaken by OCC using continuous and periodic methods throughout their area of administration. A review of the most recent LAQM Air Quality Report indicates that there are three automatic analysers operated by OCC. The closest of which is CM2 which is located approximately 4.5km south of the site at NGR: 451677, 206272. Due to the distance between the sites, similar pollutant concentrations would not be expected and as such, these monitoring stations have not been considered further within this assessment.

6.4.11 Neighbouring OCC also monitor NO_2 concentrations across the borough using passive diffusion tubes. A review of the most recent air quality monitoring data indicated 6 diffusion tubes located within the vicinity of the application site, presented in Table 6.7.

Table 6.7 OCC NO_2 Monitoring Results

Site Name		Type	NGR (m)		Annual Mean NO_2 Concentration ($\mu g/m^3$)		
			X	Y	2017	2018	2019
DT25	3 Elsfield Road Cutteslowe Roundabout	Roadside	450419	210256	35.0	35.0	35.0
DT26	3 Summers Place Cutteslowe Roundabout	Roadside	450389	210189	41.0	41.0	40.0
DT27	Wolvercote Roundabout - 78 Sunderland avenue	Roadside	449824	210198	29.0	29.0	29.0
DT28	Wolvercote Roundabout - 51 Sunderland Avenue	Roadside	449856	210162	26.00	27.00	26.00
DT29	Pear Tree Park & Ride	Roadside	449530	210734	28.0	25.0	26.0
DT71	BP Service Station Woodstock Road	Roadside	449617	210216	41.0	38.0	40.0

6.4.12 As indicated in Table 6.7, the annual mean AQO of 40 $\mu g/m^3$ for NO_2 was exceeded at three diffusion tubes in recent years. This is due to their locations within a designated AQMA. Reference should be made to Figure 6.2 within Appendix 6.2 for a graphical representation of the monitoring locations.

Background Pollutant Concentrations

6.4.13 The total concentration of a pollutant is comprised of explicit local emission sources (such as roads and industrial sources) and the background component. The background component consists of indeterminate sources which are transported into an area from further away by meteorological conditions. Background pollutant concentrations are therefore the ambient level of pollution that is not affected by local sources of pollution.

6.4.14 In reality, it is not usually practical to obtain a true representation of background levels in urban areas due to corruption by local sources; background levels used in assessments may contain a mixture of both sources.

6.4.15 Predictions of background pollutant concentrations on a 1km by 1km grid basis have been produced by DEFRA for the entire of the UK to assist LAs in their Review and Assessment of air quality. The Proposed Development site is located across two grid squares:

- NGR: 450500, 210500; and
- NGR: 450500, 211500

6.4.16 Data for this location was downloaded from the DEFRA website . For the purpose of this assessment an average background concentration was taken and are summarised in Table 6.8 for the verification year (2019) and the predicted development opening year (2025).

Table 6.8 Predicted Background Pollutant Concentrations

Pollutant	2019	2025
NO_x	18.04	13.80
NO_2	13.36	10.46
PM_{10}	15.84	14.72
$PM_{2.5}$	10.30	9.41

6.4.17 As indicated in Table 6.8, background pollutant concentrations of NO_2, PM_{10} and $PM_{2.5}$ are below the relevant AQOs detailed in Table 6.1.

6.5 Sensitive Receptors

Construction Phase

6.5.1 There are no nationally or European designated ecological receptors within 50m of the Site boundary, or within 50m from a route used by construction vehicles on the public highway (up to 500m from the Site entrance). Therefore, the risk of dust effects at a nationally or European designated ecological receptor site from construction impacts have not been considered further in this assessment.

6.5.2 Human receptors sensitive to potential dust impacts during, demolition, earthworks and construction were identified from a desk-top study of the area up to 350m from the Proposed Development boundary. These are summarised in Table 6.9.

Table 6.9 Earthworks and Construction Dust Sensitive Receptors

Distance from Site Boundary (m)	Approximate Number of Human Receptors
Less than 20	10-100
20 – 50	10-100
50 – 100	More than 100
100 – 350	More than 100

6.5.3 Reference should be made to Figure 6.3 within Appendix 6.2 for a graphical representation of earthworks and construction dust buffer zones.

6.5.4 Receptors sensitive to potential dust impacts from trackout were identified from a desk-top study of the area up to 50m from the road network within 500m of the site access route. These are summarised in Table 6.10. The exact construction vehicle access routes were not available for the purpose of this assessment as they will depend on sourcing of materials. This is likely to be decided by the contractor. However, it was assumed that construction traffic would access the Proposed Development via Oxford Road, to ensure a worst case trackout assessment is undertaken.

Table 6.10 Trackout Dust Sensitive Receptors

Distance from Site Boundary (m)	Approximate Number of Human Receptors
Less than 20	10-100
20 – 50	10-100

6.5.5 Reference should be made to Figure 6.4 within Appendix 6.2 for a graphical representation of trackout dust buffer zones.

6.5.6 A number of additional factors have been considered when determining the sensitivity of the surrounding area. These are summarised in Table 6.11.

Table 6.11 Additional Area Sensitivity Factors

Guidance	Comment
Whether there is any history of dust generating activities in the area	The site is located in a residential area. There is likely to have been a history of dust generating activities due to commuting and redevelopment processes in the locality.
The likelihood of concurrent dust generating activity on nearby sites.	A review of the CDC and OCC planning portal indicated that there are several large-scale planning applications within the vicinity of the site. As such, there is risk of concurrent dust impacts , should phases overlap
Pre-existing screening between the source and the receptors	There is vegetation present along the development boundaries. If retained, this could

Guidance	Comment
	provide little natural protective screening to receptors in these directions.
Conclusions drawn from analysing local meteorological data which accurately represent the area: and if relevant the season during which works will take place	The wind direction is predominantly from the west of the development. As such, properties to the east of the site would be most affected by dust emissions
Conclusions drawn from local topography	The topography of the area appears to be predominantly flat. As such, there are no constraints to dust dispersion.
Duration of the potential impact, as a receptor may become more sensitive over time	Currently the duration of the construction phase is to last over a period of 3 years
Any known specific receptor sensitivities which go beyond the classifications given in the document.	No specific receptor sensitivities identified during the baseline.

Operational Phase

6.5.7 A desk-top study was undertaken in order to identify any sensitive receptor locations in the vicinity of the site that require specific consideration during the assessment and are summarised in Table 6.12.

Table 6.12 Existing Sensitive Human Receptors

Potential Impact		NGR (m)		Height (m)
		X	Y	
R1	82-83 Hawksmoor Road	450449.2	210179.0	1.5
R2	Residential - Cuttleslowe Roundabout	450443.1	210225.4	1.5
R3	Residential - Cuttleslowe Roundabout	450385.4	210168.4	1.5
R4	Residential - Cuttleslowe Roundabout	450386.6	210226.1	1.5
R5	431 Banbury Road	450352.6	210366.7	1.5
R6	Residential - Banbury Road	450314.3	210499.7	1.5
R7	532 Banbury Road	450328.7	210629.6	1.5
R8	560 Banbury Road	450333.9	210724.3	1.5
R9	20 Jordon Hill	450321.9	210956.6	1.5
R10	403 Banbury Road	450340.1	210525.0	1.5
R11	460 Banbury Road	450440.5	209984.5	1.5
R12	2 Sunderland Avenue	450304.0	210233.5	1.5
R13	5 Elsfield Way	450495.4	210227.2	1.5
R14	50 Kendall Crescent	450677.6	210231.3	1.5
R15	Cuttleslowe Primary School	451070.8	210147.8	1.5
R16	32 Sunderland Avenue	450129.8	210229.3	1.5
R17	Cuttleslowe Roundabout - Residential	449805.0	210195.8	1.5
R18	Wolvercote Roundabout - Residential	449785.5	210168.4	1.5
R19	39 Sunderland Avenue	449972.9	210165.9	1.5
R20	79 Sunderland Avenue	449782.6	210127.0	1.5
R21	Woodstock Road - Residential	449867.9	209995.0	1.5
R22	Godstow Road - Residential	449633.9	210059.3	1.5
R23	Woodstock Road - Residential	449589.9	210325.0	1.5
R24	328 Oxford Road	449765.1	210270.0	1.5
R25	300 Oxford Road	449943.5	210344.1	1.5
R26	171 Oxford Road	449664.0	213170.0	1.5
R27	166 Oxford Road	449584.9	213315.7	1.5
R28	Wheely Court	449556.6	213482.7	1.5
R29	85 Oxford Road	449385.2	213700.2	1.5
R30	28 Beagles Close	450211.3	213326.7	1.5
R31	46 Hampden Drive	449987.2	212660.4	1.5

6.5.8 Receptors modelled at 1.5m to represent the average UK "breathing height" above ground level. Reference should be made to Figure 6.6 within Appendix 6.2 for a graphical representation of operational phase emission sensitive human receptor locations.

Operational Phase Sensitive Ecological Receptors

6.5.9 A desk-top study was undertaken in order to identify any sensitive ecological receptor locations in the vicinity of the application site that require specific consideration during the assessment and are summarised in Table 6.13.

Table 6.13 Existing Sensitive Ecological Receptors

Receptor		Designation	NGR (m)		Height (m)
			X	Y	
ER1	Oxford Meadows, Pixey Yarnton Meads	SSSI/SAC	448235	210652	0
ER2	Oxford Meadows, Pixey Yarnton Meads	SSSI/SAC	448548	210001	0
ER3	Oxford Meadows, Pixey Yarnton Meads	SSSI/SAC	448574	209980	0
ER4	Stratfield Brake	LWS	449997	211931	0
ER5	Stratfield Brake, Woodland Trust Reserve, Conservation Target Area	LWS	449718	211904	0
ER6	Meadows West of the Oxford Canal, Conservation Target Area	LWS	449679	211915	0
ER7	Linkside Lake	LWS	449833	210428	0
ER8	Peartree Hill Verges	LWS	449259	211142	0
ER9	Peartree Hill Verges	LWS	449263	211193	0
ER10	Canalside Meadow Oxford Canal Marsh	LWS	448940	210305	0
ER11	Duke Meadow	LWS	448806	210187	0
ER12	Bypass Meadows	LWS	451404	210052	0

6.5.10 Ecological receptors were modelled at 0m above ground level. Reference should be made to Appendix 6.1 for a graphical representation of operational phase sensitive ecological receptor locations.

6.5.11 Critical loads have been designated within the UK based on the sensitivity and relevant features of the receiving habitat. A review of the Air Pollution Information System (APIS) website[2] was undertaken in order to identify the worst-case habitat description and associated critical load for the designation considered within the model. This ensures a conservative approach has been considered. Table 6.14 shows the relevant critical loads for acid deposition.

Table 6.14 Acid Critical Load

Receptor	APIS Habitat	Critical Load (ke/ha/yr)		
		CLmaxS	CLmaxN	CLminN
ER1	Acid Grassland	4.11	0.438	4.548
ER2	Acid Grassland	4.11	0.438	4.548
ER3	Acid Grassland	4.11	0.438	4.548

6.5.12 APIS does not provide critical load data for Local Wildlife Sites, as such these receptor locations

[2] UK Air Pollution Information System, www.apis.ac.uk.

will utilise the Air Quality Limit Values

6.5.13 Background concentrations and deposition rates at the ecological receptor locations were downloaded from the APIS website and are summarised in Table 6.15.

Table 6.15 Background Concentrations and Deposition Rates

Receptor	APIS Habitat	Background Concentrations Deposition Rates		
		NOx (µg/m3)	NH3 (µg/m3)	Acid – N (keq/ha/yr)
R1	Acid Grassland	16.6885	2.3	19.3
R2	Acid Grassland	16.6885	2.3	19.3
R3	Acid Grassland	16.45034	2.3	19.3
R4	N/A	16.01453	2.3	N/A
R5	N/A	16.01453	2.3	N/A
R6	N/A	16.01453	2.3	N/A
R7	N/A	17.13228	2.3	N/A
R8	N/A	16.01453	2.3	N/A
R9	N/A	16.01453	2.3	N/A
R10	N/A	16.6885	2.3	N/A
R11	N/A	16.6885	2.3	N/A
R12	N/A	12.03431	2.3	N/A

6.6 Potential Environmental Impacts & Effects

Construction Phase

Step1 – Screening

6.6.1 The desk-study detailed in Table 6.9 and Table 6.10 identified a number of receptors with a high classification of sensitivity within 350m of the site boundary, and within 50m of the anticipated trackout routes. As such, a detailed assessment of potential dust impacts was required, and summarised in the below sections.

Step 2A – Magnitude

6.6.2 The scale and nature of the works was determined to assess the magnitude of dust arising from each construction phase activity. The determination of magnitude was based upon the criteria detailed in Appendix 6.3, with the outcome of Step 2A is summarised below in Table 6.16.

Demolition

6.6.3 Demolition will involve the removal of Pipal Barns. The volume of buildings to be demolished is therefore likely to be less than 20,000m^3. With this considered the magnitude of potential dust emissions related to demolition activities is considered small.

Earthworks

6.6.4 The Proposed Development site is estimated to cover an area of approximately 480,000 m^2. The magnitude of potential dust emissions related to earthwork activities is therefore considered large.

Construction

6.6.5 The proposals comprise the construction of 800 dwellings, associated community infrastructure and open space (including a primary school and a local centre), given the scale of the Proposed Development the total building and infrastructure volume is more than 50,000m^3. The magnitude of potential dust emissions related to construction activities is therefore considered large.

Trackout

6.6.6 Information on the number of HDV trips to be generated during the construction phase of the Proposed Development was not available at the time of assessment. Similarly, the surface material and unpaved road length was not known at this stage of the project. Based on the site area, it is anticipated that the unpaved road length is likely to be greater than 100m. The magnitude of potential dust emissions from trackout is therefore considered large.

Table 6.16 Dust Emissions Magnitude

Magnitude of Activities			
Demolition	**Earthworks**	**Construction**	**Trackout**
Small	Large	Large	Large

Step 2B – Sensitivity

6.6.7 The next step (Step 2B) is to determine the sensitivity of the surrounding area, based on general principles such as amenity and aesthetics, as well as human exposure sensitivity.

Dust Soiling

6.6.8 As shown in Section 6.5 and Table 6.9, the desk top study indicated approximately more than 100 sensitive receptors within 350m of the Proposed Development boundary and 10 - 100 within 50m of the anticipated trackout routes.

6.6.9 Based on the assessment criteria detailed in Appendix 6.3, the sensitivity of the receiving environment to potential dust soiling impacts was considered to be high for all construction phase activities. This is because the site is situated in a predominantly residential area and the people or property would reasonably be expected to be present here for extended periods of time.

Human Health

6.6.10 The annual mean concentration of PM_{10} is 15.84µg/m^3 as detailed in Table 6.8, based on the receptor counts provided above, the area is considered to be of low sensitivity for all construction phase activities.

6.6.11 The sensitivity of the receiving environment to specific potential dust impacts, based on the criteria detailed in Appendix 6.3 is summarised in Table 6.17.

Table 6.17 Sensitivity of the Surrounding Area

Earthworks	**Magnitude of Activities**			
	Demolition	**Earthworks**	**Construction**	**Trackout**
Dust Soiling	High	High	High	High
Human Health	Low	Low	Low	Low

Step 2C – Risk

6.6.12 Both the magnitude and sensitivity factors are combined in Step 2C to determine the risk of dust impacts without the application of best practice mitigation measures.

6.6.13 It should be noted that the potential for impacts depends significantly on the distance between the dust generating activity and receptor location. Risk was predicted based on a worst-case scenario of works being undertaken at the site boundary closest to each sensitive area. Therefore, actual risk is likely to be lower than that predicted during the majority of the construction phase. A summary of the risk from each dust generating activity is provided in 0.

Table 6.18 Sensitivity of the Surrounding Area

Earthworks	Magnitude of Activities			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium	High	High	High
Human Health	Negligible	Low	Low	Low

Step 3 – Mitigation

6.6.14 The IAQM guidance provides a number of potential mitigation measures to reduce impacts during the construction phase. These measures have been adapted for the Site as summarised in Table 6.22. It will be required to review these measures prior to the commencement of construction works and incorporated into existing strategies where practical.

Operational Phase

6.6.15 As discussed in this chapter additional vehicle movements associated with the operation of the Proposed Development will generate exhaust emissions, such as NO_2, PM_{10} and $PM_{2.5}$ on the local and regional road networks.

6.6.16 Operational Traffic data for the assessment scenarios has been supplied by i-Transport, the appointed Transport Consultant for the scheme.

Future Exposure

6.6.17 Annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations were predicted across the Proposed Development for the 2025 DS scenario at a height of 1.5m to represent exposure across the ground floor level, as shown in Figures 6.8 to 6.10 within Appendix 6.2.

6.6.18 Background NO_2 PM_{10} and $PM_{2.5}$ levels are likely to be lower at elevated heights due to increased distance from emission sources, such as roads. Therefore, predicted concentrations at heights above ground floor level are considered acceptable in regards to future exposure and have not been assessed further.

Nitrogen Dioxide

6.6.19 Predicted annual mean NO_2 concentrations across the Proposed Development site during the DS scenario are summarised in Table 6.19.

Table 6.19 Modelling Results - Annual Mean NO_2 at Proposed Development

Floor Level	Predicted 2025 Annual Mean NO_2 Concentration (µg/m³)
Ground (1.5m)	11.5 – 24.5

6.6.20 The predicted concentrations shown in Table 6.19 indicate that there were no exceedances of the AQO across the Proposed Development. As such, it is considered that annual mean NO_2 levels at the Proposed Development site should not be viewed as a constraint to development.

6.6.21 Predictions of 1-hour NO_2 concentrations were not produced as part of the dispersion modelling assessment. LAQM.(TG22) states if annual mean NO_2 concentrations are below 60µg/m³ then it is unlikely that the 1-hour AQO will be exceeded. As such, based on the results in Table 6.19 it is not predicted that on-site concentrations will exceed the 1-hour mean AQO for NO_2.

6.6.22 Based on the results of the dispersion modelling assessment, the site is considered to be suitable for residential use without the implementation of mitigation techniques to protect future site users from elevated NO_2 concentrations.

Particulate Matter (PM_{10} & $PM_{2.5}$)

6.6.23 Predicted annual mean PM_{10} and $PM_{2.5}$ concentrations across the Proposed Development site during the DS scenario are summarised in Table 6.20.

Table 6.20 Modelling Results - Annual Mean PM_{10} and $PM_{2.5}$ at Proposed Development

Floor Level	Predicted 2025 Annual Mean Concentration (µg/m³)	
	PM_{10}	$PM_{2.5}$
Ground (1.5m)	15.1 – 18.7	9.6 – 11.9

6.6.24 The predicted concentrations shown in Table 6.20 indicate that there were no exceedances of the annual mean AQOs for PM_{10} or $PM_{2.5}$ throughout the modelling area. As such, it is considered that annual mean PM_{10} or $PM_{2.5}$ levels at the Proposed Development site should not be viewed as a constraint to development.

6.6.25 Based on the results of the dispersion modelling assessment, the site is considered to be suitable for proposed end use without the implementation of mitigation techniques to protect future site users from elevated PM_{10} and $PM_{2.5}$ concentrations.

Road Vehicle Exhaust Emissions Impacts

6.6.26 Based on data from the appointed traffic consultant, i-Transport, it is expected that there will be 1,123 Annual Average Daily Traffic (AADT) trips generated by the Proposed Development. Based on the anticipated AADT trip generation a dispersion modelling assessment was undertaken in order to quantify potential changes in pollutant concentrations at sensitive locations in the vicinity of the site.

6.6.27 Predicted impacts on annual mean NO_2 PM_{10} and $PM_{2.5}$ concentrations as a result of operational phase exhaust emissions were predicted to be **negligible** at 31 sensitive receptor locations within the vicinity of the site including receptors located within the nearby AQMA.

6.6.28 The overall significance of potential impacts was determined to be **not significant** in accordance with the EPUK and IAQM guidance. The use of robust assumptions, in the form of worse-case road vehicle emission factors, was considered to provide sufficient results confidence for an assessment of this nature.

6.6.29 Full assessment results and commentary can be found in Appendix 6.4, further discussion on the overall impact significance is provided in 0.

6.6.30 It should be noted that predicted impacts on annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations using 2019 emission factors were also predicted to be **moderate** at 1 sensitive receptor location, **slight** at 2 receptor locations and **not significant** for the remaining 28 sensitive receptor locations within the vicinity of the site. Full assessment results on the sensitivity analysis can be found in Appendix 6.5.

Impact Significance

6.6.31 The overall significance of operational phase road traffic emission impacts for 2025 was determined as **not significant** This was based on the predicted impacts at discrete receptor locations and the considerations outlined in Section 0. Further justifications are provided in 0.

Table 6.21 Overall Road Emissions Impact Significance

Guidance	Comment
Number of properties affected by slight, moderate or substantial air quality impacts and a judgement on the overall balance	Impacts on annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations were predicted to be negligible at all 31 sensitive receptors.
Where new exposure is introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective or limit value will be relevant	The proposed development will not result in any new exposure to pollutant concentrations above the AQOs at sensitive locations on the application site and as such no new exposure has been introduced.
The percentage change in concentration relative to the objective and the descriptions of the impacts at the receptors	The change in concentration relative to the AQO was predicted to range from: • <0.01% to 0.83% for NO_2; • <0.01% to 0.25% for PM_{10}; and • <0.01% to 0.24% for $PM_{2.5}$ Resultant impacts were subsequently predicted to be negligible at 31 receptor locations.
Whether or not an exceedance of an objective is predicted to arise or be removed in the study area due to a substantial increase or decrease	There were no new exceedances of the annual mean AQOs as a result of the proposed development. There were no exceedances of the annual mean AQO for PM_{10} and $PM_{2.5}$ at any location within the modelling extent.
The extent to which an objective is exceeded e.g. an annual mean NO_2 concentration of 41µg/m3 should attract less significance than an annual mean of 51µg/m3	As stated above, there were no new exceedances of the annual mean AQOs for NO_2, PM_{10} and $PM_{2.5}$ at any location within the modelling extent.

Road Vehicle Exhaust Emission Impacts – Ecological Sensitive Receptors

6.6.32 Predicted impacts on NOx and NH3 concentrations and deposition rates as a result of operational phase exhaust emissions could be screened out as insignificant at all sensitive ecological receptor locations in accordance with the IAQM guidance and EA screening criteria, as outlined in Section 6.3, when assessing the proposed development in isolation. Full impact assessment results can be found in Appendix 6.4.

6.7 Mitigation

6.7.1 There are a number of air quality mitigation options available to ensure suitable reductions to air quality impacts as a result of the Proposed Development. Additionally, mitigation measures are required to protect existing receptor location as a result of fugitive dust emissions and road vehicle exhaust emissions generated by the construction and operational phase of the Proposed Development. Measures relevant to the operational and construction of the Site are outlined in the following Sections.

Construction Phase

6.7.2 The IAQM guidance provides a number of potential mitigation measures to reduce potential impacts from the construction phase. The Site has been classified as a high risk in regard to the potential of dust soiling and low risk in regard to human health resulting from construction phase

activities. Mitigation measures have therefore been adapted for the Site and summarised in Table 6.22. It will be required to review these measures prior to the commencement of construction works and incorporated into existing strategies.

Table 6.22 Fugitive Dust Mitigation Measures

Guidance	Comment
Communications	Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary Develop and implement a stakeholder communications plan that includes community engagement Display the head or regional office contact information Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the LA
Site Management	Record all dusty and air quality complaints Record any exceptional incidents that cause dust/or air emissions, and the action taken to resolve the situation Hold regular liaison meetings with other high-risk construction sites that are within 500m of the site boundary. Ensuring plans are co-ordinated and dust and particulate matter emission are minimised Make complaints log available to LA when asked
Monitoring	Undertake daily on-site and off-site inspection, where receptors are nearby, to monitor dust, record inspection results, and make the log available to the LA when asked Carry out regular site inspections to monitor compliance with the DMP Increase frequency of site inspections when activities with a high potential to produce dust are being carried out Agree dust deposition, dust flux, or real-time PM10 continuous monitoring locations with the Local Authority.
Preparing and Maintaining the Site	Plan site layout so that machinery and dust causing activities are located away from receptors Erect solid screens or barriers around dust activities or the site boundary that are at least as high as any stockpiles on site Fully enclose site or specific operations where there is a high potential for dust production and the site as actives for an extensive period Avoid site runoff of water or mud Use water as dust suppressant where applicable Keep site fencing, barriers and scaffolding clean using wet methods Remove materials that have a potential to produce dust from site as soon as possible Cover, seed or fence stockpiles to prevent wind whipping
Operating Vehicle/ Machinery and Sustainable Travel	All vehicles to switch off engines - no idling vehicles Avoid the use of diesel or petrol-powered generators where practicable Impose a signpost a maximum-speed limit of 15mph on surfaced and

Guidance	Comment
	10mph on un-surfaced haul roads and work areas Produce a Construction Logistics Plan to manage sustainable deliveries
Operations	Cutting equipment to use water as dust suppressant or suitable local extract ventilation Ensure adequate water supply on the site for effective dust/particulate matter suppression/mitigation Use enclosed chutes, conveyors and covered skips Minimise drop heights Ensure equipment is readily available on site to clean any spillages
Waste Management	No bonfires or burning of waste materials
Demolition	Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust). Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground. Avoid explosive blasting, using appropriate manual or mechanical alternatives. Bag and remove any biological debris or damp down such material before demolition
Earthworks	Re-vegetate earthworks and exposed areas Use Hessian, mulches or trackifiers where it is not possible to re-vegetate Only remove the cover in small areas during work and not all at once
Construction	Avoid scabbling Ensure sand and other aggregates are stored and not able to dry out, unless it is required for a specific process Ensure bulk cement and other fine powder materials are delivered and stored to prevent escape For smaller supplies of fine powder ensure bags are sealed after use and stored appropriately to prevent dust
Trackout	Use water-assisted dust sweeper on the access and local roads Avoid dry sweeping of large areas Ensure vehicles entering and leaving sites are covered to prevent escape of materials Inspect on-site haul routes for integrity, instigate necessary repairs and record in site log book Record all inspections of haul route and any subsequent action in a site log book

Guidance	Comment
	Install hard surfaced haul routes which are regularly damped down with fixed or mobile sprinkler systems, or mobile bowsers and regularly cleaned Implement a wheel washing system at a suitable location near site exit Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits Access gates to be located at least 10m from receptors, where possible

Operational Phase

6.7.3 Further to inherent mitigation measures set out above, a variety of additional operational mitigation measure have been proposed within Chapter 5 Transport and Access which will aid in reducing vehicular trips, and therefore emissions.

6.8 Residual effects

Residual effects are defined as those that remain following the implementation of mitigation. Effects on air quality for the Proposed Development are outlined in the following Sections.

Construction Phase

6.8.1 Assuming the relevant mitigation measures outline in Table 6.22 are implemented, the residual effect from all dust generation activities is predicted to be negligible.

Operational Phase

6.8.2 Predicted impacts on referenced pollutant species as a result of the operational phase were predicted to be negligible at all sensitive receptor locations.

6.9 Implications of Climate Change

6.9.1 Changes in climate can result in impacts on local air quality. For example, atmospheric warming associated with climate change has the potential to increase ground-level ozone. However, the impact of climate change on other air pollutants, such as particulate matter, is less certain. Given this uncertainty, it is not feasible to incorporate the effects of climate change within the air quality assessment at this time following any standard industry approach.

6.9.2 Overall, the effects of climate change are considered unlikely to materially affect the results of the assessments reported in this chapter. Furthermore, it is considered that should the effects of climate change have the potential to result in any worsening of air pollutant levels at the site in the future, any such effect would be counterbalanced by the forecasted reduction in polluting vehicles on the road network in the future due to the introduction of electric vehicles. This is supported by the UK target to cut the purchasing of new petrol and diesel fuelled cars by 2040 (Business, Energy and Industrial Strategy Committee (2018) Fourteenth Report of Session 2017-2019).

6.9.3 In order to provide a robust assessment, the approach that has been taken has been to maintain background pollutant concentrations for the latest ratified monitoring year (2019) as well as utilising emission factors for the baseline year (2019) in preference to predicting any future improvements in both background concentrations and emission factors. Therefore, this combination of baseline

emission factors and background concentrations provides further overestimation to pollutant concentrations during the operation of the proposed development. This is because local air quality is predicted to improve during future years, due to improved vehicle emission standards associated with a shift towards 'greener' vehicle fleet compositions such as, electric vehicles. As such, this approach allows for a conservative assessment.

6.10 Cumulative effects

6.10.1 Cumulative effects are defined as those that occur as a result of current and future activities that may impact collectively over time. Cumulative effects on air quality at the Proposed Development are outlined in the following sections. These sections consider the effect of the Proposed Development in conjunction with traffic associated with the identified committed developments listed Chapter 15.

Construction Phase

6.10.2 A review of the OCC and CDC planning portal indicated a recent planning approval within 350m of the Proposed Development, Scheme 15, Figure 15.1. As such, there is a likelihood for cumulative effects should the construction phases of the committed development's overlap.

6.10.3 However, the implementation of the mitigation measures for the proposed development as suggested in Table 6.22, as well as nearby sites adhering to their suggested mitigation measures will ensure that cumulative effects as a result of concurrent Construction Phase impacts are negligible on a temporary basis and therefore construction phase impacts are considered not significant. It is assumed that development occurring on the adjacent site will be adhering to Dust Management Plans to control fugitive dust emission from construction activities.

Operational Phase

6.10.4 The assessment has considered the effect of the Proposed Development in conjunction with the identified committed developments with Chapter 15. Associated traffic generation from the appropriate and available applications were factored into the modelled traffic data to consider the combined effect of committed developments and the Proposed Development.

6.10.5 The future year 2025 DM and DS scenario traffic flows as provided by i-Transport the appointed Transport Consultant for the scheme.

6.11 Summary

6.11.1 The Proposed Development has the potential to cause air quality impacts during both the construction and operational phases.

6.11.2 During the construction phase of the Proposed Development there is potential for air quality impacts at human receptors as a result of fugitive dust emissions from the Site. These were assessed in accordance with the relevant guidance methodologies. Assuming good practice dust control measures are implemented, the residual significance of potential air quality impacts from dust generated by demolition, earthworks, construction and trackout activities was predicted to be negligible and subsequently not significant.

6.11.3 Dispersion modelling was undertaken in order to quantify pollutant concentrations at the Site and assess potential exposure of future users. Annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted across the proposed development site and were subsequently verified using local monitoring results obtained from OCC and CDC.

6.11.4 The dispersion modelling results indicated that annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations across proposed sensitive residential use were below the relevant AQOs. The location is therefore considered suitable for the proposed end-use without the implementation of protective mitigation techniques.

6.11.5 In addition, dispersion modelling was undertaken in order to predict air quality impacts at sensitive receptor locations within the vicinity of the Site as a result of the additional road vehicle exhaust emission generated by the operation of the Proposed Development. This indicated that the increase in pollutant concentrations at sensitive receptor locations including those within the AQMA was deemed negligible .

6.11.6 As a result, a comprehensive offsetting strategy is to be employed to reduce development generated emissions. The strategy is for every home with dedicated parking to have an Electric Vehicle charger (Building Regulations, Part S), public charging points will also be available. The Site will also provide dedicated cycle parking for dwellings with regard to OXCC's best practice requirements and guidance.

6.11.7 Therefore, in light of the comprehensive offsetting strategy the overall significance of potential residual impacts is considered to reduce from minor adverse to not significant, in accordance with the relevant guidance criteria.

Table 6.23 Summary of effects

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
Construction phase					
Sensitive Receptors - Construction Dust emissions	High	Short Term	Table 6.22- Proposed Development will incorporate the specific construction phase mitigation measures outlined in the IAQM guidance.	Negligible	Not Significant
Sensitive Receptors - Construction Vehicle road emissions	High	Short Term	Table 6.22 - Proposed Development will incorporate the specific construction phase mitigation measures outlined in the IAQM guidance.	Negligible	Not Significant
Operational phase					
Sensitive Receptors - Operational development Road Traffic emissions	High	Long-Term	Best practice measures.	Negligible	Not Significant
Sensitive Receptors – Proposed Future occupants	High	Long Term	Best practice measures.	Negligible	Not Significant

6.12 References

6.12.1 This ES Chapter has been prepared by reference to the following:

- Department for Environment, Food and Rural Affairs (DEFRA) (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland.
- Department for Environment, Food and Rural Affairs (DEFRA) (2021) Local Air Quality Management Technical Guidance 2016 LAQM.TG(22).
- England Directive 2008/50/EC (2016) The Air Quality Standards (Amendment) Regulations.
- Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) (2017) Land-Use Planning and Development Control: Planning for Air Quality.
- Institute of Air Quality Management (IAQM) (2016) Guidance on the Assessment of Dust from Demolition and Construction.
- Ministry of Housing, Communities & Local Government (2019), The National Planning Guidance (NPPG).
- Ministry of Housing, Communities & Local Government (2021) The National Planning Policy Framework (NPPF).

7 Noise and vibration

7.1 Introduction

7.1.1 This chapter has been prepared by Dice Environmental Ltd. (Dice) and assesses the potential significant environmental impacts of the Proposed Development regarding noise and vibration.

7.1.2 This chapter sets out the methodology followed in undertaking the assessment and provides a review of the prevailing baseline and predicted future noise environment at the Site and the surrounding area. This information is gathered from a combination of on-site noise surveys carried out by Dice in November 2022, and predicted traffic flows for current and future scenarios provided by i-Transport, the project's transportation consultant. This assessment will be used to determine whether noise and vibration pose a constraint to residential development at the Site and inform any mitigation measures required in the design of the proposed buildings. Noise and vibration mitigation measures required as result of the construction and operation of the proposed Site are also considered.

7.1.3 An introduction to acoustics principles and a glossary of all terminology used is given in Appendix 7.1.

7.2 Legislation & Guidance

Professional Practice Guidance on Planning & Noise 2017

7.2.1 Professional Practice Guidance (ProPG) on Planning and Noise [1] has been produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England. The guidance encourages better acoustic design for new residential development and aims to protect people from the harmful effects of noise. It aims to complement Government planning and noise policy and guidance. In particular, it strives to:

- Advocate full consideration of the acoustic environment from the earliest possible stage of the development control process
- Encourage the process of good acoustic design in and around new residential developments
- Outline what should be taken into account in deciding planning applications for new noise-sensitive developments
- Improve understanding of how to determine the extent of potential noise impact and effect; and
- Assist the delivery of sustainable development.

7.2.2 ProPG advocates a systematic, proportionate, risk-based, 2-stage, approach. The approach encourages early consideration of noise issues, facilitates straightforward accelerated decision making for lower risk sites, and assists proper consideration of noise issues where the acoustic environment is challenging.

7.2.3 The two sequential stages of the overall approach are:

Stage 1 – an initial noise risk assessment of the proposed development Site

7.2.4 It is important that the assessment of noise risk at a proposed residential development Site is not the basis for the eventual recommendation to the decision maker. The recommended approach is intended to give an early indication of the likely initial suitability of the Site for new residential development from a noise perspective and the extent of the acoustic issues that would be faced.

Stage 2 – a systematic consideration of four key elements

Element 1 – Demonstrating a "Good Acoustic Design Process"

7.2.5 It is imperative that acoustic design is considered at an early stage of the development control process. A good acoustic design process takes a multi-faceted and integrated approach to achieve optimal acoustic conditions, both internally and externally. Good acoustic design should avoid "unreasonable" acoustic conditions and prevent "unacceptable" acoustic conditions.

Element 2 – observing internal "Noise Level Guidelines"

Table 7.1 ProPG internal noise level guidelines

Activity	Location	Daytime (07:00-23:00)	Night (23:00-07:00)
Resting	Living room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$ 45 dB $L_{Amax,fast}$[4]

NOTE 1: The table provides recommended internal L_{Aeq} target levels for overall noise in the design of a building. These are the sum total of structure-borne and airborne noise sources. Ground-borne noise is assessed separately and is not included as part of these targets, as human response to ground-borne noise varies with many factors such as level, character, timing, occupant expectation and sensitivity.

NOTE 2: The internal L_{Aeq} target levels shown in the table are based on the existing guidelines issued by the WHO [2] and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow a typical diurnal pattern, for example on a road serving a port with high levels of traffic at certain times of the night, an appropriate alternative period, e.g., 1 hour, may be used, but the level should be selected to ensure consistency with the internal L_{Aeq} target levels recommended in the table.

NOTE 3: These internal L_{Aeq} target levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year's Eve.

NOTE 4: Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise sensitive rooms at night (e.g., bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45 dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability, and regularity of noise events.

NOTE 5: Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed. However, any façade openings used to provide whole dwelling ventilation (e.g., trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded, subject to the further advice in Note 7.

NOTE 6: Attention is drawn to the requirements of the Building Regulations.

NOTE 7: Where development is considered necessary or desirable, despite external noise levels above the WHO Guidelines [2], the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} target levels by more than 5 dB, the more that most people are likely to regard them as "unreasonable". Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal L_{Aeq} levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as "unacceptable" by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing "unacceptable" noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form.

Element 3 – undertaking an "External Amenity Area Noise Assessment"

7.2.6 BS8233 [3] provides the following advice:

If external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed as intended. The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50-55 dB $L_{Aeq,16hr}$. These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces.

7.2.7 Where, despite following a good acoustic design process, significant adverse noise impacts remain on any private external amenity space then that impact may be partially offset if the residents are provided, through the design of the development or the planning process, with access to:

- a relatively quiet facade or a relatively quiet externally ventilated as part of their dwelling; and/or
- a relatively quiet alternative or additional external amenity space for sole use by a household; and/or
- a relatively quiet, protected, nearby, external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or
- a relatively quiet, protected, publicly accessible, external amenity space that is nearby.

Element 4 – consideration of "Other Relevant Issues"

- compliance with relevant national and local policy;
- magnitude and extent of compliance with ProPG;
- likely occupants of the development;
- acoustic design v unintended adverse consequences; and
- acoustic design v wider planning objectives.

7.2.8 Following the above stages, including the initial site risk assessment and full assessment, a recommendation to the decision maker is determined as follows:

- Grant without noise conditions; or
- Grant with noise conditions; or
- Avoid (significant adverse effects); or
- Prevent (unacceptable adverse effects).

National Planning Policy Guidance

7.2.9 National Planning Policy Guidance [4] states that noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. When preparing local or neighbourhood plans, or taking decisions about new development, there may also be opportunities to consider improvements to the acoustic environment.

7.2.10 Local planning authorities' plan-making and decision-taking should take account of the acoustic environment and in doing so consider:

- Whether or not significant adverse effect is occurring or is likely to occur
- Whether or not adverse effect is occurring or is likely to occur
- Whether or not a good standard of amenity can be achieved.

7.2.11 In line with the Explanatory Note of the Noise Policy Statement for England [5], this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.

7.2.12 The Observed Effect Levels are as follows:

- Significant Observed Adverse Effect Level:
  - This is the level of noise exposure above which significant adverse effects on health and quality of life occur.
- Lowest Observed Adverse Effect Level:
  - This is the level of noise exposure above which adverse effects on health and quality of life can be detected.
- No Observed Effect Level:
  - This is the level of noise exposure below which no effect at all on health or quality of life can be detected.

7.2.13 Table 7.2 summarises the noise exposure hierarchy, based on the likely average response.

Table 7.2 Noise exposure hierarchy

Perception	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level			
Not present	No effect	No observed effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard but does not cause any change in behaviour, attitude, or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No observed adverse effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude, or other physiological response, e.g., turning up volume of television; speaking more loudly; 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 small actual or perceived change in the quality of life.	Observed adverse effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour attitude, or other physiological response, 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.	Significant observed adverse effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude, or other physiological response and/or an inability to mitigate effect of noise leading to psychological, e.g., regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g., auditory and non-auditory.	Unacceptable adverse effect	Prevent

7.2.14 The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation.

7.2.15 These factors include:

- The source and absolute level of the noise together with the time of day it occurs. Some types and level of noise will cause a greater adverse effect at night than if they occurred during the day – this is because people tend to be more sensitive to noise at night as they are trying to sleep. The adverse effect can also be greater simply because there is less background noise at night.
- For non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise.
- The spectral content and general character of the noise. The local topology and topography should also be taken into account along with the existing and, where appropriate, the planned character of the area.

7.2.16 More specific factors to consider when relevant:

- Where applicable, the cumulative impacts of more than one source should be taken into account, along with the extent to which the source of noise is intermittent and of limited duration.
- Consideration should also be given to whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time. In both cases a suitable alternative means of ventilation is likely to be necessary. Further information on ventilation can be found in the Building Regulations.
- If external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed as intended.

British Standard 8233:2014 *Guidance on sound insulation and noise reduction for buildings*

Noise Criterion Limits

7.2.17 The scope of this standard [3] is the provision of recommendations for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new buildings or refurbished buildings undergoing a change of use, rather than to assess the effect of changes in the external noise climate.

7.2.18 The standard suggests ambient noise levels in dwellings from external noise sources should not exceed the values given in Table 7.3.

Table 7.3 BS8223 Recommended indoor ambient noise level limits

Activity	Location	Limit $L_{Aeq,T}$	
		Daytime (07:00-23:00)	Night-Time (23:00-07:00)
Suitable resting/sleeping conditions	Living Room	35 dB	-
	Bedroom	35 dB	30 dB
Dining	Dining room	40 dB	-

7.2.19 BS8233 goes on to recommend noise levels for external amenity spaces (i.e., gardens, balconies etc.). According to BS8233;

It is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors might be warranted.

7.2.20 BS8233 goes on to say:

In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited.

Ventilation Requirements

7.2.21 Where a partially open window cannot be relied upon to provide an adequate level of facade sound insulation, it is necessary to consider alternative ventilation for habitable rooms. Section 8.4.5.4 of BS8233 states:

The Building Regulations' supporting documents on ventilation [6, 7, 8] recommend that habitable rooms in dwellings have background ventilation. Where openable windows cannot be relied upon for this ventilation, trickle ventilators can be used and sound attenuating types are available. However, windows may remain openable for rapid or purge ventilation, or at the occupant's choice.

Alternatively, acoustic ventilation units (see 7.7.2) are available for insertion in external walls. These can provide sound reduction comparable with double glazed windows. However, ducted systems with intakes on the quiet side of the building might be required in very noisy situations, or where appearance rules out through-the-wall fans.

7.2.22 Section 7.7.2 states:

NOTE 5: If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level.

World Health Organisation's (WHO) *Guidelines for Community Noise*

7.2.23 The WHO *Guidelines for Community Noise* [2] offer advice with regard to setting noise criteria applicable to sleep disturbance. Section 4.2.3 specifies:

If the noise is not continuous, L_{Amax} or SEL are used to indicate the probability of noise-induced awakenings. Effects have been observed at individual L_{Amax} exposures of 45 dB or less. Consequently, it is important to limit the number of noise events with a L_{Amax} exceeding 45 dB.

7.2.24 The guidelines go on to state:

At night, sound pressure levels at the outside façades of the living spaces should not exceed 45 dB L_{Aeq} and 60 dB L_{Amax}, so that people may sleep with bedroom windows open. These values have been obtained by assuming that the noise reduction from outside to inside with the window partly open is 15 dB.

7.2.25 The sound insulation performance value of 15 dB for a façade containing a partially open window accords with the guidance offered in BS8233 [3]. The guidelines reference a study by Vallet & Vernet [9], which concluded that:

For a good sleep, it is believed than indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than 10-15 times per night.

7.2.26 Accordingly, this assessment has utilised the 10th highest measured maximum noise level from the night-time period and allows for an assessment of a typical maximum noise level in determining façade sound insulation performance.

British Standard 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*

7.2.27 BS4142 [10] describes methods for rating and assessing sound of an industrial or commercial nature which includes:

- Sound from industrial and manufacturing processes
- Sound from fixed installations which comprise mechanical and electrical plant and equipment
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from processes or premises, such as that from forklift trucks, or that from train or ship movements on or around an industrial or commercial site.

7.2.28 The procedure detailed in the standard compares the measured or predicted noise level, 'the specific noise level', from any of the above detailed noise sources with the background sound level at a residential dwelling. The measured background sound level at a receptor should be reliable and should not necessarily ascertain a lowest measured background sound level, but rather to quantify what is typical.

7.2.29 The specific noise level also acknowledges the following reference time intervals depending upon whether the noise source operates during daytime or night-time periods:

- Daytime (07:00-23:00): 1 hr; and,
- Night-time (23:00-07:00): 15 minutes.

7.2.30 There are a number of 'penalties' which can be attributed to the specific sound level depending upon the 'acoustic features' of the sound under investigation as follows. These penalties vary in their weighting depending upon the severity of the acoustic feature, as follows:

7.2.31 Tonality

- +2 dB: where the tonality is just perceptible
- +4 dB: where the tonality is clearly perceptible
- +6 dB: where the tonality is highly perceptible

7.2.32 Impulsivity

- +3 dB: where the impulsivity is just perceptible
- +6 dB: where the impulsivity is clearly perceptible
- +9 dB: where the impulsivity is highly perceptible

7.2.33 Intermittency

- +3 dB: where the intermittency is readily distinctive against the acoustic environment

7.2.34 In addition to the above acoustic features, there is a penalty for 'other sound characteristics' of +3 dB where a sound exhibits characteristics that are neither tonal nor impulsive, though are readily distinctive against the acoustic environment.

7.2.35 BS4142 goes on to state that the rating level is equal to the specific sound level if there are no such features present or expected to be present.

7.2.36 Assessment of the rating level relative to the background noise level can yield the following commentary:

- Typically, the higher the rating level is above the background sound level, the greater the magnitude of impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact.

7.2.37 With the above in mind, it is common that a Local Planning Authority will specify their own criteria for the rating level relative to the background sound level and, where this is the case, this criterion usually takes precedence over a simple comparison of the rating level against the background sound level.

7.2.38 BS4142 includes the following text in relation to areas with low and very low noise levels:

Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.

Building Regulations Approved Document O: *Overheating*

7.2.39 Approved Document O of the Building Regulations 2010 *Overheating* (ADO) [11] concerns ventilation and overheating requirements in dwellings. Requirement O1(2)(a) concerns the maximum acceptable noise levels in bedrooms at night during overheating scenarios. These represent a 10 dB relaxation on the noise levels set out in BS8233 [3] and the WHO Guidelines [2] that apply in non-overheating scenarios. These limits are:

- L_{Aeq} 40 dB
- L_{AFmax} 55 dB not normally exceeded

Building Bulletin 93 *Acoustic design of schools: performance standards*

7.2.40 BB93 [12] sets out minimum performance standards for the acoustics of school buildings. This is to ensure suitable acoustic conditions to enable effective teaching and learning. Performance standards are set in terms of sound insulation between spaces, reverberation control in spaces, noise levels generated by building services, and background noise levels in spaces due to external noise sources. The latter is the only of these relevant to this Environmental Statement.

7.2.41 Table 7.4 sets out the upper limit for indoor ambient noise levels of typical room types for new-build schools.

Table 7.4 Upper limits for indoor ambient noise levels in new-build schools

Type of room	Indoor ambient noise level $L_{Aeq,30mins}$
Classroom Music room Drama studio Assembly hall	<35 dB
Library Science lab Sports hall Office	<40 dB
Dining room Circulation	<45 dB
Kitchen Toilet/Changing room	<50 dB

British Standard 5228:2019 *Code of Practice for Noise and Vibration Control on Construction and Open Sites*

7.2.42 This standard [13] sets out methods for assessing and controlling noise from different types of construction activities. It includes advice on preventative measures (e.g., training about the risks of noise, hearing protection, and how to protect against noise-induced hearing loss) and factors that contribute to noise nuisance.

7.2.43 BS5228 states:

- There are many general measures that can reduce noise levels at source such as:
- Avoid unnecessary revving of engines and switch off equipment when not required
- Keep internal haul routes well maintained and avoid steep gradients
- Use rubber linings in, for example, chutes and dumpers to reduce impact noise
- Minimize drop height of materials
- Start up plant and vehicles sequentially rather than all together

7.2.44 The movement of plant onto and around the Site should have regard to the normal operating hours of the Site and the location of any noise sensitive premises as far as is reasonably practicable.

Control of Pollution Act 1974

7.2.45 Sections 60 and 61 of the Control of Pollution Act 1974 relate to the control of noise on construction sites. Section 60 empowers the local authority to stipulate their requirements to the entity completing the construction works. This may comprise noise limits, certain items of plant/machinery that should be avoided, limiting the hours during which construction works can take place.

7.2.46 Section 61 details the process by which a developer can apply to the local authority for consent to carry out works, with the intention of agreeing noise and vibration limits prior to the work commencing. Section 61 states the following:

An application under this section shall contain particulars of –

a) The works, and the method by which they are to be carried out; and
b) The steps proposed to be taken to minimise noise resulting from the works.

If the local authority considers that the application contains sufficient information for the purpose and that, if the works are carried out in accordance with the application, it would not serve a notice under [Section 60] in respect of those works, the local authority shall give its consent to the application.

7.3 Methodology for Assessing Significance

7.3.1 When the impacts of the development of have been established and presented, it will then be necessary to assess the significance of these impacts. This has been done in accordance with the methodology described in the Institute of Environmental Management & Assessment's *Guideline for Environmental Noise Impact Assessment.* This requires the noise levels to be assessed in terms of the expected change to the existing noise environment. Table 7.5 sets out the assessment matrix which has been followed for this project, with the corresponding descriptors in Table 7.6.

Table 7.5 Relationship between noise impact and significance

MAGNITUDE (Nature of Impact)		**DESCRIPTION OF EFFECT** (on a specific sensitive receptor)	**SIGNIFICANCE** (as required within EIA)
Substantial	**BENEFICIAL**	Marked change Causes a material change in behaviour and/or attitude, e.g., individuals begin to engage in activities previously avoided due to preceding environmental noise conditions. Quality of life enhanced due to change in character of the area.	**More likely to be significant** (Greater justification needed – based on impact magnitude and receptor sensitivities – to justify a non-significant effect) ↕ (Greater justification needed – based on impact magnitude and receptor sensitivities – to justify a non-significant effect) **Less likely to be significant**
Moderated		Noticeable improvement Improved noise climate resulting in small changes in behaviour and/or attitude, e.g., turning down volume of television; speaking more quietly; opening windows. Affects the character of the area such that there is a perceived change in the quality of life.	
Slight		Just noticeable improvement Noise impact can be heard but does not result in any change in behaviour or attitude. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life	
Negligible		N/A = No discernible effect on the receptor	**Not Significant**
Slight	**ADVERSE**	Non-intrusive Noise impact can be heard but does not cause any change in behaviour or attitude, e.g., turning up volume of television; speaking more loudly; closing windows. Can slightly affect the character of the area but no such that there is a perceived change in the quality of life.	**Less likely to be significant** (Greater justification needed – based on impact magnitude and receptor sensitivities – to justify a non-significant effect) ↕ (Greater justification needed – based on impact magnitude and receptor sensitivities – to justify a non-significant effect) **More likely to be significant**
Moderate		Intrusive Noise impact can be heard and causes small changes in behaviour and/or attitude, e.g., turning up volume of television; speaking more loudly; closing windows. Potential for non-awakening sleep disturbance. Affects the character of the area such that there is a perceived change in the quality of life.	
Substantial		Disruptive Causes a material change in behaviour and/or attitude, e.g., avoiding certain activities during periods of intrusion. 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 character of the area.	

Table 7.6 Effect Descriptors

Substantial	Greater than 5 dB change in L_{Aeq} in sound level at a noise sensitive receptor
Moderate	3.0-4.9 dB L_{Aeq} change in sound level at a sensitive or highly sensitive receptor, or greater than 5 dB L_{Aeq} change in sound level at a receptor of some sensitivity
Slight	3.0-4.9 dB L_{Aeq} change in sound level at a receptor of some sensitivity
Negligible	Less than 2.9 dB L_{Aeq} change in sound level and/or all receptors are of negligible sensitivity to noise

7.4 Baseline Conditions

Current Baseline

7.4.1 Dice Environmental has conducted a background and ambient noise survey over an entire weekend and weekday period. The dominant noise source at the Site is road traffic noise, primarily from Oxford Road, and the A34 dual-carriageway. The noise survey took place over the following period:

- 13:00 on Thursday 25th November 2022 to 15:15 on Monday 28th November 2022

7.4.2 The following positions were chosen for the survey:

- Positions N1-N4 are shown in 0. The unattended monitoring positions are shown in green, with the sample positions shown in blue. These positions were chosen to be representative of the noise levels at the facades of the proposed buildings.

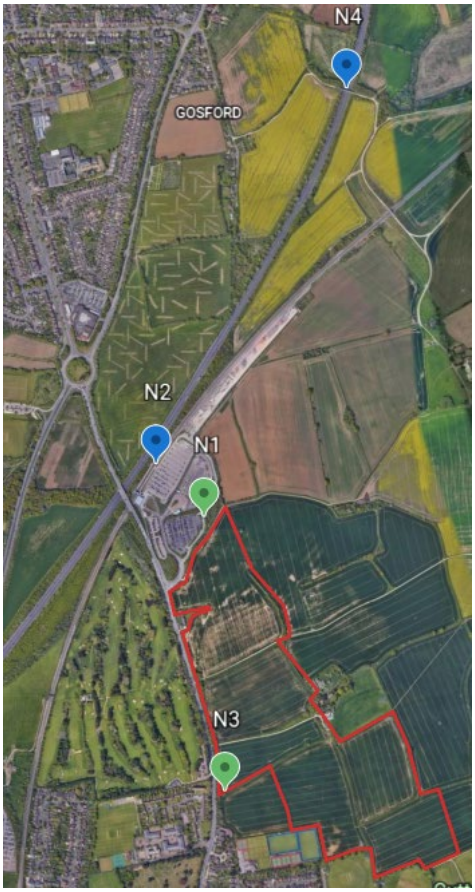

Figure 7.1 Site location and measurement positions

7.4.3 A summary of the noise levels measured at the unattended monitor positions is presented in Table 7.7. Full results are presented in graphical form on Figures 7.1 to 7.6.

Table 7.7 Summary of measured noise levels

Position	Period	Average measured levels $L_{Aeq,T}$	Typical background level L_{A90}	10th highest night maximum level L_{AFmax}
N1	Day (07:00-23:00)	60 dB	51 dB	-
	Night (23:00-07:00)	55 dB	43 dB	84 dB
N3	Day (07:00-23:00)	58 dB	52 dB	-
	Night (23:00-07:00)	52 dB	42 dB	68 dB

7.4.4 The weather conditions during the noise surveys were conducive towards the measurement of environmental noise, being primarily dry with wind speeds below 5 m/s. The sound level meters were field calibrated on site before and after the measurements were taken. No significant drift was witnessed. Calibration certificates are available on request.

Future Baseline

7.4.5 In addition to this noise survey, traffic flow data was provided by the transportation consultant. This comprised seven assessment scenarios as follows, in order to establish the impact of the proposed development on the noise environment of the local area.

- Baseline (2023) – no development in place
- Opening year (2025) – no proposed development in place
- Opening year (2025) – with proposed development in place
- Design year (2031) – no proposed development in place
- Design year (2031) – with proposed development in place

7.4.6 It is typical to also assess noise impacts of a scheme at 15 years after opening (2040). However, Oxfordshire County Council is committed in their Local Transport and Connectivity Plan [14] to deliver a net-zero transport network and replace/remove an additional 1 in 3 car trips in Oxfordshire by 2040. It is therefore assumed that traffic volumes in 2040 will be lower than in 2031, and that 2031 will represent a worst-case assessment.

7.4.7 Noise maps showing the predicted noise levels across the Site for each of these 3 future year scenarios are presented in Figures 7.2, 7.4 and 7.6. In summary, the predicted noise levels at positions N1 and N3 in future years from road traffic only are set out in Table 7.8.

Table 7.8 Change in baseline in future years

Future year	Position	Predicted future noise level $L_{Aeq,T}$
2023	N1	52.1
	N3	59.6
2025	N1	52.6
	N3	59.9
2031	N1	52.6
	N3	60.0

7.5 Mitigation

Construction Phase

7.5.1 Construction noise limits have been established for the scheme according to the methodology set out in Annex E of BS5228. The limits are presented in Table 7.9.

Table 7.9 Maximum acceptable noise level due to construction at the nearest receptor

	Period		
	Daytime[1]	**Evening[2]**	**Night-time[3]**
$L_{Aeq,T}$	65 dB	65 dB	55 dB

[1] Weekday 07:00-19:00, and Saturday 07:00-13:00
[2] Weekday 19:00-23:00, Saturday 13:00-23:00, and Sunday 07:00-23:00
[3] Everyday 23:00-07:00

7.5.2 It has not been possible to incorporate specific construction stage design mitigation measures at this stage of the project. Dice will need to work with the Contractor to develop and implement this.

7.5.3 A Construction Environmental Management Plan (CEMP) will be produced prior to the commencement of the construction works on site. This proposed CEMP will be a working document within which suitable procedures and methods will be specified to protect noise sensitive receptors. This will include specific method statements identifying methods of working and controls to address the noise and vibration effects of the development's construction.

7.5.4 Noise mitigation measures typically considered within a CEMP include:

- Follow best practice guidance set out in BS5228 [13]
- Avoiding noise- and vibration-generating construction methods as far as possible
- Limiting periods of time when noisy works are permitted to within the working day to minimise disruption
- Following Best Practicable Means principles, such as:
    - Using quieter working tools wherever possible (e.g., electrical tools are generally quieter than diesel-powered tools)
    - Ensuring all tools and machinery are well maintained and properly operated so as to minimise noise generation
    - Deactivating all equipment not under active use
    - Where the above measures cannot ensure noise levels would be adequately controlled, positioning noisy activities behind physical barriers, and/or within acoustic enclosures to further reduce the noise emission
- Locating noisy activities on site as far from sensitive receptors as far as practicable
- Reduce audible warning systems usage to the minimum setting, as per the Health and Safety Executive

Operational Phase

7.5.5 In order to accurately assess the noise levels associated with the proposed development at the closest receptors, a 3D noise model has been constructed using the modelling software CadnaA. The following assumptions, inputs, and considerations have been included in the model:

- Terrain data taken from DEFRA Data Services Platform [15]
- Existing buildings that provide shielding from any of the noise sources
- Noise survey measurement positions have been used to calibrate the noise model.

- Noise sources associated with the proposed development have been inputted as point and line sources using the measured sound pressure levels, traffic flow data, and height data provided.
- A reflection order of 2 has been used in all calculations, with a ground absorption of 1.0
- Noise levels generated using ISO 9613-1 [16] and ISO 9613-2 [17] as incorporated into CadnaA software.

Residential Noise

7.5.6 In order to achieve the noise criteria stated within the BS8233 [3] and WHO Guidelines [2] for bedrooms and living areas, a double-glazing specification of $R_w + C_{tr}$ 30 dB will be sufficient. This will provide sufficient protection against the predicted worst-case noise levels in the 2031 scenario. A more detailed glazing design strategy will be developed as the project progresses.

School

7.5.7 In order to achieve the noise criteria stated within BB93 for external noise break-in at the school, a range of double-glazing specifications are required according to the room usage. The internal layout of rooms within the school is not yet established, and so this assessment is based on a worst-case scenario of the most sensitive room being located on the worst-affected façade. In this scenario, the highest glazing performance required at the school will be $R_w + C_{tr}$ 30 dB.

External Amenity

7.5.8 The predicted noise levels in the gardens of the new properties will be up to $L_{Aeq,16h}$ 50 dB for the majority of properties at the Site without any mitigation measures in place. All properties will experience external amenity area noise levels below the upper noise level target given in BS8233 [3] of $L_{Aeq,16h}$ 55 dB for properties facing onto Oxford Road.

7.5.9 The noise levels in gardens will be further reduced by the installation of gardens fences, or in the case of balconies, solid balustrades. In order to achieve the necessary noise screening from the fences they should be free from gaps and holes and constructed of any suitable material with a surface density of >10 kg/m^2.

Noise Generating Activities

7.5.10 The only noise generating activities associated with the operational phase of the development are:

- plant items associated with the local centre, school and the community space
- noise break out from events at the community space.

7.5.11 Specific noise mitigation measures pertaining to these sources must be designed at a later stage in conjunction with the building services team, after the design of these items has progressed. Typical mitigation measures for controlling noise from plant include:

- Operating plant at a lower setting/speed
- Screening plant from sensitive receptors
- Installing appropriate attenuators to the plant units to reduce noise levels generated

7.5.12 In the case of the community events, noise break-out can be controlled by specifying adequate glazing performances for events spaces, and keeping windows closed during noisy events. The glazing will be specified at a later date according to the proposed uses of the space, and taking to account the typical low frequency content of music.

7.6 Residual Effects

Construction Phase

7.6.1 After mitigation measures have been designed and implemented based on the proposed construction plan for the development, the criteria of BS5228 [13] are expected to be achieved.

Operational Phase

Residential Noise

7.6.2 Table 7.10 set outs the predicted noise levels in habitable rooms after the implementation of the glazing and ventilation mitigation measures outlined above. These comply with the criteria set out in BS8233 [3] and WHO Guidelines [2].

Table 7.10 Residual internal noise levels in dwellings (worst-case)

Activity	Location	Noise level	
		Daytime (07:00-23:00)	Night-Time (23:00-07:00)
Suitable resting/sleeping conditions	Living Room	$L_{Aeq,T}$ 35 dB	-
	Bedroom	$L_{Aeq,T}$ 35 dB	$L_{Aeq,T}$ 25 dB L_{AFmax} 41 dB
Dining	Dining room	$L_{Aeq,T}$ 35 dB	-

Overheating Noise

7.6.3 Noise levels within bedrooms at night are expected to comply with the criteria set out in ADO [11].

Noise Generating Activities

7.6.4 After mitigation measures have been designed and implemented, the noise level criteria in BS8233 [3] relating to external amenity spaces and BS4142 [10] are expected to be achieved.

7.6.5 The receptors most sensitive to this noise will be other residential dwellings within the development and Pipal Cottage, on Oxford Road. Noise levels will be adequately controlled to achieve standard and planning noise level limits at the dwellings. As these dwellings are the nearest properties to the noise source, they represent a worst-case assessment and as such the noise impact on existing surrounding dwellings can be considered negligible.

External Amenity

7.6.6 Noise levels in private gardens are expected to be fall below $L_{Aeq,16h}$ 55 dB without the need for mitigation measures, with most falling below the lower target of $L_{Aeq,16h}$ 50 dB. This is below the guideline noise levels described in BS8233 [3].

7.6.7 As discussed in Element 3 of ProPG [1], the impact of higher external noise levels can be partially offset if there is an alternative, relatively quiet external amenity area nearby that is open to residents. There are several public open spaces, community gardens, and play areas included within the scheme masterplan, as well as the proposed extension to Cutteslowe Park in the southeast of the Site. These will provide a relatively tranquil amenity space for residents.

7.6.8 BS8233 [3] also suggests that development should not be prohibited as a result of high noise levels in the external areas, as residents will often prefer to have a private external area with a slightly higher noise level than to not have a private external area at all. Consequently, it is demonstrated that the proposed external amenity noise level locations will be suitable for their intended use.

Traffic noise levels

7.6.9 Changes in noise levels have been assessed at each location by comparing the traffic flows in the 'Baseline + Committed Development' scenarios in 2025 and 2031 without the Water Eaton PR6a development in place with the 'With Development' scenarios. The results of the assessment are given in Table 7.11, along with the significance of the noise impact.

Table 7.11 Predicted noise impact and significance within local road network

Link	Location	Baseline + Com Dev		Baseline + Com Dev + PR6a		Noise impact of PR6a		Significance of noise impact
		2025	2031	2025	2031	2025	2031	
1	A420 Oxford Road between Kidlington roundabout and Sainsburys	59.9	60.0	60.1	60.3	0.2	0.3	Negligible
2	Bicester Road north of Kidlington roundabout	70.9	70.5	71.0	71.2	0.1	0.7	Negligible
3	Oxford Road between Kidlington roundabout and Park and Ride	68.7	68.8	68.8	68.9	0.1	0.1	Negligible
4	A4260 Frieze Way south of Kidlington roundabout	69.5	69.6	69.7	69.7	0.2	0.1	Negligible
5	Oxford Road between Kidlington roundabout and The Broadway	63.1	62.8	63.2	62.8	0.1	0.0	Negligible
6	Oxford Road between Park and Ride and proposed PR06b access	67.4	67.3	67.4	67.3	0.0	0.0	Negligible
7	Oxford Road between proposed PR06b access and proposed PR6a access	71.0	70.7	71.3	70.8	0.3	0.1	Negligible
8	Oxford Road between proposed PR6a access and proposed signal junction	70.5	70.3	70.7	70.5	0.2	0.2	Negligible
9	Oxford Road between proposed signal junction and Croudace proposed access	70.7	70.5	70.8	70.7	0.1	0.2	Negligible
10	Oxford Road between Croudace proposed access and Five Mile Drive	69.7	69.8	69.9	70.1	0.2	0.3	Negligible
11	Banbury Road between Five Mile Drive and Harbord Road	68.7	69.0	68.9	69.2	0.2	0.2	Negligible
12	Banbury Road between Harbord Road and Harefields	70.0	70.4	70.4	70.7	0.4	0.3	Negligible

7.7 Implications of Climate Change

7.7.1 The impact of climate change on the development and adaptations to climate change have been considered utilising the UKCP18 climate change projections. The only aspects of the acoustics assessment affected by climate change is the overheating assessment. As mean air temperatures increase the amount of time in which overheating scenarios apply will also increase. As the noise assessment indicates that open windows will provide sufficient protection against sound in overheating scenarios, this is will not have an impact on the design.

7.8 Summary

7.8.1 Environmental noise surveys have been completed to quantify the prevailing noise environment, dominated by road traffic from Oxford Road. The noise survey has been used to develop a 3D computer model of noise propagation across the Site including all significant noise sources with full topography, and to inform a scheme of mitigation measures required to ensure a commensurate level of protection against noise from future occupants of the Water Eaton development, as well protecting existing occupants of the surrounding areas.

7.8.2 Accordingly, appropriate consideration has been given towards the mitigation measures required to ensure that the internal ambient noise level requirements set out in BS8233 [3] and WHO Guidelines [2] can be met for the development. Preliminary assessment indicates that the highest glazing performance required to control noise and meet these requirements is $R_w + C_{tr}$ 30 dB.

7.8.3 Noise levels in external amenity areas are shown to fall below the upper design target level of $L_{Aeq,16h}$ 55 dB in all cases, and below the lower design target level of 50 dB in most cases. These levels can be further reduced by the installation of garden fences/balustrades to the external amenity levels.

7.8.4 It has not been possible to assess the noise from any external plant items at this stage of the design, but these will be designed as the project progresses to ensure they comply with the noise level requirements of BS4142 [10].

7.8.5 A Construction Environmental Management Plan will be developed to ensure noise from the construction phase of the development will comply with the noise level limits determining in accordance with the methodology set out in BS5228 [13].

7.8.6 An assessment of the impact of the development on ambient noise levels in the surrounding area has determined that the construction of the PR6a site will have a negligible impact on noise levels in the surrounding area.

7.8.7 The assessment is based upon robust and worst-case assumptions and demonstrates that, in principle and subject to the incorporation of the identified mitigation measures, there should be no adverse impact at the proposed or dwellings as a result of existing noise. The Site is suitable for the promotion of residential development.

7.9 References

[1] *C. Grimwood and D. Fiumicelli,* Professional Practice Guidance on Planning & Noise, *2017.*

[2] *B. Berglund, T. Lindvall and D. H. Schwela, "Guidelines for Community Noise," World Health Organization, Geneva, 1999.*

[3] *British Standards Institution,* 8233 Guidance on sound insulation and noise reduction for buildings, *London: BSI Standards Limited, 2014.*

[4] *Ministry of Housing, Communities & Local Government,* National Planning Policy Framework, *London: UK Government, 2021.*

[5] *Noise and Nuisance Team,* Noise Policy Statement for England, *London: Department for Environment, Food and Rural Affairs, 2010.*

[6] *The Building Regulations 2010,* Approved Document F: Ventilation, *HM Government, 2015.*

[7] *The Building Standard Advisory Committee,* Building Standards Technical Handbook - Domestic Buildings, *Scottish Government, 2020.*

[8] *The Department of the Environment,* Technical Booklet K: Ventilation, *2012.*

[9] *M. Vallet and I. Vernet, "Night noise index and sleep disturbance," in* Proceedings of the Internoise Congress*, Sydney, 1991.*

[10] *British Standards Institution,* 4142 Methods for rating and assessing industrial and commercial sound, *London: BSI Standards Limited, 2019.*

[11] *The Building Regulations 2010,* Approved Document O: Overheating, *HM Government, 2022.*

[12] *Department for Education,* Building Bulletin 93 Acoustic design of schools: performance standards, *London: HM Government, 2015.*

[13] *British Standards Institution,* 5228 Code of practice for noise and vibration control on construction and open sites, *London: BSI Standards Limited, 2009.*

[14] *Oxfordshire County Council, Oxfordshire Fair Deal Alliance; Future Oxfordshire Partnership; Oxford to Cambridge Arc Leadsership Group; England's Economic Heartland;,* Local Transport and Connectivity Plan, *Oxford: Oxfordshire County Council, 2022.*

[15] *Department for Environment, Food & Rural Affairs, "DEFRA data services platform," 2019. [Online]. Available: https://environment.data.gov.uk/DefraDataDownload/?Mode=survey.*

[16] *Technical Committee ISO/TC 43, Acoustics, Sub-Committee SC 1, Noise,* Acoustics - Attenuation of sound during propagation outdoors - Part 1: Calculation of the absorption of sound by the atmosphere, *International Organization for Standardization, 1993.*

[17] *Technical Committee ISO/TC 43, Acoustics, Sub-Committee SC 1, Noise,* Acoustics - Attenuation of sound during propagation outdoors - Part 2: General Method of Calculation, *International Organization for Standardization, 1993.*

8 Drainage and Flood Risk

8.1 Introduction

8.1.1 This chapter of the ES has been produced by Glanville Consultants to assess the impact of the development regarding drainage and flood risk.

8.1.2 The chapter describes:

- the assessment method;
- the baseline conditions at the Site and surroundings,
- the future baseline with committed development;
- the likely significant environmental effects;
- the mitigation measures required to prevent, reduce or offset any significant adverse effects; and
- the likely residual effects after these measures have been implemented.

8.1.3 The assessment considers the combined impact of the Proposed Development. This assessment builds upon the work of the Water Eaton (PR6a) application which will be submitted alongside this Environmental Statement.

8.1.4 A Flood Risk Assessment (FRA) has been produced for the Proposed Development as a separate document and is included in Appendix 8.1. The scope and contents of the FRA has been informed by discussions with officers at the Lead Local Flood Authority (LLFA), OXCC. The FRA has been produced in accordance with the National Planning Policy Framework (NPPF) (July 2021), and the Planning Practice Guidance (PPG) for Flood Risk and Coastal Change (August 2022).

8.1.5 The FRA primarily identifies the Proposed Development's compliance with national and local flood risk planning policy and guidance. The FRA also identifies the measures that are proposed to mitigate the anticipated flood risk and drainage impacts of the Proposed Development, with consideration of impacts both on-site and off-site.

8.1.6 A Foul Drainage and Utilities Assessment (FDUA) has been produced for the Proposed Development as a separate document and is included in Appendix 8.2. The scope and contents of the FDUA has been informed by discussions with the statutory undertaker, Thames Water.

8.1.7 The FDUA primarily identifies the Proposed Development's impact on foul drainage and utility infrastructure, including potable water supply and the measures that are proposed to mitigate the anticipated impacts, with consideration of impacts both on-site and off-site.

8.2 Assessment Methodology

8.2.1 This section of the ES chapter identifies the assessment criteria and methodology.

Scoping Opinion

8.2.2 An EIA Scoping Opinion was received dated 9th June 2021 (Appendix 4.2). Thames Water, the Environment Agency and the Lead Local Flood Authority (LLFA) were consulted. This has informed:

- Assessment of fluvial and surface water flood risk;
- Management of surface water; and
- Water quality measures

Pre-Application Consultation

8.2.3 OXCC in its role as Lead Local Flood Authority (LLFA) was consulted regarding flood risk and surface water drainage and meetings held on 9th November 2021 and 23rd November 2022. This has informed:

- Assessment of surface water flood risk and management of existing flow paths;
- Management of existing drainage ditches;
- Surface water drainage calculation parameters;
- Principles of surface water drainage strategy; and
- Water quality measures

8.2.4 Thames Water as statutory undertaker was consulted regarding foul water drainage and a meeting held on 27th October 2021. This has informed:

- The process of liaising and collaborating with Thames Water for the modelling, design and construction of mitigation measures;
- Understanding Thames Water's environmental obligations with respect to wastewater treatment works and their liaison with the Environment Agency; and
- Foul drainage strategy for the Site.

Planning Policy and Guidance

8.2.5 The relevant legislation, policy and guidance are listed below.

Legislative Framework

Water Resources (Environmental Impact Assessment) Regulations 2017

8.2.6 These Regulations implement European Union (EU) Directive 2014/52/EU on the assessment of the effects of certain projects on the water environment in England and Wales.

Environment Act 1995

8.2.7 This Act established and outlined the duties of various new agencies for the protection of the environment, including the Environment Agency (EA) with respect to water quality and flood risk.

Water Framework Directive 2017

8.2.8 This Directive transposed EU Water Framework Directive 2000/60/EC into UK Law and outlines aims for the quality of all ground and surface waters.

Flood Risk Regulations 2009

8.2.9 This Directive transposed EU Flood Directive 2007/60/EC into UK Law and provides a framework for the management of flood risk, including requirements for flood risk modelling and mapping.

Flood and Water Management Act 2010

8.2.10 This Act relates to the management of flood risk and coastal erosion, aiming to reduce risk associated with extreme weather and climate change. It established and outlined the duties of Lead Local Flood Authorities with respect to management of flood risk in local areas.

National Planning Policy

National Planning Policy Framework 2021

8.2.11 The National Planning Policy Framework (NPPF) sets out the government's planning policies for England and how they are expected to be applied. Paragraphs 152 to 173 relate to "Meeting

the challenge of climate change, flooding and coastal change" and was last updated in July 2021.

8.2.12 Paragraph 161 of the NPPF supports a sequential, risk-based approach which aims to ensure areas at little or no risk of flooding are developed in preference to those at higher risk, and where development is necessary in areas at risk of flooding, the development should be made safe for its lifetime without increasing flood risk elsewhere.

8.2.13 Paragraph 167 of the NPPF states that:

"When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment."

8.2.14 Paragraph 169 of the NPPF states that

"Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should: (a) take account of advice from the lead local flood authority; (b) have appropriate proposed minimum operational standards; (c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and (d) where possible, provide multifunctional benefits."

8.2.15 The allocation and planning of development should therefore follow a sequential risk-based approach to flood risk, and give due consideration including the potential effects of climate change and the potential benefits of sustainable drainage systems as outlined by the NPPF.

Planning Practice Guidance for Flood Risk and Coastal Change 2022

8.2.16 The Planning Practice Guidance (PPG) for Flood Risk and Coastal Change, updated in August 2022, provides supporting guidance to the NPPF on how to take account of and address the risks associated with flooding and coastal change in the planning process.

8.2.17 The PPG outlines steps to be followed in the assessment, avoidance, management and mitigation of flood risk. The PPG is for the benefit of local planning authorities in the preparation of Local Plans, neighbourhoods in the preparation of Neighbourhood Plans, and developers in the preparation of planning applications.

8.2.18 The PPG supports the sequential risk-based approach outlined by the NPPF and provides more detailed guidance on the application of the Sequential Test and Exception Test. It also provides guidance on the contents of site-specific Flood Risk Assessments, the use of sustainable drainage systems for reduction of flood risk, and how to make development safe from flood risk.

8.2.19 The design of the Proposed Development, as well as assessment and management of flood risk, should therefore follow this guidance where it applies to the Proposed Development.

Local Planning Policy

Cherwell Local Plan 2011-2031 (Part 1) Partial Review - Site PR6a

8.2.20 The Cherwell Local Plan 2011-2031 (Part 1) Partial Review - Oxford's Unmet Housing Need was formally adopted as part of the statutory Development Plan by the Council on 7 September 2020. The Plan provides the strategic planning framework and sets out strategic site allocations to provide Cherwell District's share of the unmet housing needs of Oxford to 2031.

8.2.21 Site PR6a related to the Proposed Development, as well as land extending further to the east towards the River Cherwell. This Policy requires the application to be accompanied by:

- A Flood Risk Assessment which has regard to the Cherwell Level 2 Strategic Flood Risk

Assessment;

- A surface water management framework to maintain greenfield run-off rates and volumes; and
- Demonstration that the Environment Agency and Thames Water have been consulted regarding wastewater treatment.

Cherwell District Council Level 1 Strategic Flood Risk Assessment Update 2017

8.2.22 This report was commissioned by Cherwell District Council and forms part of the Evidence Base for the Cherwell Local Plan 2011-2031 (Part 1) Partial Review. According to the PPG, the purpose of a Strategic Flood Risk Assessment (SFRA) is to:

"..assess the risk to an area from flooding from all sources, now and in the future, taking account of the impacts of climate change, and to assess the impact that land use changes and development in the area will have on flood risk."

8.2.23 Appendix D of the SFRA provides a review of proposed development sites within the area covered by the SFRA. The Proposed Development is contained within a wider defined development site "SFRA38" which covers land to the west of Oxford Road as well as extending further to the east towards the River Cherwell. The SFRA identified that there are areas at risk of fluvial flooding (Flood Zone 1, 2 and 3a and 3b) and surface water flooding (low and medium risk) within the boundary of SFRA38, with variable groundwater flood risk, and four recorded sewer flood incidents in the 5-digit postcode area. The fluvial flood risk area identified is located outside of the boundary of the Site. The report advises that:

"All sites will require a FRA which must assess risk from rivers, surface water and groundwater flooding. Sites within or adjacent to indicative floodplains will require detailed assessment of the extent of the floodplain as part of a site specific FRA."

Cherwell District Council Level 2 Strategic Flood Risk Assessment Update 2017

8.2.24 A Level 2 SFRA is only required where information provided with the Level 1 document identifies that all development cannot be allocated outside of flood risk areas, or if it is understood that high numbers of planning applications may be made within flood risk areas, for example due to demand or other spatial factors.

8.2.25 The Level 2 SFRA assesses the wider defined development site "SFRA38" which covers the Proposed Development, as well as land to the west of Oxford Road and extending further to the east towards the River Cherwell. The assessment of sources of flood risk comes to the same conclusions as the Level 1 SFRA.

8.2.26 The Level 2 SFRA also recommends that for "SFRA38":

- A site-specific FRA will be required;
- The likelihood and impact of groundwater emergence should be considered within the site-specific FRA;
- A surface water management framework should be adopted to mimic the existing drainage regime, and reduce surface water runoff to greenfield runoff rates and volumes from the developed site;
- Infiltration drainage techniques should be used where possible, although it notes that the geological conditions are unlikely to support infiltration techniques; and
- Limited sewer capacity will require consideration and liaison with Thames Water.

8.2.27 The Level 2 SFRA also recommends that development should be restricted to outside of the modelled Flood Zone 3 envelope. Accordingly, the boundary of the Site is outside the modelled

Flood Zone.

8.2.28 The design of the Proposed Development will therefore give due consideration to these recommendations.

Guidance

Non-Statutory Technical Standards for Sustainable Drainage Systems 2015

8.2.29 This document was produced by the Department for Environment, Food and Rural Affairs (Defra) and sets out non-statutory technical standards for sustainable drainage systems to be used in conjunction with the NPPF and PPG.

Oxfordshire County Council Local Standards and Guidance for Surface Water Drainage on Major Developments in Oxfordshire 2021

8.2.30 This document was adopted by OXCC in its role as Lead Local Flood Authority (LLFA) as policy and therefore is a material planning consideration for Major developments. This document sets out standards and guidance to assist developers in the design of surface water drainage systems and Local Planning Authorities in considering drainage proposals. It outlines how surface water drainage should be designed to reduce the risk of flooding and maximise water quality, water resources, biodiversity, landscape and amenity, as well as ensuring that all new developments are designed to mitigate and adapt to the effects of climate change.

Environment Agency Flood Risk Assessments: Climate Change Allowances 2022

8.2.31 This online guidance produced by the Environment Agency (EA) outlines when and how Local Planning Authorities and developers should use climate change allowances in Flood Risk Assessments.

CIRIA Report: The SuDS Manual C753 2015

8.2.32 This document sets out guidance relating to the planning, design, construction and maintenance of Sustainable Drainage Systems (SuDS) to assist with their implementation, outlining how SuDS should be designed to maximise the opportunities and benefits that can be secured by surface water management.

Assessment Methodology

8.2.33 In undertaking this assessment, the following documents have been reviewed and summarised within this chapter. The technical reports used in the assessment are provided in Appendices 8.1 and 8.2.

8.1 Water Eaton, Oxford - Flood Risk Assessment
8.2 Water Eaton, Oxford - Foul Drainage and Utilities Assessment

8.2.34 Criteria for assessing the significance of the potential effects have been based on a qualitative assessment of the receptor sensitivity and the predicted magnitude of change from the baseline as a result of the development. Receptor sensitivity has been identified as shown in Table 8.1 and the criteria used to assess the magnitude of change are outline in Table 8.2.

Table 8.1 Receptor Sensitivity

Sensitivity	Receptor
High	High importance and / or rarity, limited capacity to accommodate change,
Medium	Medium importance and/or rarity, limited capacity to accommodate change.
Low	Low importance and/or rarity, moderate capacity to accommodate change.
Negligible	Negligible importance, tolerant of change.

Table 8.2 Magnitude of change

Magnitude	Description
High	Total loss or major permanent change to key elements of features of the baseline conditions. (Adverse) Improvement to baseline conditions. (Beneficial)
Medium	Partial loss or material long-term but reversible change to one or more key elements/features of the baseline conditions. (Adverse) Minor improvement to baseline conditions. (Beneficial)
Low	Minor or immaterial short term but reversible change to baseline conditions. (Adverse) Very minor improvement to baseline conditions (Beneficial)
Negligible	No or negligible change identified. (Adverse) No or negligible change identified. (Beneficial)

8.2.35 The magnitude of change predicted and the sensitivity of identified receptors have been used to qualitatively assess the impact significance of the proposed development as shown in Table 8.3. Impacts have the potential to be either adverse or beneficial.

Table 8.3 Impact significance

Receptor sensitivity	Magnitude of change			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Negligible
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

8.2.36 The following are examples of impacts according to the above classification:

- Major: Severe permanent effects on hydrology / hydrogeology on both land and aquatic flora and fauna;
- Moderate: Severe temporary effect on both land and aquatic flora and fauna;
- Minor: Temporary effect to local hydrology;
- Negligible: No appreciable impact.

8.2.37 All impacts classed as moderate or above are considered to be significant in terms of the assessment of the Proposed Development.

8.2.38 The study area for the surface water drainage strategy is primarily restricted to the Site but an assessment of the potential effects on hydrological and hydrogeological catchments upstream and downstream has also been made.

8.2.39 Intrusive investigations to determine the existing ground conditions and soil permeability have been undertaken by Southern Testing Consultants (ST Consult). (Intrusive Ground Investigation Report (reference: JN1597) submitted as part of the planning application).

8.2.40 A Sustainable Urban Drainage System (SuDS) strategy for the disposal of surface water runoff has been developed in accordance with the guidance provided in CIRIA document C753 'The SuDS Manual' (2015) and guidance provided in OXCC Local Standards and Guidance for Surface Water Drainage on Major Developments in Oxfordshire (2021). These documents provide guidance on the types of SuDS features available including summaries of their performance in terms of attenuation and water quality.

8.2.41 The sensitivity of the receiving watercourses has been assessed against quantity and quality of runoff currently being discharged to it. The sensitivity of floodplain to development has been

assessed by consideration of the 'Flood Zones' as described in the NPPF.

8.2.42 The methodology of assessing the hydrology and proposed surface water drainage is based on current best practice. As such, there are no unusual or significant limitations to note.

8.3 Baseline Conditions

8.3.1 This section of the report describes the baseline conditions relating to hydrology, flood risk and foul water drainage.

Site Setting

8.3.2 The Site extends to approximately 45.8 hectares (ha) located to the east of the A4165, Oxford Road to the north of Oxford. The Site largely consists of agricultural land, with St Frideswide's Farm located just outside the eastern site boundary, Pipal Barns located along the western Site boundary and Pipal Cottage adjacent to Pipal Barns but outside of the Site boundary.

8.3.3 A full site description is provided in Chapter 2.

Hydrology

8.3.4 A network of drainage ditches is located along field boundaries. The on-site ditches generally flow in an easterly or southerly direction, all eventually discharging to the River Cherwell, the closest watercourse designated as a main river by the Environment Agency (EA). This is located approximately 0.5km to the east of the Site at its closest point. The drainage ditches are culverted in some areas and are also understood to take flows from a number of off-site catchments.

8.3.5 A pond is located at St Frideswide's Farm adjacent to the eastern boundary of the Site, which is connected to the surrounding drainage ditches, although its water level is not greatly affected by the flow within the surrounding ditches. No major artificial water bodies are located on or in the vicinity of the Site. The closest artificial water feature is the Oxford Canal, located around 1km to the south-west of the Site.

8.3.6 Rain falling over the area of the Site is understood to infiltrate directly to ground in the first instance. The agricultural land is understood to be served by networks of land drains in some areas, which convey flows to the on-site ditch network. In more extreme events, where the infiltration capacity of the underlying soil has been reached, surface water run-off will be generated within the Site. Overland flows will follow the topography of the Site, with the flows directed to the ditch network.

8.3.7 The surface water runoff from the undeveloped Site naturally discharges to both the ground and to the local watercourses. Preliminary calculations undertaken in accordance with the methods provided in EA and Defra document 'Rainfall runoff management for development' (Report SC030219, October 2013) have provided a greenfield runoff rate (QBAR) for the undeveloped Site of approximately 3.2 l/s/ha.

8.3.8 Further information on the existing ordinary watercourses present on the Site is provided in Flood Risk Assessment presented as Appendix 8.1.

Geology

8.3.9 Geological maps published by the British Geological Survey (BGS) indicate that the Site is underlain by a bedrock geology of Oxford Clay Formation and West Walton Formation, consisting of mudstone. The maps indicate that there is no known superficial geology underlying

the majority of the Site, with a band of Wolvercote Sand and Gravel Member present between St Frideswide's Farm and the southern boundary. This is confirmed by BGS borehole records which show Oxford Clay Formation underlying the entire Site, with some sand and gravel superficial deposits in the south-east between St Frideswide's Farm and the southern boundary. A band of Alluvium deposits is also shown along the boundary in the south-eastern corner of the Site, consisting of clay, sand, silt and gravel.

8.3.10 Intrusive investigations undertaken by ST Consult have confirmed that the underlying geology of the Site was found to be generally in accordance with the BGS mapping, comprising of topsoil, a clay subsoil, over the Oxford Clay Formation, with the latter consisting of gravelly clay often becoming shelly with depth. Shallow Made Ground was encountered in only two locations. Some local granular deposits were noted within the south in the areas of the mapped Wolvercote Sand and Gravel Member.

8.3.11 A total of twelve falling-head permeability tests were undertaken across the Site in August 2021. The tests were very poor, recording infiltration rates of 0 – 1.77x10^-7 m/s, with the exception of those located in the southern part of the Site. Further soakage tests to BRE365 were undertaken in September 2021 in this southern area of the Site. The tests recorded rates of 1.41x10^-5 – 9.58x10^-6 m/s. Therefore, the results of these tests show that infiltration drainage techniques are not widely feasible, with some potential within the southern area of the Site corresponding to the Wolvercote Sand and Gravel Member.

8.3.12 Further investigation works were subsequently undertaken which comprised 20 no. trial pits carried out across the Site to a depth of up to 3m bgl. In addition, 3 no. trial pits were carried out in the south of the Site in the area where preliminary investigations indicated infiltration could be feasible.

8.3.13 A total of three soakage tests were carried out to BRE365 standards within the 3 no. trial pits. The tests were good, recording rates of 1.41x10^-5 – 9.58x10^-6 m/s which indicates that infiltration drainage techniques could be feasible in these locations. However, groundwater monitoring installations located within close vicinity of the trial pits (WLS210 & WLS211) recorded groundwater levels between 0.70-1.30m bgl, indicating that infiltration drainage techniques would be constrained by high groundwater.

Hydrogeology

8.3.14 Groundwater monitoring installations were installed by ST Consult within 12 no. boreholes across the Site and were monitored over the 2021-22 winter period. Groundwater was recorded in all of the boreholes in the range of 0.30 to 1.30m bgl, except for one which was dry to 3.00m bgl. Groundwater monitoring installations located in the area identified as having soakage potential recorded groundwater levels between 0.70-1.30m bgl, indicating that infiltration drainage techniques will be constrained or precluded by high groundwater.

8.3.15 The EA defines Source Protection Zones (SPZs) for groundwater used for public drinking water supply, which show the risk of contamination from activities that might cause pollution in the area. The Site is not located within an SPZ.

8.3.16 The public records obtained indicate there is one recorded water abstraction site within a 1000m radius of the Site (Cutteslowe Allotments 601m to the south).

8.3.17 The groundwater vulnerability map published by the EA indicates that the bedrock geology underlying the Site is associated with a negligibly permeable non-aquifer. The superficial deposits of sand and gravel in the south-east of the Site are associated with a variably

permeable minor aquifer of low leaching potential, with an area of high leaching potential just outside the southern boundary.

8.3.18 The bedrock aquifer designation map published by the EA shows the mudstone bedrock underlying the majority of the Site is classified as unproductive strata. The superficial sand and gravel deposits in the south-east of the Site are associated with a Secondary A aquifer. Unproductive Strata indicates regions where layers of rock or drift deposits have low permeability and have negligible influence on water supply or river base flow. Secondary A aquifers indicate regions where layers of rock or drift deposits are permeable and therefore are capable of supporting water supply on a local scale and may provide a source of base flow to rivers.

Flood Risk

8.3.19 The sensitivity of the Fluvial Flood Zones to development can be considered in accordance with the definitions provided in the NPPF. Development within Flood Zone 3 (High Risk) can be considered as high sensitivity given that uncontrolled development within the Flood Zone is considered most likely to have an impact on flood risk downstream. In a similar manner Flood Zone 2 can be considered to be of medium sensitivity and Flood Zone 1 of low sensitivity. Based on the EA Flood Map for Planning and EA Flood Model, the Site is wholly located in Flood Zone 1.

8.3.20 Based on broad-scale data provided by the Cherwell District Council (CDC) SFRA, flood potential mapping published by the BGS, anecdotal reports and groundwater monitoring on-site carried out by ST Consult, the risk of groundwater flooding is considered to be very low for the majority of the Site, and low to medium at the lower lying parts of the Site where historical events have been reported anecdotally, and in the area underlain by permeable superficial deposits.

8.3.21 Based on risk mapping provided by the EA and the CDC SFRA, and anecdotal reports, some areas of the Site are currently at low to high risk of surface water flooding. Some risk areas are identified as having contributions from off-site, whilst others are generated by rain falling on the Site itself.

8.3.22 Based on broad-scale data provided by the CDC SFRA, and that only a small number of private sewer networks exist in the vicinity of the Site, the risk of flooding from existing sewers is considered to be low.

8.3.23 Based on mapping provided by the EA and the location of the nearest artificial water bodies to the Site, no existing flood risks from artificial sources (canals or reservoirs) have been identified.

Foul Drainage

8.3.24 Thames Water is the statutory undertaker for wastewater drainage in Oxfordshire. Thames Water sewer records do not indicate any public foul water sewers within the boundary of the Site, or along the A4165 adjacent to the Site. A gravity foul water network is indicated within the residential areas to the south of the Site: a 225mm gravity foul sewer is indicated along the A4165 flowing in a southerly direction; and 225mm gravity foul sewers are indicated in Hayward Road and Harbord Road, flowing in a westerly direction. The closest manhole to the Site is Thames Water manhole 3803 along the A4165 to the south-west of the Site. It is understood that this network eventually discharges to the Grenoble Road Sewage Treatment Works in Oxford.

8.3.25 Pipal Cottage to the north-west of the Site and St Frideswide's Farm to the east of the Site are not known to connect into the public sewer network and instead are served by a septic tank and

/ or on-site treatment.

8.3.26 No other private foul drainage infrastructure is known to be located within the Site boundary.

8.3.27 A pre-planning enquiry was submitted to Thames Water in May 2021. Estimates of peak and pump flow rates were submitted in support of the enquiry. Thames Water's response to this enquiry indicated that reinforcements to the existing foul water network would be necessary in order to facilitate the Proposed Development. To ensure that the appropriate upgrades are made, Thames Water will need to carry out modelling work to identify where and when reinforcement works will be needed.

Water Resources

8.3.28 Thames Water is the provider of potable water in Oxfordshire. Thames Water sewer records indicate a 16'' trunk main along the western verge of the A4165, which crosses the road at the entrance to the Park and Ride and continues northwards, crossing the railway and A34. The records also indicate 4'' distribution mains within the residential areas to the south of the Site. A water main serving Water Eaton Manor not shown on statutory records is known to cross the northern part of the Site. Although not shown on records, it is expected that a water main also serves St Frideswide's Farm, connecting across the Site to the strategic trunk main along the A4165.

8.3.29 From this review of the service records it is anticipated that the Proposed Development could be served by the apparatus which currently exists within the A4165. The water mains connecting to Water Eaton Manor and St Frideswide's Farm are anticipated to require diversion in order to facilitate the Proposed Development. There are no anticipated issues in diverting these water mains.

8.3.30 A pre-planning enquiry was submitted to Thames Water in May 2021. Thames Water's response to this enquiry indicated that the existing network only had capacity for 50 new residential dwellings. Therefore, reinforcements to the existing potable water network would be necessary in order to facilitate the Proposed Development. To ensure that the appropriate upgrades are made, Thames Water will need to carry out modelling work to identify where and when reinforcement works will be needed.

8.4 Potential Effects

Construction Phase Effects

Flood Risk (On-Site)

8.4.1 The risk of flooding from fluvial, artificial and sewer flooding is low or negligible. The risk of flooding from surface water and groundwater is high in some areas of the Site. Surface water flooding could lead to injury, risk to life or damage to equipment, machinery or materials. Groundwater flooding could lead to instability of excavations, and therefore personal injury or risk to life.

8.4.2 Flood risk receptors during the construction stage include construction workers (high sensitivity), equipment and machinery, and materials (low sensitivity).

8.4.3 The magnitude of change is considered high for construction workers and low for equipment, machinery and materials.

8.4.4 Therefore, without inclusion of mitigation measures, on-site flood risk could have major impact significance for construction workers, and minor impact significance for equipment, machinery

and materials during the construction phase.

Flood Risk (Off-Site)

8.4.5 During the construction phase there is a potential risk of an increase in surface water run-off to downstream watercourses due to the removal of existing land drainage infrastructure, construction of new impermeable areas (including site compounds), and the movement of plant compressing soil which would limit the ability of water to drain away to ground.

8.4.6 The primary flood risk receptors are the receiving watercourses and areas at risk of flooding downstream of the Site, which have a medium sensitivity to temporary changes in water quantity given the flood risk identified downstream of the Site.

8.4.7 The magnitude of change is considered to be medium, as even a temporary increase in flood risk downstream could lead to longer term consequences, such as personal injury or damage to structures.

8.4.8 Therefore, without inclusion of mitigation measures, the Proposed Development could have moderate impact significance on flood risk downstream of the Site during the construction phase.

Surface Water and Groundwater Quality

8.4.9 During the construction phase there is a risk of potentially polluting materials entering downstream watercourses as surface water run-off, or entering groundwater by infiltration to ground. Potentially polluting materials include fine materials (e.g. silt and clay), cement, oil, chemicals and construction waste (e.g. woods, plastics, sewage and rubble). These substances may be present as a result of normal site practices, movement of plant, or leakage and spills (accidental or due to poor site practices).

8.4.10 The primary receptors of potential pollutants are the receiving watercourses, which have a medium sensitivity to temporary changes in water quality, and groundwater, which has a low sensitivity to changes in water quality due to the location of the Site outside of a Source Protection Zone.

8.4.11 The magnitude of change would depend on the nature of the pollution incident, however, it is concluded that the magnitude of change is medium, given that a significant pollution event during the construction period could have long-term but reversible consequences on water quality.

8.4.12 Therefore, without inclusion of mitigation measures, the Proposed Development could have moderate impact significance on water quality for the receiving watercourse, and minor impact significance on water quality for the receiving groundwater during the construction phase.

Groundwater Table

8.4.13 During the construction phase there will be alterations to the ground levels and excavations which could affect groundwater levels, which intrusive investigations have recorded as being close to existing levels in some areas.

8.4.14 The groundwater receptor has a medium sensitivity to temporary changes in levels during the construction period.

8.4.15 The magnitude of change is considered to be medium, as changes to the water table could have long-term but reversible consequences.

8.4.16 Therefore, without inclusion of mitigation measures, the Proposed Development could have

moderate impact significance on the groundwater table during the construction phase.

Water Resources

8.4.17 During the construction phase there will be potable water supply requirement.

8.4.18 The sensitivity of water resources is considered to be low during the construction period as there is moderate capacity to accommodate temporary changes.

8.4.19 The magnitude of change is considered to be low during the construction period given the short-term nature of the changes.

8.4.20 Therefore, without inclusion of mitigation measures, the Proposed Development could have low impact significance on water resources during the construction phase.

Operational Phase Effects

Flood Risk (On-Site)

8.4.21 The risk of flooding from fluvial, artificial and sewer flooding is low or negligible. The risk of flooding from surface water and groundwater is high in some areas of the Site. Surface water flooding could lead to injury, risk to life or damage to buildings. Groundwater flooding is unlikely to result in a risk to people or property independently of surface water as these mechanisms are understood to be related. However, high groundwater could lead to ingress into surface water systems (and subsequent reduction in storage volume) or affect below-ground structures.

8.4.22 Flood risk receptors therefore include site users (high sensitivity), building structures (low sensitivity) and the surface water drainage system (medium sensitivity).

8.4.23 The magnitude of change is considered high for site users, and medium for building structures and the surface water drainage system.

8.4.24 Therefore, without inclusion of mitigation measures, on-site flood risk could have major impact significance for site users, minor impact significance for building structures and moderate impact significance the surface water drainage system.

Flood Risk (Off-Site)

8.4.25 As a result of the Proposed Development surface water run-off to downstream watercourses could increase, due to the reduction in permeable areas and increase in new impermeable areas, which increases the rate and volume of run-off from the Site compared to its current undeveloped (greenfield) state.

8.4.26 The primary flood risk receptors are the receiving watercourses and areas at risk of flooding downstream of the Site, which have a high sensitivity to changes in water quantity given the flood risk identified downstream of the Site.

8.4.27 The magnitude of change is considered to be high as an increase in the rate and volume of run-off could lead to a permanent increase in flood risk downstream, which could lead to personal injury, risk to life or damage to structures.

8.4.28 Therefore, without inclusion of mitigation measures, the Proposed Development could have major impact significance for the receiving watercourse and areas at risk of flooding downstream of the Site.

Surface Water and Groundwater Quality

8.4.29 As a result of the Proposed Development potentially polluting materials could enter downstream watercourses as surface water run-off, or groundwater by infiltration to ground. Potentially

polluting materials include suspended solids, metals and hydrocarbons. These substances may be present as a result of traffic (e.g. vehicle emissions, wear and corrosion), leaks and spillages (e.g. from road vehicles), litter, soil erosion, maintenance on-site and other activities.

8.4.30 The primary receptors of potential pollutants are the receiving watercourses, which have a medium sensitivity to changes in water quality, and groundwater, which has a low sensitivity to changes in water quality due to the location of the Site outside of a Source Protection Zone.

8.4.31 It is concluded that the magnitude of change is high, given that a significant pollution event could result in a permanent change to water quality.

8.4.32 Therefore, without inclusion of mitigation measures, the Proposed Development could have major impact significance for the receiving watercourse, and moderate impact significance for the receiving groundwater.

Groundwater Table

8.4.33 As a result of the Proposed Development there could be a risk in alteration to the water table due to the reduction in permeable areas reducing groundwater recharge. However, intrusive ground investigations have demonstrated that the majority of the Site is underlain by relatively impermeable soils and therefore the increase in impermeable areas will result in limited change to groundwater recharge from surface water. In the area of the Site underlain by more permeable deposits, there is a greater potential for change.

8.4.34 The groundwater receptor has a medium sensitivity to changes, given that the majority of the Site is underlain by impermeable soils.

8.4.35 The magnitude of change is considered to be medium, as changes to the water table could have long-term consequences.

8.4.36 Therefore, without inclusion of mitigation measures, the Proposed Development could have moderate impact significance on the groundwater table.

Foul Water Drainage

8.4.37 The Proposed Development will increase foul water flows into the receiving Thames Water network and Sewage Treatment Works downstream, and could therefore result in an increase in sewer flood risk and additional pressure on Thames Water's environmental obligations.

8.4.38 Consultation with Thames Water has confirmed that the receiving Thames Water network has a high sensitivity to change in flows.

8.4.39 The magnitude of change is considered to be high, as increases in foul water flows could result in a permanent change to the receiving network and flood risk as a consequence.

8.4.40 Therefore, without inclusion of mitigation measures, the Proposed Development could have major impact significance on the receiving sewer network.

Water Resources

8.4.41 The Proposed Development will increase potable water requirements from the Thames Water supply network, and could therefore result in additional pressure on water resources.

8.4.42 Consultation with Thames Water has confirmed that the Thames Water potable water network has a high sensitivity to change in demand.

8.4.43 The magnitude of change is considered to be high, as increases in potable water demand could result in a permanent change to water resources.

8.4.44 Therefore, without inclusion of mitigation measures, the Proposed Development could have major impact significance on water resources.

8.5 Mitigation

Construction Phase Mitigation

8.5.1 A Construction Environmental Management Plan (CEMP) will be prepared prior to commencement of the construction works. This document will outline how the construction works will avoid, minimise and mitigate potential effects on the environment and surrounding area. The document will be reviewed and revised throughout the project where necessary.

8.5.2 The CEMP will typically cover construction issues arising from noise, construction vehicle movement and emissions, dust, surface water run-off, site waste and spillages.

Flood Risk (On-Site)

8.5.3 The Proposed Development layout has been designed to avoid built development within areas at risk of surface water flooding from off-site sources. As such, limited construction works will be required in these areas. Where overland flow routes are maintained, it is proposed to channel flows and attenuate ponding more effectively through careful consideration of the existing and proposed topography, potentially combined with swales, ditches and terraced areas where appropriate.

8.5.4 Surface water flow routes which are generated from on-site sources are not expected to exist following the Proposed Development, and as such are not proposed to be avoided within the Proposed Development, although may be retained as road or green corridors where possible. As such, these flow routes may still exist in the temporary construction stage.

8.5.5 Groundwater will pose the greatest flood risk during groundworks, especially deep excavations.

8.5.6 Flood risk to the contractors, equipment, machinery and materials is a health and safety issue and therefore considered as part of risk management and elimination under Construction (Design and Management) Regulations (CDM Regulations, 2015). The CEMP would also cover emergency planning relating to flood risk.

8.5.7 Flood risk management and elimination could include:

- positioning of site compound(s) and material storage areas giving due consideration to areas at risk of surface water flooding in the temporary situation;
- monitoring of weather forecasts to ensure that no works are being undertaken within areas at flood risk and all loose items which could float away moved to higher ground ahead of time;
- construction of surface water flood risk mitigation measures (e.g. swales, ditches and terraced areas) in the early phases of development;
- construction of main road and drainage infrastructure in the early phases of development in order to intercept surface water run-off;
- dewatering of excavations and monitoring of groundwater levels, with excavation activities carefully monitored and coordinated with forecasted dry periods where possible; and
- survey of the Site after any flood event to identify any potential environmental issues that have arisen and address them.

8.5.8 Additional mitigation measures may be implemented where deemed necessary.

Flood Risk (Off-Site)

8.5.9 The CEMP would include measures to manage surface water run-off during the construction stage. Exact measures implemented would depend on detailed layouts, drainage strategy, phasing and build programme, however these would typically include:

- construction of main road and drainage infrastructure in the early phases of development in order to intercept surface water run-off;
- the movement of plant and machinery over bare soil areas limited to avoid soil compaction and smearing, with suitable preparatory works included where this cannot be avoided so as to minimise increases in surface water runoff; and
- if necessary, temporary drainage facilities to ensure the controlled discharge of surface water run-off to the receiving watercourse until such a time as the permanent surface water drainage system is employed.

8.5.10 Additional mitigation measures may be implemented where deemed necessary.

Surface Water and Groundwater Quality

8.5.11 The CEMP would include measures to manage the quality of surface water run-off during the construction stage. Exact measures implemented would depend on detailed layouts, drainage strategy, phasing and build programme, however these would typically include:

- surface water should be managed appropriately in accordance with best practice during the construction period;
- construction of main road and drainage infrastructure in the early phases of development in order to intercept surface water run-off;
- any trapped gullies and linear drains protected by the use of a geotextile layer under the gratings to prevent silt and construction waste entering the drainage system. These would be regularly checked and replaced if they are silted-up or torn. Straw or similar would be placed in the gully pots to support the geotextiles and provide additional filtration. Gullies and drains should be inspected weekly, and after each adverse rainfall event, and cleared out as necessary;
- manholes upstream and downstream of attenuation features and upstream of receiving watercourse to be used as silt traps by incorporating a geotextile membrane (Terram 1000 or similar approved). These manholes should be regularly inspected and cleaned during the construction period; and
- prevention of silts and sediment generated during the construction period entering open sustainable drainage features (e.g. swales, basins) by the use of measures outlined above, provision of an alternative temporary drainage solution, or de-silting and remediation of the feature at the end of the construction period.

8.5.12 Additional mitigation measures may be implemented where deemed necessary.

Groundwater Table

8.5.13 Measures to protect the groundwater table during the construction phase will be included in the CEMP where appropriate.

Water Resources

8.5.14 Measures to reduce potable water usage would be considered where appropriate e.g. rainwater reuse, grey water recycling and low water use fittings within the site compound(s), and use of materials and processes with low water demand.

Operational Phase Mitigation

Flood Risk (On-Site)

8.5.15 Surface water flood risk areas which have some off-site contributions are proposed to be retained as green corridors through the Site, in order to maintain flow routes through the Proposed Development and act as exceedance flow paths post-development.

8.5.16 All other surface water flood risk areas identified are generated by rain falling on the Site itself. Therefore, urbanising the catchment should remove this flood risk entirely. Therefore, there is no requirement to maintain these flow paths and/or avoid these areas for the Proposed Development. Nevertheless, since the flow paths tend to follow the topography of the Site, consideration has been given in the Proposed Development layout to retaining these routes as green and/or road corridors in order to act as exceedance flow paths post-development, directing flows which exceed the drainage system away from the proposed buildings.

8.5.17 Where flow routes are maintained, it is proposed to channel flows and attenuate ponding more effectively through careful consideration of the existing and proposed topography, potentially combined with swales, ditches and terraced areas where appropriate. Therefore, the footprint of the area at-risk will be reduced post-development. As such, although green corridors will follow the route of the overland flow paths, the entire footprint of at-risk areas has not been sterilised for built development on the Proposed Development layout. This strategy will also enable green corridors to have usable open space, with landscaping and biodiversity designed specifically for dry or seasonally wet conditions.

8.5.18 A number of off-site catchments drain through the Site via the network of drainage ditches. Existing formal drainage routes will be maintained through the development. Ditches carrying off-site flows will be retained as green corridors within the Proposed Development layout, and locally re-routed or culverted only where necessary (e.g. under roads). Improvements and clearance of existing drainage routes, including ditches and culverts, will be considered where necessary, removing blockages, improving flows and improving the routing of flows through the existing drainage system. Consideration will also be given to reinstating existing culverts to open ditches where possible and reasonable.

8.5.19 The proposed surface levels will be designed to convey surface water into a sustainable drainage system. The system will be designed not to flood for a 1 in 100 year event with an allowance for climate change. Therefore, there is very low risk of flooding from the proposed drainage system. Any surface flooding during extreme events which may overload the drainage system will be routed via access roads, away from properties, overflowing towards the ditch systems, without creating any significant risk to people or property.

8.5.20 During the meetings held between Glanville and OXCC in its role as Lead Local Flood Authority (LLFA) in November 2021 and November 2022, OXCC confirmed that the proposed approach to existing and proposed surface water flood risk management was appropriate.

8.5.21 Groundwater flood risk is higher at the lower ends of the Site. Open green space is proposed to be located at the lower (eastern) ends of the Proposed Development layout. Appropriate groundwater flood risk mitigation measures will be implemented. For example, where high groundwater levels are encountered, drainage features (such as ponds or swales) may be lined with an impermeable membrane to prevent groundwater ingress, where deemed appropriate.

8.5.22 Based on the ground conditions and anecdotal reports, surface water run-off from the Site which infiltrates into the ground and emerges at lower points in the topography contributes to the groundwater flood risk. Therefore, the introduction of a positive drainage system will reduce

groundwater flood risk from this source.

Flood Risk (Off-Site)

8.5.23 In accordance with the hierarchy stipulated by Building Regulations, infiltration drainage is not feasible for the majority of the Site, and as such surface water will be discharged into the network of ditches, mimicking the existing situation. Despite good infiltration results in a small area in the south of the Site, groundwater levels encountered mean that it is unlikely that even shallow infiltration techniques would be feasible in the area of gravelly deposits As such, the strategy proposed at this stage has been prepared on this basis, with no infiltration drainage. At detailed design stage, at-source infiltration drainage techniques will be considered on a plot-by-plot basis in the southern area of the Site, following further tests to BRE365 and groundwater monitoring through the winter months on a tighter grid if required.

8.5.24 Defra's Non-statutory Technical Standards for Sustainable Drainage Systems (March 2015) state that surface water drainage systems should be designed such that volumes and peak flow rates are no greater than the rates and volumes prior to development of the Site. For an undeveloped greenfield site, the peak flow rates post-development should match the greenfield rates. OXCC's Local Standards and Guidance For Surface Water Drainage on Major Development (December 2021) require post-development rates to be restricted to "QBAR", the peak rate of flow from a catchment for the mean annual flood (approximately 1 in 2.3 years) for all events up to and including the 1 in 100 year event. This approach ensures that post-development run-off volumes are no greater than the pre-development run-off volume.

8.5.25 The surface water drainage strategy for the Proposed Development will follow the Defra and OXCC Standards. The topography of the Site leads to several catchment areas and outfalls. The proposed drainage strategy will seek to retain broadly similar catchments to the existing situation, and restrict run-off rates and volumes to each outfall point at or below the existing greenfield QBAR values for the existing catchment draining to each outfall point, for all events up to and including the 1 in 100 year event. As such, there will be no increase in peak flow rates or volumes to the receiving watercourses.

8.5.26 In order to restrict to the greenfield rate, surface water run-off is primarily proposed to be attenuated within the Proposed Development using site control techniques, in accordance with the SuDS Management Train approach. It is proposed to utilise detention basins and ponds/wetlands as the primary form of storage on the Proposed Development. These will be located at the lower end of each of the catchments, and attenuate and treat run-off prior to discharge to the ditch network. At-source techniques, such as rainwater harvesting, green roofs, bioretention systems, pervious pavements and tree pits, will be incorporated throughout the Proposed Development. These will reduce the rate and / or volume discharging into the downstream ponds / basins and receiving watercourses, as well as providing additional water quality treatment and biodiversity and amenity value. Swales, filter strips or filter drains will be considered as means of flow conveyance through the Proposed Development in-place of conventional pipe networks wherever practical. As such, additional width through road corridors, and green corridors following the site topography, will be considered within the Proposed Development layout in order to accommodate surface conveyance features such as these.

8.5.27 During the meetings held between Glanville and OXCC in its role as Lead Local Flood Authority (LLFA) in November 2021 and November 2022, OXCC confirmed that the proposed approach to surface water drainage strategy was appropriate.

8.5.28 The provision of a new drainage system as described will also alleviate the surface water

flooding for the receiving watercourses on and around St Frideswide's Farm, by attenuating and releasing flows from land upstream at restricted rates. Improvements and clearance of blockages from the existing drainage around the farm, including ditches and culverts, will also be considered where necessary, removing blockages, improving flows and improving routing of flows into the existing drainage system. Consideration could also be given to land drains and/or bunds within the green corridor between the built development and St Frideswide's Farm, to improve land drainage, divert flows around the existing house and improve the flood risk situation further.

Surface Water and Groundwater Quality

8.5.29 Pollution control measures will be incorporated in order to minimise the transmittal of any pollutants collected by run-off flowing over hard paved areas to the receiving watercourses.

8.5.30 The CIRIA SuDS Manual indicates the minimum treatment indices for contributing pollution hazards for different land use classifications. In order to deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index (for each contaminant type) that equals or exceeds the pollution hazard index. In order to provide an adequate level of treatment, an assessment using this method should be carried out for each land use parcel and their respective SuDS features. This will be undertaken at the appropriate stage of the design process, once detailed Site proposals are available.

8.5.31 Nevertheless, an initial appraisal of the outline strategy can be undertaken at this stage. A detention basin on its own is sufficient to mitigate pollution risk from the majority of land uses (all roofs, individual driveways, residential car parks, low traffic roads and car parking with infrequent change). For commercial yard areas and car parking with frequent change, combining the detention basin with a swale, filter strip, filter drain, bioretention system or permeable pavement will provide sufficient mitigation from any pollution risk. Providing a pond/wetland rather than a basin would also provide sufficient mitigation on its own. As such, an adequate level of treatment for all land uses is capable of being provided.

8.5.32 In addition, treatment features such as catchpits for roof run-off, pervious paving for driveway areas, and proprietary treatment devices for road run-off will also be considered at detailed design stage in order to improve the quality of water entering downstream SuDS features.

Groundwater Table

8.5.33 The site investigation has demonstrated that the majority of the Site is underlain by relatively impermeable soils and therefore the increase in impermeable areas will result in limited change to groundwater recharge from surface water. Furthermore, where not precluded by high groundwater levels, drainage features (e.g. swales, permeable pavements and basins) will not be lined and therefore will contribute to groundwater recharge.

8.5.34 In the area of the Site underlain by more permeable deposits, infiltration drainage techniques will be utilised where feasible which will contribute to groundwater recharge. However, high groundwater levels may preclude the use of infiltration drainage techniques and require drainage features to be lined to prevent groundwater ingress into the system and potential pollution of groundwater.

8.5.35 The potential to promote groundwater recharge through these methods will be assessed at detailed design stage once infiltration potential and groundwater levels are assessed on a plot-by-plot basis.

8.5.36 The proposed surface water drainage system serving the Proposed Development seeks to

mimic the existing drainage situation by directing flows to existing outfalls and watercourses at the lower end of the Site. As such, groundwater levels in locations downstream of the Site, in particular at St Frideswide's Farm pond, will not be affected by the Proposed Development, as existing flow rates and volumes will be maintained to this area, despite the introduction of a positive drainage system.

Foul Water Drainage

8.5.37 Thames Water have confirmed via a Pre-Planning Enquiry that reinforcement works to their network will be required in order to facilitate the flows from the Proposed Development. In order ensure that the appropriate upgrades are made, Thames Water will need to carry out modelling work to identify where and when reinforcement works will be needed. Thames Water will undertake this modelling work at their expense once the Proposed Development has secured an outline planning consent.

8.5.38 There has been early engagement and regular correspondence with Thames Water, which will ensure that the development proposals are accounted for in Thames Water modelling at the appropriate level and stage. Thames Water has already started the process of feeding data about the Proposed Development into a high-level assessment model which is operated in parallel with Thames Water's Strategic Growth Model (which captures developments that are permitted or expected to receive planning consent). Although capacity within the system is not reserved, continued engagement with Thames Water helps to ensure that the appropriate capacity can be provided (including reinforcement works where necessary) ahead of occupancy of buildings on the Proposed Development.

8.5.39 Environmental obligations in respect of the Thames Water's discharge permit are considered as part of planning upgrade works, and this is discussed and agreed between Thames Water, the Environment Agency and the Local Council. On a residential / mixed-use development such as Water Eaton, developers are not party to discussions and have no bearing on how Thames Water's environmental obligations are met. However, it is noted that Thames Water are separately addressing issues such as infiltration, surface water and groundwater flows into the foul network in order to improve capacity and accommodate additional growth. The Asset Planning team at Thames Water deal with wastewater treatment works, and upgrade works to Wastewater Treatment Works are being planned and implemented.

8.5.40 Measures to reduce potable water usage (and therefore foul discharge from the proposed Development) will be considered where appropriate e.g. rainwater reuse, grey water recycling and low water use fittings within all proposed buildings.

Water Resources

8.5.41 Thames Water have confirmed via a Pre-Planning Enquiry that reinforcement works to their potable water network will be required in order to facilitate the Proposed Development, with current capacity for 50 new dwellings only. In order ensure that the appropriate upgrades are made, Thames Water will need to carry out modelling work to identify where and when reinforcement works will be needed. Thames Water will undertake this modelling work at their expense once the Proposed Development has secured an outline planning consent.. The timescale for modelling, design and construction of any reinforcement works is estimated to be 20 months. If the modelling work is commenced once outline planning consent is granted, it is anticipated that the reinforcement works will be undertaken prior to first occupation of the Proposed Development. Ongoing liaison is underway with Thames Water to understand how the Proposed Development sits alongside other allocated sites within the same catchment.

8.5.42 Measures to reduce potable water usage will be utilised wherever appropriate e.g. rainwater reuse, grey water recycling and low water use fittings within all proposed buildings.

8.6 Residual effects

8.6.1 This section outlines the potential residual effects that will remain assuming that the mitigation measures described above have been undertaken. All impacts are adverse unless specifically noted otherwise.

Construction Phase Effects

Flood Risk (On-Site)

8.6.2 Flood risk receptors during the construction stage include construction workers (high sensitivity), equipment and machinery, and materials (low sensitivity).

8.6.3 The effective implementation of a CEMP would address the flood risk posed to the identified receptors. Therefore, the magnitude of change is considered negligible for construction workers and for equipment, machinery and materials.

8.6.4 Through inclusion of the identified mitigation measures, on-site flood risk would have negligible impact significance for construction workers, equipment, machinery and materials.

Flood Risk (Off-Site)

8.6.5 The primary flood risk receptors are the receiving watercourses and areas at risk of flooding, which have a medium sensitivity to temporary changes in water quantity given the areas of flood risk identified downstream of the Site.

8.6.6 The effective implementation of a CEMP would address the flood risk posed to the identified receptors. Therefore, the magnitude of change is considered to be negligible.

8.6.7 Through inclusion of the identified mitigation measures, the Proposed Development would have negligible impact significance for the receiving watercourses and areas at risk of flooding.

Surface Water and Groundwater Quality

8.6.8 The primary receptors of potential pollutants are the receiving watercourses, which have a medium sensitivity to temporary changes in water quality, and groundwater, which has a low sensitivity to changes in water quality due to the location outside of a Source Protection Zone.

8.6.9 The effective implementation of a CEMP would address the water quality risk posed to the identified receptors. Therefore, the magnitude of change is considered to be low, as there could still be some minor change to baseline conditions due to spillage or accidental pollution event even with the implementation of the identified mitigation measures.

8.6.10 Through inclusion of the identified mitigation measures, the Proposed Development would have minor impact significance for the receiving watercourses and groundwater.

Groundwater Table

8.6.11 The groundwater receptor has a medium sensitivity to temporary changes in levels.

8.6.12 The effective implementation of a CEMP would address the risk posed to the identified groundwater receptor. Therefore, the magnitude of change is considered to be low, as changes to the water table during the construction phase could still occur but would be short-term reversible changes.

8.6.13 Through inclusion of the identified mitigation measures, the Proposed Development would have

minor impact significance on the groundwater table.

Water Resources

8.6.14 The sensitivity of water resources is considered to be low during the construction period.

8.6.15 The implementation of measures to reduce water usage and demand would reduce the demand on water resources. Therefore, the magnitude of change is considered to be negligible during the construction period.

8.6.16 Through inclusion of the identified mitigation measures, the construction phase would have negligible impact significance on water resources.

Operational Phase Effects

Flood Risk (On-Site)

8.6.17 Flood risk receptors include site users (high sensitivity), building structures (low sensitivity) and the surface water drainage system (low sensitivity).

8.6.18 Mitigation measures include the development of the layout to avoid areas at risk of surface water and groundwater flooding, channelling and management of both pre-development and post-development surface water overland flows, the implementation of a surface water drainage strategy and the lining of surface water drainage features where necessary and appropriate. On this basis, the magnitude of change would be considered to be negligible for site users, structures and the surface water drainage system. Where surface water flooding is generated in whole or part by rain falling on the Site itself, the urbanisation of the catchment and implementation of a surface water drainage strategy incorporating sustainable drainage systems would address surface water flood risk on-site. Improvements to existing drainage systems where necessary and appropriate would also alleviate surface water flood risk. Therefore, the magnitude of change is considered to be medium (beneficial) for all receptors

8.6.19 Through inclusion of the identified mitigation measures, on-site flood risk could have major beneficial impact significance for site users, and minor beneficial impact significance for structures and the surface water drainage system.

Flood Risk (Off-Site)

8.6.20 The primary flood risk receptors are the receiving watercourses and areas at risk of flooding, which have a high sensitivity to changes in water quantity given the areas of flood risk identified downstream of the Site.

8.6.21 The implementation of a surface water drainage strategy incorporating sustainable drainage systems and restricted peak flows and volumes off-site to at or lower than the undeveloped "greenfield" rates and volumes will address the flood risk to the receiving watercourses. On this basis, the magnitude of change would be considered to be negligible for the receiving watercourses. The introduction of a positive drainage system could also alleviate surface water flooding for the receiving watercourses and on and around St Frideswide's Farm by attenuating and releasing flows from land upstream at restricted rates, as well as improvements to existing drainage systems where necessary and appropriate. Therefore, the magnitude of change is considered to be medium (beneficial).

8.6.22 Through inclusion of the identified mitigation measures, the Proposed Development could have major beneficial impact significance for off-site flood risk for the receiving watercourses.

Surface Water and Groundwater Quality

8.6.23 The primary receptors of potential pollutants are the receiving watercourses, which have a medium sensitivity to changes in water quality, and groundwater, which has a low sensitivity to changes in water quality due to the location outside of a Source Protection Zone.

8.6.24 The implementation of a surface water drainage strategy incorporating sustainable drainage systems including pollution control measures will address risk of pollution to both surface water and groundwater receptors. Therefore, the magnitude of change is low, as there could still be some minor change to baseline conditions due to spillage or accidental pollution event even with the implementation of the identified mitigation measures.

8.6.25 Through inclusion of the identified mitigation measures, the Proposed Development could have minor impact significance for the receiving watercourse and groundwater.

Groundwater Table

8.6.26 The groundwater receptor has a medium sensitivity to changes, given that the majority of the Site is underlain by impermeable soils.

8.6.27 The implementation of a surface water drainage strategy which maximises groundwater recharge within the limitations of the ground conditions will address the risk to changes in the groundwater table. Therefore magnitude of change is considered to be low.

8.6.28 Through inclusion of the identified mitigation measures, the Proposed Development could have minor impact significance on the groundwater table.

Foul Water Drainage

8.6.29 The receiving Thames Water network has a high sensitivity to change in flows.

8.6.30 The modelling and reinforcement of the Thames Water network will allow for the increases in flows into the Thames Water network without an increase in flood risk. Therefore, the magnitude of change is considered to be negligible.

8.6.31 Through inclusion of the identified mitigation measures, the Proposed Development could have negligible impact significance on the receiving sewer network.

Water Resources

8.6.32 The sensitivity of water resources is considered to be high.

8.6.33 The modelling and reinforcement of the Thames Water network will allow for the increases in potable water demand from the Thames Water network. Measures to reduce potable water usage will also be utilised wherever appropriate to reduce water demand. Therefore, the magnitude of change is considered to be negligible.

8.6.34 Through inclusion of the identified mitigation measures, the Proposed Development could have negligible impact significance on water resources.

Summary of Residual Effects

8.6.35 This section demonstrates that there will be no significant residual adverse impacts (i.e. moderate or major) as a result of the Proposed Development. Minor adverse impacts were identified to surface water and groundwater quality in the event of spillage or accidental pollution incident during both the construction and operational phases, and the groundwater table during both the construction and operational phases.

8.6.36 Some beneficial impacts have been identified. Significant beneficial impacts are identified for

flood risk on-site for site users and off-site for receiving watercourses and the flood risk area around St Frideswide's Farm. Minor beneficial impacts are identified for flood risk on-site for structures and the surface water drainage system.

8.7 Implications of Climate Change

8.7.1 The impact of climate change on the development and adaptations to climate change are considered within this section.

Climate Change Allowances

Environment Agency Guidance: Peak River Flow and Peak Rainfall Intensity

8.7.2 Environment Agency (EA) Guidance "Flood risk assessments: climate change allowances" (February 2016, updated May 2022) provides guidance on how climate change should be taken into account in relation to flood risk and surface water drainage. The EA Guidance includes climate change allowances which are predictions of the anticipated change for peak river flow and peak rainfall intensity.

8.7.3 The range of allowances is based on the proportion of possible scenarios that fall below an allowance level, known as percentiles. The 50th percentile is the point at which half of the possible scenarios for peak flow fall below it, and half fall above it. The central allowance is based on the 50th percentile, the higher central on the 70th percentile, and the upper end on the 95th percentile.

8.7.4 The range of allowances are set out for different periods of time or "epochs", the 2020s (short term / construction period), 2050s (medium-term) and 2080s (long-term). The EA requires that for development with a lifetime up to 2060, the 2050s epoch should be assessed. For a development with a lifetime between 2061 and 2100, the 2070s or 2080s epoch should be assessed. For a mixed use development such as the Proposed Development, the lifetime is considered to be between 2061 and 2100 and therefore the 2070s or 2080s epoch should be assessed.

8.7.5 Peak river flow allowances show the anticipated changes to peak flow by management catchment, which are sub-catchments of river basin districts. The Site is located in the Cherwell and Ray Management Catchment of the Thames Basin District. The climate change allowances for this Catchment are set out in Table 8.4.

Table 8.4 Peak River Flow Climate Change Allowances - Cherwell and Ray Management Catchment

Epoch	Central	Higher Central	Upper End
2020s	6%	11%	24%
2050s	4%	10%	27%
2080s	15%	25%	49%

8.7.6 The EA guidance states that the Central Allowance should be used to assess developments which include "More Vulnerable" uses (such as residential dwellings). As such, the Central 2080s allowance of 15% should be used to assess the impact of climate change on flood risk to the Proposed Development. However, this development seeks to provide additional resilience, and as such, the Higher Central (25%) and Upper End (49%) will also be assessed. In order to provide resilience above and beyond the guidance, a climate change allowance of 70% has also been assessed.

8.7.7 Peak rainfall intensity allowances show the anticipated changes to peak rainfall intensity by management catchment, which are sub-catchments of river basin districts. The peak rainfall intensity allowances should be used for site-scale application (e.g. drainage design) and for surface water flood mapping in small (less than 5 square kilometres) and urbanised drainage catchments. For modelling large areas with rural land use direct rainfall modelling is unlikely to be appropriate and flood risk should be assessed using the peak river flow allowances. The Site is located in the Cherwell and Ray Management Catchment of the Thames Basin District. The climate change allowances for this Catchment are set out in Table 8.5.

Table 8.5 Peak Rainfall Intensity Climate Change Allowances - Cherwell and Ray Management Catchment

Rainfall Event	Epoch	Central	Upper End
3.3% annual exceedance rainfall event	2050s	20%	35%
	2070s	25%	35%
1% annual exceedance rainfall event	2050s	20%	40%
	2070s	25%	40%

8.7.8 The EA guidance states that the Upper End Allowance should be used to assess developments with a lifetime beyond 2100 for both the 1% and 3.3% annual exceedance probability events for the 2070s epoch. As such, the Upper End 2070s allowance of 35% should be used to assess the impact of climate change on peak rainfall for the 3.3% exceedance probability event and 40% for the 1% exceedance probability event.

UK CP18 Climate Change Projections

8.7.9 The UK CP18 Climate Change Projections are summarised in Chapter 14 of this ES The general projected trends of climate change through the 21st century show a progressive increase in mean air temperature during summer and winter, a reduction in the rate of precipitation during the summer months but an increase during the winter months, with a slight reduction in average wind speed in the summer and a small increase during the winter.

Groundwater

8.7.10 Groundwater storage and recharge is affected by a number of mechanisms, namely changes in rainfall patterns and changes in evapotranspiration, which in turn affect the amount of infiltration and groundwater recharge. Predicted increases in rainfall during the winter months will increase infiltration and therefore increase groundwater recharge and storage. Predicted decreases in rainfall during the summer months, as well as higher evapotranspiration due to rising temperatures and increased CO_2, will reduce the amount of water reaching the groundwater table, therefore reducing groundwater recharge and storage. Considering these factors, it is predicted that groundwater recharge and storage is likely to be subjected to greater variation as a result of the effects of climate change, but that in the long term groundwater recharge may reduce. The effects of climate change therefore may include:

- Long-term decline in groundwater storage;
- Increased frequency and severity of groundwater droughts;
- Increased frequency and severity of groundwater floods; and
- Mobilisation of pollutants due to seasonally high water tables.

Climate Change Impacts

Flood Risk (On-Site)

8.7.11 Flood risk receptors during the construction stage include construction workers (high sensitivity), equipment and machinery, and materials (low sensitivity). Flood risk receptors during the operational phase include site users (high sensitivity), building structures (low sensitivity) and the surface water drainage system (medium sensitivity).

8.7.12 The increase in peak rainfall intensity will increase surface water and groundwater flood risk to the identified receptors, and will increase the demand on the on-site surface water drainage system. Fluvial flood risk off-site will increase and as such should be assessed as to whether it would pose a risk to the identified receptors when the effects of climate change are taken into account.

8.7.13 The surface water drainage system serving the Proposed Development will be designed to accommodate the 1 in 100 year (1% annual exceedance probability) rainfall event with a 40% allowance for climate change in accordance with EA Guidance without flooding from surface water.

8.7.14 The channelling and management of both pre-development and post-development surface water overland flows will be designed to accommodate the 1 in 100 year (1% annual exceedance probability) rainfall event with a 40% allowance for climate change in accordance with EA Guidance. Consideration will be given to including additional resilience against the potential future effects of climate change on rainfall, beyond the national guidance. Consideration will be given as to the level to which this additional resilience will be provided, as well as how this can be incorporated within the development and drainage proposals, at detailed design stage. Potential options include the design of usable open space around basins to be floodable, which would provide amenity benefits in all but extreme storm events, as well as the design of road and green networks through the Site (as discussed in Section 4) to be located at lower points in the topography in order to route exceedance flows away from building and downstream into the open drainage system.

8.7.15 The potential increase in winter groundwater levels is difficult to predict and quantify, however the potential for increased groundwater levels and flood risk will be considered within the design of the surface water drainage system as far as practical. Infiltration drainage features or other unlined SuDS features will be designed to be a minimum of 1m above the highest recorded groundwater level which allows for groundwater levels to gradually increase over time without impacting on the storage capacity or functioning of the surface water drainage system.

8.7.16 The EA's River Cherwell (Thrupps Bridge to Thames Confluence) fluvial flood mapping and modelling study was obtained via Product 5 and 6 data request in 2021 and has been re-run with the appropriate climate change allowances detailed in this section: 15%; 25%; 49%; and 70%. These model results have been used in conjunction with the detailed topographical survey of the Site in order to establish the flood zone extents. This confirms that the Site lies entirely outside of the 1 in 100 year (1% annual exceedance probability) flood event including these allowances for climate change. The closest proposed built development is a distance of c. 300m and an elevation of 10m above the most extreme fluvial flood scenario assessed.

8.7.17 These mitigation measures are in-line or exceed guidance for predicted climate change effects. They demonstrate that fluvial and surface water flood risk, and the surface water drainage system will not pose an increased risk to the identified receptors as a result of the predicted effects of climate change, including in the short-term construction stage.

Flood Risk (Off-Site)

8.7.18 The primary flood risk receptors are the receiving watercourses and areas at risk of flooding, which have a high sensitivity to changes in water quantity given the areas of flood risk identified downstream of the Site.

8.7.19 In accordance with EA Guidance, the surface water drainage system serving the Proposed Development will be designed to restrict flows for all rainfall events up to and including the 1 in 100 year rainfall event with a 40% allowance for climate change to the pre-development "greenfield" rates and volumes. This will address the flood risk to the receiving watercourses.

8.7.20 The predicted increase in temperatures (including increased evapotranspiration) and reduction in precipitation in the summer months will also increase the frequency and severity of hot, dry periods. The landscaping design of open sustainable drainage features such as ponds, basins and swales will consider planting appropriate to cater for wet, partially wet and dry conditions.

8.7.21 These mitigation measures are in-line or exceed guidance for predicted climate change effects. They demonstrate that the Proposed Development will not pose an increased risk to the identified receptors as a result of the predicted effects of climate change, including in the short-term construction stage.

Surface Water and Groundwater Quality

8.7.22 The primary receptors of potential pollutants are the receiving watercourses, which have a medium sensitivity to changes in water quality, and groundwater, which has a low sensitivity to changes in water quality due to the location of the Site outside of a Source Protection Zone.

8.7.23 There is no expected change in the impact on the receiving watercourses as a result of the potential effects of climate change.

8.7.24 Increased winter groundwater levels could increase the likelihood of interaction between the surface water drainage systems and the groundwater. The potential increase in winter groundwater levels is difficult to predict and quantify, however the potential for increased groundwater levels will be considered within the design of the surface water drainage system as far as practical. Infiltration drainage features or other unlined SuDS features will be designed to be a minimum of 1m above the highest recorded groundwater level which allows for groundwater levels to gradually increase over time without impacting surface water directly discharging into the groundwater.

Groundwater Table

8.7.25 The groundwater receptor has a medium sensitivity to changes, given that the majority of the Site is underlain by impermeable soils.

8.7.26 Although groundwater storage and recharge will be affected by climate change, the Proposed Development will have no increased impact on the groundwater table as a result of the potential effects of climate change.

Foul Water Drainage

8.7.27 The receiving Thames Water network has a high sensitivity to change in flows.

8.7.28 The wider Thames Water network will be affected by climate change due to changes in groundwater table affecting infiltration into the existing system, and changes in rainfall patterns affecting inflows to the network due to combined systems and misconnections. However, given that the Proposed Development will employ separate foul water and surface water drainage systems, the Proposed Development will have no significant increased impact on the receiving

foul water network as a result of the potential effects of climate change.

8.7.29 The mitigation measures identified to reduce potable water usage, including rainwater reuse and grey water recycling, may be affected by changing rainfall patterns and therefore may change the foul discharge into the Thames Water network. However, this is difficult to predict and quantify, and may result in some increases and decreases in foul discharge at different times of year. Furthermore, future advances in rainwater and grey water recycling technology may help to reduce the impact of changing rainfall patterns on these systems.

Water Resources

8.7.30 The sensitivity of water resources is considered to be high.

8.7.31 Oxfordshire's potable water supply is provided by a combination of reservoirs and groundwater sources. Water availability in the Thames Catchment is predicted to decrease as a result of climate change. Thames Water have a programme of infrastructure investment including demand management and supply infrastructure improvements. However, the Proposed Development will have no significant increased impact on the potable water demand as a result of the potential effects of climate change.

8.7.32 The mitigation measures identified to reduce potable water usage, including rainwater reuse and grey water recycling, may be affected by changing rainfall patterns and therefore may change the potable water demand. However, this is difficult to predict and quantify, and may result in some increases and decreases in potable water demand at different times of year. Furthermore, future advances in rainwater and grey water recycling technology may help to reduce the impact of changing rainfall patterns on these systems.

8.8 Cumulative effects

8.8.1 This section considers the cumulative effects with other relevant projects. With respect to drainage and flood risk, the following sites are relevant as they are located within the same drainage catchment as the Site

- Cherwell District Council Local Plan Partial Review - Site Allocation Policy PR6b; and
- Land South West of St Frideswide's Farm, Banbury Road (Oxford City Council ref. 21/01449/FUL).

8.8.2 Cherwell Site Allocation PR6b (herein referred to as PR6b) is located to the West of Oxford Road and the Site (Figure 15.1, map reference 1). The allocation is for the construction of 670 dwellings and provision of facilities for sports, play areas and allotments.

8.8.3 The Land South West of St Frideswide's Farm (Site 15) is located to the East of Oxford Road and adjoining the south-western boundary of the Site (Figure 15.1, map reference Site 15). Oxford City Council has granted planning permission for the development of 134 dwellings, pumping station, substation and associated works (Croudace Homes).

8.8.4 Both PR6b and Site 15 are located upstream of the Site and a number of drainage routes, both formal (e.g. drainage ditches) and informal (overland flow paths) pass through the Site and downstream to the River Cherwell.

Flood Risk (On-Site)

8.8.5 Both PR6b and Site 15 will address issues related to flood risk within their own sites. A number of drainage routes, both formal (e.g. drainage ditches) and informal (overland flow paths) pass through the Site and downstream to the River Cherwell. These drainage routes will be

maintained through the Proposed Development. Where drainage routes are required to be amended in order to facilitate the Proposed Development (such as culverting of ditches or channelisation of overland flow routes) their design will provide sufficient capacity to convey the predicted flows. Therefore, the Proposed Development will ensure that there is no increase in flood risk to PR6b, Site 15 or other areas upstream of the Site, as well as within the Site itself.

Flood Risk (Off-Site)

8.8.6 Both PR6b and Site 15 will address issues related to off-site flood risk within their own sites; in-line with relevant national and local planning policy and guidance, flood risk off-site should not increase as a result of these developments. Therefore, there should be no cumulative increase in flood risk downstream of the Site.

Surface Water and Groundwater Quality

8.8.7 Both PR6b and Site 15 developments will address issues related to surface water and groundwater quality within their own sites.

Groundwater Table

8.8.8 Both PR6b and Site 15 developments will address issues related to the groundwater table within their own sites.

Foul Water

8.8.9 Both PR6b and Site 15 developments will increase the foul water discharge into the Thames Water network. Other developments being brought forward which have not been specifically listed may also be located within the same foul network catchment as the Site. Although all promoters/developers will liaise with Thames Water separately regarding network capacity, Thames Water consider all developments being brought froward which will affect their foul water network. This will ensure that the cumulative effects of these developments are taken into account.

Water Resources

8.8.10 The development of PR6b and Site 15 sites will increase the potable water demand on the Thames Water network. Other developments being brought forward which have not been specifically listed may also be located within the same potable water network catchment as the Site. Although all promoters/developers will liaise with Thames Water separately regarding network capacity, Thames Water consider all developments being brought froward which will affect their network and potable water supply. This will ensure that the cumulative effects of these developments are taken into account.

8.9 Summary

8.9.1 This Chapter of the ES concludes that the Proposed Development would only result in negligible to minor adverse effects, providing that the specified mitigation is implemented.

8.9.2 Minor adverse impacts were identified to surface water and groundwater quality in the event of spillage or accidental pollution incident during both the construction and operational phases, and the groundwater table during both the construction and operational phases.

8.9.3 Some beneficial impacts have been identified. Significant beneficial impacts are identified for flood risk on-site for site users and off-site for receiving watercourses and the flood risk area around St Frideswide's Farm. Minor beneficial impacts are identified for flood risk on-site for structures and the surface water drainage system.

8.9.4 The assessment confirms that the only mitigation measures required to reduce the potential adverse effects of the Proposed Development are:

- A detailed Construction Environmental Management Plan;
- A strategy for the management of overland flow routes;
- A surface water drainage strategy in accordance with National and Local Policy and Guidance which manages the quantity and quality of run-off and groundwater recharge; and
- Modelling and reinforcement of the Thames Water foul water and potable water networks.

8.9.5 This Chapter of the ES concludes that the potential effects of climate change will generally exacerbate the effects of the Proposed Development on receptors without mitigation. However, the mitigation measures identified will ensure that there is no increase in risk to the identified receptors as a result of the predicted effects of climate change.

8.9.6 This Chapter of the ES concludes that there are no significant adverse cumulative impacts from the Site and other relevant projects, PR6b and Site 15 (Land South West of St Frideswide's Farm. Oxford CC ref. 21/01449/FUL).

8.9.7 A detailed Flood Risk Assessment including surface water drainage strategy, and Foul Drainage and Utilities Assessment including foul water drainage strategy, have been prepared in support of the outline application, ES appendices 8.1 and 8.2.

8.9.8 A summary of the assessment is set out in Table 8.6 overleaf.

8.10 References

Cherwell District Council (CDC) (2017) Cherwell Level 1 Strategic Flood Risk Assessment Update 2017

Cherwell District Council (CDC) (2017) Cherwell Level 2 Strategic Flood Risk Assessment Update 2017

Cherwell District Council (CDC) (2020) Cherwell Local Plan 2011-2031 (Part 1) Partial Review - Site PR6a.

CIRIA (2015) The SuDS Manual (C753).

Department for Environment, Food and Rural Affairs (Defra) (2015) Non-Statutory Technical Standards for Sustainable Drainage Systems

Department for Levelling Up, Housing and Communities (DLUHC) and Ministry of Housing, Communities and Local Government (MHCLG) (2016) Planning Practice Guidance: Flood Risk and Coastal Change. London: DCLG.

Environment Agency (EA) (2022) Flood Risk Assessments: Climate Change Allowances

Ministry of Housing, Communities and Local Government (MHCLG) (2018) National Planning Policy Framework.

(OXCC) Oxfordshire County Council (2021) Local Standards and Guidance for Surface Water Drainage on Major Developments in Oxfordshire

Table 8.6 Summary of effects

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
Construction phase					
Flood risk (on-site)	High / Low	Temporary	Construction Environmental Management Plan (CEMP)	Negligible	Not significant
Flood risk (off-site)	Medium	Temporary	Construction Environmental Management Plan (CEMP)	Negligible	Not significant
Surface Water and Groundwater Quality	Medium / Low	Temporary	Construction Environmental Management Plan (CEMP)	Minor	Not significant
Groundwater Table	Medium	Temporary	Construction Environmental Management Plan (CEMP)	Minor	Not significant
Water Resources	Low	Temporary	Construction Environmental Management Plan (CEMP)	Negligible	Not significant
Operational phase					
Flood risk (on-site)	High / Medium / Low	Permanent	Strategy for the management of overland flow routes.	Major Beneficial / Minor Beneficial	Significant Not significant
Flood risk (off-site)	High	Permanent	Surface water drainage strategy which manages the quantity of run-off.	Major Beneficial	Significant
Surface Water and Groundwater Quality	Medium / Low	Permanent	Surface water drainage strategy which manages the quality of run-off.	Minor	Not significant
Groundwater Table	Medium	Permanent	Surface water drainage strategy which manages groundwater recharge.	Minor	Not significant
Foul Water Drainage	High	Permanent	Modelling and reinforcement of the Thames Water network.	Negligible	Not significant
Water Resources	High	Permanent	Modelling and reinforcement of the Thames Water network.	Negligible	Not significant

9 Biodiversity

9.1 Introduction

9.1.1 This chapter of the Environmental Statement (ES) has been produced by The Environmental Dimension Partnership Ltd (EDP).

9.1.2 This chapter should be read in conjunction with Technical Appendix 9.1 (Ecological Baseline) which sets out full details of the baseline surveys and other work undertaken to identify and evaluate relevant Important Ecological Features within the Site's Zone of Influence (ZoI).

Purpose of Assessment

9.1.3 This chapter considers the existing biodiversity and ecological context of the Study Area and the potential effects of the Proposed Development on Important Ecological Features (IEFs) as required by Cherwell District Council (CDC) in the Scoping Opinion (ES Appendix 4.2), where biodiversity matters have been requested to be included within the EIA.

Legislative Framework

9.1.4 The following is a summary of legislation and planning policies relevant to biodiversity and ecological issues both at national and local levels.

Legislative Context

The Conservation of Habitats and Species Regulations 2017 (as amended)

9.1.5 The Conservation of Habitats and Species Regulations 2017 (as amended) provide for the designation and protection of statutorily designated wildlife sites of European importance ('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).

The Environment Act 2021

9.1.6 The Environment Act 2021 was passed into law in November 2021. Its overall aims are to strengthen environmental protection and deliver the UK Government's 25-year environment plan following the UK's exit from the European Union. Of greatest relevance to ecology and biodiversity are provisions within the Act for biodiversity gain to be a condition of planning permission in England. When these provisions come into force, following secondary legislation expected to be issued by the Secretary of State within approximately two years of the Act passing into law, the delivery of a net gain in biodiversity of 10% (as measured by a standard biodiversity metric) will become a legal requirement of planning permission for development.

The Wildlife and Countryside Act 1981 (as amended)

9.1.7 The Wildlife and Countryside Act 1981 (as amended) enshrines the protection of statutory designated wildlife sites of national importance (Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (NNRs)) in England and Wales. The Act also sets out varying degrees of protection and offences with regards to native species and their habitats that are rare and vulnerable in a national context. The Act also provides for the control, management and offences in respect of invasive non-native species. Sites of national importance (SSSIs and NNRs) are designated by Natural England under the Act and are protected from any development that may destroy or negatively affect them, either directly or indirectly.

Protection of Badgers Act 1992

9.1.8 The Protection of Badgers Act 1992 (as amended) affords protection specifically to badgers (*Meles meles*) and their setts.

Natural Environment and Rural Communities (NERC) Act 2006

9.1.9 Section 40 of the Natural Environment and Rural Communities (NERC) Act 2006 places a statutory duty on Local Planning Authorities (LPAs) to consider the effects upon biodiversity when exercising their functions in England and Wales. In addition, Section 41 of the Act makes for the provision of a list of habitats and species of principal importance for the conservation of biodiversity.

Biodiversity 2020

9.1.10 In 2013, the UK BAP Priority Habitats and Priority Species, and the Section 41 Species and Habitats of Principal Importance for Conservation under the NERC Act 2006, were rationalised. This rationalisation occurred under the 'Post-2010 Biodiversity Framework'. As a result, a new list of Priority Species and Priority Habitats is now in operation at the UK level. These new lists supersede the former UK BAP; they are the new 'Biodiversity Indicators' that are used to monitor the status of biodiversity at the UK level. Each of the four devolved countries of the UK also has a similar list. Within England, the new rationalised lists of 24 Priority Habitats and 213 Priority Species are provided in Biodiversity 2020 which is the national biodiversity policy for England.

Planning Policy Context

National Planning Policy Framework (NPPF)

9.1.11 The Government published a revised version of the National Planning Policy Framework (NPPF) in July 2021. Paragraph 174 of the NPPF states that:

"*planning policies and decisions should contribute to and enhance the natural and local environment by:*

a) Protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);

b) Recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland."

9.1.12 Paragraph 174 of the NPPF states that planning policies and decisions should contribute to and enhance the natural and local environment by:

d) "*Minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.*"

9.1.13 With regard to planning applications and biodiversity, Paragraph 180 of the NPPF states that:

"*When determining planning applications, local planning authorities should apply the following principles:*

a) If significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;

b) Development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other

developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the Application Site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;

c) *Development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists; and*

d) *Development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to incorporate biodiversity improvements in and around developments should be encourages especially where this can secure measurable net gains for biodiversity.*"

National Planning Practice Guidance (NPPG)

9.1.14 Further guidance on the NPPF with respect to ecology is described within the Planning Practice Guidance on the Natural Environment under 'Biodiversity, Geodiversity and Ecosystems'.

Local Planning Policy

9.1.15 Relevant development management policies within the Cherwell Local Plan 2011 – 2031 are: Policy ESD9, which relates to protection of the Oxford Meadows SAC, Policy ESD10, which aims to protect and enhance biodiversity and the natural environment; and Policy ESD17, relating to the maintenance and enhancement of the District's Green Infrastructure.

9.2 Survey

9.2.1 All survey methodologies used within the assessment followed the published guidelines as accepted by the statutory and non-statutory agencies, including Natural England (NE) and the Chartered Institute for Ecology and Environmental Management (CIEEM). This EcIA follows the standard current guidance in place at the time of writing in 2022, as set out by the CIEEM and recommended by NE.

9.2.2 For the purposes of this chapter the term 'Site' refers to all land within the Application Site red line boundary as shown in Figure 1.1. The term 'Study Area' relates to the areas covered by the ecological surveys and desk-based survey which varies as appropriate for the ecological features being considered, due to its sensitivity, size of home range etc., as well as the nature of predicted impacts. The study areas used for the desk-study are defined below.

Survey Methodology

Desk Study

9.2.3 An ecological desk-study was completed to collate current baseline data from statutory and non-statutory sources. The following data was gathered:

- Records of statutorily designated sites of international importance SAC, SPA and Ramsar sites, national/regional SSSIs, or local importance LNR within 15km, 5km and 2km of the Site respectively;
- Records of non-statutorily designated sites for nature conservation (Local Wildlife Sites (LWS) within 2km of the Site;
- Habitats of importance for nature conservation including ancient woodlands and Habitats of Principal Importance (HPI) under the Natural Resources and Environment Act (NERC) Act 2006 within or adjacent to the Site; and
- Records of legally protected and notable species (including Species of Principal

Importance (SPI)) under the NERC Act within 2km of the Site.

9.2.4 Information was sourced from Thames Valley Environmental Records Centre (TVERC) in February 2015, updated in December 2017 and most recently in March 2022. Online resources, including data available through the Multi-Agency Geographic Information for the Countryside (MAGIC) website (www.magic.gov.uk) were used to supplement the baseline data and reviewed in order to gain an overview and identify features of interest in the wider landscape.

Field Survey

9.2.5 An Extended Phase 1 Habitat Survey of the Site was carried out in accordance with the standard JNCC methodology in February 2015, which was updated in May 2017 and again in May 2021. Hedgerows were assessed against the Wildlife and Landscape criteria of the Hedgerow Regulations 1997 in June 2022. Details of these methodologies are presented within Technical Appendix 9.1.

9.2.6 Detailed faunal surveys were carried out in accordance with the relevant survey methodology for that species as recommended by CIEEM and NE. The faunal surveys undertaken include breeding birds, roosting and foraging/commuting bats, badger, common reptiles, great crested newts and butterflies (brown, black and white-letter hairstreak). Methodologies used are presented within Technical Appendix 9.1.

9.3 Assessment Methodology

9.3.1 Assessment and evaluation has been made in accordance with the CIEEM guidance for EcIA, which recognises that evaluation is a complex process and that a range of factors need to be considered in attributing value to ecological features. Various characteristics can be used to identify features that are likely to be important in terms of biodiversity, including:

- Naturalness;
- Animal or plant species that are rare or uncommon, either internationally, nationally or more locally;
- Ecosystems and their component parts which provide the habitats required by the above species, populations and/or assemblages;
- Endemic species or locally distinct sub-populations of a species;
- Habitat diversity, connectivity and/or synergistic associations (e.g. Networks of hedgerows and areas of species-rich pasture that provide important feeding habitat for a rare species, such as greater horseshoe bat);
- Plant communities (and their associated animals) that are considered to be typical valued natural/semi-natural vegetation types – these will include examples of naturally species-poor communities;
- Species on the edge of their range, particularly where their distribution is changing as a result of global trends and climate change;
- Species-rich assemblages of plants and animals; and
- Typical faunal assemblages that are characteristic of homogenous habitats.

9.3.2 The ecological features that may be affected by the Proposed Development have been evaluated within a geographical framework based on the ecological status of the features, but which also reflects a wide range of legislation and governmental guidance. The guidance stresses there are many geographic contexts in which the importance of ‘Important Ecological Features’ (IEFs) can be assessed and the importance is in how these are defined. The significance of impacts is also then subsequently assessed based on this frame of reference.

9.3.3 Features with a value of Local or above were considered to represent IEFs. Those features not meeting the criteria for IEFs were classified as having below local (that is, not considered to appreciably enrich the habitat resource at the local level, although they may provide some habitat diversity within the immediate context of the Site itself), or Negligible ecological importance. These features are excluded from further assessment given that impacts on such features are considered insignificant regardless of the nature or magnitude of the potential impact, the exception to this being where a feature (typically individuals or populations of a species) is legally protected.

9.3.4 The likelihood that a change/activity will occur as predicted has a degree of confidence assigned. The categories of confidence used are provided in Table 9.1.

Table 9.1 Level of Confidence in Predictions

Level of Confidence	Estimated Probability
Certain/Near Certain	Probability estimated at 95% chance or higher
Probable	Probability estimated below 95% but above 50%
Unlikely	Probability estimated below 50% but above 5%
Extremely Unlikely	Probability estimated at less than 5%

9.3.5 The impacts of the Proposed Development have been predicted, taking into account different stages and activities within the development process. Impacts have been considered both individually and cumulatively. When describing impacts on an ecosystem, structure or function, reference is made to the terms as described in Table 9.2.

Table 9.2 Terms used to Describe Impacts

Parameter	Definition of parameter
Positive or Negative	Whether the impact has a positive or negative effect.
Extent	The area of which the impact occurs.
Magnitude	The size or amount of an impact.
Duration	The time for which the impact is predicted to last prior to recovery or replacement of the resource or feature.
Reversibility	Whether the impact is permanent (i.e. irreversible) or temporary (i.e. reversible).
Timing and Frequency	How often the impact occurs (e.g. repeated noise from piling work) and when it occurs (e.g. vegetation clearance undertaken outside of the bird breeding season.

9.3.6 The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended) require that attention be paid to all likely forms of effects. These may be:

- Direct or indirect;
- Short- or long-term;
- Intermittent, periodic or permanent; and
- Cumulative.

9.3.7 Potential effects prior to mitigation include:

- Direct loss of habitats and associated flora and fauna within the Site boundary, interruption of wildlife corridors, decrease in value to wildlife through reduction in species and/or habitats;
- Indirect effects on retained vegetation within and bordering the Site, through increase

disturbance and through local changes in soils, drainage and hydrology;
- Potential effects upon protected and scarce species through disturbance;
- Operational effects such as pollution incidents from chemical spills, pollution of streams and fragile habitats from run-off and incorrect storage of materials; and
- Long-term effects arising as a result of the favourable restoration of the Site to beneficial after-use.

Magnitude

9.3.8 Magnitude of effects has been determined based on the scales described in Table 9.3:

Table 9.3 Methodology for Assessing Magnitude

Parameter	Definition of parameter
Major	Total loss or major/substantial alteration to key elements/features of the baseline (pre-Development) conditions such that the post Development character/composition/attributes will be fundamentally changed.
Moderate	Loss or alteration to one or more key elements/features of the baseline conditions such that post Development character/composition/attributes of the baseline will be materially changed.
Minor	A minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible/detectable but not material. The underlying character/composition/attributes of the baseline condition will be similar to the pre-Development circumstances/situation.
Negligible	Very little change from baseline conditions. Change barely distinguishable, approximating to a 'no change' situation

Significance

9.3.9 The ecological significance of any impact has been assessed, based upon the likely effect on the structure, function or conservation status of the feature. The assessment of impact significance is undertaken both to identify the need for mitigation and also to assess residual effects.

9.3.10 The significance of likely effects was determined by identifying those ecological features likely to be affected. The features were evaluated to identify the important ones, i.e. those which, if their level of importance reduced, national or local policies (or in some cases legislation) would be triggered. The nature of the individual and combined impacts (positive or negative) were characterised on each important feature, to determine the longevity, reversibility and consequences for the feature in terms of ecological structure and function and/or the conservation status of a habitat or species. As part of the process of determining whether there is likely to be an effect on the integrity of a site or ecosystem, the following questions are considered:

- Will any site/ecosystem processes be removed or changed?
- What will be the effect on the nature, extent, structure and function of component habitats?
- What will be the effect on the average population size and viability of the component species?

9.3.11 Once an impact is considered to be significant then the scale of impact is assessed on a geographical scale (i.e. international, national, regional, county etc.) as above. For example, the impact may not be significant at a county scale but is significant at a more local scale. For the purposes of this Chapter, likely significant effects on IEFs are those identified as being of significance at a local scale or above.

Mitigation, Compensation or Enhancement

9.3.12 For the purposes of the EcIA, impacts on IEFs are assessed without mitigation in place. Mitigation or compensation is identified for significant impacts on features of nature conservation importance. In line with current CIEEM guidelines, the mitigation proposals for the Development should aim to:

- Avoid negative ecological impacts – especially those that could be significant;
- Reduce negative impacts that cannot be avoided; and
- Compensate for any remaining significant ecological impacts.

9.3.13 Priority is given to avoidance of impacts, where possible, through design and/or regulation of the Development through aspects such as timing, storage of materials etc. Where this is not possible opportunities are sought to reduce the impacts as much as is feasible. If significant impacts cannot be avoided through mitigation, then compensation that is considered appropriate to offset the negative impacts of the Development should be outlined. Where it is known to exist, evidence is supplied for the effectiveness of proposed mitigation or compensation.

9.3.14 Development should be sustainable, and projects should seek to provide a net gain for biodiversity, as promoted through national and local policies. Enhancement should therefore be an objective of all projects, and refers to gains, such as from improved management or habitat creation, which are unrelated to an identified negative impact or, are over and above that required for mitigation or compensation of an identified effect, and will therefore deliver a net biodiversity gain or benefit.

Assumptions and Limitations

9.3.15 Limitations relating to field surveys are generally limited or absent, as described in further detail with Technical Appendix 9.1.

Consultation

9.3.16 A consultation email was sent to Charlotte Watkins, the Biodiversity Officer at Cherwell District Council, on 18 February 2022 and followed up on 08 March and 30 March 2022, but no response was received. However, the application is submitted in outline and there is some flexibility to accommodate comments through the determination of this application and at detailed design stage.

9.3.17 Three public consultation events were held in October 2021, including two in-person events and one online event. Further public consultation events were held in July and December 2022 and January 2023. The intention of the public engagement process was to provide local residents with the opportunity to view and make comments on the development proposals prior to the determination of the planning application.

9.3.18 The preparation of the EIA has included consultation with stakeholders via the EIA scoping process.

9.3.19 Consultee responses have been reviewed and these have been taken into account in the formulation of the planning application, including responses relevant to biodiversity and ecology from: the Oxfordshire County Council, Cherwell District Council, and Natural England.

9.4 Baseline Conditions

Current Baseline

9.4.1 The baseline conditions within the Site, which have informed the subsequent evaluation and ecological assessment, are detailed in full within Technical Appendix 9.1 and are summarised below.

Designated Sites

9.4.2 The Site is not covered by any statutory designations. However, a single European Site, the Oxford Meadows SAC, is present within 10km of the Site, and 12 nationally significant designated sites, many of which form component parts of the Oxford Meadows SAC, within 5km of the Site. No part of the Site is covered by any non-statutory designations, but nine Oxfordshire Local Wildlife Sites (LWS), four proposed Oxfordshire Local Wildlife Sites (pLWS), four Oxford City Wildlife Sites (OCWS), two Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust Reserves (BBOWTR), one Cherwell District Wildlife Site (CDWS), two proposed Cherwell District Wildlife Site (pCDWS) and one Woodland Trust Reserve (WTR) are located within 2km of the Site. A summary of designated sites scoped in as IEFs within the Site's ZoI is provided below in Table 9.4. The locations of designated sites identified as IEFs are visualised on Figures 9.1 and 9.2.

Table 9.4 Important Designated Sites

IEF	Approximate Distance and Direction from the Study Area	Interest Feature(s)	Level of Ecological Importance
Oxford Meadows SAC	1.5km SW	A large area of Lowland Hay Meadow (*Alopecurus pratensis, Sanguisorba officinalis*), managed in a traditional way for several hundred years. Also present is creeping marshwort (*Apium repens*), which is found on only one other site.	International
Port Meadow with Wolvercote Common and Green SSSI	1.5km SW	Unimproved grassland that is a constituent part of Oxford Meadow SAC, with an unbroken 1000+ year history of grazing.	National
Pixey and Yarnton Meads SSSI	1.8km SW	Amongst the best remaining examples of neutral hay meadow in lowland England. Constituent part of Oxford Meadow SAC. Has remained traditional hay meadow for 1000+ years.	National
Hook Meadow and the Trap Grounds SSSI	1.7km SW	Unimproved neutral hay meadows with wet meadows in the south containing diverse sedges.	National
Wolvercote Meadows SSSI	2.0km SW	Unimproved and semi-improved neutral hay meadow and pasture, a constituent part of Oxford Meadow SAC.	National
New Marston Meadows SSSI	2.4km S	Unimproved lowland hay meadow, swamp and species-rich hedgerows.	National
Rushy Meadows SSSI	2.9km NW	A series of unimproved alluvial grasslands along the Oxford Canal.	National
Stratfield Brake CDWS	370m W	Mature and new woodland adjacent to a large wetland project and open ground.	County

IEF	Approximate Distance and Direction from the Study Area	Interest Feature(s)	Level of Ecological Importance
Meadows West of the Oxford Canal LWS	1.2km WNW	Wet meadows bordered by species-rich hedges.	County
Canalside Meadow-Oxford Canal Marsh LWS	1.4km SW	Wet meadow with rare marsh habitat, including sedge dominated fen.	County
Duke's Lock Pond LWS	1.6km SW	Diverse pond with extensive reedbed.	County
Meadow North of Goose Green LWS	1.4km SSW	Small meadow with a mixture of tall wetland habitat and wet grassland.	County
Loop Farm Flood Meadows LWS	1.6km W	Wet, species-rich, cattle grazed pasture with a small area of reedbed and some recovering fen and elements of lowland meadow habitats.	County
Wet Wood and Swamp nr. Yarnton LWS	1.6km W	Wet willow woodland and tall wetland vegetation.	County
Almonds Farm and Burnt Mill Fields LWS	1.7km SE	Flush along ditch and tall fen vegetation in field to west. A number of botanical rarities.	County
Bypass Meadows pLWS	850m SSE	Two fields with rough grassland, tall herb and pond sedges.	County
Meadows east of Cassington to Yarton Pits LWS	1.7km WSW		County
Wolvercote Mill Swamp pLWS	1.9km SW	Small area of wetland habitat between two channels of the River Thames.	County
Line Ditch pLWS	1.8km S	A drainage ditch approximately 1km long. Well vegetated with common reed and greater pond sedge.	County
Linkside Lake OCWS	350m S	Eutrophic standing water with grass snake, and various plant and bird species.	County
Duke's Meadow OCWS and pLWS	1.6km SSW	Two fields with remnants of lowland meadow habitat.	County
Oxford Canal OCWS	1.5km S	Canal supporting a variety of flora and fauna, with well vegetated banks. Forms a corridor from countryside into the city.	County
Victoria Arms Spinney OCWS	2km SSE	Small area of secondary woodland.	County
Stratfield Brake WTR	600m WNW	Mature and new woodland adjacent to a large wetland project and open ground.	County
North Meadow West of Canal pCDWS	1.2km WNW	Small area of unimproved grassland (lowland meadow remnant and floodplain grazing marsh), including some species-rich areas.	County
Oxey Mead BBOWTR	2km WSW	Pixey and Yarnton Meads SSSI.	National
Pixey Mead BBOWTR	2 km WSW	Pixey and Yarnton Meads SSSI.	National

9.4.3 The Oxford Meadows SAC and its constituent SSSIs (Port Meadow with Wolvercote Common and Green SSSI, Pixey and Yarnton Meads SSSI, and Wolvercote Meadows SSSI) are judged to be at risk of indirect adverse impacts, namely increased recreational pressure and the possibility of degradation through air quality impacts, resulting from the Proposed Development and therefore a Shadow Habitats Regulations Assessment of the proposals, in line with The

Conservation of Habitats and Species Regulations 2017, is included as Technical Appendix 9.2 to this ES.

9.4.4 Initial review and impact screening with regard to other designated sites, as described within Technical Appendix 9.1, ruled out adverse impacts on SSSIs other than those listed in Table 9.4 due to lack of hydrological links, distance from main roads leading from the Site, and distance from the Site and lack of public access, making increased recreational impacts unlikely. However, the SSSIs listed above are considered at risk of adverse impacts due to increased recreational pressure and air quality effects.

9.4.5 All non-statutory sites have been scoped in as IEFs due to proximity to the Site and the potential for air quality, hydrological and recreational impacts arising from the Proposed Development.

Habitats and Vegetation

9.4.6 The current distribution of habitats within the Site is illustrated on Figure 9.3 and further details/evaluation of habitats are provided in Technical Appendix 9.1. Those habitats and flora of sufficient value for inclusion as IEFs in the assessment are summarised in Table 9.5.

Table 9.5 Important Habitats and Flora

IEF	Summary	Level of Ecological Importance
Species-poor and species-rich hedgerows and scattered mature broadleaved trees.	Low distinctiveness although forms part of notable habitat corridor throughout the site and with off-site habitats.	Local
Broadleaved Woodland	Narrow strip of woodland of limited value but forms part of a notable north-south corridor along the Oxford Road. Value limited by extent and lack of notable ground flora.	Local
Dense scrub	Small areas of dense scrub along the Oxford Road alongside areas of woodland. Increased value because of connectivity with woodland, despite small extent.	Local

Fauna

9.4.7 A detailed account of the protected and notable species present within and around the Site is provided in Technical Appendix 9.1. Those species or species assemblages of sufficient value for inclusion as IEFs in the assessment are summarised in Table 9.6.

Table 9.6 Important Species/Species Assemblages

IEF	Summary	Level of Ecological Importance
Winter Bird Assemblage	No significant wintering populations on-site, although the hedgerows, trees and arable stubbles offer refuge for small farmland passerines. Barn owl recorded previously recorded in a nest box at St Frideswide's Farm, although not present every year.	Local
Breeding Bird Assemblage	Locally significant populations of farmland birds breed within the Site, including 8-14 pairs of skylark, 1-2 pairs of yellow wagtail and 2-3 pairs of lapwing in some years.	District
Roosting Bats	The Site and its surroundings contain 17 buildings, five of which have potential to support roosting bats. Buildings F1, F2, B3, B5 and F8 were confirmed as minor pipistrelle roosts. A total of 35 trees were also identified as offering potential to support roosting bats: 14 high, 17 moderate and 4 low.	Local
Foraging and Commuting Bats	Foraging and commuting by mostly common and widespread bat species with low numbers of uncommon species including barbastelle.	Local
Badgers	A single, partially active outlier sett is located in the east of the Site.	Site (included as an

IEF	Summary	Level of Ecological Importance
	Latrines and footprints have been recorded across the Site, suggesting it forms part of a badger clan's territory.	IEF due to legal protection)
Reptiles	A small population of grass snakes was recorded along field boundaries north of St Frideswide's Farm.	Site (included as an IEF due to legal protection)
Butterflies	Non-significant breeding population of brown hairstreak butterfly on site.	Local

Future Baseline

9.4.8 In the absence of development it is predicted that the existing agricultural use of the land would continue, as would the management of existing habitats such as hedgerows and trees. The current management is not undertaken with the objective of maintaining or enhancing the ecological and biodiversity value of the Site and does not, for example, include repairing or replanting of trees to replace those which have died. Therefore, in the long-term, it is predicted that the ecological and biodiversity value would gradually decline below existing levels, in the absence of any significant intervention or farming subsidies which would incentivise habitat enhancement and restoration.

9.5 Potential Effects

9.5.1 An assessment of likely significant effects of the Proposed Development on those IEFs identified above has been undertaken based on the application plans. The quantum and layout of the Proposed Development incorporates inherent or embedded ecological mitigation as a result of an iterative assessment and design process. In particular, green corridors have been incorporated into the design along the Site boundaries and through the centre of the Site at key points, in which existing hedgerows can be retained and new habitat created. In particular, the area of multifunctional green space that runs along the eastern boundary (the primary objective of which is landscape mitigation) also provides opportunities for new habitat creation.

9.5.2 The likely effects are assessed with the inherent mitigation included, but in the absence of the additional mitigation measures required to address potentially significant effects. Anticipated effects during the construction and operation/post-completion stage of the Proposed Development are discussed in turn below.

Construction Phase

9.5.3 Generalised effects which could arise as a result of the construction of the Proposed Development in the absence of mitigation include the following:

- Effects of direct habitat loss, damage and degradation due to land take upon habitats and species;
- Effects of dust deposition due to vehicle movements and construction activities on habitats within and adjacent to the Site;
- Impacts of noise, light and human disturbance to species; and
- Pollution of groundwater and surface water flows.

Designated Sites

9.5.4 Due to the intervening distance, no construction impacts are anticipated upon Oxford Meadows SAC.

9.5.5 The closest national statutory designation, Port Meadow with Wolvercote Common and Green

SSSI, lies 1.5km south-west of the Site beyond the built environment of Sunnymead. There is therefore not considered to be a risk of direct or indirect effects on national statutory designations during the construction phase owing to their spatial separation from the Site.

9.5.6 The closest non-statutory designated site is situated 0.35km to the south, which lies outside of the potential ZoIs for all construction effects. Therefore, no construction impacts are anticipated upon any non-statutory designated site.

Habitats and Vegetation

Species-poor and species-rich hedgerows and trees

9.5.7 The vast majority of the linear hedgerow and tree network will be retained and enhanced, with approximately 650m (16.12%) of existing hedgerows lost, including 230m of species-rich and 420m of species-poor hedgerow, to make way for built development. Such permanent effects are considered to be significant at the Local level only due to their limited extent and magnitude.

9.5.8 In addition, during the construction phase retained hedgerows and trees may be subject to indirect degradation impacts, such as soil compaction and encroachment by machinery resulting from adjacent construction works. In the absence of mitigation, the extent and magnitude of such temporary impacts, although uncertain, is evaluated to be moderate because although much of the retained habitats are restricted to the Site boundaries and green infrastructure corridors, some proposed road corridors and pathways pass close to retained hedgerows. Given the limited extent and low probability, such impacts are considered to constitute a Site level negative effect.

Broadleaved Woodland and Dense Scrub

9.5.9 Direct impacts on woodland and scrub include the unavoidable, total loss of a thin strip of woodland (c.0.74ha) and sections of mixed scrub (c.0.16ha) and bramble scrub (0.27ha) along the western boundary to facilitate the residential development and access. The permanent direct loss of woodland and dense scrub is a significant adverse effect at up to a Local level (moderate adverse).

Fauna

Winter Birds

9.5.10 Land take associated with the built development and other groundworks will result in the reduction in habitat available for foraging, shelter and roosting by a range of bird species, albeit the majority of habitats affected are of limited importance.

9.5.11 Barn owl have been recorded adjacent to the Site during the winter, roosting at St Frideswide's Farm. As these buildings are not directly impacted by the Proposed Development and will be buffered from the Proposed Development by a significant corridor of public open space, effects are considered unlikely to be significant. Furthermore, very little suitable foraging habitat is present within the Site, confined to narrow arable field margins along hedgerows. These hedgerows are, for the most part, to be retained and buffered, meaning that the quantum of suitable foraging habitat for this species within the Site will not decrease significantly.

9.5.12 In view of the inherent mitigation measures reflected in the retention of notable habitat features within the design layout, the loss and degradation of potential overwintering and foraging habitats during construction will primarily be restricted to arable fields and 650m of hedgerow habitat. These habitats were not found to support any large flocks of notable overwintering birds. However, the hedgerows may be used for shelter by farmland passerines. It is considered that

many of these species, would potentially continue to inhabit, and even thrive, in a well-designed residential development with appropriate green space. In light of this and given the retention of the majority of the tree and hedgerow stock on-site, the direct permanent loss of arable and hedgerow habitats would only be significant at the Local level.

Breeding birds

9.5.13 The loss and degradation of potential bird nesting and foraging habitats during construction will spread across the majority of the Site, through the loss of arable land, scrub, hedgerow habitat and buildings. However, most habitats are considered to be of limited quality, being managed as part of a commercial farm operation. The hedgerows are used by conservation concern species such as linnet and yellowhammer, and the arable fields provide foraging habitat for a range of species and nesting habitat for skylark (eight to fourteen pairs), yellow wagtail (1-2 pairs) and lapwing (up to three pairs). The permanent loss and degradation of habitats as a result of the Proposed Development is considered to result in a significant effect at the Local level.

9.5.14 St Frideswide's Farm, adjacent to the east of the Site has features capable of supporting nesting/roosting barn owl (including a barn owl nest box). Although these features will not be lost to the Proposed Development there is potential for them to be indirectly impacted as a result of disturbance. However, given that no barn owls have been confirmed nesting within the Site and foraging habitat is limited to narrow margins along the base of hedgerows, the loss of suitable habitat is very minor and effects of habitat loss are considered insignificant.

9.5.15 Removal of breeding habitat at inappropriate times of year could result in the injuring or killing of individual birds, their eggs or young. However, such actions would also be an offence under the Wildlife and Countryside Act 1981 (as amended), compliance with which is assumed as being inherent to the Proposed Development. Therefore, no significant effect is anticipated.

9.5.16 Birds using retained habitats in close proximity to the construction zone are likely to be disturbed temporarily during construction by noise and movement from machinery and personnel. This disturbance could affect breeding success, albeit it is likely only a small proportion of the population would be affected. Such effects would be minor adverse, temporary, reversible, not certain, and significant at a Local level.

Bats

9.5.17 Thirty-five trees/tree groups with bat roost potential were identified within the Site and immediately surrounding area, the majority of which lie within an orchard at St Frideswide's Farm, adjacent to the Site. Two trees, trees T1 and T15, with moderate and high bat roost potential respectively, require removal to facilitate the construction of the Proposed Development. The loss of these trees is not considered to be significant in EIA terms, although further consideration is required with respect to update surveys and mitigation to ensure there is no risk of legislative breaches when they are removed.

9.5.18 A number of the remaining trees within the Site with bat roost potential are sufficiently close to the development footprint to be at risk of disturbance from construction noise and lighting. Given that this effect applies to potential, rather than actual, bat roosting and affects a small number of trees, it is judged to be minor adverse, temporary, reversible, uncertain and significant at a Site level.

9.5.19 There are seventeen buildings within and immediately surrounding the Site. Of these, five are located within the Site, comprising a collection of agricultural buildings in the west of the Site at

Pipals Barns. Four of these buildings were deemed to have low bat root potential and one moderate potential. Two of these buildings have been confirmed as minor pipistrelle roosts. In addition, three of the off-site buildings at St Frideswide's Farm have also been confirmed as minor pipistrelle roost. The five buildings within the Site are due to be lost to facilitate the Proposed Development.

9.5.20 While the loss of such potential roosting resource is not considered to be significant in EIA terms, further consideration is required with respect to update surveys and mitigation to ensure there is no risk of legislative breaches when they are removed.

9.5.1 Removal of a confirmed bat roost could result in the injuring or killing of individual bats and such actions would also be an offence under the Conservation of Habitats and Species Regulations 2017 (as amended), compliance with which is assumed as being inherent to the Proposed Development. Therefore, no significant effect is anticipated.

9.5.2 With respect to effects on bat foraging and commuting habitats, the highest quality bat habitats within the Site are the hedgerows and trees. Given the relatively low numbers of largely common and widespread species using the Site and the limited hedgerow loss, the area of direct habitat loss represents a small proportion of the total resource and is therefore judged to be insignificant.

9.5.3 Potential disturbance of retained bat foraging habitats by artificial lighting during construction has been ruled out on the basis that standard hours of operation will be imposed, thereby avoiding works after dark during the main bat activity season.

Badger

9.5.4 Badgers have been considered as an IEF primarily due to their legal protection rather than their ecological value or conservation status. A single partially active outlier sett has been recorded within the site and evidence of commuting and foraging badgers has been noted across the Site.

9.5.5 New access infrastructure breaching hedgerows forming part of badgers' potential foraging and commuting corridors may have some detrimental effect upon the badger's ability to move and forage across the local landscape. Additionally, the loss of scrub and woodland will result in the loss of potential sett building habitat. However, there will be no development within 40m of the existing, partially active sett. In the absence of mitigation, the low magnitude, negative effect of this habitat severance on badger is not considered to be significant in EIA terms and would not pose a contravention of the legal protection afforded to badgers.

9.5.6 Indirect disturbance (e.g. light spill, visual and noise) may also result from adjacent Site works during construction. However, such potential temporary negative effects on badger foraging are considered to be negligible and therefore not significant in EIA terms.

Reptiles

9.5.7 Low quantities of foraging and dispersal habitat in the form of small sections of scrub, hedgerow and grass margins will be lost as part of the Proposed Development totalling approximately 650m, resulting in permanent fragmentation of habitat. Given the small size of the grass snake population and the amount of habitat retained and created in the east of the Site, these effects are considered to be significant at less than Local level only and therefore not significant in EIA terms.

9.5.8 Impacts related to the direct injury or killing are possible in the absence of mitigation. Furthermore, indirect disturbance (e.g. visual and noise) may also result from adjacent Site

works during construction. Such potential temporary negative effects on reptiles are considered to be significant at the Local level.

Butterflies

9.5.9 Only a minority of the hedgerows within the Site were found to support, or have potential to support, brown hairstreak butterflies. These were principally associated with hedgerows within the centre of the Site, which are being partially retained within the Proposed Development. There is a lack of egg-laying habitat in the wider site resulting from low percentage of blackthorn within the majority of hedgerows. One further hedgerow and a section of dense scrub which support brown hairstreak breeding habitat are to be lost to facilitate the Proposed Development. In total, approximately 501m of suitable egg-laying habitat will be lost of a total of approximately 1,034m. The quantum of direct habitat loss therefore represents a significant proportion (48.5%) of the total resource within the Site, although many of those hedgerows are sub-optimal habitat for the species. The loss of suitable hedgerows is therefore judged to be significant at the Local level.

Operational Phase

9.5.10 Potential effects identified which could arise as a result of the operation of the Proposed Development in the absence of mitigation include the following:

- Recreational pressures;
- Air quality impacts, including increased deposition of nitrogen oxide (NOx) and particulate matter arising from increased traffic, as further identified and assessed in Chapter 6 of this ES;
- Impacts of light and noise/visual/human disturbance to habitats and species;
- Increased risk of collision to species arising from increased traffic movements;
- Urban edge effects, including increased pet predation of protected species and fly-tipping;
- Increased nutrient load in sensitive waterbodies; and
- Pollution of groundwater and surface water flows.

Designated Sites

Statutory Designated Sites

9.5.11 An Appropriate Assessment (AA) detailing the assessment on Oxford Meadows SAC is included as part of the Habitats Regulations Assessment (HRA): Technical Appendix 9.2.

9.5.12 The Proposed Development will result in the development of approximately 800 dwellings, with associated residents (approximately 1,920 people based on a 2.4 residents per household multiplier), the Proposed Development also includes a significant quantum of green space (including attenuation features, sports pitches, semi-natural green space and allotments) that will provide new and enhanced recreational opportunities for new and existing local residents. This includes retaining existing Public Rights of Way (PRoW) and providing new pedestrian links and paths.

9.5.13 Due to the distance between Oxford Meadows SAC and the Site, as well as the embedded mitigation of the significant green space provision that is proposed it is not considered that this Proposed Development alone will have significant recreational impacts on Oxford Meadows SAC.

9.5.14 In addition, the HRA (August 2018) of Cherwell District Council's Partial Review of the Cherwell Local Plan 2011-2031 (Part 1): Oxford's Unmet Housing Needs screened in potential recreation

impacts upon Oxford Meadows SAC resulting from Policy PR6a. The potential for likely significant effects was therefore subject to AA.

9.5.15 In terms of recreational impacts, the AA stated that the parking provision at Oxford Meadows SAC is limited and that access is limited by the presence of a number of major roads which may act as a deterrent for visitors including dog walkers to the SAC. It was also noted that the majority of visitors to Oxford Meadows SAC are from Oxford itself, with people willing to walk up to 1.9 km to the SAC. Whilst the Site is within 1.9km of the SAC, the generous green space provision and Cutteslowe Park extension, combined with the difficulty of access to the SAC are considered likely to encourage a significant number of potential visitors to avoid the SAC for everyday exercise and instead use those resources closer to their point of origin.

9.5.16 The AA also mentioned the potential for recreational impacts is further reduced by Policies ESD17: Green Infrastructure, BSC10: Open Space, Outdoor Sport and Recreation Provision and BSC11: Local Standards of Provision of The Cherwell Local Plan 2011 – 2031 (adopted July 2015). As such the AA concluded that:

"*No adverse effect on the integrity of the Oxford Meadows SAC will result from the Partial Review of the Cherwell Local Plan 2011-2031 (Part 1): Oxford's Unmet Housing Needs alone through recreational pressure.*"

9.5.17 In light of the AA findings, the spatial separation of the SAC from the Proposed Development, quantum of greenspace provided within the Proposed Development, no significant recreational effects upon the integrity of the SAC are considered likely to arise as a result of the development proposals. This is discussed in further detail within Technical Appendix 9.2: Shadow Habitats Regulations Assessment (SHRA).

9.5.18 With regards to air quality, the assessment undertaken for the Partial Review of the Cherwell Local Plan 2011-2031 (Part 1): Oxford's Unmet Housing Needs Proposed Submission Plan June 2017 (which included Policy PR6a) concluded that there would be no likely significant effects on the Oxford Meadows SAC.

9.5.19 Chapter 6 of the ES (Air Quality) includes an assessment of potential air quality impacts from increased vehicle emissions. The results of this analysis are that the impact of the Proposed Development, assuming no improvement in vehicle emissions or background concentration, will be below critical load thresholds for NOx, ammonia (NH3) and acid. Therefore, the predicted effects of the Proposed Development on air quality at Oxford Meadows SAC and associated SSSIs were concluded to be negligible.

9.5.20 The site is hydrologically connected to the Thames River via a ditch approximately 130m beyond the eastern boundary, which drains into the Cherwell River, eventually joining the Thames at the confluence approximately 4km downstream of the Oxford Meadows SAC. In relation to water quality and volume, the Local Plan HRA concludes that Policy ESD 8: Water Resources and ESD 9: Protection of Oxford Meadows SAC of the adopted Local Plan will ensure that no adverse effects will arise. Furthermore, the drainage proposals have been designed to attenuate and manage water run-off from the Site in line with good practice guidance and planning policy. As a result, no likely significant adverse effects from changes in water quantity or quality upon Oxford Meadows SAC are anticipated. This is discussed in further detail within Technical Appendix 9.2: Shadow Habitats Regulations Assessment (SHRA).

9.5.21 Three of the six nationally designated sites listed in Table 9.4 form constituent parts of Oxford Meadows SAC. Effects on these IEFs are therefore described above. In the absence of mitigation the other three nationally designated sites, Hook Meadows and the Trap Grounds

SSSIs, New Marston Meadows SSSI and Rushy Meadows SSSI are at risk of indirect adverse hydrological impacts as they are associated with the Thames and Cherwell catchments, However, it is considered that the policies with the Local Plan designed to protect Oxford Meadows SAC and the mitigation outlined for the Proposed Development will, by proxy, protect these nationally designated sites from significant adverse hydrological impacts resulting from the Proposed Development.

Non-statutory Designated Sites

9.5.22 All non-statutory sites within 2km of the Site are more than 300m from the Site boundary. As such, urban edge, noise and light disturbance effects are ruled out. However, 2km is considered within the range for possible effects from recreational disturbance, hydrological impacts and air quality effects (due to traffic increases).

9.5.23 Of the sites within 2km, Linkside Lake OCWS, Line Ditch OCWS, Duke's Meadow OCWS and Peartree Hill Verges pCDWS do not have public access through, or past, their boundaries. Recreational disturbance effects are therefore ruled out for these sites. All other non-statutory designated sites within 2km have Public Rights of Way (PRoWs) running either through, or along, the boundary of the Site. Recreational disturbance effects are therefore possible, although it's likely that no one site will draw a significant proportion of residents arising as a result of the Proposed Development for recreational use, meaning that recreational pressure will be spread across possible destinations. Such effects are therefore considered to be significant at the Local-level, given the separation of these sites from the Proposed Development (by major roads), the low likelihood of regular disturbance and the relatively small extent of habitat alongside PRoWs.

9.5.24 Chapter 6 of the ES (Air Quality) includes an assessment of potential air quality impacts from increased vehicle emissions. The results of this analysis are that the impact of the Proposed Development, assuming no improvement in vehicle emissions or background concentration, will be below critical load thresholds for NOx, ammonia (NH3) and acid. Therefore, the predicted effects of the Proposed Development on air quality at sensitive non-statutory sites were concluded to be negligible.

9.5.25 Wetland habitats within non-statutory designated sites are judged to be at risk of hydrological impacts, via adverse changes in water quality and/or flow within the Site during operation of the Proposed Development.

9.5.26 Operation of the Proposed Development will result in currently undeveloped, permeable land being developed with the construction of buildings, highways and other hard surfaces. Accordingly, this could increase the rate and volume of surface water run-off entering the seasonally wet ditch and connected habitats downstream. However, a surface water drainage system is to be installed as part of the Proposed Development, which is treated as 'embedded mitigation'. This will intercept, manage and release rainfall run-off from the Site at a controlled rate, to ensure post-development peak run-off rates are not increased compared to the baseline situation and hence that additional flows are not discharged to the downstream catchments. In addition, the proposed surface water drainage system, will include the use of SuDS features, catch pits, and trapped gullies, prior to water being discharged to the downstream catchment. Such measures will remove hydrocarbon pollutants and suspended solids (via settlement), and thereby ensure a high-quality discharge from the Site to the downstream catchment. On this basis the effect would be negligible.

Habitats and Vegetation

9.5.27 Negative effects on retained habitats during operation of the Proposed Development (beyond the habitat losses experienced during construction) are predicted to be limited. However, there is potential for some deterioration of features to occur as a result of poor management/neglect. Such effects are not predicted to be significant in EIA terms, however, this has been addressed as part of the mitigation strategy outlined in Technical Appendix 9.3: Biodiversity Improvement and Management Plan (BIMP) to meet planning policy requirements in respect of biodiversity net gain and to maintain locally important species populations.

Fauna

Wintering and breeding bird assemblage

9.5.28 Retained habitats supporting wintering and breeding birds (in particular hedgerows and trees) are potentially at risk of disturbance and damage post-development. Owing to the large extent of available habitat, these effects are judged to be minor adverse, permanent, irreversible, not certain, and significant at a Local level.

9.5.29 An increase in domestic cats and dogs within the Site would increase the risk of predation and disturbance of birds. These effects are judged to be minor adverse, permanent, reversible and significant at a Local level.

9.5.30 Potential post-development effects on barn owl are increased collision risk, light spill and disturbance upon habitats used for foraging and nesting. Owing to the large extent of available habitat included within POS, most of which is sufficiently separated from the proposed development areas, these effects are judged to be minor adverse, permanent, irreversible (collision risk)/reversible (disturbance effects), not certain, and significant at a Local level.

Bat assemblage

9.5.31 Potential effects on the bat population at the operational phase are increased collision risk, light spill and disturbance upon habitats used for foraging, commuting and roosting. Owing to the large extent of available habitat, most of which is sufficiently separated from the proposed development areas, these effects are judged to be minor adverse, permanent, reversible/irreversible (as above), not certain, and significant at a Local level.

Badger

9.5.32 Potential post-development effects on badger are increased collision risk, light spill and disturbance of setts or foraging habitats, and an increase in domestic dogs in the vicinity could increase the risk of disturbance of badgers. In addition, badgers could be deterred from using, or accessing, their breeding or foraging habitats by light spill from the Proposed Development. This is only likely to affect badgers using habitats in close proximity to the development and associated highways infrastructure. These minor adverse effects are judged to be insignificant in EIA terms owing to the small presence of this species on the Site and the extent of available habitat.

Reptiles

9.5.33 Habitats supporting reptiles are potentially at risk of disturbance and damage post-development, and an increase in domestic cats and dogs in the vicinity could increase the risk of predation and disturbance of reptiles. Such effects are judged to be minor adverse, permanent, irreversible, not certain, and significant at a Local level.

Butterflies

9.5.34 New and retained habitats of importance to brown-hairstreak butterflies are at risk of the effects of degradation due to inappropriate management, accidental damage and fly-tipping post-development. Such effects are judged to be minor adverse, permanent, reversible, not certain, and significant at a Local level.

9.6 Mitigation

Introduction

9.6.1 Wherever possible, negative effects have been avoided or reduced through inherent mitigation. However, not all potential negative effects can be avoided or reduced in severity through inherent mitigation alone. This section identifies any additional mitigation measures required to avoid, reduce, or offset the potential for such significant negative impacts. The key mechanisms described include measures to:

- Conform with relevant and pertinent legislative requirements, particularly those associated with legally protected species; and
- Deliver and, where possible, maximise opportunities for biodiversity enhancement and gain through the Proposed Development.

9.6.2 The key mitigation delivery mechanisms to be implemented are summarised below.

Detailed Design Measures

9.6.3 Aspects of the detailed design which are especially relevant are as follows:

- Street lighting – to be designed to avoid impacts on nocturnal wildlife where in close proximity to retained habitats;
- Surface water drainage system – to be designed to maintain/improve water quality and maintain existing run-off rates, and provide additional wetland habitat; and
- Soft landscape scheme (see below) – to be designed to include new habitats of ecological value within the POS.

Construction Environmental Management Plan

9.6.4 A Construction Environmental Management Plan (CEMP) will be prepared and will be implemented during the entirety of the construction stage to ensure appropriate management and operational systems are in place to avoid or minimise adverse pollution effects. Further details on the measures to be included in the CEMP are provided within Chapters 6, 7 and 8 of the ES (covering Air Quality, Noise and Drainage and Flood Risk respectively).

9.6.5 The CEMP can be secured by way of a suitably worded pre-commencement planning condition attached to the planning permission.

Ecological Construction Method Statement

9.6.6 An Ecological Construction Method Statement (ECMS) for each phase of the development will set out in detail the measures to be implemented to protect IEFs during the construction phase of the Proposed Development, based on the principles set out in the BIMP (Technical Appendix 9.3). It is proposed that the implementation of the ECMS will be overseen by an appointed Ecological Clerk of Works (ECoW), whose scope and remit will be set out within the ECMS. This document will cross reference with the CEMP, where relevant, and a detailed Arboricultural Method Statement (AMS) which will set out measures to protect trees and hedgerows during the construction phase.

9.6.7 Each ECMS (and AMS) and appointment of the ECoW can be secured by way of a suitably worded pre-commencement planning condition attached to the planning permission.

Soft Landscape Scheme and Landscape and Ecological Management Plan

9.6.8 The Proposed Development incorporates areas informal/natural green space (new POS areas designed for biodiversity) and formal/amenity green space (new POS areas designed for amenity use and with limited biodiversity potential). A detailed Soft Landscape Scheme (SLS) will be prepared for these areas.

9.6.9 A Landscape and Ecological Management Plan (LEMP) will be prepared for each phase of development based on the principles set out in the BIMP. This will set out in detail the measures to be implemented to ensure the successful establishment/installation of new habitats/features and the long-term maintenance and management of both existing and new habitats/features proposed as part of the soft landscape scheme.

9.6.10 Each LEMP can be secured by way of a suitably worded pre-commencement planning condition attached to the planning permission.

Construction Phase

9.6.11 All necessary surveys are considered to be sufficiently up to date at the time of submission to determine the application. However, where relevant and depending on development timescales and phasing, certain detailed species surveys may require updating prior to commencement of the relevant phase of development. The findings will be used to inform the measures set out below.

Designated Sites

9.6.12 Due to the intervening distance between the Site and the closest designations, no potential adverse effects on designated sites are anticipated during construction.

Habitats and Vegetation

9.6.13 Potential adverse effects on retained habitats relating to damage, deterioration or disturbance, will be avoided or reduced to insignificant levels by the following:

- CEMP – including pollution prevention and control of hours of operation; and
- ECMS and AMS – including establishment of Ecological Protection Zones (EPZs) around retained habitats, clearly delineated by protective fencing (or other barriers) and signage, where construction activities (including incursion by vehicles or personnel, fires and stockpiling of materials) are excluded.

9.6.14 The measures above will address construction effects on retained habitats, however, habitat losses within the development footprint will be addressed through new habitat creation and enhancement of existing habitats during and after construction.

9.6.15 New habitats to be delivered as part of the SLS include the following:

- New native woodland planting (with associated native ground flora planting) – c.1.89ha;
- Tree and scrub planting (with scrub managed on a 3-year rotation) – c.0.98ha;
- New species-rich native hedgerow planting – c.1.06km;
- Sowing of new species-rich wildflower grassland – c.6ha;
- Sowing of new tussocky grassland – c.4.5ha;
- Sowing of wildflower lawns within amenity open space - c.2.93ha;
- SuDS designed with open water of varying depths; and

- Native emergent species planting in marginal zones of open water SuDS features.

9.6.16 The establishment and long-term management of these habitats, as secured through the LEMP, will offset the losses to development and result in a considerable net gain in habitat biodiversity value. Details of the biodiversity metric can be seen within the BIMP (Technical Appendix 9.3). Furthermore, the proposed new planting will enhance the connectivity between existing habitats, thereby strengthening the integrity of the local ecological network.

9.6.17 Subject to detailed design of greenspace, and provided design of those spaces follows the principles set out within the BIMP, the Site is capable of achieving a net gain to biodiversity well in excess of policy requirements. Calculations using the Defra Metric (version 3.1) have indicated a net gain to biodiversity of 46.31 area units (50.62%) and 18.80 linear units (64.07%).

Fauna

9.6.18 Protection of species during construction will be ensured through the provisions of the ECMS. As a general measure aimed at protecting species, “toolbox talks” will be provided by a suitably qualified ecologist to the principal contractor appointed by the Developer, for distribution to all employees involved in any enabling works/vegetation clearance, to ensure that identification and protection of the relevant species, and their habitats is understood.

9.6.19 The habitat enhancement and creation measures described above (delivered via the LEMP and SLS) will offset any impacts of habitat loss and fragmentation on the important species and species groups present within the Site. Details of mitigation measures set out below can be found within the BIMP (Technical Appendix 9.3).

9.6.20 In addition to the habitat protection and creation measures described above, which will deliver much of the necessary species protection, further measures to be included in the ECMS and LEMP for each relevant species-group are summarised below.

Birds

Construction Measures

9.6.21 Retained nesting and foraging habitats, including retained trees and hedgerows, will be included within EPZs.

9.6.22 Removal of potential nesting habitat will be undertaken outside the bird breeding season (namely March-August) unless a detailed survey by a suitably experienced ecologist has confirmed that no active nests are present in the affected area immediately prior to works commencing.

9.6.23 A pre-commencement check of any buildings and mature trees for nesting barn owls will be carried out prior to demolition/felling and appropriate mitigation (timing of works and provision of nest box) will be applied if any barn owl nests are found.

Habitat Creation Measures

9.6.24 Landscape planting to include a range of fruit and seed-bearing plants to enhance foraging resource for birds.

9.6.25 Bird nesting features (bird boxes and swallow cups) to be installed on retained trees and new buildings in the development.

9.6.26 Grassland cutting along eastern boundary as required to encourage tussock growth in order to encourage foraging by barn owls (by supporting small mammal population).

Bats

Construction Measures

9.6.27 Retained trees with bat roost potential will be included within EPZs.

9.6.28 Construction activities will be restricted to daylight hours as far as possible to mitigate effects of increased visual and noise disturbance, with the use of temporary, artificial lighting avoided during the hours between dusk and dawn, with directional and low-level lighting used away from sensitive habitat corridors to mitigate effects relating to increased use of artificial lighting.

9.6.29 Update survey of trees with confirmed bat roosting or bat roost potential prior to felling or pruning of trees will be undertaken if required and, if bat roosts are confirmed present, works will cease until an appropriate strategy is devised and agreed.

9.6.30 Works to buildings or trees containing bat roost(s) will require a Natural England (NE) EPS licence to derogate from the legal protection afforded to bats. In order to obtain a licence it must be demonstrated that there will be no detriment to the maintenance of the favourable conservation status of the local bat population.

9.6.31 Demolition of buildings will be supervised by a suitably qualified ECoW.

Habitat Creation Measures

9.6.32 Provision of roosting habitat to mitigate losses of confirmed roosts and provide additional opportunities. Bat roosting features can include bat boxes, tiles and access slates, to be installed on retained trees and/or incorporated into selected new buildings in the development.

9.6.33 Landscape planting to include nectar and fruit producing species, particularly those flowering at night (such as honeysuckle) to provide resources for nocturnal prey insects.

Badger

Construction Measures

9.6.34 Update check of development footprint and 30m buffer for badger setts prior to works commencing;

9.6.35 In the unlikely event that setts are recorded, aim to avoid impacts by micro-siting of development or, if impacts cannot be avoided, exclusion of animals from the affected area (under NE licence and potentially requiring provision of alternative setts) prior to works; and

9.6.36 Use of ramps or sloping sides in open excavations to allow for wildlife to escape.

Habitat Creation Measures

9.6.37 Landscape planting to include a range of fruit bearing shrubs and trees to enhance foraging resource for badgers. Grassland seeding will provide new opportunities for invertebrate prey.

9.6.38 Woodland and scrub planting will provide additional sett building opportunities in the east of the Site.

Reptiles

Construction Measures

9.6.39 Precautionary staged vegetation removal along grass margins, particularly around the eastern Site boundary, under supervision of ECoW.

Habitat Creation Measures

9.6.40 Enhancement of retained habitats including wildflower and tussocky grassland seeding and construction of log/brash piles within the open space.

Butterflies

Construction Measures

9.6.41 Retained hedgerows should be subject to an ongoing, wildlife sensitive maintenance schedule, as set out in Technical Appendix 9.3: Biodiversity Improvement and Management Plan (BIMP), during construction to minimise brown hairstreak egg mortality rates in these habitats.

Habitat Creation Measures

9.6.42 Inclusion of a high proportion of blackthorn within landscape planting scheme to provide additional breeding habitat for brown hairstreak.

Operational Phase

Designated Sites

9.6.43 Potential adverse effects on designated sites during operation of the Proposed Development via air quality and recreational impacts will be avoided or reduced to insignificant levels by implementation of a sustainable transport strategy and provision of significant areas of public open space within the Site.

Habitats and Vegetation

9.6.44 Potential adverse effects on retained habitats as a result of poor management/neglect will be avoided by implementation of the LEMP as described above. Furthermore, the LEMP will include measures to restore and enhance the ecological value of existing hedgerow habitats through a combination of initial interventions (e.g. gap planting) and sensitive long-term management (e.g. rotational cutting/flailing, laying and replacement of failed stock).

9.6.45 Other degradation effects, such as accidental damage by members of the public and fly-tipping will be mitigated through provision of information boards throughout public open space and a detailed waste strategy.

Fauna

9.6.46 Long-term viability of fauna populations will be ensured through the implementation of the LEMP, as described above in relation to habitats.

9.6.47 Potential adverse effects on fauna species due to ongoing disturbance and habitat degradation effects will be largely mitigated through the measures set out above in relation to habitats. Disturbance effects will additionally mitigated through the provision of information boards throughout semi-natural habitats in Public Open Space.

9.6.48 The loss of breeding habitat for ground-nesting birds could be mitigated, if required, due to neighbouring habitat already available, through the provision of an appropriate level of off-site habitat enhancements, such as the creation of skylark plots. The details of the ground-nesting bird mitigation strategy, if required, will be agreed through discussion with the LPA.

9.6.49 A sensitive lighting strategy will be implemented, with design of streetlighting to avoid impacts on bats, badgers and other nocturnal species where in close proximity to retained habitats.

9.7 Residual Effects

Construction Phase

9.7.1 Subject to the mitigation measures outlined above, residual effects anticipated upon IEFs during the construction phase have been reduced to levels that are not considered to be significant.

Operational Phase

9.7.2 In light of the mitigation proposed, all potential effects upon those IEFs identified within the assessment are not considered to be significant. Furthermore, habitat creation, restoration and long-term management to be delivered via the LEMP will result in beneficial (Local level) effects on the local ecological resource.

9.8 Implications of Climate Change

9.8.1 Changes to future climate including higher winter and summer temperatures and a decrease in summer rainfall could negatively affect habitats and species on site, and/or result in a shift in the geographical range of plants and animals (generally northward or towards higher altitudes).

9.8.2 The proposed protection and enhancement of existing habitats, and creation of new habitats composed of native climate tolerant species, will increase the resilience of the Site's ecological features to the future effects of climate change. In addition, the increased habitat connectivity that would be achieved by the landscaping proposals would facilitate the long-term migration/shift in geographical range by plants and animals in response to the changing climate.

9.9 Cumulative Effects

9.9.1 The schemes to be considered in the cumulative assessment include the Proposed Development along with other committed developments (i.e. those that have not been commenced but have a valid planning permission and those schemes which are in the planning process). The assessment of cumulative effects repeats the assessment process set out above, but considers the potential change caused by all schemes identified for cumulative assessment.

9.9.2 The schemes listed below have been included within the assessment of cumulative effects due to proximity to the Proposed Development.

- Land West of Oxford Road – urban extension to Oxford adjacent to the Site, 670 homes
- Land at Frieze Farm – land reserved for the construction of a golf course
- Land South East of Kidlington – allocated extension to Kidlington, 230 homes
- Land at Stratfield Farm – allocated extension to Kidlington, 100 homes
- Land East of the A44 – new urban neighbourhood of 1,950 homes
- Land West of Yarnton – allocated extension to Yarnton, 530 homes
- Kidlington 1A – employment
- Kidlington 1B – employment
- St Frideswide Farm –134 homes
- Oxford University Press Sports Ground – Oxford City allocation for 130 homes
- Pear Tree Farm – Oxford City allocation for 122 homes
- Northern Gateway – employment led mixed-use development including 180 bedroom hotel and 480 residential units.

9.9.3 In total, the allocated and approved development listed above will result in the construction of 4,616 new homes.

9.9.4 The potential cumulative impacts of these committed developments and the Proposed Development are assessed in terms of potential air quality at Oxford Meadow SAC or Cothill Fen SAC, and recreation impacts at Oxford Meadow SAC (Appendix 9.2).

Potential air quality effects at Oxford Meadow SAC and other designated sites

9.9.5 The Local Plan HRA considers developments within the district and adjacent planning districts, concluding that no significant effects are likely to occur upon European sites from the proposals within the Local Plan when the appropriate mitigation is implemented for each project. Any impacts through degradation of air quality are not considered to have a likely significant effect, either alone or in-combination, on the Oxford Meadow SAC.

Recreation effects at Oxford Meadows SAC and other designated sites

9.9.6 In summary, the provision of semi-natural and formal green space across nearly half of the Site and access to nearby paths and recreation area is considered likely to accommodate the vast majority of daily pedestrian recreation activity arising from Water Eaton.

9.9.7 Development in Cherwell District on the northern edge of Oxford is separated from the SAC by the A40, and from the western units of the SAC also by the A34. This, combined with the lack of car parking around most of the SAC is considered to be a deterrent to pedestrians accessing the SAC. Port Meadow within Wolvercote, offers the most accessible opportunity for recreational activity. Oxford City Council has set out guidance for members of the public to adhere to whilst visiting this section of the SAC.

9.9.8 Provided the design of the above sites includes sufficient on-site opportunities for recreation, any potential impacts through an increase in recreation visits to Oxford Meadow SAC are not considered to have a significant effect in-combination with the sites above.

Potential effects on habitats

9.9.9 Habitats outside of the Site have not been assessed and their baseline value is not known. It is assumed that the detailed design of each development listed above will follow the mitigation hierarchy (avoid-minimise-restore-offset) and will result in a net gain to biodiversity in line with national and local policy. As all residual effects on habitats are considered to be negligible/beneficial, the Proposed Development is considered to contribute a net positive effect to the balance of any cumulative effects.

Potential effects on species

9.9.10 Populations of species outside of the Site have not been assessed and their baseline is not known. It is assumed that the design of the projects outlined above and relevant mitigation will take protected species into account. As all residual effects on species are considered to be negligible/beneficial, the Proposed Development is considered to contribute a net positive effect to the balance of any cumulative effects.

Nearby proposed sites

9.9.11 The adjacent future developments at St Frideswide Farm and PR6b (Land West of Oxford Road) are, combined, likely to result in effects roughly equivalent to the Proposed Development. These sites have been included in the cumulative assessment above. Given the conclusions of the AQ assessment and the above assessment of recreational impacts on designated sites, the provision of public open space within the Site and adjacent sites, no significant effects are anticipated in combination.

9.10 Summary

9.10.1 This chapter assesses the impacts and consequential ecological effects that may occur to Important Ecological Features from the Proposed Development. Important Ecological Features includes designations, habitats, protected and Priority Species of plants and animals (terrestrial and aquatic).

9.10.2 The assessment includes a summary of the current baseline and predicted future ecological conditions and identifies measures to avoid, mitigate and/or compensate, where appropriate, for significant effects that may arise as part of the Proposed Development.

9.10.3 The assessment has been informed by baseline investigations (desk studies and a series of detailed ecological surveys) by EDP. The assessment has been undertaken using professional judgement and experience, and in accordance with industry standard guidance.

9.10.4 The majority of the Site comprises arable fields that are of negligible – site level intrinsic ecological importance. However, the Site also includes species-poor and species-rich hedgerows, scrub, broadleaved woodland and trees that are of Local ecological importance.

9.10.5 The Important Ecological Features taken forward for detailed assessment are set out below:

- Oxford Meadows SAC (International level);
- SSSIs within 2km (National level);
- Non-statutory designated nature sites within 2km (County level);
- Hedgerow network (Local level);
- Broadleaved woodland (Local level);
- Dense scrub (Local level);
- Winter bird assemblage (Local level);
- Breeding bird assemblage (District level);
- Roosting, foraging and commuting bats (Local level);
- Badgers (Site-level);
- Reptiles (Site-level); and
- Butterflies (Local level).

9.10.6 A range of industry standard measures describing key working methods and timings to avoid/minimise ecological effects during construction will be delivered through an Ecological Construction Method Statement (ECMS) following the principles set out within the BIMP, and protected species licenses where required, overseen by an ECoW. These licenses would be obtained in advance of construction, and mitigation measures would be further refined and agreed during the licensing process.

9.10.7 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, and to deliver biodiversity gains in accordance with local and national planning policy. To achieve this, the Proposed Development incorporates 22.73ha of greenspace, approximately 49.86% of the total Site area, which will be managed for amenity use and biodiversity. The establishment, maintenance and long-term management of the retained and created habitats will be delivered via a LEMP following the principles set out within the BIMP.

9.10.8 Overall, it is predicted that a significant net biodiversity gain can be delivered onsite by the development proposals, thereby meeting both local and national policy requirements regarding biodiversity.

9.10.9 In summary, with appropriate mitigation and design built into the Proposed Development, **no significant**, adverse construction nor operational effects are predicted to the Important Ecological Features assessed. Furthermore, the Proposed Development can potentially deliver a long-term **beneficia**l effect at a **Local level** with respect to hedgerow, grassland and woodland habitats.

9.10.10 A summary of the assessment is set out in Table 9.7 overleaf.

Table 9.7 Summary of effects

Feature(s)	Potential effect	Nature of effect	Significance (pre-mitigation)	Mitigation measure	Significance of residual effect
Construction Phase					
Designated Sites					
All designated sites	N/A				
Habitats and Vegetation					
Broad-leaved Semi-natural woodland	Direct loss (100%)	Moderate adverse, permanent, irreversible, certain.	Significant (Local level)	SLS (new habitat creation/planting)	Moderate beneficial (Local-level)
Species-rich hedgerows and trees	Direct loss (0.26km)	Minor adverse, permanent, irreversible, certain.	Significant (Local level)	LEMP (enhancement of retained habitat); and SLS (new habitat creation/planting)	Moderate beneficial (Local-level)
	Damage or deterioration	Non-significant adverse		CEMP, ECMS and AMS (protection of retained habitats); LEMP (enhancement of retained habitat); and SLS (new habitat creation)	Negligible
Species-poor hedgerows	Direct loss (0.41km)	Moderate adverse, permanent, irreversible, certain.	Significant (Local level)	LEMP (enhancement of retained habitat); and SLS (new habitat creation/planting)	Moderate beneficial (Local-level)
	Damage or deterioration	Non-significant adverse		CEMP, ECMS and AMS (protection of retained habitats); LEMP (enhancement of retained habitat); and SLS (new habitat creation)	Negligible
Dense scrub	Direct loss (100%)	Moderate adverse, permanent, irreversible, certain.	Significant (Local level)	SLS (new habitat creation)	Moderate beneficial (Local-level)
Fauna					
Wintering birds	Loss of foraging and roosting habitat	Moderate adverse, permanent, partially reversible, certain	Significant (Local level)	LEMP (enhancement of retained habitat); and SLS (new habitat creation/planting)	Moderate beneficial (Local-level)
	Disturbance	Minor adverse, temporary, reversible, not certain.	Significant (Local level)	CEMP and ECMS (protection of retained habitats)	Negligible
Breeding Birds	Loss of nesting and foraging habitat	Moderate adverse, permanent, partially reversible, certain	Significant (Local level)	LEMP (enhancement of retained and off-site habitat); and SLS (new habitat creation/planting)	Moderate beneficial (Local-level)
	Direct killing and injuring of nesting birds, young and eggs	Non-significant adverse (based on inherent mitigation – legal compliance)		ECMS (sensitive timing and method of vegetation clearance)	Negligible
	Disturbance	Minor adverse, temporary, reversible, not certain.	Significant (Local level)	CEMP and ECMS (protection of retained habitats)	Negligible

Feature(s)	Potential effect	Nature of effect	Significance (pre-mitigation)	Mitigation measure	Significance of residual effect
Roosting Bats	Loss of actual and potential roosting habitat in trees	Non-significant adverse		LEMP (bat boxes)	Moderate beneficial (Local-level)
	Loss of actual and potential roosting habitat in buildings	Non-significant adverse		LEMP (bat boxes)	Minor beneficial (Local-level)
	Direct killing and injuring of roosting bats	Non-significant adverse (based on inherent mitigation – legal compliance)		ECMS and EPS Licence (sensitive timing and method of tree removal, provision of replacement roost habitat)	Negligible
	Disturbance of potential roosting habitat	Minor adverse, temporary, reversible, not certain.	Significant (Local level)	CEMP and ECMS (protection of retained onsite and offsite habitats including sensitive lighting scheme)	Negligible
Foraging and Commuting Bats	Loss of foraging habitat and commuting lines (small proportion)	Non-significant adverse		LEMP (enhancement of retained habitat); and SLS (new habitat creation/planting)	Moderate beneficial (Local-level)
	Disturbance of foraging habitat and commuting lines	Non-significant adverse (due to enforced site working hours)		CEMP and ECMS	Negligible
Badger	Loss of foraging and potential sett building habitat	Moderate adverse, permanent, irreversible, certain	Significant (Local level)	LEMP (enhancement of retained habitat); and SLS (new habitat creation/planting)	Moderate beneficial (Local-level)
	Direct killing and injuring of badgers in setts, and disturbance of sett	Non-significant adverse (based on inherent mitigation – legal compliance)		ECMS and NE Licence if required (sensitive timing and method of works)	Negligible
Reptiles	Loss of breeding, refuge and foraging habitat	Non-significant adverse		LEMP (new pond creation and enhancement of retained habitat); and SLS (new habitat creation/planting)	Moderate beneficial (Local-level)
	Direct killing and injuring	Non-significant adverse (based on inherent mitigation – legal compliance)		ECMS (sensitive timing and method of vegetation clearance)	Negligible
Butterflies	Loss of breeding habitat (small proportion)	Moderate adverse, permanent, irreversible, certain	Significant (Local level)	LEMP (enhancement of retained habitat); and SLS (new habitat creation/planting)	Minor beneficial (Local-level)

Cont/

Operational Phase					
Designated sites					
Oxford Meadows SAC	Increased recreation	Non-significant adverse		Delivery of large quantum of quality multi-functional green space within the proposed Development	Negligible
	Air Quality impacts	Non-significant adverse		Projected reductions in vehicle emissions.	Negligible
	Hydrological impacts - changes in flood characteristics and changes in water quality from on-site pollution	Minor adverse, permanent, reversible, not certain	Significant (National Level)	Surface water drainage system (SuDS features)	Negligible
Nationally designated sites as listed in Table 9.4	Hydrological impacts - changes in flood characteristics and changes in water quality from on-site pollution	Minor adverse, permanent, reversible, not certain	Significant (District Level)	Surface water drainage system (SuDS features)	Negligible
	Air Quality Impacts	Non-significant adverse		Projected reductions in vehicle emissions.	Negligible
Non-statutory Designated Sites	Increased recreation	Minor adverse, permanent, reversible, not certain	Significant (Local Level)	Delivery of large quantum of quality multi-functional green space within the proposed Development	Negligible
	Air Quality impacts	Non-significant adverse		Projected reductions in vehicle emissions.	Negligible
	Hydrological impacts - changes in flood characteristics and changes in water quality from on-site pollution	Minor adverse, permanent, reversible, not certain	Significant (Local Level)	Surface water drainage system (SuDS features)	Negligible
Habitats and Vegetation					
Retained habitats	Poor management/neglect	Non-significant adverse		LEMP (enhancement of retained habitat); and SLS (new habitat creation/planting)	Negligible
Fauna					
Breeding and winter birds	Poor management/neglect of retained habitats	Minor adverse, permanent, irreversible, not certain	Significant (Local level)	LEMP (enhancement of retained habitat); and SLS (new habitat creation/planting)	Negligible
Roosting bats	Poor management/neglect of retained habitats	Minor adverse, permanent, irreversible, not certain	Significant (Local level)	LEMP (enhancement of retained habitat); and SLS (new habitat creation/planting)	Negligible
Foraging and commuting bats	Poor management/neglect of retained habitats	Minor adverse, permanent, irreversible, not certain	Significant (Local level)	LEMP (enhancement of retained habitat); and SLS (new habitat creation/planting)	Negligible
Badger	Poor management/neglect of retained habitats	Minor adverse, permanent, irreversible, not certain	Significant (Site level)	LEMP (enhancement of retained habitat); and SLS (new habitat creation/planting)	Negligible

Reptiles	Poor management/neglect of retained habitats	Minor adverse, permanent, irreversible, not certain	Significant (Local level)	LEMP (enhancement of retained habitat); and SLS (new habitat creation/planting)	Negligible
Butterflies	Poor management/neglect of retained habitats	Minor adverse, permanent, irreversible, not certain	Significant (Local level)	LEMP (enhancement of retained habitat); and SLS (new habitat creation/planting)	Negligible
Nocturnal species (barn owl, bats, and badger)	Disturbance of habitat by lighting	Minor adverse, permanent, irreversible, not certain	Significant (Local level)	Sensitive lighting design	Negligible

9.11 References

- Statutory Instruments 30 November 2017 No. 1012 The Conservation of Habitats and Species Regulations 2017. Online at http://www.legislation.gov.uk/uksi/2017/1012/contents/made
- 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 (NERC) Act 2006). Online at http://www.legislation.gov.uk/ukpga/1981/69
- Section 40 of the NERC Act 2006. Duty to conserve biodiversity. Online at http://www.legislation.gov.uk/ukpga/2006/16/section/40
- Animal Welfare Act 2006. Online at http://www.legislation.gov.uk/ukpga/2006/45/contents
- Protection of Badgers Act 1992 (as amended). Online at http://www.legislation.gov.uk/ukpga/1992/51/contents
- Hedgerow Regulations 1997. Online at http://www.legislation.gov.uk/uksi/1997/1160/contents/made
- CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial,
- Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management,
- Winchester
- British Standards Institute (2013) BS 42020 – Biodiversity – Code of Practice for Planning and Development
- JNCC, (2010), Handbook for Phase 1 habitat survey – a technique for environmental audit, JNCC, Peterborough, ISBN 0 86139 636 7
- Bat Conservation Trust (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). Bat Conservation Trust, London
- Mitchell-Jones, A.J, & McLeish, A.P. Ed., (2004), 3rd Edition Bat Workers' Manual
- Mitchell-Jones, A.J. (2004) Bat Mitigation Guidelines English Nature, Peterborough
- Bat Conservation Trust (2018) Guidance Note 08/18. Bats and Artificial Lighting in the UK
- Chartered Institute of Ecology and Environmental Management and The Mammal Society (2013). Technical Guidance Series, Competencies for Species Survey: Eurasian Otter
- Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016). The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series)
- Harris, S., Cresswell, P., and Jeffries, D.J. (1989) Surveying Badgers, Mammal Society, London
- British Standard. BS 5837:2012 Trees in Relation to Demolition, Design and Construction. Fourth Edition (present), April 2012
- Section 41 Species - Priority Actions Needed (B2020-008)
- Bat Conservation Trust and the Institute of Lighting Professionals (2018) Guidance Note 08/18 - Bats and Artificial Lighting in the UK

10 Landscape and visual effects

10.1 Introduction

10.1.1 This chapter provides a Landscape and Visual Impact Assessment (LVIA) of proposals to develop land east of Oxford Road at Water Eaton ('the site'). The site falls within Cherwell District Council (CDC) Local Planning Authority (LPA) area and extends to 45.8 hectares (ha).

10.1.2 The proposed development comprises an outline application with site and development details given within Chapters 2 and 3 of this ES.

10.1.3 The purpose of this LVIA is to identify the baseline conditions of the site and surrounding area and to determine those landscape and visual characteristics that might inform the design of the development proposals, including recommendations for mitigation. It then provides an assessment of the likely significant landscape and visual effects to arise from development on the site with reference to the baseline analysis.

10.1.4 In undertaking the assessment described in this LVIA, the following has been considered:

- a thorough data trawl of relevant designations and background documents;
- Assessment of the existing (baseline) condition and character of the site and its setting;
- Assessment of the existing visual (baseline) context, especially any key views to and from the site. The establishment of baseline landscape and visual conditions, when evaluated against the proposed development, allow the identification and evaluation of landscape effects later in the LVIA;
- Description of the landscape aspects of the proposed development that may influence any landscape or visual effects;
- An assessment of the landscape and visual effects in accordance with the approach described below; and
- Provided an analysis of the likely landscape and visual effects of the proposed scheme, which is determined by combining the magnitude of the anticipated change with the assessed sensitivity of the identified receptors. The nature of any anticipated effects is also identified (i.e. positive/negative, permanent/reversible).

10.2 Assessment Methodology

10.2.1 The assessment methodology for assessing landscape and visual effects prepared by EDP is based on the following best practice guidance:

- Guidelines for Landscape and Visual Impact Assessment – Third Edition (LI/IEMA, 2013);
- An Approach to Landscape Character Assessment (Natural England 2014); and
- Landscape Institute Technical Guidance Note (TNG) 06/19 Visual Representation of Development Proposals (17 September 2019).

10.2.2 Other reference documents used to understand the baseline position in landscape terms comprise published landscape character assessments appropriate to the site's location and the nature of the proposed development.

10.2.3 The nature of landscape and visual assessment requires both objective analysis and subjective professional judgement. Accordingly, the following assessment is based on the best practice guidance listed above, information and data analysis techniques. It uses quantifiable factors wherever possible and subjective professional judgement where necessary and is based on clearly defined terms (see **Glossary, Chapter 17**).

10.2.4 This chapter should be read in conjunction with the following figures and appendices:

- Figure 10.1: Site Boundary and Locations
- Figure 10.2: Topography
- Figure 10.3: Site Character and Context
- Figure 10.4: Environmental Planning Context
- Figure 10.5: Published Landscape Character
- Figure 10.6: Site Visibility Plan
- Figure 10.7: Landscape Strategy Plan
- Appendix 10.1: Photoviewpoints
- Appendix 10.2: Wirelines

Study Area

10.2.5 A study area has been determined at a 3km offset from the site boundary. This is considered appropriate to provide an assessment of landscape and visual effects within the site and wider effects in the surrounding area. The wider study area and refined detailed study area are shown on Figure 10.1.

Landscape Assessment

10.2.6 Landscape effects derive from changes in the physical landscape fabric that may give rise to changes in its character and how this is experienced. These effects need to be considered in line with changes already occurring within the landscape and which help to define the character of it.

10.2.7 Effects upon the wider landscape resource i.e. the landscape surrounding the development, requires an assessment of visibility of the proposals from adjacent landscape character areas, but remains an assessment of landscape character and not visual amenity.

Visual Assessment

10.2.8 The assessment of effects on visual amenity draws on the anticipated effects of the development, the landscape and visual context, and the visibility and viewpoint analyses, and considers the significance of the overall effects of the proposed development on the visual amenity of the main visual receptor types in the study area.

Identifying Landscape and Visual Receptors

10.2.9 This assessment has sought to identify the key landscape and visual receptors that may be affected by the changes proposed.

10.2.10 The assessment of effects on landscape as a resource in its own right, draws on the description of the development, the landscape context and the visibility and viewpoint analysis to identify receptors, which, for the proposed development may include, but not be limited to, the following:

- The key landscape characteristics of the local context;
- The 'host' landscape character area that contains the proposed development;
- The 'non-host' landscape character areas surrounding the host character area and may be affected by the proposals (where relevant); and
- Landscape designations on a national, regional or local level (where relevant).

10.2.11 The locations and types of visual receptors within the defined study areas are identified from Ordnance Survey maps and other published information (such as walking guides), from fieldwork observations and from local knowledge provided during the consultation process. Examples of visual receptors may include, but not be limited to, the following:

- Settlements and private residences;
- Users of National Cycle Routes and National Trails;
- Users of local/regional cycle and walking routes;
- Those using local rights of way – walkers, horse riders, cyclists;
- Users of open spaces with public access;
- People using major (motorways, A and B) roads;
- People using minor roads; and
- People using railways.

Assessment of Landscape and Visual Effects

10.2.12 The assessment of effects on the landscape resource includes consideration of the potential changes to those key elements and components that contribute towards recognised landscape character or the quality of designated landscape areas; these features are termed landscape receptors. The assessment of visual amenity requires the identification of potential visual receptors that may be affected by the development. As noted, following the identification of each of these various landscape and visual receptors, the effect of the development on each of them is assessed through consideration of a combination of:

- Their overall sensitivity to the proposed form of development, which includes the susceptibility of the receptor to the change proposed and the value attached to the receptor; and

- The overall magnitude of change that will occur - based on the size and scale of the change, its duration and reversibility.

Defining Receptor Sensitivity

10.2.13 A number of factors influence professional judgement when assessing the degree to which a particular landscape or visual receptor can accommodate change arising from a particular development. Sensitivity is made up of judgements about the 'value' attached to the receptor, which is determined at baseline stage, and the 'susceptibility' of the receptor, which is determined at the assessment stage when the nature of the proposals, and therefore the susceptibility of the landscape and visual resource to change, is better understood.

10.2.14 Susceptibility indicates "*the ability of a defined landscape or visual receptor to accommodate the specific proposed development without undue negative consequences*". Susceptibility of visual receptors is primarily a function of the expectations and occupation or activity of the receptor. A degree of professional judgement applies in arriving at the susceptibility for both landscape and visual receptors and this is clearly set out in the technical appendices to this assessment.

10.2.15 A location may have different levels of sensitivity according to the types of visual receptors at that location. Any one receptor type may be accorded different levels of sensitivity at different locations.

10.2.16 Table 10.1 provides an indication of the criteria by which the overall sensitivity of a landscape receptor is judged within this assessment and considers both value and susceptibility independently.

Table 10.1 Landscape Receptor Sensitivity

Category	Landscape Receptor Value Criteria	Landscape Susceptibility to Change Criteria
Very High	Nationally/internationally designated/valued countryside and landscape features; strong/distinctive landscape characteristics; absence of landscape detractors.	Strong/distinctive landscape elements/-aesthetic/perceptual aspects; absence of landscape detractors; landscape receptors in excellent condition. Landscapes with clear and widely recognised cultural value. Landscapes with a high level of tranquillity.
High	Locally designated/valued countryside (e.g. Areas of High Landscape Value, Regional Scenic Areas) and landscape features; many distinctive landscape characteristics; very few landscape detractors.	Many distinctive landscape elements/-aesthetic/perceptual aspects; very few landscape detractors; landscape receptors in good condition. The landscape has a low capacity for change as a result of potential changes to defining character.
Medium	Undesignated countryside and landscape features; some distinctive landscape characteristics; few landscape detractors.	Some distinctive landscape elements/-aesthetic/perceptual aspects; few landscape detractors; landscape receptors in fair condition. Landscape is able to accommodate some change as a result.
Low	Undesignated countryside and landscape features; few distinctive landscape characteristics; presence of landscape detractors.	Few distinctive landscape elements/-aesthetic/perceptual aspects; presence of landscape detractors; landscape receptors in poor condition. Landscape is able to accommodate large amounts of change without changing these characteristics fundamentally.
Very Low	Undesignated countryside and landscape features; absence of distinctive landscape characteristics; despoiled/-degraded by the presence of many landscape detractors.	Absence of distinctive landscape elements/-aesthetic/perceptual aspects; presence of many landscape detractors; landscape receptors in very poor condition. As such landscape is able to accommodate considerable change.

For visual receptors, judgements of susceptibility and value are closely interlinked considerations. For example, the most valued views are those that people go and visit because of the available view – and it is at those viewpoints that their expectations will be highest and thus most susceptible to change. The overall sensitivity of visual receptors is rated in a two-step process that combines both susceptibility and value as indicated by the criteria in Table

Table 10.2 Visual Receptor Sensitivity

Category	Visual Receptor Criteria
Very High	Designed view (which may be to or from a recognised heritage asset or other important viewpoint), or where views of the surroundings are an important contributor to the experience. Key promoted viewpoint e.g. interpretative signs. References in literature and art and/or guidebooks tourist maps. Protected view recognised in planning policy designation. Examples may include views from residential properties, especially from rooms normally occupied in waking or daylight hours; national public rights of way, e.g. National Trails and nationally designated countryside/landscape features with public access which people might visit purely to experience the view; and visitors to heritage assets of national importance.
High	View of clear value but may not be formally recognised, e.g. framed view of high scenic value, or destination hill summits. It may also be inferred that the view is likely to have value, e.g. to local residents. Examples may include views from recreational receptors where there is some appreciation of the landscape, e.g. golf and fishing; local public rights of way, access land and National Trust land, also panoramic viewpoints marked on maps; road routes promoted in tourist guides for their scenic value.
Medium	View is not promoted or recorded in any published sources and may be typical of the views experienced from a given receptor. Examples may include people engaged in outdoor sport other than appreciation of the landscape e.g. football and rugby or road users on minor routes passing through rural or scenic areas.
Low	View of clearly lesser value than similar views experienced from nearby visual receptors that may be more accessible. Examples may include road users on main road routes (motorways/A roads) and users of rail routes or people at their place of work (where the place of work may be in a sensitive location). Also views from commercial buildings where views of the surrounding landscape may have some limited importance.
Very Low	View affected by many landscape detractors and unlikely to be valued. Examples may include people at their place of work, indoor recreational or leisure facilities or other locations where views of the wider landscape have little or no importance.

10.2.17 The tables above offer a template for assessing overall sensitivity of any landscape or visual receptor as determined by combining judgements of their susceptibility to the type of change or development proposed and the value attached to the landscape as set out at paragraph 5.39 of GLVIA 3rd Edition (2013). However, the narrative in this report may demonstrate that assessment of overall sensitivity can change on a case-by-case basis.

10.2.18 For example, a high susceptibility to change and a low value may result in a medium overall sensitivity, unless it can be demonstrated that the receptor is unusually susceptible or is in some particular way more valuable. A degree of professional judgement applies in arriving at the overall sensitivity for both landscape and visual receptors.

Magnitude of Change

10.2.19 The magnitude of any landscape or visual change is determined through a range of considerations particular to each receptor. The three attributes considered in defining the magnitude are:

- Scale of change;
- Geographical extent; and
- Duration and reversibility/proportion.

10.2.20 Receptor locations from which views of the proposed development are not likely to occur will receive no change and therefore no effect. With reference to the Zone of Theoretical Visibility (ZTV) and site survey, the magnitude of change is defined for receptor locations from where visibility of the proposed development is anticipated to occur.

10.2.21 Table 10.3 provides an indication of the criteria by which the size/scale of change at a landscape or visual receptor is judged within this assessment.

Table 10.3 Landscape and Visual Receptor Magnitude of Change Criteria

Category	Landscape Receptor Criteria	Visual Receptor Criteria
Very High	Total loss of or major alteration to key elements/features/characteristics of the baseline condition. Addition of elements which strongly conflict with the key characteristics of the existing landscape.	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.
High	Notable loss or alteration to one or more key elements/features/characteristics of the baseline condition. Addition of elements that are prominent and may conflict with the key characteristics of the existing landscape.	The proposed development will be clearly noticeable and the view would be fundamentally altered by its presence.
Medium	Partial loss or alteration to one or more key elements/features/characteristics of the baseline condition. Addition of elements that may be evident but do not necessarily conflict with the key characteristics of the existing landscape.	The proposed development will form a new and recognisable element within the view which is likely to be recognised by the receptor.
Low	Minor loss or alteration to one or more key elements/features/characteristics of the baseline landscape. Addition of elements that may not be uncharacteristic within the existing landscape.	The proposed development will form a minor constituent of the view being partially visible or at sufficient distance to be a small component.
Very Low	Barely discernible loss or alteration to key elements/features/characteristics of the baseline landscape. Addition of elements not uncharacteristic within the existing landscape.	The proposed development will form a barely noticeable component of the view, and the view whilst slightly altered would be similar to the baseline situation.

10.2.22 Table 10.4 provides an indication of the criteria by which the geographical extent of the area affected is adjudged within this assessment.

Table 10.4 Geographical Extent Criteria

	Landscape Receptors	Visual Receptor Criteria
Largest ↕ Smallest	Large scale effects influencing several landscape types or character areas.	Direct views at close range with changes over a wide horizontal and vertical extent.
	Effects at the scale of the landscape type or character areas within which the proposal lies.	Direct or oblique views at close range with changes over a notable horizontal and/or vertical extent.
	Effects within the immediate landscape setting of the site.	Direct or oblique views at medium range with a moderate horizontal and/or vertical extent of the view affected.
	Effects at the site level (within the development site itself).	Oblique views at medium or long range with a small horizontal/vertical extent of the view affected.
	Effects only experienced on parts of the site at a very localised level.	Long range views with a negligible part of the view affected.

10.2.23 The third, and final, factor, in determining the anticipated magnitude of change is duration and reversibility. Duration and reversibility are separate but linked considerations. Duration is judged according to the defined terms set out below, whereas reversibility is a judgement about the prospects and practicality of the particular effect being reversed in, for example, a generation. The categories used in this assessment are set out below.

Duration:

- Long term (20 years+);
- Medium to long term (10 to 20 years);
- Medium term (5 to 10 years);
- Short term (1 year to 5 years); or
- Temporary (less than 12 months).

Reversibility:

- Permanent with unlikely restoration to original state, e.g. major road corridor, power station, urban extension etc.;
- Permanent with possible conversion to original state, e.g. agricultural buildings, retail units;
- Partially reversible to a different state, e.g. mineral workings;
- Reversible after decommissioning to a similar original state, e.g. wind energy development; or
- Quickly reversible, e.g. temporary structures.

Significance of Effect

10.2.24 The purpose of the EIA process is to identify the significant environmental effects (both beneficial and adverse) of development proposals. Schedule 4 to the EIA Regulations specifies the information to be included in all environmental statements, which should include a description of:

"The likely significant effects of the development on the environment, which should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development".

10.2.25 In order to consider the likely significance of any effect, the sensitivity of each receptor is combined with the anticipated magnitude of change to determine the significance of effect, with reference also made to the geographical extent, duration and reversibility of the effect within the assessment. Having taken such a wide range of factors into account when assessing sensitivity and magnitude at each receptor, the significance of effect can be derived by combining the sensitivity and magnitude in accordance with the matrix in Table 10.5.

10.2.26 The parameters identified for the evaluation of effects follows recommendations for the assessment of visual effects, in guidance published by Scottish Natural Heritage , which states that:

"The…matrix of three classes on each axis producing 9 cells, only 3 of which are typically judged as significant, is in our view simplistic and unrefined and quite unsuitable as a tool for widespread use. In particular it implies a degree of certainty about a very restricted definition of significance that we do not believe is justified. Expanding a 3 x 3 (9 cells) matrix to 4 x 4 (16 cells) or even 5 x 5 (25 cells) is much more representative of the diversity of size and sensitivity found in visual impact assessment".

Table 10.5 Level of Effects Matrix

Overall Sensitivity	Overall Magnitude of Change				
	Very High	High	Medium	Low	Very Low
Very High	**Substantial**	**Major**	**Major/-Moderate**	**Moderate**	Moderate/-Minor
High	**Major**	**Major/-Moderate**	**Moderate**	Moderate/-Minor	Minor
Medium	**Major/-Moderate**	**Moderate**	Moderate/-Minor	Minor	Minor/-Negligible
Low	**Moderate**	Moderate/-Minor	Minor	Minor/-Negligible	Negligible
Very Low	Moderate/-Minor	Minor	Minor/-Negligible	Negligible	Negligible/-None

10.2.27 Each effect is described and evaluated individually through the combination of all of the relevant factors and assessed as either significant or not significant. For landscape and visual effects, those effects identified at a substantial, major, major/moderate or moderate level (bold type within matrix above) are generally considered to be significant and those effects assessed at a moderate/minor, minor, minor/negligible or negligible level are considered to be not significant.

10.2.28 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.

Definition of Effects

10.2.29 Taking into account the levels of effect described above, and with regard to effects being either adverse or beneficial, the following table represents a description of the range of effects likely at any one receptor.

Table 10.6 Definition of Effect

Effect	Definition
Substantial	Effects which are in complete variance to the baseline landscape resource or visual amenity.
Major	Effects which result in noticeable and fundamental alterations to the landscape resource or visual amenity.
Moderate	Effects which result in noticeable but non-fundamental alterations to the baseline landscape resource or visual amenity.
Minor	Effects which result in slight alterations to the landscape resource or visual amenity.
Negligible	Effects which result in barely perceptible alterations to the landscape resource or visual amenity.
None	No detectable alterations to the landscape resource or visual amenity.

10.2.30 Effects can be adverse (negative), beneficial (positive) or neutral. The landscape effects will be considered against the landscape baseline, which includes published landscape strategies or policies if they exist. Changes involving the addition of large-scale man-made objects are typically considered to be adverse as they are not usually actively promoted as part of published landscape strategies. Accordingly, the assessment of landscape effects as a result of these aspects of the proposed development will be assumed to be adverse, unless otherwise stated within the assessment.

10.2.31 Visual effects are more subjective as people's perception of development varies through the spectrum of negative, neutral and positive attitudes. In the assessment of visual effects, the assessor will exercise objective professional judgement in assessing the level of effects and, unless otherwise stated, will assume that all effects are adverse, thus representing the worst-case scenario.

Cumulative Effects

10.2.32 Cumulative effects generally occur where there may be simultaneous or sequential visibility of two or more developments of the same type and scale, or where the consideration of other schemes would increase an identified effect. Where other similar schemes are in the planning system and made known to the applicant, or are under construction, these are considered in conjunction with the proposed scheme.

Consultation

10.2.33 Consultation with Cherwell District Council took place in the form of email correspondence in August 2021. This exchange confirmed the LPA's agreement with the proposed study area and suggested viewpoint locations.

10.2.34 Additional correspondence was provided during December 2022 to agree wireline locations and as part of this the Council requested three additional views. These were recorded as Photoviewpoint EDP 17, 18 and 19 at the request of the Council.

Assumption and Limitations

10.2.35 Two site visits were undertaken to take photographs and establish the baseline condition of the site. The second site visit was undertaken during the summer months. As a result, additional site photography shows views with vegetation in leaf, which does not reflect the worst-case visibility conditions. Professional judgement is used to account for seasonal changes and incorporate this in the assessment process where necessary.

10.3 Planning Context

10.3.1 The following outlines planning policy considered relevant for the proposed development. This includes national and regional policy.

National Planning Policy Framework (2021)[1]

10.3.2 The National Planning Policy Framework (NPPF) sets out the planning policies for England and how these should be applied. At the heart of the NPPF is a presumption in favour of sustainable development. **Paragraph 20**, outlines the strategic policies for England, which states that there should be sufficient provision for:

"*d) conservation and enhancement of the natural, built and historic environment, including landscapes and green infrastructure, and planning measures to address climate change".*

10.3.3 **Paragraph 130** highlights that development should be "*sympathetic to local character and history, including the surrounding built environment and landscape setting*". In **paragraph 131**, emphasis is put on incorporating trees within development. The NPPF states that *"planning policies and decisions should ensure that new streets are tree lined*".

10.3.4 With regards to the Green Belt designation and its boundaries, **paragraph 143** states that:

"a) ensure consistency with the development plan's strategy for meeting identified requirements for sustainable development";

b) not include land which it is unnecessary to keep permanently open"; and

"f) define boundaries clearly, using physical features that are readily recognisable and likely to be permanent".

Cherwell Local Plan (Part 1) Partial Review – Oxford's Unmet Housing Need (adopted 2020)[2]

10.3.5 The Cherwell Local Plan (CLP) sets out the policies for Cherwell district and its future development. The following policies are considered relevant to this LVIA.

10.3.6 **Policy PR3: The Oxford Green Belt** notes, that the Green Belt boundary in Cherwell District will be revised. This should be in accordance with planning policy and development requirements.

10.3.7 **Policy PR5: Green Infrastructure** states that "*strategic developments provided for under Policies PR6 to PR9 will be expected to protect and enhance green infrastructure".*

10.3.8 **Policy PR6a - Land East of Oxford Road** refers to the site and development proposals

[1] Ministry of Housing, Communities and Local Government (2021), National Planning Policy Framework, accessed at https://www.gov.uk/government/publications/national-planning-policy-framework--2 on 29.07.21
[2] Cherwell District Council (2020), Cherwell Local Plan (Part1) Partial Review - Oxford's Unmet Housing Need, CDC, Oxfordshire

assessed in this LVIA. It identifies the site's release from the green belt designation to accommodate the housing need in the local area. The key requirements relevant in landscape and visual terms are outlined as follows:

"5. The provision of facilities for formal sports, play areas and allotments to adopted standards within the developable area";

"*6. The provision of public open green space as an extension to Cutteslowe Park on 11 hectares of land in the location shown and including land set aside for the creation of wildlife habitats and for nature trail/circular walks accessible from the new primary school*";

"*7. The creation of a green infrastructure corridor on 8 hectares of land incorporating a pedestrian, wheelchair and all weather cycle route along the site's eastern boundary within the area of green space shown on the policies map*";

"*25. The provision of a landscaped green infrastructure corridor at the eastern settlement edge which links Cutteslowe Park to Oxford Parkway, minimises the visual and landscape impact of the development, creates an appropriate setting for the listed St. Frideswide's Farmhouse and Wall, and provides a clear distinction between the site and the Green Belt"; and*

"28. The public open green space/extension to Cutteslowe Park and agricultural land to be kept free of buildings to avoid landscape impact"

Cherwell District Council Local Plan Part 1 Partial Review - Landscape Character and Capacity Assessment (2017)[3]

10.3.9 The Cherwell Landscape Character and Capacity Assessment identifies the landscape character sensitivity and capacity for certain development types in CDC. The site lies within an area of land described as "*LSCA38 North Oxford Triangle, Kidlington*".

10.3.10 The area containing the site to the east of Oxford Road, with its *"wider landscape offering panoramic views",* is assessed as a landscape of medium value and medium sensitivity in terms of character and visual sensitivity. The study further notes that *"within the areas of arable land, the field boundaries remain in reasonably good condition and appear to be well maintained and the hedgerow trees are a prominent characteristic of the landscape."*

10.3.11 In terms of mitigation to visual receptors, the study finds that: "*potential exists to provide mitigation planting within the east and west land parcels without altering the character and appearance of the land; this would comprise the reinstatement and improvement of field boundaries and the potential for the creation of wider hedgerow boundaries to increase screening*".

10.3.12 In the study's assessment of landscape capacity for development, it finds that there is a medium capacity for residential development on the site "*as this would form a natural extension to the northern edge of Cutteslowe*" and "*infilling of land between the A4165 oxford Road and the A34*". Although it finds that "t*he west part of the east land parcel where infilling north of Cutteslowe northwards to the park and ride could be accommodated*", the eastward extent of development would need to be carefully considered to maintain the "*existing landscape context and intervisibility/visual separation with Water Eaton and Woodeaton*."

10.3.13 It is the 'exposed nature' of the site which also leads to the study assessing a medium to low potential for formal or informal recreation due to the "*effect this would have on the surrounding area*".

[3] WYG (2017), Cherwell District Council - local Plan Part 1 Partial Review - Landscape Character and Sensitivity Study, WYG Environment Planning Transport Ltd, Newcastle

Cherwell Green belt Study (2017)[4]

10.3.14 The Cherwell Green Belt Study (CGBS) comments on the positioning of revised Green Belt boundaries to encompass areas identified for development, including land within policy PR6a of the CLP. The site lies within Green Belt parcel PR38c.

10.3.15 The CGBS states that parcel PR38c is a *"visually open, valley landscape"* with *"no strong landscape features to contain development"* and "*forms part of a broad valley consistent land use and field patterns*". As a result, it is assessed that "*any development here would encroach on the countryside*" and release of this parcel of land would result in a "*high*" level of harm to the Green Belt. However, the study notes that development restricted to the south-western corner, and "*low enough to avoid significant visual impact on the gap between the settlement edge and Oxford Parkway"*, would result in slightly lowered "*moderate*" level of harm.

10.3.16 The study considers that the hedgerow along the eastern edge of parcel PR38c "*is the only Green Belt boundary option*". It recommends, on the basis of landscape sensitivity that "*it would be beneficial to retain a belt of agricultural land that incudes the south eastern part of the site, rather than have recreational use as far east as the floodplain*".

Oxford Green Belt Study (2015)[5]

10.3.17 The Oxford Green Belt Study assesses the Green Belt's performance in relation to the purposes of the Green Belt as set out in the NPPF. It divides the Green Belt into 83 small parcels and 13 broad areas. The sites fall within parcel OX2.

10.3.18 The study states that "*the eastern part of the parcel retains the characteristics of open countryside, but contribution to the countryside character is reduced to "medium" closer to the A4165 and Cutteslowe." With regards to potential defensible boundaries, the study states that "there are no features considered to constitute significant or durable boundaries preventing further spread of development east of from the A4165." In respect of preventing neighbouring towns from merging, the study states that for OX2 "loss of openness adjacent to the A4165 between Oxford and the Park and Ride would potentially reduce the gap significantly but would no cause coalescence".*

10.4 Baseline Conditions

Current Baseline

Site Description

10.4.1 The site is located on the northern edge of Oxford between Oxford Road to the west, Oxford Parkway Park and Ride to the north and Cutteslowe Park to the south. The site consists of six medium to large sized arable fields and is bound by Oxford Road along its western boundary. Hedgerows define most of the eastern boundary of the agricultural land, except for a section along the north-eastern boundary of the site. The southern boundary of the agricultural fields is defined by maintained hedgerows with some trees which enclose the sports pitches at Cutteslowe Park that form the site's southern boundary.

Terrain Analysis

10.4.2 The terrain within the site is predominantly flat and low lying. There is a slight slope from Oxford Road towards the eastern boundary of the site. The lowest point of the site is within its south-eastern corner, which is sensitive to water logging and flooding.

[4] LUC (April 2017), Cherwell Green Belt Study, LUC, Bristol
[5] LUC (October 2015), Oxford Green Belt Study, Oxfordshire County Council, Oxford

10.4.3 The terrain within the study area is generally low lying. There is a noticeable dip in the east around the River Cherwell and in the west around the Oxford Canal. There are no other variations of note in the local landform within the study area. The topography of the site and its surroundings are shown on the topography plan contained in Figure 10.2.

Land Use

10.4.4 The site presents a rural/urban transitional character and is defined by its arable land use. It comprises of midsized fields divided by native hedgerows. Land to the south of the site has urbanising influences as a result of the existing built form along the southern border.

10.4.5 The study area is influenced by the northern settlement edge of Oxford, which includes residential and recreational land uses. The land use within the northern extent of the study area is influenced by transport corridors such as the Bicester-Oxford railway line and the A34. The eastern part of the study area is an extension of the site's land use and constitutes arable land. The area adjacent to Oxford Road to the west of the study area is defined by its use as a golf course. Further to the west there is a strong influence from the A34 and the railway line, which cut across agricultural land.

Vegetation Cover

10.4.6 The site's current land use as arable land defines its vegetation cover. Landscape features of note within the site include native hedgerows with occasional hedgerow trees and a deciduous tree belt along the eastern edge of Oxford Road. There is a noticeable group of trees around St Frideswide's Farm on the eastern border of the site.

10.4.7 The eastern extent of the study area is defined by arable land and typical field boundaries in the form of hedgerows. To the south, within the settlement edge, vegetation cover is limited to private gardens with some tree cover in Cutteslowe Park. To the west, the North Oxford Golf Course features a managed landscape with varying levels of tree and shrub planting as well as large areas of mown grass. Beyond the golf course, there is arable land and a dense belt of vegetation along the A34.

Landscape Designations

10.4.8 The following is a summary of landscape designations considered relevant to the site and study area. These are shown on the environmental planning context plan Figure 10.4.

Public Rights of Way (PRoW)

10.4.9 There is an extensive network of PRoW present in the study area. The following PRoW is located within the site:

- Bridleway 229/9/30 within the northern extent of the site; and
- 229/8/10 in the southern extent of the site.

10.4.10 There are several further footpaths within the study area, particularly to the east in the more open countryside. A footpath of note in this area is the Oxford Greenbelt Way, which follows the meandering course of the River Cherwell.

Open Access Land

10.4.11 The nearest Open Access Land areas are meadowlands associated with the River Thames. The closest at just over 1km to the south-west of the site is Wolvercote Common. Slightly further to the west of the common, on the north side of the River Thames and south of the A40, lie a further two smaller areas of Open Access Land at West Mead and Pixey Mead. Intervening infrastructure routes and associated vegetation and topography interrupt views from these

areas to the site, and therefore these receptors will not be considered further in this assessment.

Summary of Tree Stock

10.4.12 A site wide tree survey has been undertaken, the methodology of which has been adopted based on guidelines set out in BS 5837:2012 Trees in Relation to Design, Demolition and Construction. This data has been derived from the Topographic Survey (drawing number 17932-500-01). All surveyed items are detailed within the Arboricultural Baseline Note (edp5650_r001). No other trees are covered by this survey.

10.4.13 The survey has identified 31 individual trees, 16 groups of trees and 19 hedgerows, totalling 66 items. Of these 66 items, three have been awarded an A category, 30 have been categorised as B category, and 26 have been categorised as C and are of low quality. In addition, seven items have been categorised as U and are considered unsuitable for retention irrespective of development.

10.4.14 Overall, the items identified across the Study Area are primarily of moderate to high quality, with the exception of seven category U items. The category B and A items are located either off-site or around the periphery and therefore do not adversely constrain the main body of the Study Area. Furthermore, there are two B1 category veteran ash trees (T41 & T44), located on the eastern boundary of the study area.

10.4.15 A veteran tree is a tree that, by a recognised criterion, 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.

10.4.16 The standing advice from Natural England and the Forestry Commission recommends that any development should be kept as far as possible from veteran trees, leaving a buffer at least 15 times larger than the diameter or 5m from the edge of its canopy, if that's greater, therefore a buffer has been calculated.

Tree Preservation Orders (TPO)

10.4.17 There are no TPOs located within the site. A TPO lies to the south of the North Oxford Golf Course, approximately 130m west of the site boundary along Oxford Road.

Ancient Woodland

10.4.18 There are no areas of ancient woodland present within the site or study area.

Listed Buildings

10.4.19 A separate heritage assessment (provided in Chapter 11 of this ES) considers the historic character and setting of designated and non-designated heritage assets within the study area. While these are not landscape designations, they are used to inform the landscape value of the site and study area. There are no listed buildings within the site. There are several listed features within the study area, of which two are located within 500m of the site:

- Grade II listed Frideswide's Farmhouse, approximately 10m to the east of the site; and
- Grade II listed property on 566 Banbury Road approx. 260m to the south-west of the site (also known as the former Tollhouse).

Landscape Character

10.4.20 This section summarises published landscape character assessments and provides a review of the local landscape character. A map showing the published landscape character areas is shown on **Figure 10.5**.

National Character Assessment

10.4.21 The site lies in National Character Area (NCA) 108: Upper Thames Clay Vale.[6] Its character is described as "*a broad belt of open, gently undulating lowland farmland" with "contrasting landscapes, including enclosed pastures of the clay lands […] and more settled, open arable lands". While the description is broadly representative of the wider landscape, the focus of this assessment will be on local landscape character areas.*

Local Landscape Character Assessment

Oxford Wildlife and Landscape Study (OWLS)

10.4.22 The OWLS provides an assessment of the landscape character typologies in Oxfordshire. The site is located within the "Vale Farmland" landscape type (LT).

10.4.23 The following characteristics described in the OWLS are considered representative of the site and study area:

- A gently rolling landscape associated with clay soils;
- Medium to large regularly shaped arable field and more localised smaller grass fields;
- A well-defined hedgerow pattern with characteristic hedgerows;
- Occasional ditches and minor streams bordered by crack willows and ash; and
- A nucleated pattern of small, compact villages.

10.4.24 The site is located in "Peartree Hill Vale Farmland" landscape character area (LCA). This is described as "*largely characterised by medium to large-sized arable fields and pastureland. The hawthorn and elm hedges are generally in poor condition and often gappy and fragmented. The main structural landscape elements are the thinly-distributed hedgerow trees of oak, dead elm and ash, as well as some tree belts surrounding farm houses".*

10.4.25 While this is considered broadly representative of the local character, the site displays some features that are not in accordance with the published assessment:

- The settlement edge to the south introduces urbanising influences including residential development and sports pitches with flood lighting columns at Cutteslowe Park; and
- Pylons and overhead cables cross the valley landscape immediately to the east of the site.

Cherwell District Landscape Assessment 1995 (CDLA)

10.4.26 Although dated, the CDLA remains the definitive landscape assessment of the district. The site lies in the Otmoor Lowlands area and is wholly located in the Large-Scale Open Farmland landscape type. The key characteristics include:

- Traditional land use has consisted of grazed wet meadow with willow pollards lining streams and drainage ditches. However, owing to improvements in drainage, substantial areas of land are no in arable cultivation;
- Fields are large and regular with weak boundaries, creating an open, exposed landscape;
- Patterns of smaller fields on steeper slopes to the south with open grazing persisting on

[6] Natural England (2014), National Character Area Profile: 108. Upper Thames Clay Vales, accessed at www.naturalengland.org.uk accessed on 29.07.21

the higher open ground with remnant upland heath characteristics on the highest slopes;

- Isolated hills have woodland cover on their brows and tend to be surrounded by military development;
- The roads which cross the landscape are usually built up above the level of the surrounding fields; and
- Very few trees to interrupt long views across the floodplain.

Site Landscape Character Assessment

10.4.27 The site is located on the northern edge of Oxford, to the east of Oxford Road and the south-east of the Oxford – Bicester railway line. To the east lies the open agricultural landscape of the Cherwell River valley. The site's landscape character and context is shown on Figure 10.3. The site consists of six medium to large sized arable fields to the east of Oxford Road. It is bordered to the east and north by further agricultural land but remains influenced by urbanising features including Oxford Parkway and Water Eaton Park and Ride to the north, Oxford Road to the west, the settlement edge of Cutteslowe and Cutteslowe Park bordering to the south (as shown in Image 10.1) The presence of electricity pylons and transport features are prominent in the landscape, resulting in a rural/urban transitional character.

Image 10.1 View towards Cutteslowe Park and the settlement edge

10.4.28 Landscape features of note within the site include native hedgerows with occasional hedgerow trees, predominantly Oak and a deciduous tree belt along the eastern edge of Oxford Road, predominantly Sycamore with limited understorey, and a number of trees overgrown with ivy, dead or fallen. Hedgerows define most of the eastern boundary of the site, except for an open section along the north-east boundary of the northern field, where fields have been amalgamated (as illustrated in Image 10.2). The southern boundary of the site is defined by maintained hedgerows with some trees which enclose the sports pitches of Cutteslowe Park that bound the site to the south. PRoW Bridleway 229/9/80 and Footpath 229/8/10 run north-east to south-west across this area, to Oxford Road, with the footpath connecting to the road via a permissive route.

Image 10.2 View looking east across the local landscape. Gaps in typical hedgerows on the eastern boundary are visible in the distance. Man-made features such as electricity pylons detract from the rural appearance.

10.4.29 The terrain of the site is predominantly flat and gently slopes towards the east of the site, which increases to the east of St Frideswide's Farm, and across the northern field as the landscape dips towards a drainage ditch which extends from the Oxford Parkway/Water Eaton Park and Ride around to the eastern edge of Cutteslowe Park, bounding short sections of the northern tip and south-eastern boundaries of the site. The River Cherwell flood zone 3 lies to the east of the site, according to the Environment Agency Flood Map[7]. There are no watercourses within the site.

10.4.30 The topography and overlying pattern of hedgerows and vegetation influence views out from the site. The north sloping aspect of the northern field contained within the site and hedgerow along the southern side of Bridleway 229/9/30 focus the extensive views from this part of the site towards the north and east, which also overlook the urbanising features of the Oxford Parkway, Water Eaton Park and Ride, railway line and A34. From the southern part of the site the views extend eastwards across the Cherwell Valley, with the only detractor being the pylons and overhead cables. Views across the site on a north-south alignment are limited and filtered by field boundary hedgerows.

10.4.31 Urbanising features are noticeable within the site. Oxford Road forms a notable contrast to the innately tranquil nature of the agricultural landscape. At night the sports pitch's bright floodlighting at Cutteslowe Park is likely to stand out against the urban light glow from Oxford.

10.4.32 Historical maps show that the level of tree cover within the agricultural landscape was greater to the east of Oxford Road up until the mid-20th century, when historical features including Water Eaton Copse and other tree planting (possibly orchards) extending to the north of St Frideswide's Farm were removed.

Sensitivity of the Landscape Resource

10.4.33 GLVIA3 sets out the requirements for considering sensitivity of landscape resource and states that "*landscape receptors need to be assessed firstly in terms of sensitivity, combining*

[7] Accessed at: https://flood-map-for-planning.service.gov.uk/; Accessed on 14.12.22

judgements of their susceptibility to the type of change or development proposed and the value attached to the landscape" in paragraphs 5.39 and 5.47. The below considers the susceptibility and value of those receptors identified.

Susceptibility of the Site

10.4.34 The susceptibility of the landscape resource is defined as the ability of the receptor (whether the overall character, individual elements or perceptual aspects) to accommodate the proposed development without undue consequences for the maintenance of the baseline situation.

10.4.35 The site has limited susceptibility to development due to the openness of the agricultural landscape and its proximity to the floodplain of the River Cherwell. The field boundary hedgerows and hedgerow trees and tree belt along Oxford Road could be accommodated and enhanced within the development. As a result, the site is considered to be of medium susceptibility to the proposed development.

Value of the Landscape

10.4.36 When considering landscape value, GLVIA advocates that the starting point should be a review of existing landscape designations, including those at a local and national level. Having assessed the site in accordance with GLVIA 3 Box 5.1, there is no reason to conclude that the site has any elevated landscape value or importance above the rest of the OWLS Vale Farmland LT, CDLA Otmoor Lowlands CA or Lower Cherwell Floodplain CA. Furthermore, there is no evidence to suggest that the local community place special weight on the site, meaning overall the site is considered to be of no more than local value.

10.4.37 The review of the landscape value and susceptibility of the site has resulted in an assessment of an overall for the site's landscape character. Its proximity and strong visual connection to open countryside is considered a valuable characteristic of the site. Nevertheless, the lack of landscape designations and its value solely on a local scale constitute a **medium sensitivity** of the local landscape character.

Visual Amenity

10.4.38 This section identifies those visual receptors that may be able to obtain views to the application site, their distribution, character and sensitivity to change. Using landform data within a Geographical Information System (GIS), a broad Zone of Theoretical Visibility (ZTV) has been prepared. The ZTV is generated using landform height data only and therefore it does not account for the screening effects of intervening buildings, structures or vegetation. The ZTV was then visited by walking and driving (as appropriate) local roads, rights of way and other publicly accessible viewpoints.

10.4.39 The following is a visual appraisal of the site and its context:

- North: Topography limits visibility to the north-east, whilst to the north views are limited by development at Oxford Parkway Park and Ride, and beyond the A34, Kidlington settlement and vegetation within the landscape;
- East: The agricultural fields within the site form part of the western edge of the River Cherwell Valley with open visibility across the valley landscape. Further east, views are limited to the western slopes of Lyme Hill;
- South: From the eastern part of the site, visibility is limited to the settlement edge of Cutteslowe by built development and associated mature vegetation, except at Cutteslowe Park, where views extend into the open sports pitches. Beyond the pitches, views become filtered and screened by vegetation, including that lining the A40; and

- West: Visibility to the west of the site is limited due to the low-lying topography and intervening vegetation along Oxford Road. There is glimpsed visibility of the site through the boundary vegetation.

Defining Receptor Groups

10.4.40 Within the ZTV and wider area, the people ('receptors') likely to experience visual change can be considered as falling into a number of discernible groups. Visual receptors anticipated to experience effects as a result of the development are listed below:

- Users of PRoW and permissive footpaths;
- Road Users;
- Residents;
- Users of the Park and Ride; and
- Users of Cutteslowe Park

Users of PRoW and Permissive Footpaths

10.4.41 As outlined above, there are several PRoW within the site and study area that are considered to have intervisibility with the site. Users of PRoW are generally considered to have high sensitivity.

10.4.42 Bridleway 229/9/30 runs across the site from the east to the west and forms a connection between the North Oxford Golf Club in the west and the wider countryside in the east. As illustrated by Photoviewpoints (**Photoviewpoint** EDP) 4 **and 13**, this footpath offers expansive views of the site and towards the open countryside. From the wider countryside, views from the footpath looking west give an expansive overview of the local landscape in context with the nearby settlement edge (as shown in Photoviewpoint EDP 18 and Photoviewpoint EDP 5) and glimpsed views of the site are possible through the typical boundary vegetation. Footpath 229/8/10 crosses the site from the south-west to the east and connects the northern settlement edge and Cutteslowe Park with the wider countryside. As shown in Photoviewpoint EDP 2, receptors from this footpath would experience a view of the southern extent of the site in context with the adjacent settlement boundary.

10.4.43 PRoW located to the north of the site would have no visibility of the site. This is due to the intervening built form at Oxford Parkway Park and Ride and the railway and A34 which lie between the nearest designated footpath and form a physical barrier towards the site. Planting along the railway corridor and along the dual carriageway would additionally screen the site from view. A defunct footpath to the north of the site (as shown in Photoviewpoint EDP 19 as requested by the Council) would have uninterrupted views of the site.

10.4.44 To the north-east and east of the site, an extensive network of PRoW provides access to the countryside within the Cherwell Valley. While there are some field boundaries in the form of hedgerows and hedgerow trees, vegetation is intermittent and has limited screening effect. Built form and surrounding trees and shrubs at St Frideswide's Farm provide a level of screening to views from the east for the central extent of the site. There is a high level of intervisibility between the site and the countryside as illustrated in **Photoviewpoint** EDP 10, 14 and **6**. Views from **Photoviewpoint EDP** 5, 9 and 15 are limited due to slight undulations in the terrain and the relative distance from the site.

10.4.45 To the south of the site, the permissive footpath along the site's boundary offers expansive views across the site and towards the settlement edge (as shown in **Photoviewpoint EDP** 3).

Footpath 320/54/10 has limited visibility of the site, due to the intervening vegetation and built form at Cutteslowe Park to the south of the site. Built form on the settlement edge provides further screening to views from the south.

Road Users

10.4.46 Oxford Road forms the western boundary of the site. While it is in close proximity of the site, it has limited visibility of the site due to the dense vegetation planted along the road. Any views would be through gaps in the vegetation. For motorists and cyclists this would be during a journey along a busy road and would be a brief, glimpsed view. For pedestrians this would be a similar experience, albeit at a slower pace. The road is slightly elevated near the Oxford Park and Ride, which affords views of the site – particularly in winter when trees are not in leaf. Overall, views from Oxford Road would be dominated by the immediate context of the road (as shown in Photoviewpoint EDP 16). Banbury Road is the extension of Oxford Road to the south. As shown in Photoviewpoint EDP 11, there are no direct views of the site although the vegetated boundary along Oxford Road is visible. Access Track to St Frideswide's Farm

10.4.47 The access track to St Frideswide's Farm accesses the site off Oxford Road. It crosses the central part of the site and has direct visibility of the site to the north and east of the track. Views across the site show the site's existing land use and its context within the wider agricultural landscape, as well as the settlement edge (as shown in Photoviewpoint EDP 12).

10.4.48 Road users are typically moving to or from a specific location. Within the context of the site, these receptors would not be travelling on roads to experience a view. Therefore, road users are considered to have low sensitivity.

Residents

10.4.49 This LVIA focusses predominantly on views from publicly accessible locations. Views from private residential properties, although likely to be of high to very high sensitivity for the householder, are not protected by national planning guidance or local planning policy. The sensitivity of residential receptors is dependent, to some extent, on the room(s), and the activities of people in those rooms, from which the site is visible. Residents with visibility from rooms normally occupied in waking hours will generally have a very high sensitivity with a lower sensitivity from bedrooms and rooms from which there may be no expected view, for example bathrooms. Good site masterplanning of a development site, however, should consider the visual amenity of domestic dwellings in close proximity to the proposals, and this is the case for this development.

10.4.50 Due to the location of the site within a series of fields beyond the settlement edge, there is a limited number of residential properties that have visibility of the site. Properties to the south of the site along Hayward Road and Harbord Road have some visibility of the site. However, this view is partially interrupted by sports pitches and the existing boundary vegetation around these, as illustrated on **Photoviewpoint 8**. Residential dwellings within the northern extent of Haslemere Gardens to the west of the sports pitches have direct, uninterrupted views of the site.

10.4.51 Residents at St Frideswide's Farm are located adjacent to the site. There is dense vegetation located within the garden so that there are glimpsed views of the site. They have a visual connection with the surrounding countryside, but also the settlement edge and the Oxford Park and Ride. View Photoviewpoint EDP 17 is located to the south of the farm, which is an illustrative view towards the site for visitors to the farm.

10.4.52 Residents at Pipal Cottage are located adjacent to the site. They have uninterrupted views of

the site to the east. They are within the context of the settlement edge, the park and ride and Oxford Road which have urbanising influence on these receptors.

10.4.53 In the local context, there are few residential properties within the detailed study area which would experience close range views of the site. Notwithstanding, any masterplan would need to be sensitive to the residential amenity of these dwellings in terms of development offset. With consideration of the scale of the proposed development within the site, the susceptibility to change of these receptors is considered to be high, resulting in an overall very high sensitivity.

Users of the Park and Ride

10.4.54 The Oxford Parkway Park and Ride provides access to the local and regional railway network and busses offer connections to Oxford's centre. Users of the park and ride facility would be within a busy context along a railway line and A road. Due to an extensive buffer of vegetation, views to the south are restricted. As a result, visual receptors from this location have been scoped out of being further assessed in this report.

Users of Cutteslowe Park

10.4.55 Cutteslowe Park is located to the south of the site. Its vegetated boundary, consisting of a hedgerow and tree planting, forms part of the site's southern boundary. Users of the park are expected to visit the park to use facilities and footpaths provided within the park. While receptors within Cutteslowe Park would experience filtered views of the site through the vegetated boundary along the northern border of the sports pitches (as shown in **Photoviewpoint 8**), this would be experienced while actively participating in a sporting or leisure activity.

Representative Viewpoints

10.4.56 The main receptor groups have been identified and described above and are represented by the Photoviewpoints presented in Table 10.7. Based on fieldwork observations and the findings of the data trawl, these viewpoints have been selected to represent the variety of views available from public vantage points towards the site. The locations of the photoviewpoints are shown on Figure 10.6 while the views themselves are shown in Photoviewpoints 1 to 10 (Appendix 10.1). Details of each view, including receptors, sensitivity and their baseline descriptions, are provided below:

Table 10.7 Representative Views

Photoviewpoint Number	Location	Grid Reference and Direction	Receptor and sensitivity
1	PRoW Footpath 229/10/30	X:449813 Y:211252 Approx. 500m west of the site looking east	Users of PRoW; Users of the golf course Medium Sensitivity
2	PRoW Footpath 229/8/10	X:451334 Y:211740 Approx. 75m north-east of site, looking south-west	Users of PRoW Medium Sensitivity
3	Permissive Footpath between Oxford Road and Cutteslowe	X:450375 Y:210927 Approx. 50m to the south, looking east	Pedestrians Low Sensitivity
4	PRoW Bridleway 229/9/30	X: 450303 Y: 211332 0m, looking east across site	Users of PRoW Medium Sensitivity
5	Intersection of PRoW Bridleway and footpaths	X:451335	Users of PRoW;

Photoviewpoint Number	Location	Grid Reference and Direction	Receptor and sensitivity
	229/9/30, 229/9/20 and 229/6/20	Y:211740 Approx. 790m to the east, looking west towards the site	Cyclists Medium Sensitivity
6	PRoW footpath 229/7/10	X:451513 Y:211047 Approx. 310m to the east, looking west towards the site	Users of PRoW Medium Sensitivity
7	PRoW footpath 320/54/10 at Cutteslowe Park	X:451373 Y:210636 Approx. 115m south, looking north-west towards the site	Users of PRoW Medium Sensitivity
8	Cutteslowe car park	X:450774 Y210927 Approx. 140m to the south, looking north towards the site	Pedestrians; Motorists Low Sensitivity
9	Sparsey Bridge, Intersection of PRoW footpath 229/8/30 and 229/8/40 and Oxfordshire Green Belt Way (229/17/10)	X:451860 Y:211895 Approx. 1.1km north east, looking south-west towards the site	Users of PRoW Medium Sensitivity
10	PRoW (Oxfordshire Green Belt Way) Bridleway 229/5/30	X:451005 Y:212502 Approx. 800m north-east, looking south-west towards the site	Users of PRoW High Sensitivity
11	Oxford Road	X: 450353 Y: 210835 Approx. 150m, looking north-east tpwards the site	Road Users Low sensitivity
12	Track leading to St Frideswide's Farm	X:450354 Y:211100 0m, looking east across the site	Road Users Low sensitivity
13	PRoW footpath 229/9/30	X: 450566 Y: 211455 0m, looking north-west across northern extent of the site	Users of PRoW High sensitivity
14	PRoW footpath 229/17/10	X: 451528 Y: 212123 Approx. 1.1km north-east, looking west towards the site	Users of PRoW High sensitivity
15	PRoW footpath 229/5/30	X: 451131 Y: 212344 Approx. 900m north-east, looking south towards the site	Users of PRoW High sensitivity
16	Oxford Road near the Park and Ride	X: 450118 Y: 211754 Approx. 150m north-west	Road Users Low Sensitivity
17	St Frideswide's Farm	X: 450725 Y:211129 On site boundary	Illustrative view for workers at St Frideswide's Farm Low Sensitivity
18	View from footpath 229/9/30	X: 450740 Y: 211516	Users of PRoW

Photoviewpoint Number	Location	Grid Reference and Direction	Receptor and sensitivity
		Approx. 160m west	High Sensitivity
19	View from footpath to the north of the site	X: 450481 Y: 211909 Approx. 20m north	Users of footpath Medium Sensitivity

Interim Conclusions

10.4.57 In accordance with the NPPF, development should have a presumption in favour of sustainable development. In addition, new roads should be tree lined and enhance local green infrastructure networks.

10.4.58 The site is allocated within the local plan for development. In accordance with Policy PR6a - Land East of Oxford Road, development in this location should incorporate open green space and green infrastructure to limit effects on the local landscape.

10.4.59 The landscape character is reviewed in separate studies. These identify the lack of trees, which results in an open character of the wider countryside. Fields are described as having weak boundaries, which creates an open and exposed landscape. Visually, the slight undulations in the terrain afford expansive views out into the countryside from the site. Due to the openness of the site and its surrounding, development requires sensitive design of the masterplan layout to minimise adverse effects on landscape character and visual amenity.

Future Baseline

10.4.60 In the absence of development it is predicted that the existing agricultural use of the land would continue, as would the management of existing vegetation such as hedgerows and trees. The current management is not undertaken with the objective of maintaining or enhancing the landscape and biodiversity value of the Site and does not, for example, include repairing or replanting of trees to replace those which have died. Therefore, in the long-term, it is considered that the landscape value would broadly remain the same with a potential to gradually decline, in the absence of any significant intervention or farming subsidies which would incentivise landscape enhancement and restoration.

10.5 Mitigation

10.5.1 A landscape strategy has been developed alongside the wider design team to provide high-quality green space and extensive areas of tree planting within the scheme. It incorporates building with nature principles to ensure there are multifaceted benefits to the scheme and future residents in terms of access to nature, water sensitive landscapes, productive landscapes and interactive landscapes for amenity value and overall well-being.

Overall Landscape Strategy

10.5.2 The Landscape Strategy Plan is contained as Figure 10.7.

10.5.3 The landscape strategy has been developed alongside the wider design team to provide high-quality green space and extensive areas of tree planting within the scheme, in line with the Green Infrastructure Parameters plan prepared for the scheme (Ref.:477898-58-D) . It incorporates ‘building with nature’ principles to ensure there are multifaceted benefits to the

scheme and future residents, in terms of access to nature, water sensitive landscapes, productive landscapes and interactive landscapes for amenity value and overall well-being.

10.5.4 Thorough analysis of the site and its context has identified the constraints and opportunities present within the site and helped the development of a landscape concept. This identifies a series of Landscape Character Areas within the site, which aid in creating a sense of place as part of the scheme. The strategy builds on a 'community first' approach and aims to create a climate resilient design that forms a connection with nature and the wider countryside.

10.5.5 Key Landscape Character Areas identified in the strategy are:

- Eastern Boundary Landscape Buffer: Creating a soft transition between the site and the wider countryside to the east, incorporating leisure routes, natural play and allotments;
- Country Park: Providing an extension to Cutteslowe Park with improved access and play provision;
- Oxford Road Frontage: Creating an appropriate frontage to the scheme, ensuring appropriate replacement and incorporation of tree planting alongside the proposed cycle super highway;
- Central Hub: Creating amenity space within the main activity hub of the site; and
- Southern Corridor: Providing a high-quality boundary with allotments and play space to enhance amenity value.

Proposed Landscape Mitigation

10.5.6 The following is a summary of landscape mitigation measures that are considered inherent to the design:

- Hedgerows are retained where they provide linear structure to the site;
- PRoW within the site are retained and incorporated into the scheme;
- Views out into the countryside are retained and channelled through strategic placement of tree planting to allow some permeability between the countryside in the east and the site;
- The south-eastern extent of the site is kept as open space and not built on, which retains open views across this area and aids in integrating the scheme within the landscape to the east;
- Where hedgerows are lost to development, extensive replacement planting at an appropriate scale and using appropriate species for their location and required typologies are provided; and
- Where trees and tree groups along Oxford Road are lost, an extensive tree replacement strategy is proposed to recreate a well-treed avenue along the site's boundary and the proposed super cycle highway.

Proposed Landscape Enhancement

10.5.7 The following summarises the landscape enhancement which would form part of the proposed scheme:

- Additional tree planting throughout the site provides tree canopy cover, habitat enhancement and amenity value;

- Where tree removal is required to facilitate the Oxford Road improvement works, an extensive tree replacement strategy should be provided;
- Access to the site would be improved and areas of open space would be accessible to the public;
- Allotments within the site would enhance opportunities for growing produce and would connect residents with the local landscape; and
- Play areas proposed within the site would be accessible to the new community and the existing community.

10.5.8 Thorough analysis of the site and its context has identified the constraints and opportunities present within the site and helped the development of a landscape strategy. The strategy builds on a community first approach and aims to create a climate resilient design that forms a connection with nature and the wider countryside.

Construction Phase

10.5.9 There is limited landscape mitigation as part of the scheme which is applicable to the construction phase. Key components of this phase are the retention of existing landscape features of note where feasible, such as hedgerows and trees within the site. Beyond this a Construction Environmental Management Plan (CEMP) will be provided which ensures there are limited effects on the environment as a result of the construction phase.

Operational Phase

10.5.10 The following is a summary of landscape mitigation measures that are considered inherent to the design:

- Hedgerows are retained where they provide linear structure to the site;
- PRoW within the site is retained and incorporated into the scheme;
- Views out into the countryside are retained and channelled through strategic placement of tree planting to allow some permeability between the countryside in the east and the site;
- The south-east corner is kept as open space and not built on, which retains open views across this area and aids in integrating the scheme within the landscape to the east;
- Where hedgerows are lost to development, extensive replacement planting at an appropriate scale and using appropriate species for their location and required typologies are provided; and
- Where tree groups along Oxford Road are lost, an extensive tree replacement strategy is proposed to recreate a well-treed avenue along the site's boundary and the proposed super cycle highway.

10.5.11 The following summarises the landscape enhancement which would form part of the proposed scheme:

- Additional tree planting throughout the site provides tree canopy cover, habitat enhancement and amenity value;
- Where tree removal is required to facilitate the Oxford Road improvement works, an extensive tree replacement strategy is in place;
- Access to the site would be improved and areas of open space would be accessible to the

public;

- Allotments within the site would enhance opportunities of growing produce and would connect residents with the local landscape; and
- Play areas proposed within the site would be accessible to the new community and the existing community.

10.6 Residual Effects

10.6.1 The following is a summary of likely significant effects which would remain despite the proposed mitigation measures. This includes effects which are considered to be of a moderate level and above.

Landscape Character

10.6.2 The following is a summary of the likely effects on landscape character. A detailed assessment is contained in the assessment tables in Section 10.8

Construction Phase

10.6.3 Construction activities, movement of site traffic, lighting, noise and sounds will be ever-present during the construction process. This is not unusual and will be carefully controlled by a conditioned construction method statement. Recommendations for protection of retained trees and hedgerows, in accordance with relevant British Standards such as BS 5837, will ensure that the rooting areas of trees and hedgerows are not adversely affected by the construction process. The magnitude of change will, however, be very high (on both the site itself and immediate context) and when combined with the medium sensitivity of the site, will result in a major/moderate adverse level of effect, which is significant in EIA terms. The effect will, however, be temporary and extend only for the duration of the construction process.

Operational Phase

10.6.4 Following construction/establishment of the landscape strategy (whichever is sooner), the predicted effects take into account suitable and appropriate management of existing and proposed landscape features, undertaken in accordance with a landscape management plan or similar.

10.6.5 It is a consequence of the nature of the development proposed that visual and sensory character of the site would change substantially as a result of implementation. The magnitude of change is not an indication of bad design but is to be expected as a result of the change of use of any green field site to residential development.

10.6.6 The changes predicted to occur on the dimensions that contribute to the character of the site are described below and evaluated overall:

- The site's generally flat landform would remain the same. Sustainable drainage features would be provided throughout the site – particularly on the eastern edge – capitalising on the naturally occurring slight undulations in the local landscape;
- The site's visual and sensory character would be changed from its baseline condition. Built form would be introduced into the agricultural landscape which would extend the settlement character into the site. Urbanising influences would be introduced into the site, which would alter its appearance;
- The existing vegetation within the site would generally be removed and replaced where

appropriate. Extensive new tree planting along Oxford Road would create a new attractive frontage to the site. The extensive eastern landscape buffer and new open space to the south-east of the site would create extensive amenity space within the site and would provide areas of habitat creation and tree cover throughout the site;

- Historic hedgerows would be retained where appropriate to provide structure to the local landscape. Mounds within the site would be integrated into the local amenity space at the central hub, which would increase awareness of such features and would integrate this into the proposed development; and
- Where appropriate, cultural references to writers and poets from Christ Church would be integrated into areas of open space. This would aid in the creation of a sense of place and identity for the site and proposed development.

10.6.7 On balance, therefore, the overall effect on the character of the site is considered to be Major/moderate adverse at Year 1 when the proposed development is newly implemented. At Year 15, the effects would soften and the proposed development would assimilate into the local context which constitutes a moderate adverse effect, which is significant in EIA terms.

Predicted Effects on the Vale Farmland LT and Otmoor Lowlands

10.6.8 While there would be noticeable effects within the site's immediate surroundings, the likely effects on the wider host landscape character areas would be localised. The overall effects on Vale Farmland LT and Otmoor Lowlands LCA are considered to be negligible and therefore not significant in EIA terms at operation.

Visual Amenity

10.6.9 The following is a summary of the likely effects on visual amenity. A detailed visual assessment is contained in the assessment tables 10.8 and 10.9.

Users of PRoW and Permissive Footpaths

10.6.10 Footpath 229/9/30 would be most affected by the proposed development where it is located within the site (as shown in Photoviewpoint EDP 4 and 13) and where it affords uninterrupted views of the site from the wider countryside to the east of the site (as shown in Photoviewpoint EDP 15). As shown in Photoviewpoint EDP 2, receptors on footpath 229/8/10 looking west would experience direct views of the proposed development. The proposed landscape strategy on the eastern boundary of the site would be highly noticeable for walkers along this footpath. This would result in a major/moderate adverse effect for users of ProW on footpaths within the site and with short-range views towards the site, which is significant in EIA terms.

10.6.11 ProW located to the north of the site has no visibility of the site and would not be affected by the proposed development. A defunct footpath to the north of the site (as shown in Photoviewpoint EDP 19 as requested by the Council) would have uninterrupted views of the site and would experience a considerable change.

10.6.12 From the north-east and east, views from ProW would have visibility of the site. While there is a high level of intervisibility between the site and the countryside as shown in Photoviewpoint EDP 10, 6 and 14, the proposed development would generally be located in the far background of this view. Where there are elements of built form and dense areas of vegetation within the landscape, there are no views towards the site and views from ProW would experience limited effects due to the proposed development (as shown in Photoviewpoint EDP 5 and 9 and 18). Visual receptors would experience varying levels of effect ranging from moderate/minor adverse to no effect depending on their orientation and distance from the site, which not significant in

EIA terms.

10.6.13 To the south of the site, the permissive footpath along the site's boundary offers expansive views across the site and towards the settlement edge (as shown in Photoviewpoint EDP 3). The footpath in Cutteslowe Park would have visibility of the proposed scheme (as shown in Photoviewpoint EDP 7). This would constitute a moderate/minor adverse effect, which is not significant in EIA terms.

10.6.14 There would be no discernible effects in views from the Golf Course to the west of the site (as shown in Photoviewpoint EDP 1).

Road Users

Oxford Road

10.6.15 Views from Oxford Road would generally be channelled along the busy road corridor. Receptors would be moving along the route and would not be there to experience a view. Nevertheless, the proposed development would include considerable vegetation clearance along the site's western boundary, which would be prominent from Oxford Road (as shown in Photoviewpoint EDP 16). Initially, the removal of trees and construction of a footpath and cycle route with new tree planting would have a very high magnitude of change which would result in moderate adverse effects. Over time, as the planting along the site's western boundary matures and the proposed scheme weathers and assimilates into the landscape, these effects would reduce slightly and be moderate/minor adverse, which is not significant in EIA terms.

Access Track to St Frideswide's Farm

10.6.16 As shown in Photoviewpoint EDP 12, receptors on the access track on their way to St Frideswide's Farm would have uninterrupted views of the site and would experience moderate/minor effects, which is not significant in EIA terms.

Residents

St Frideswide's Farm

10.6.17 Residents at St Frideswide's Farm are located adjacent to the site. While there is dense vegetation to the north-west and west of the property which offers some screening towards the site, they would experience a change as a result of the development. This would constitute a high change which would result in major/moderate adverse effects, which is significant in EIA terms. However, as the proposed landscape strategy on the eastern edge of the site matures and screens the development, the level of effect would reduce over time. Photoviewpoint EDP 17 – as requested by the Council - represents an illustrative view from St Frideswide's Farm, which would be experienced by workers at the farm, who would experience moderate adverse effect as a result of the scheme.

Pipal Cottage

10.6.18 Due to their location on the boundary of the site, residents would have uninterrupted views of the proposed scheme. Vegetation clearance and road improvement works along Oxford Road would be noticeable. Overall this would result in a high magnitude of change which would result in major/moderate adverse effects. Over time the enhanced Oxford Road Frontage and landscape strategy within the site would mature and embed the scheme into the local area, which would lessen the effects.

Haslemere Gardens

10.6.19 Due to the overall orientation of the residential dwellings in this development, there are only four properties on the northern edge which have direct views out to the site. These four properties would experience a high magnitude of change, resulting in a major/moderate adverse effect, which is significant in EIA terms. Other properties at Haslemere Gardens would experience a low to very low change, resulting in a moderate/minor to minor effect, which is not significant in EIA terms.

Hayward Road

10.6.20 Residents at Hayward Road are located to the south of the sports pitches contained in Cutteslowe Park, with rear gardens facing north. The foreground of views towards the site would generally be dominated by private gardens and sports pitches with flood lighting in the foreground.

Harbord Road

10.6.21 Residents at Harbord Road would experience limited change due to the development. Built form may be visible in glimpsed views from upper storeys of buildings. Overall, this would constitute a low magnitude of change which results in a moderate/minor adverse effect, which is not significant in EIA terms.

Water Eaton

10.6.22 Residents at Water Eaton have expansive views across the local countryside. The proposed development would be noticeable in the background of views. Due to the relative distance from the site this would constitute an initial medium magnitude of change. Once the landscape strategy matures and the development integrates into the local landscape, it would constitute a low change which in the long-term would result in a moderate/minor adverse effect, which is not significant in EIA terms.

10.6.23 Overall, residential properties that have visibility of the site would experience a change due to the proposed development. This is dependent on the orientation of dwellings, the location of

windows, relative distance to the site and intervening features such as vegetation or built form. The assessment of visual effects on residential receptors is based on site walkovers and desktop analysis and is not based on visiting individual properties.

Users of Cutteslowe Park

10.6.24 Users of the Park would have visibility of the proposed development through the boundary vegetation on the site's southern edge. Generally, the southern extent of the site would be mainly used as open space and would contain a considerable amount of tree and shrub planting, which would soften views of built form contained within the site. Therefore, users of the park are expected to experience a change (as shown in Photoviewpoint EDP 8), this would result in an overall moderate/minor adverse effect, which is not significant in EIA terms.

10.7 Cumulative Effects

10.7.1 Cumulative effects consider developments which would take place in the vicinity of the site and its wider context and would result in an amplified effect as a result of the proposed developments. Developments that have been considered as part of this exercise are shown on Figure 15.1.

10.7.2 The following 9 cumulative schemes have been discounted from this assessment due to their relative distance from the site and the unlikely correlation of landscape and visual effects:

- Policy PR8
- Policy PR9
- Policy PR10
- Kiddlington 1A
- Kiddlington 1B
- Policy SP24
- Policy SP52
- Policy SP28
- 18/02065/OUTFUL

10.7.3 The following 5 schemes are considered to be within the context of the site and are likely to have cumulative effect in landscape and visual terms. The likely cumulative effects are described below.

Policy PR6b

10.7.4 Policy PR6b is located within North Oxford Golf Club to the west of the site on the western side of Oxford Road and is for residential development. Due to the existing vegetation patterns along Oxford Road and the proposed landscape strategy within the site, there would be limited intervisibility between the two allocated areas.

10.7.5 In landscape terms, the allocated PR6b site has limited value due to its recreational use as a golf course and the highly managed character of the landscape features within it. It is contained by a railway line to the north-west and west, Oxford Road to the north-east and east and the settlement edge of Oxford to the south.

10.7.6 In visual terms, PR6b is relatively enclosed due to existing vegetation on the boundary and

within the area. Photoviewpoint EDP 1, which forms part of the visual assessment, is taken from the western edge of PR6b and would have visibility of proposals within this location in the foreground. Views along Oxford Road would be able to see PR6b and the site at the same time, which would amplify potential urbanising effects as a result of proposed residential and mixed use development.

10.7.7 Overall, PR6b and the site would have correlating effects in landscape and visual terms if both locations are developed. This would mainly affect close-range views along Oxford Road, where both allocated sites would be visible. Beyond this there would be limited to no cumulative effects. The landscape character along the settlement edge would change, but the wider landscape character in the local area would remain the same.

Policy PR6c

10.7.8 The allocated Policy PR6c site lies to the north-west of the site, beyond the A34 and A4260. Due to the extensive vegetation along the A34 and the Oxford Parkway Park and Ride to the north of the site, there would be no intervisibility between the sites. As a result there would be no significant cumulative effects in landscape and visual terms between the site and the allocated PR6c site.

Policy PR7a

10.7.9 The allocated Policy PR7a site lies to the north of the site, beyond the A34 and is for residential development. Due to the extensive vegetation along the A34 and the Oxford Parkway Park and Ride to the north of the site, there would be no intervisibility between the sites. The proposed landscape strategy within the site proposes extensive vegetation in the northern part of the site, which would add to this visual screening effect. As a result there would be no significant cumulative effects in landscape and visual terms between the site and the allocated PR7a site.

Policy PR7b

10.7.10 The allocated Policy PR7b site lies to the north-west of the site, beyond the A34 on the settlement edge of Kiddlington and is for residential development. Due to the extensive vegetation along the A34 and the Oxford Parkway Park and Ride to the north of the site, there would be no intervisibility between the sites. The proposed landscape strategy within the site proposes extensive vegetation in the northern part of the site, which would add to this visual screening effect. As a result there would be no significant cumulative effects in landscape and visual terms between the site and the allocated PR7b site.

20/03034/FUL

10.7.11 The allocated site lies to the south-east of the site along the A40 Northern Bypass Road and is for residential development. While there is no intervisibility between the sites, views from the wider landscape looking west or south-west towards Oxford may have views of both the PR6a site and the 20/03034/FUL site. Beyond this there would be no significant cumulative effects in landscape and visual terms.

10.8 Summary

10.8.1 This report has summarised the findings of a comprehensive landscape data trawl and field appraisal undertaken by EDP's landscape team (Sections 2,3,4 and 5). In Section 6, the proposed development is described with any proposed mitigation. Section 7 undertakes an assessment of the likely landscape and visual effects having regard to the above and based on a combination of the thresholds set out in the assessment methodology coupled with professional judgement.

10.8.2 The following effects are likely:

- The character of the site would experience a considerable level of change due to the proposed development. The introduction of built form into the currently agricultural site would disrupt the integrity of the existing landscape character. This would constitute a major/moderate adverse effect at Year 1 and a moderate adverse effect once the proposed landscape strategy is established at Year 15 and the development has integrated into the local context;
- The immediate landscape character context of the site would experience a major/moderate adverse level of effect as a result of the proposed development. However, this effect would be localised in relation to the wider landscape character and diminish as distance to the site increases. The site would generally read as an extension to the existing settlement;
- PRoW 229/9/30 and PRoW 229/8/10 contained within the site would be affected by the scheme and visual receptors from these footpaths would experience major/moderate adverse effects where they are located within the site and in proximity to the site;
- Road Users along Oxford Road would experience a considerable change as a result of the proposed tree removal along the western boundary, which would result in moderate adverse effects, which would diminish over time to moderate/minor adverse effects;
- Residential receptors with views of the south of the site would experience considerable visual effects. Residential receptors along Oxford Road and further south would have limited to no visibility of the proposed development;
- Policy PR6a: Land East of Oxford Road refers to the site and development proposals assessed in this LVA. The proposed development responds to the requirements outlined in this policy as set out below:
    - The proposed development would provide “facilities for formal sports, play areas and allotments” as per point 5 outlined in the policy;
    - The proposals would create an extensive landscape buffer on the site’s eastern boundary and would incorporate a “public open green space as an extension to Cutteslowe Park” in the south-east of the site. This space would enhance the amenity space provision in the local area, creating “nature trail/circular walks” that connect to the new primary school – as per point 6 in the policy;
    - The site’s eastern boundary would be developed as an extensive landscape corridor, creating a soft transition into the countryside. This would become an accessible “green infrastructure corridor” as per point 6 in the policy and would “minimise the visual and landscape impact of the development” on the local landscape, while creating a new permanent green belt boundary as per point 25 in the policy; and
    - The south-eastern part of the site would remain “free of buildings” and would be developed as an extension to the existing Cutteslowe Park – as per point 28 in the policy.

10.8.3 The proposed development would introduce built form into the site which would alter its baseline landscape character and visual appearance. Over time, the proposals would integrate into the local context and would read as an extension to the settlement. From a visual perspective, close-range views and views from within the site would be most affected. Mid-range and long-

distance views would generally be less affected by the proposals due to the intervening vegetation and built form.

10.8.4 While there would be considerable adverse effects on local landscape and visual receptors due to the nature of the proposed development, it would provide a series of benefits. From a landscape and visual perspective these include:

- Improved access to the site including walking and cycling routes for leisure and recreation;
- Provision of play areas and allotments for the emerging community and the existing residents;
- Extensive landscape buffer on the eastern boundary that ensures a soft transition to the countryside and creates a defensible Green Belt boundary;
- High-quality outdoors space including extensive tree and shrub planting for amenity value and habitat creation; and
- Sustainable drainage features which create habitat value and seasonal interest for residents, with the potential for play area in/with water.

10.8.5 While there would be considerable tree loss along Oxford Road, a tree replacement strategy in combination with the proposed landscape strategy would deliver a high-quality avenue along the western site boundary and create significant green infrastructure and areas of open space as part of the scheme. Overall, the proposed development is considered to create an appropriate settlement edge with a soft transition into the countryside.

Table 10.8 Summary of landscape character effects

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
Construction phase					
Site Character and Context	Medium	During the construction phase, moving plant and machinery, earthworks, the construction of buildings and overall implementation of the proposed development would alter the site in relation to its baseline condition. Partially constructed buildings would introduce built form into the previously agricultural site. This would constitute a very high change which would result in a major/moderate adverse effect.	CEMP	major/moderate adverse effect.	Significant
Vale Farmland LT	Medium	During the construction phase, moving plant and machinery, earthworks, the construction of buildings and overall implementation of the proposed development would alter the site in relation to its baseline condition. Increased traffic would be noticeable beyond the site and in the wider character area containing the site. However, the site forms a relatively small part of the wider character area. The effects would therefore be localised and would as such not considerably alter the integrity of the wider character area. This would therefore result in a medium magnitude of change, resulting in a moderate/minor adverse effect on the Vale Farmland LT.	CEMP	moderate/minor adverse effect	Significant
Otmoor Lowland	Medium	During the construction phase, moving plant and machinery, earthworks, the construction of buildings and overall implementation of the proposed development would alter the site in relation to its baseline condition. Increased traffic	CEMP	Minor adverse effect	Not significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		would be noticeable beyond the site and in the wider character area containing the site. However, the site forms a relatively small part of the wider character area. The effects would therefore be localised and would as such not considerably alter the integrity of the wider character area. This would therefore result in a low magnitude of change, resulting in a minor adverse effect on the Otmoor Lowlands.			
Operational phase					
Site Character and Context	Medium	<u>Operation (Year 1):</u> In the short-term, the proposed development would be in discordance with the site's existing character. Elements of built form which have urbanising influence would be introduced into the currently agricultural site. This would extend the settlement character and the settlement edge into the site. The proposed landscape strategy would have limited beneficial effects on the proposed development, due to its immaturity at this stage. The proposed development is therefore considered to result in a very high change which constitutes a major/moderate adverse effect. <u>Operation (Year 15):</u> In the medium term, the Proposed Development would alter the character of the site permanently. While this is in discordance with the existing baseline condition, the landscape enhancements	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape.	At all stages of the proposed development, the newly introduced built form would be in discordance with the baseline character of the site. This constitutes a major/moderate adverse effect at Year 1 and, due to the integration of the scheme into the local context, a lessened moderate adverse effect at	Significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		within the site would provide a new defensible green belt boundary and would create a soft transition into the wider landscape. Additional planting and high-quality green infrastructure provided as part of the scheme, would integrate the proposed development into the existing context. The proposed development would be read as an extension to the settlement and would as such have a lesser magnitude of change once it has weathered and assimilated into the landscape. Therefore, at Year 15, the proposed development is considered to result in a high magnitude of change, which results in a moderate adverse effect.		Year 15.	
Vale Farmland	Medium	<u>Operation (Year 1):</u> At Year 1, there would be limited effect on landscape character beyond the site's boundary. The proposed development would read as an extension to the existing settlement and would as such be perceived as part of the existing settlement pattern. The following changes would occur to the landscape character: The typical field pattern within the site would be disrupted due to the change of use within the site. Further afield the patterns would not be affected; While ditches and streams would be altered and diverted form their baseline locations, there would be a network of swales, ditches and attenuation features contained in the scheme. Beyond the site, these features would not be affected;	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape.	At Year 1, there would be localised moderate/minor adverse effect At Year 15, there would be localised minor adverse effect.	Not significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		The character of nucleated and compact villages would not be affected, since Oxford does not fall into this category at present. Water Eaton and villages like Islip would not experience effects to their settlement pattern; and The gently rolling landscape in the LT would generally remain intact, although views across the slightly rolling landform would be limited across the site due to the proposed development. Effects on the wider landscape character would be localised, resulting in a medium magnitude of change, which constitutes a moderate/minor adverse level of effect. <u>Operation (Year 15):</u> In the medium term, the Proposed Development would be assimilated into the local landscape. It would read as part of the existing settlement and would form part of Oxford. The wider landscape character is therefore considered to experience localised effects of a low magnitude, which results in a minor adverse effect on the Farmland Vale LT.			
Otmoor Lowland	Medium	<u>Construction Phase:</u> During the construction phase, moving plant and machinery, earthworks, the construction of buildings and overall implementation of the proposed development would alter the site in relation to its baseline condition. Increased traffic would be noticeable beyond the site and in the wider character area containing the site.	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape.	At Year 1, there would be localised minor adverse effect At Year 15, there would be localised	Not significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		However, the site forms a relatively small part of the wider character area. The effects would therefore be localised and would as such not considerably alter the integrity of the wider character area. This would therefore result in a low magnitude of change, resulting in a minor adverse effect on the Otmoor Lowlands. <u>Operation (Year 1):</u> At Year 1, there would be limited effect on landscape character beyond the site's boundary. The following effects would occur to the landscape character: The landscape contained within Otmoor Lowlands is dominated by arable land use. The site would be removed from this land use, but would incorporate extensive areas of open space, including a distinctive buffer along the eastern development edge which would create a soft transition towards the remaining arable land in the LCA; The exposed character of the LCA would no longer be applicable to the site due to the introduction of built form. However, the overall open character of the wider LCA would not be affected; The proposed development would incorporate an extensive landscape buffer and tree planting, which would limit views out to the countryside and disrupt this character feature. However, beyond the site level this characteristic would		minor/negligible adverse effect.	

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		remain intact and views towards the site and settlement would be softened. Overall, the proposed development would read as an extension to the existing settlement and would as such be perceived as part of the existing settlement pattern. Effects on the wider landscape character would be localised, resulting in an overall low magnitude of change, which constitutes a minor adverse effect. <u>Operation (Year 15):</u> In the medium term, the Proposed Development would be assimilated into the local landscape. It would read as part of the existing settlement and would form part of Oxford. The wider landscape character is therefore considered to experience localised effects of a very low magnitude, which results in a minor/negligible adverse effect on the Otmoor Lowlands.			

Table 10.9 Summary of Visual Effects

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
Construction phase					
Photoviewpoint 1	High	<u>Construction Phase:</u> Due to the structural planting within the golf course, there is no visibility towards the eastern edge of the golf			Not significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		course and the site. Construction activity would not be noticeable form this location. No Effect.			
Photoviewpoint 2	High	Construction Phase: During the construction phase, moving plant and machinery would be noticeable from this location. While the south-eastern parcel contained within the site is being developed as an extension to Cutteslowe Park with extensive areas of landscaping, works to facilitate the proposed planting scheme and public open space design would be visible. Taller vertical elements constructed in the centre of the site would be visible above the tree line and beyond the agricultural buildings at St Frideswide's Farm. Construction activity would be in contrast to the existing view and would be highly noticeable. This is considered to result in major/moderate adverse effect.	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	During the temporary construction phase, construction activity would be noticeable. This would therefore result in major/moderate adverse effects to this view.	Significant
Photoviewpoint 3	Low	Construction Phase: During the construction phase, moving plant and machinery would be prominent from this location. Partially constructed buildings would be visible. Earth works and excavation works would be noticeable in this view. The left of this view, which includes the site, would be changed from its baseline	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	During the temporary construction phase, receptors would have direct visibility of the construction work in the far left of this view.	Significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		condition and would therefore experience a moderate adverse effect.		This would result in a moderate adverse effect.	
Photoviewpoint 4	High	Construction Phase: During the construction phase, moving plant and machinery would be prominent from this location. Partially constructed buildings would be visible. Earth works and excavation works would be noticeable in this view. The expansive views of the countryside would be disrupted. The view would be completely changed from its baseline condition and would therefore experience a major adverse effect.	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	During the temporary construction phase, receptors would have direct visibility of the construction work, which would disrupt the baseline view. This would result in a major adverse effect.	Significant
Photoviewpoint 5	High	Construction Phase: During the construction phase, there would be limited visibility of moving plant and machinery. Taller vertical elements such as cranes or partially constructed buildings would be noticeable where they protrude above the existing boundary vegetation. Construction activity would constitute a very low magnitude of change which would result in a minor adverse effect.	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	During the temporary construction phase, receptors would have filtered views of the construction work. This would result in a moderate adverse effect.	Significant
Photoviewpoint 6	High	Construction Phase: During the construction phase, there would be limited visibility of moving	Additional planting in accordance with the landscape strategy to	During the temporary construction	Significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		plant and machinery. Taller vertical elements such as cranes or partially constructed buildings would be noticeable. Construction activity would constitute a medium magnitude of change which would result in a moderate adverse effect.	embed the proposed scheme within the local landscape and screen potential visual effects.	phase, receptors would have visibility of the construction work, which would disrupt the baseline view. This would result in a moderate adverse effect.	
Photoviewpoint 7	High	Construction Phase: Construction activity within the site would be noticeable form this location. Moving plant and machinery, earth works and taller elements such as partially constructed buildings would be noticeable. The south-east of the site would be extensively planted in line with the landscape strategy proposals. This would change the baseline view and would have a moderate adverse effect.	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	During the temporary construction phase, receptors would have visibility of the construction work, which would disrupt the baseline view. This would result in a moderate adverse effect.	Significant
Photoviewpoint 8	High	Construction Phase: During the construction phase, moving plant and machinery would be visible behind the boundary hedge. New tree and shrub planting along the site's southern boundary would be visible. Partially constructed buildings would protrude above the vegetation. The open view beyond the boundary hedge	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	During the temporary construction phase, receptors would have visibility of the construction work. This would	Significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		would be disrupted which would result in a very high magnitude of change and a moderate adverse effect.		disrupt the baseline view. This would result in a moderate adverse effect.	
Photoviewpoint 9	Low	Construction Phase: During the construction phase, there may be glimpsed views of construction activity and partially constructed buildings through the existing vegetation. However, this would be in the far background of the view and would not be a prominent feature. The view would experience a medium magnitude of change which would result in a minor adverse effect.	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	During the temporary construction phase, receptors would have limited visibility of the construction work. This would result in a minor adverse effect.	Not significant
Photoviewpoint 10	High	Construction Phase: Due to the relative distance from the site, there would be no discernible effects for this view. No Effect.		During the temporary construction phase, receptors would not have visibility of the construction activity. This would therefore result in no effect to this view.	Not significant
Photoviewpoint 11	Low	Construction Phase: During the construction phase,	Additional planting in accordance with the	During the temporary	Not significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		increased traffic to and from the site would be noticeable from this location. Road works and road closures would be visible to the left of this view. Vegetation clearance would be noticeable in the far left of this view. While this would be a visible change, it would not be the focus of this view. This view is therefore considered to experience a medium magnitude of change which would constitute a minor adverse effect.	landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	construction phase, receptors would have limited visibility of construction works taking place. As a result there would be a minor adverse effect.	
Photoviewpoint 12	Low	Construction Phase: During the construction phase, moving plant and machinery would be prominent from this location. Partially constructed buildings would be visible. Earth works and excavation works would be noticeable in this view. The view would be completely changed from its baseline condition and would therefore experience a very high level of change which constitutes a moderate adverse effect.	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	During the temporary construction phase, receptors would have direct visibility of construction works. This would result in a moderate adverse effect.	Significant
Photoviewpoint 13	High	Construction Phase: During the construction phase, moving plant and machinery would be prominent from this location. Partially constructed buildings would be visible. Earth works and excavation works would be noticeable in this view. Vegetation clearance along Oxford	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	During the temporary construction phase, receptors would have direct visibility of construction works and	Significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		Road would be clearly visible, which would change the view and make Oxford Road visible. The view would be changed from its baseline condition and would therefore experience a very high magnitude of change which constitutes a major adverse effect.		vegetation clearance. This would result in a major adverse effect.	
Photoviewpoint 14	High	Construction Phase: Due to the relative distance form the site and the intervening vegetation, construction activity would not be easily discernible form this location. Taller vertical elements and partially constructed buildings would be noticeable in the far backdrop of this view. Nevertheless, the integrity of the view would remain intact. This would result in a low magnitude of change which constitutes a moderate/minor adverse effect.	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	During the temporary construction phase, receptors would have limited visibility of the construction activity. This would therefore result in moderate/minor effect to this view.	Not significant
Photoviewpoint 15	High	Construction Phase: Due to the relative distance from the site, construction activity would not be easily discernible form this location. Taller vertical elements and partially constructed buildings would be noticeable in the far backdrop of this view. Construction activity would not protrude above the existing tree line. This would result in a low magnitude of change which constitutes a	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	During the temporary construction phase, receptors would have limited visibility of the construction activity. This would therefore result in	Not significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		moderate/minor adverse effect.		moderate/minor effect to this view.	
Photoviewpoint 16	Low	Construction Phase: Construction activity within the site and along Oxford Road would be noticeable from this location. Where vegetation clearance along Oxford Road is required this would be easily discernible and would disrupt the current appearance of the view. Roadworks and any road closures would be visible. Partially built buildings and construction works would be visible. This would result in a very high change which constitutes a moderate adverse effect.	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	During the temporary construction phase, receptors would be able to see constriction activity. This would disrupt the existing view. This would constitute a moderate adverse effect.	Significant
Photoviewpoint 17	Low	Construction activity within the site would be prominent from this location and would alter the view from its baseline condition. This would result in a very high magnitude of change, which paired with the low sensitivity of the receptor would constitute a **moderate adverse level of effect.**	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	During the temporary construction phase, receptors would be able to see constriction activity. This would disrupt the existing view. This would constitute a moderate adverse effect.	Significant
Photoviewpoint 18	High	Construction activity within the site would be noticeable from this location	Additional planting in accordance with the	During the temporary	Significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		and would alter the view from its baseline condition. Construction activity would constitute a medium magnitude of change which would result in a **moderate adverse effect.**	landscape strategy to enhance boundary vegetation embed the proposed scheme within the local landscape and screen potential visual effects.	construction phase, receptors would have filtered views of the construction work. This would result in a moderate adverse effect.	
Photoviewpoint 19	Medium	During the construction phase, moving plant and machinery would be prominent from this location. Partially constructed buildings would be visible. Earth works and excavation works would be noticeable in this view. This would result in a high magnitude of change, which combined with the medium sensitivity would result in a **moderate adverse effect.**	Additional planting in accordance with the landscape strategy to enhance boundary vegetation embed the proposed scheme within the local landscape and screen potential visual effects.	During the temporary construction phase, receptors would have uninterrupted views of the construction work. This would result in a moderate adverse effect.	Significant
Operational phase					
Photoviewpoint 1	High	<u>Operation (Year 1):</u> In the short-term, the Proposed Development would not be visible. No Effect. <u>Operation (Year 15):</u> In the medium term, the Proposed Development would not be visible. No Effect.		At all stages of the Proposed Development, the proposals would not be visible and no effect is predicted.	Not significant
Photoviewpoint 2	High	<u>Operation (Year 1):</u>	Additional planting in	At all stages of	Significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		In the short-term, the Proposed Development would be noticeable. New planting would be evident in the centre and in the backdrop of this view, where the proposed open space to the south-east and the green spine along the eastern site boundary would be established. While this would alter the baseline view, it would provide some screening to the proposed residential development and add additional screening to the settlement edge around Cutteslowe Park. The proposed school would protrude above the existing tree line and other elements of built form would be noticeable between the vegetation – particularly during the winter months when trees are not in leaf. Therefore, the view is considered to experience moderate adverse effects. <u>Operation (Year 15):</u> In the medium term, vegetation to the east and south-east of the site would have matured and the majority of the proposed development would be screened. Taller buildings on the Oxford Road Frontage and the proposed school would protrude above the existing treeline and would be noticeable in the background of this view. The additional elements of green infrastructure and planting to the south-east of the site would be a benefit to	accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	the Proposed Development, there would be noticeable changes to this view, which would result in moderate adverse effects.	

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		the settlement edge and the local landscape. The proposed built form in the centre of the site, particularly the proposed school building, would extend the settlement into this view and would be a noticeable detractor. This is considered to result in moderate adverse effect.			
Photoviewpoint 3	Low	<u>Operation (Year 1):</u> In the short-term, the Proposed Development would be noticeable. Proposed built form would be introduced to the left of this view which would disrupt views towards the wider landscape. Man-made elements would be introduced into the site and would as such alter the visual appearance of the site. The new built form and additional landscaping would be noticeable new features. The view is therefore considered to experience a moderate adverse effect. <u>Operation (Year 15):</u> In the medium term, the proposed development would be visible. Vegetation would be somewhat mature at this stage, however the development edge on the site's western boundary, formed by residential dwellings and associated back gardens, would remain visible. Materials within the proposals would have become weathered and the landscape strategy	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	At all stages of the Proposed Development, the proposals would be visible and would interfere with views out into the wider countryside. This would change the baseline condition of the view and would result in a moderate adverse effect at Year 1 and a minor adverse effect at Year 15.	Not significant at Year 15.

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		would have matured, so that the completed development would become assimilated into its context and is likely to become a generally accepted feature in the view. As such, the magnitude of change is expected to reduce to medium by year 15. This would constitute a minor adverse effect.			
Photoviewpoint 4	High	<u>Construction Phase:</u> During the construction phase, moving plant and machinery would be prominent from this location. Partially constructed buildings would be visible. Earth works and excavation works would be noticeable in this view. The expansive views of the countryside would be disrupted. The view would be completely changed from its baseline condition and would therefore experience a major adverse effect. <u>Operation (Year 1):</u> In the short-term, the Proposed Development would be highly noticeable in this view. Proposed built form would be introduced in the centre of this view which would disrupt the existing view across the local landscape. Man-made elements would be introduced into the site and would alter the visual appearance of the site. Built form would protrude above the	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	At all stages of the Proposed Development, the proposals would be visible and would interfere with views out into the wider countryside. This would change the baseline condition of the view and would result in major adverse effects at Year 1. At Year 15, once the landscape strategy is established and materials have weathered, the scheme would assimilate into	Significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		exiting treeline and would dominate the skyline from this location. The view is therefore considered to experience a major adverse effect. <u>Operation (Year 15):</u> In the medium term, the proposed development would be visible. Materials within the proposals would have become weathered and the landscape strategy would have matured, so that the completed development would become assimilated into its context and is likely to become a generally accepted feature in the view. Nevertheless, the built form would be highly noticeable in this view. As such, the magnitude of change is expected to reduce to high by year 15. This would constitute a major/moderate adverse effect.		the local context, which would lessen the magnitude of change and would result in a major/moderate adverse effect.	
Photoviewpoint 5	High	<u>Operation (Year 1):</u> In the short-term, the Proposed Development would be noticeable in the background of this view. Taller buildings, particularly in the centre of the site and towards the Oxford Road frontage, would be visible through the boundary vegetation, with tops of buildings visible above the tree line. Man-made elements would be introduced into the site and would as such alter the visual appearance of the site. Vegetation clearance along	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	At all stages of the Proposed Development, the proposals would be visible. This would change the baseline condition of the view and would result in a moderate adverse effect at	Not significant at Year 15.

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		Oxford Road to facilitate the cycle super highway may be noticeable in the far background of the view. However, due to the relative distance from the site and the extensive existing and proposed boundary vegetation, proposed built form would be filtered. The proposed buildings would sit below the existing power lines. The view is therefore considered to experience a medium magnitude of change which would constitute a moderate adverse effect. <u>Operation (Year 15):</u> In the medium term, the proposed development would be visible. However, materials within the proposals would have become weathered and the landscape strategy would have matured, so that the completed development would become assimilated into its context and is likely to become a generally accepted feature in the view. As such, the magnitude of change is expected to reduce to low by year 15. This would constitute a moderate/minor adverse effect.		Year 1 and a moderate/minor adverse effect at Year 15.	
Photoviewpoint 6	High	<u>Operation (Year 1):</u> In the short-term, the Proposed Development would be highly noticeable in this view. Proposed built	Additional planting in accordance with the landscape strategy to embed the proposed	At all stages of the Proposed Development, the proposals	Not significant at Year 15.

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		form would be introduced in the centre of this view which would disrupt the existing view towards the site. Proposed vegetation would be noticeable, but would not yet be effective in screening the proposed development. However, built form would sit below the existing powerlines and would not alter the existing skyline. The view is therefore considered to experience a medium magnitude of change which would result in a moderate adverse effect. <u>Operation (Year 15):</u> In the medium term, the proposed development would be visible. However, materials within the proposals would have become weathered and the landscape strategy would have matured, so that the completed development would become assimilated into its context and is likely to become a generally accepted feature in the view. As such, the magnitude of change is expected to reduce to low by year 15. This would constitute a **moderate/minor adverse effect.**	scheme within the local landscape and screen potential visual effects.	would be visible. This would change the baseline condition of the view and would result in moderate adverse effects at Year 1. At Year 15, once the landscape strategy is established and materials have weathered, the scheme would assimilate into the local context, which would lessen the magnitude of change and would result in a moderate/minor adverse effect.	
Photoviewpoint 7	High	<u>Operation (Year 1):</u> In the short-term, the Proposed Development would be noticeable from this location. Newly implemented landscape in the south-east of the site	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local	At all stages of the Proposed Development, the proposals would be visible.	Not significant at Year 15.

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		would be visible. Built form in the centre of the site would be noticeable above the not yet mature treeline. The is would alter the baseline view and would introduce man-made influences into the local landscape. This would result in a moderate adverse effect. <u>Operation (Year 15):</u> In the medium term, the proposed landscape would have matured and would screen the development in this view. Tops of buildings may protrude above the treeline, but generally the proposed development would integrated into the landscape at this stage and would as such have a lesser magnitude of change. the Proposed Development would therefore result in a **moderate/minor adverse effect.**	landscape and screen potential visual effects.	This would change the baseline condition of the view and would result in moderate adverse effects at Year 1. At Year 15, once the landscape strategy is established and materials have weathered, the scheme would integrate into the local context, which would lessen the magnitude of change and would result in a moderate/minor adverse effect.	
Photoviewpoint 8	High	<u>Operation (Year 1):</u> At year 1, the implemented landscape would be noticeable from this location. However, it would not be sufficiently matured at this stage to offer significant screening benefits to the development. New residential dwellings would therefore protrude above the existing	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	At all stages of the Proposed Development, the proposals would be visible. This would change the baseline condition of the	Not significant at Year 15.

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		boundary hedge and would disrupt the openness of the baseline view. This would result in a very high magnitude of change which constitutes a moderate adverse effect. <u>Operation (Year 15):</u> In the medium term, the proposed landscape would have matured and would soften the visual effects of the proposed built form. The tops of dwellings may protrude above the proposed planting and there would be glimpsed views through the vegetation during the winter months when trees are not in leaf. Generally, the proposed dense screen of tree and shrub planting would limit visibility of the development, which would integrate the proposed built form into the landscape. This would result in a lesser magnitude of change so that the view would experience a moderate/minor adverse effect.		view and would result in a moderate adverse effect at Year 1. At Year 15, once the landscape strategy is established, the scheme would integrate into the view, which would lessen the magnitude of change and would result in a moderate/minor adverse effect.	
Photoviewpoint 9	Low	<u>Operation (Year 1):</u> During year 1, new built form would be visible in the background of this view. Taller buildings, particularly on the Oxford Road frontage, would protrude above the tree line. However, this would be in the background of this view and would not materially change the baseline view. This is therefore	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	At all stages of the Proposed Development, the proposals would be visible in the far background of the view. This would change	Not significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		considered to result in a low magnitude of change which would constitute a minor/negligible adverse effect. <u>Operation (Year 15):</u> In the medium term, the proposed landscape would have matured and would soften the visual effects of the proposed built form. Taller elements would nonetheless protrude above the treeline in some locations. This is therefore considered to result in a low magnitude of change which would constitute a minor/negligible adverse effect.		the baseline condition of the view and would result in a minor/negligible adverse effect.	
Photoviewpoint 10	High	<u>Operation (Year 1):</u> In the short-term, the Proposed Development would not be visible. No Effect. <u>Operation (Year 15):</u> In the medium term, the Proposed Development would not be visible. No Effect.	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	At all stages of the Proposed Development, the proposals would not be visible and no effect is predicted.	Not significant
Photoviewpoint 11	Low	<u>Operation (Year 1):</u> In the short-term, the proposed development would be noticeable in the far left of this view. Newly planted trees along the road would be easily discernible. While built form is set back from the road frontage, there would be glimpsed views of the built form	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	At Year 1, changes along the Oxford Road frontage would be noticeable to the far left of the view. Residential dwellings may	Not significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		through the trees. This is considered to alter the baseline view and result in a medium magnitude of change, which constitutes a minor adverse effect. <u>Operation (Year 15):</u> In the medium term, the Proposed Development would integrate into the existing view. The proposed planting along the Oxford Road Frontage to the left of this view would have matured and would integrate with the retained trees visible in this view. Where highway improvement works are undertaken, these would become part of the streetscape. Residential dwellings within the site would not be prominent in this view. Overall, the proposed development would have integrated into the local context Minor/Negligible neutral effect.		be visible in the gap between the residential house in the foreground and the vegetation along Oxford Road. This would constitute a minor adverse effect. At Year 15, the proposed development would have integrated into the view. While the changes would be discernible, these would not be prominent and would therefore result in a minor/negligible neutral effect.	
Photoviewpoint 12	Low	<u>Operation (Year 1):</u> In the short-term, the Proposed Development would be highly noticeable in this view. Proposed built form would be introduced in the centre of this view which would disrupt the	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen	The proposed development is visible at Year 1. The proposed built form would disrupt the existing view.	Not significant at Year 15.

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		existing view across the local landscape. The view is therefore considered to experience a very high level of change which constitutes a moderate adverse effect. <u>Operation (Year 15):</u> In the medium term, the proposed development would be visible. Materials within the proposals would have become weathered and the landscape strategy would have matured, so that the completed development would become assimilated into its context and is likely to become a generally accepted feature in the view. Nevertheless, the built form would be highly noticeable in this view and would disrupt views across the local landscape. Due to the matured landscape strategy and the weathered materials, the magnitude of change is expected to reduce to high by year 15. This would constitute a Moderate/Minor adverse effect.	potential visual effects.	This would result in moderate adverse effects. At Year 15, once the landscape strategy is established and materials have weathered, the scheme would assimilate into the local context, which would lessen the magnitude of change and would result in a moderate/minor adverse effect.	
Photoviewpoint 13	High	<u>Operation (Year 1):</u> In the short-term, the Proposed Development would be highly noticeable in this view. Proposed built form would be introduced in the centre of this view which would disrupt the existing view across the local landscape. While the implemented	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	The proposed development is visible at Year 1. The proposed built form would disrupt the existing view. This would result	Significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		landscape strategy would be visible, this would have limited effect to screen the new buildings due to its immaturity. The view is therefore considered to experience a very high magnitude of change which constitutes a major adverse effect. <u>Operation (Year 15):</u> In the medium term, the proposed development would be visible. Materials within the proposals would have become weathered and the landscape strategy would have matured, so that the completed development would become assimilated into its context and is likely to become a generally accepted feature in the view. Nevertheless, the built form would noticeably disrupt views across the local landscape and would extend the settlement edge into the site. Due to the matured landscape strategy and the weathered materials, the magnitude of change is expected to reduce to high by year 15. This would constitute a major/moderate adverse effect.		in major adverse effects. At Year 15, once the landscape strategy is established and materials have weathered, the scheme would assimilate into the local context, which would lessen the magnitude of change and would result in a major/moderate adverse effect.	
Photoviewpoint 14	High	<u>Operation (Year 1):</u> In the short-term, the Proposed Development would be visible in the far background of this view. New built form would be visible. The proposed buildings would not protrude above the	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen	At Year 1, the proposed development would be noticeable in the far backdrop of	Not significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		existing tree line and would not break the existing skyline. This is considered to result in a low magnitude of change, which constitutes a moderate/minor adverse effect. <u>Operation (Year 15):</u> In the medium term, the proposed development would be visible in the far backdrop of the view. Materials within the proposals would have become weathered and the landscape strategy would have matured, so that the completed development would become assimilated into its context and is likely to become a generally accepted feature in the view. Due to the matured landscape strategy and the weathered materials, the magnitude of change is expected to reduce to very low by year 15. This would constitute a minor adverse effect.	potential visual effects.	this view. This would constitute a moderate/minor adverse effect. At Year 15, the proposed development would have integrated into the local context. This would reduce the magnitude of change and would result in a minor adverse effect.	
Photoviewpoint 15	High	<u>Operation (Year 1):</u> In the short-term, the Proposed Development would be visible in the far background of this view. New built form would be visible. The proposed buildings would not protrude above the existing tree line and would not break the existing skyline. This is considered to result in a low magnitude of change, which constitutes a moderate/minor adverse effect.	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	At Year 1, the proposed development would be noticeable in the far backdrop of this view. This would constitute a moderate/minor adverse effect.	Not significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		Operation (Year 15): In the medium term, the proposed development would be visible in the far backdrop of the view. Materials within the proposals would have become weathered and the landscape strategy would have matured. Therefore the completed development would become assimilated into its context and is likely to become a generally accepted feature in the view. Due to the matured landscape strategy and the weathered materials, the magnitude of change is expected to reduce to very low by year 15. This would constitute a minor adverse effect.		At Year 15, the proposed development would have integrated into the local context. This would reduce the magnitude of change and would result in a minor adverse effect.	
Photoviewpoint 16	Low	Operation (Year 1): In the short-term, the Proposed Development would be visible. New buildings within the site would protrude above the existing tree line and would be prominent new features in this view. Landmark buildings along the Oxford Road frontage would be particularly noticeable. Any views out to the countryside would be disrupted by the built form and would no longer be possible. Where tree replacement planting is to be provided along Oxford Road, the immature vegetation would be noticeable. This would result in a very	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	At Year 1, the proposed development would be visible. This would constitute a moderate adverse effect. At Year 15, the proposed development would have integrated into the local context. This would	Not significant at Year 15.

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		high change to this view. Which constitutes a moderate adverse effect. <u>Operation (Year 15):</u> In the medium term, the Proposed Development would be noticeable. However, at Year 15, the proposed tree replacement strategy along Oxford Road and the landscape strategy within the site would have matured. This would provide a level of screening to the new built form and would soften visual effects of the proposed development. While the built form would still be visible, protruding above the tree line, materials would have weathered and the proposals would have somewhat assimilated into the local context. This would constitute a reduced effect from very high to high, which result in a moderate/minor adverse effect for receptors in this location.		reduce the magnitude of change and would result in a moderate/minor adverse effect.	
Photoviewpoint 17	Low	<u>Operation (Year 1):</u> In the short-term, the proposed development would be prominent in this view. The newly planted landscape strategy would be visible and additional tree and shrub planting would alter this views from its baseline condition. The existing settlement edge would become less visible due to the proposed planting strategy. Proposed built form would be noticeable to the	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	At Year 1, the proposed development would be visible. This would constitute a moderate adverse effect. At Year 15, the proposed	Not significant at Year 15.

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		right of this view. This would result in a very high magnitude of change which combined with the low sensitivity would result in a **moderate adverse effect**. <u>Operation (Year 15):</u> In the medium term, the proposed landscape strategy would have established. This would filter views across the site and would form a noticeable site boundary within the local landscape. Bult form would be filtered in views and less visible form this location. The scheme would be embedded into the local landscape as materials weather and the vegetation matures. This result in a high magnitude of change which paired with the low sensitivity constitutes a **moderate/minor adverse effect.**		development would have integrated into the local context. This would reduce the magnitude of change and would result in a moderate/minor adverse effect.	
Photoviewpoint 18	High	<u>Operation (Year 1):</u> In the short-term, the Proposed Development would be noticeable in the background of this view. Taller buildings may be visible above the tree line. Particularly the proposed school in the centre of the site may protrude above the tree line. Additional planting on the eastern boundary would not be matured enough to enhance the boundary yet. The view is therefore considered to experience a medium magnitude of change which would constitute a **moderate adverse effect.**	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	During the temporary construction phase, receptors would have filtered views of the construction work. This would result in a moderate adverse effect. At all stages of the Proposed	Not significant at Year 15.

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		Operation (Year 15): In the medium term, the proposed development would be visible. However, materials within the proposals would have become weathered and the landscape strategy would have matured, so that the completed development would become assimilated into its context and is likely to become a generally accepted feature in the view. The boundary enhancement along the eastern site boundary would have matured and added to the screening of the proposed development. As such, the magnitude of change is expected to reduce to low by year 15. This would constitute a **moderate/minor adverse effect.**		Development, the proposals would be visible. This would change the baseline condition of the view and would result in a moderate adverse effect at Year 1 and a moderate/minor adverse effect at Year 15 as the proposed landscape strategy matures.	
Photoviewpoint 19	Medium	Operation (Year 1): In the short-term, the Proposed Development would be noticeable. Proposed built form would be introduced into this view. Man-made elements would be introduced into the site and would as such alter the visual appearance of the site. The new built form and additional landscaping would be noticeable new features. The view is therefore considered to experience a high magnitude of change which constitutes a **moderate adverse effect.**	Additional planting in accordance with the landscape strategy to embed the proposed scheme within the local landscape and screen potential visual effects.	At all stages of the Proposed Development, the proposals would be visible. This would change the baseline condition of the view and would result in a moderate adverse effect at Year 1 and a moderate/minor adverse effect at	Not significant at Year 15.

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		Operation (Year 15): In the medium term, the proposed development would be visible. Materials within the proposals would have become weathered and the landscape strategy would have matured, so that the completed development would become assimilated into its context and is likely to become a generally accepted feature in the view. As such, the magnitude of change is expected to reduce to medium by year 15. This would constitute a **moderate/minor adverse effect**.		Year 15 as the proposed landscape strategy matures.	

11 Archaeology and Heritage

11.1 Introduction

11.1.1 This chapter assesses the likely significant effects of the Proposed Development on archaeological remains and built heritage resources. It incorporates a summary of the baseline Archaeological and Heritage Assessment report (Appendix 11.1) and the results of a geophysical survey and two trial trench evaluations Appendices 11.2-4). This chapter has been prepared by The Environmental Dimension Partnership Ltd (EDP).

11.1.2 The entirety of the site is located within the confirmed allocation Policy PR6a 'Partial Review of the Cherwell Local Plan 2011-2031 - Oxford's Unmet Housing Need'. Prior to the planning application, a specification for the assessment of archaeological potential was agreed between the representatives of EDP and Richard Oram, Lead Archaeologist for Oxfordshire County Council (the Archaeological Advisor to Cherwell District Council). This was to include a geophysical survey of the site, followed by trial trench evaluation.

11.1.3 An Archaeological and Heritage Assessment has also been prepared (Appendix 11.1).

11.1.4 The proposals, described in ES Chapter 3: Proposed Development, are substantially similar to those submitted in the Scoping Report in April 2021 (Appendix 4.1).

11.1.5 The chapter describes the relevant planning policy context; the assessment methodology; the baseline conditions at the Site and its surroundings; the likely significant environmental effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed.

11.1.6 Archaeology and heritage receptors include a wide range of features resulting from human intervention in the landscape, varying in scope from buried archaeological remains up to late 20th century industrial structures. In this case, archaeology and heritage receptors can be divided into the following categories:

- World Heritage Sites;
- Scheduled Monuments;
- Listed Buildings (Grades I, II* and II);
- Registered Parks and Gardens (Grades I, II* and II);
- Conservation Areas;
- Registered historic battlefields; and
- Non-designated archaeological finds and sites.

11.1.7 The archaeology and built heritage receptors outlined above are depicted on Figures 11.1 to 11.2. Registered Parks and Gardens, Scheduled Monuments, registered historic battlefields, shipwrecks and world heritage sites are not considered within this assessment, as no such designations are located within the Site, or within its wider zone of influence.

11.2 Planning Policy and Guidance

11.2.1 This section includes a brief review of legislation and policy relevant to archaeology and heritage matters, with a more comprehensive review provided in Appendix 11.1.

11.2.2 There are two primary Acts governing the conservation and management of the historic environment in an English context; The Ancient Monuments and Archaeological Areas Act (1979), and The Planning (Listed Buildings and Conservation Areas) Act (1990).

11.2.3 In summary, the 1979 Act covers the conservation and management of nationally important archaeological sites and remains, whilst in addition the 1990 Act details the designation and management of listed buildings and conservation areas, as well as the statutory duties of the LPA (or other decision makers) insofar as development is concerned.

11.2.4 The National Planning Policy Framework (NPPF) sets out national guidance concerning archaeological remains and other elements of the historic environment in Section 16. Those policies which are of relevance to the site are presented in Appendix 11.1. Of particular relevance to this chapter is the recognition in NPPF that development proposals should be assessed in their totality, so that the public benefits which they deliver are weighed against any harm resulting from their implementation.

11.2.5 Whilst Paragraph 200 states that any harm to designated heritage assets requires clear and convincing justification, the subsequent paragraphs (Paragraph 201 and 202) discriminate between substantial harm and less than substantial harm in respect of the tests to be applied by the decision maker in weighing the acceptability of a particular development proposal.

11.2.6 Paragraphs 206 and 207 of the NPPF address development that would potentially affect large and extensive heritage assets such as world heritage sites and conservation areas.

11.2.7 Paragraph 203 provides the government's guidance for the determination of development proposals involving 'non-designated' heritage assets; in doing so requiring a balanced judgement to be made regarding the scale of any harm or loss and the significance of the heritage asset in question.

11.2.8 Planning practice guidance to support the NPPF, which is of relevance to this ES chapter, is contained within National Planning Practice Guidance: Historic Environment (DLUHC and MHCLG 2019).

11.2.9 This guidance augments and provides clarification to the various heritage policies contained within the NPPF; in particular regarding the threshold for 'substantial harm' and evaluation of setting effects across the historic environment. The PPG has been used and applied in preparing the baseline assessments and drafting this chapter.

11.2.10 Local historic environment policy of relevance to the Site is contained within the Vale of White Horse Local Plan 2031. Adopted policy relevant in this case is contained within Core Policy 39: The Historic Environment.

11.2.11 The entirety of the site is located within the confirmed allocation Policy PR6a 'Partial Review of the Cherwell Local Plan 2011-2031 - Oxford's Unmet Housing Need'. This review contains specific development proposals for helping to meet Oxford's housing needs, with 4,400 homes allocated to Cherwell District.

11.2.12 Cherwell District Council submitted the Local Plan Partial Review (Oxford's Unmet Housing Need) to the Secretary of State for Housing, Communities and Local Government for formal examination on Monday 05 March 2018. This was formally adopted as part of the statutory Development Plan by the Council on Wednesday 07 September 2020.

11.2.13 Policy PR6a concerns the site and contains key delivery requirements and obligations for any forthcoming development proposals. PR6a comprises an 'urban extension to Oxford City', allowing for 690 dwellings.

11.2.14 The heritage setting assessment (within Appendix 11.1) of the designated and non-designated assets identified on Figure 11.1 and Figure 11.2 was produced in accordance with guidance set out in the following documents:

- The NPPF;
- Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets Second Edition (HE 2017);
- Historic England Advice Note 1: Conservation Area Designation, Appraisal and Management (HE 2016);
- Historic Environment Good Practice Advice in Planning, Note 2: Managing Significance in Decision-Taking in the Historic Environment (HE 2015); and
- Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment (EH 2008).

11.3 Assessment Methodology

11.3.1 The following paragraphs outline the assessment process which was employed in determining the archaeological and heritage interest of heritage assets within the Site and its wider environs, and in assessing the magnitude and significance of potential effects upon that significance.

11.3.2 Preparation of the Archaeological and Heritage Assessment (Appendix 11.1) involved the consultation of readily available archaeological and historical information from documentary and cartographic sources augmented with a site walkover.

11.3.3 Like the later stages of fieldwork (see below), the assessment was produced in accordance with relevant best practice guidance such as the Standard and Guidance for Historic Environment Desk-Based Assessment issued by the Chartered Institute for Archaeologists (CIfA, 2020). These guidelines provide a national standard for the completion of desk-based assessments.

11.3.4 Following the preparation of the baseline assessment, and in consultation with the archaeological advisor (OXCC) to Cherwell District Council, the Site was subject to a 100% detailed geophysical survey (Appendix 11.2). This entailed magnetic survey of all available and suitable areas within the Site in line with a methodology set out in a WSI approved in advance by the LPA's archaeological advisor.

11.3.5 A subsequent programme of trial trenching was undertaken on the Site (Appendix 11.3 and 11.4). The scope and methodology for this investigation was agreed in advance with the archaeological advisor (OXCC). The work comprised two phases of trial trenching, Phase 1 (Appendix 11.3) in the southern portion of the Site by Oxford Archaeology, and Phase 2 in the northern portion of the Site by Cotswold Archaeology (Appendix 11.4). Phase 1 comprised the excavation of 123 trenches, equating to a 2% sample of the Site. Phase 2 comprised the excavation of 53 trenches, equating to a 2% sample of the Site. The aim of the fieldwork was to provide information about the archaeological resource within the Site, including its presence/absence, character, extent, date, integrity, state of preservation and significance. The works were monitored throughout by EDP and the OXCC archaeological advisor, and site visits were convened to assess the results of the fieldwork.

11.3.6 With regard to the assessment of built and designated heritage assets beyond the Site, in accordance with the best practice guidance set out above, the heritage setting assessment in Appendix 11.1 undertook the following:

- Identified those heritage assets potentially affected by the Proposed Development and the manner in which they would be affected;
- Defined the contribution made to their 'significance' by their settings; and
- Assessed the likely impact upon their significance as a result of the form of development proposed being implemented.

Consultation

11.3.7 The assessment was informed by Historic England advice contained within the CDC Scoping Opinion Report (Appendix 4.2), which specifically requested the assessment consider the Cutteslowe deserted medieval village near to St Frideswide's Farm House and 'tumuli' (i.e. unscheduled round barrows) within the site which are to be retained within the landscape design.

11.3.8 Additionally, it requested an assessment of the listed buildings within it and included the undesignated farmstead Pipal Cottage and farmstead buildings within the curtilage of St Frideswide's Farm House.

11.3.9 The CDC Conservation and Design Officer also requested that the assessment considering the contribution (if any) made by the land within the site to the settings of designated heritage assets should initially focus on a study area of 1km from the boundaries of the site. These consultation responses were accordingly considered in the baseline assessment in Appendix 11.1, and, where potential impacts upon heritage assets were identified, the significance of any effects is duly assessed in this chapter.

Assessment Criteria

11.3.10 Tables 11.1, 11.2 and 11.3 set out the criteria that have been employed in attributing 'sensitivity' to archaeological and cultural heritage assets, identifying the magnitude of any changes to them and assessing the significance of the resulting effects in EIA terms.

11.3.11 The sensitivity of the heritage assets identified has been assessed on the basis of Table 11.1. The magnitude and significance of potential effects on archaeological remains and cultural heritage resources, arising from the implementation of the proposed development, have been identified and appropriately assessed, based on Tables 11.2 and 11.3.

11.3.12 The significance of effect is assessed with reference to the receptor's (i.e. the heritage asset) sensitivity and the magnitude of impact. The criteria in Table 11.1 are based on criteria established by the Highways Agency in its Design Manual for Roads and Bridges (HA 2021). This is an industry standard assessment methodology, and the only one adopted by a government agency. The attribution of the sensitivity is a question of professional judgement.

Table 11.1 Sensitivity of Receptor

Receptor	Sensitivity of Receptor				
	Very High	High	Medium	Low	Negligible
World Heritage Site	X				
Scheduled Monument		X			
Grade I or II* listed building		X			
Other nationally important archaeological asset		X			
Grade II listed building		X	X		
Grade II registered park or garden		X	X		
Conservation area			X	X	
Other asset of regional or county importance			X	X	
Locally important asset with cultural or educational value				X	X
Heritage site or feature with very limited value or interest					X

11.3.13 The classification of the magnitude of change 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. The magnitude of change is assessed using the criteria in Table 11.2.

Table 11.2 Magnitude of Change

Magnitude of Change				
Large	**Medium**	**Small**	**Negligible**	**None**
Change to the significance of a heritage asset so that it is completely altered or destroyed				
	Change to the significance of a heritage asset so that it is significantly modified			
		Change to the significance of a heritage asset so that it is noticeably different		
			Change to the significance of a heritage asset that hardly affects it	
				No change to the significance of an asset

11.3.14 Following the evaluation of sensitivity for specific archaeology and cultural heritage receptors and the magnitude of impact, the significance of effect is assessed using the criteria shown in Table 11.3 below.

Table 11.3 Significance Matrix

	Sensitivity of Receptor					
Magnitude of Change		**Very High**	**High**	Medium	Low	Negligible
	Large	**Severe**	**Major**	Medium	Moderate or Minor	Minor
	Medium	**Major**	**Major or Moderate**	Moderate or Minor	Minor	Negligible
	Small	Moderate	Moderate or Minor	Minor	Negligible	Neutral
	Negligible	Moderate or Minor	Minor	Negligible	Neutral	Neutral
	None	Neutral	Neutral	Neutral	Neutral	Neutral

11.3.15 The assessment matrix defined in Table 11.3 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 that is identified.

11.3.16 Effects are categorised with regard to their nature (adverse, beneficial or neutral) and their permanence (permanent, temporary or reversible). For all forms of heritage asset (receptor); including archaeological sites and remains; historic buildings, places and areas; and historic landscapes; the sensitivity of the receptor is combined with the predicted magnitude of change to arrive at the significance of effect.

11.3.17 The combination of sensitivity and magnitude of change is undertaken with reference to the matrix in Table 11.3, with those effects defined as severe or major being deemed significant. All other effects are determined to be not significant in EIA terms.

11.4 Baseline conditions

Current Baseline

11.4.1 This section identifies the relevant archaeological and built heritage receptors (heritage assets) within the extents of the site and its wider zone of influence. It draws upon the results of the supporting baseline assessment and investigative fieldwork reports (geophysical survey and two phases of trial trenching) (Appendices 11.1-11.4).

11.4.2 A detailed description of the baseline situation at and around the site is set out in Appendix 11.1. Provided below is a summary of the baseline assessment with regard to archaeology and built heritage, with the relevant receptors identified on Figures 11.1 to 11.2.

Designated Heritage Assets

11.4.3 There are no designated heritage assets within the boundary of the site, where there would be a presumption in favour of physical preservation in situ (Figure 11.1).

Scheduled Monuments

11.4.4 The nearest scheduled monument, Port Meadow (1010717) is situated c.1.3km to the southwest, at Upper Wolvercote.

11.4.5 This scheduled monument comprises a number of buried and low-lying archaeological features, mainly dating to the later prehistoric period. Historic England note that "although some of the items are visible from the ground, the majority can only be seen from the air. Indeed, the range and number of items present on Port Meadow was not fully realised until air photographs were first taken in 1933".

11.4.6 In this regard (i.e. on account of the features low lying and/or buried nature), the setting of the scheduled monument, or the 'surroundings in which it is experienced', is heavily restricted by the surrounding built form of the Oxford suburbs and the A34 ring road.

11.4.7 Indeed, the baseline assessment in Appendix 11.1 has established that during the site visit and visits to its wider environs, the site does not form part of the setting of this monument due to intervening built form, topography and vegetation (i.e. mature trees and hedgerows), and, as such, it has no potential to experience any indirect effect from a development in the site, as a result of change within its 'setting'. This position was verified in the field during the course of the field visits and assessment of the site's wider environs.

11.4.8 Accordingly, as this scheduled monument is not considered to have the potential to be affected by the form of development proposed within the site, it is not discussed further within this report.

11.4.9 The Port Meadow Scheduled Monument is deemed to be a heritage receptor of high sensitivity based on the criteria set out in Table 11.1

Listed Buildings

11.4.10 The identification of those listed buildings selected for further assessment, was undertaken following the methodology set out in Section 11.3.

11.4.11 Following initial desk-based analysis, including recourse to a Landscape Site Visibility Plan (EDP 2021 Landscape Assessment edp5650_r003) and confirmed through site visits, it was

established that eight listed buildings are either sufficiently close to the site and/or potentially share intervisibility with it, such that the site could potentially form part of their setting(s).

11.4.12 The listed buildings with the potential to be affected by development within the site are concentrated in the immediately surrounding environment and within the wider agricultural landscape to the east and north east of the site, where there is a more undeveloped, open aspect, and therefore, where there is a greater potential for the site to form part of their setting(s) and/or contribute to significance in this way (Figure 11.1).

11.4.13 The significance of each asset, and the contribution made to significance by its setting are considered in 11.5. The assessed assets comprise:

- The Grade II* listed St Frideswide's Farm House (1286525), situated c.50m east of the site;
- The Grade II listed St Frideswide's garden wall (1370050), situated c.75m east of the site;
- The Grade II* listed Water Eaton Manor (1046562), situated c.1.05km north east of the site;
- The Grade I listed Chapel at Water Eaton Manor (1046563), situated c.1.09km north east of the site;
- The Grade II listed South Pavilion and attached walls at Water Eaton Manor (1369721), situated c.1.07km north east of the site;
- The Grade II listed Gateway at Water Eaton Manor (1046564), situated c.1.08km north east of the site;
- The Grade II listed North Pavilion and attached walls at Water Eaton Manor (1046565), situated c.1.1km north east of the site; and
- The Grade II listed Dovecote at Water Eaton Manor (1046566), situated c.1.14km north east of the site.

St Frideswide's Farm

St Frideswide's Farm House and associated Garden Wall

11.4.14 St Frideswide's (1286525) is a Grade II* listed building situated c.50m east of the site at its closest point. The listing citation describes it as a farm house dating to the 16th century, with later additions and alterations in the 17th and 20th centuries. The list entry also describes in some detail the external and internal features which helps to identify its special architectural interest.

11.4.15 The Grade II listed garden wall (1370050) is located c.10m to the north east of the farm house and was built in the late 17th or early 18th century.

11.4.16 The farm house is built of limestone rubble with ashlar dressings, set beneath a hipped Stonesfield-slate roof with brick stacks. It is orientated to the south on a through-passage plan, with a rear (northern) wing. The principal southern façade has a moulded stone doorway with a four-centred arch, within a rectangular surround. The fenestration on this elevation comprises a mix of three, four and five-light stone mullioned and transomed windows, all of which have concave chamfers and leaded glazing. The northern, rear elevation is flanked by a 20th century wing and a 17th or 18th century lean-to extension, returning from the right end.

11.4.17 The interior was not inspected; however the listing citation notes features such as moulded wooden doorways and cornices, fine 17th century oak panelling, heavy chamfered beams and a large 16th century arched-stone fireplace.

11.4.18 With regard to the adjacent garden wall, this is also built of limestone rubble and is topped with

tiled coping. It is approximately 2.5m high and extends for approximately 60m to the east, returning southwards for a few metres, to enclose the garden (Image EDP 3 in Appendix 11.1). The list entry notes that it is 'included for group value'. There is no evidence to suggest these buildings possess any 'artistic interest'.

11.4.19 The Oxfordshire Historic Environment Record (HER) records a deserted medieval village (DMV) immediately south of St Frideswide's Farm and a medieval moat is also recorded at this location. Both features lie within an open pasture field to the south of the farm house (still beyond the site boundary) and extant, albeit reduced earthworks were noted here during the field visits.

11.4.20 The site of St Frideswide's Farm and the Deserted Medieval Village (DMV) site is thought to comprise an earlier site of the settlement of Cutteslowe, defined by 'poor quality earthworks' dated by quantities of mostly 15th century pottery. It is postulated that the 'village' was deserted at some time between 1350 and 1450 and this may suggest an earlier foundation (i.e. pre-16th century origins) for St Frideswide's Farm House.

11.4.21 The First (1876) and Second Edition (1899) Ordnance Survey Maps (see Appendix 11.1), show the main farm house range, as well as a courtyard of farm outbuildings to the immediate south west, all accessed via a track leading east from the Oxford Road. An orchard lies immediately north of the farm house and its remaining boundaries are well-vegetated, particularly as shown on the First Edition (not reproduced). The historic maps also reveal the presence of Water Eaton Copse to the north of the farm house, which expanded south towards the orchard in the first half of the 20th century, before being removed to just a hedgeline by the end of the 20th century.

11.4.22 The significance of these listed buildings is predominantly derived from the special architectural and historic interest of their standing fabric, however their association/group value, and, to a similar degree, their relationship to the adjacent moat and DMV earthworks, also contributes to their significance. The principal building is no doubt listed at Grade II* due to its survival as a medieval moated farmstead, and this site is particularly noteworthy, demarcating the location of an earlier Cutteslowe settlement.

11.4.23 St Frideswide's Farm House and its adjacent gardens, including the listed wall to the northeast and pond to the immediate south-west are well-enclosed and sheltered by trees and vegetation (Images EDP 3-4 in Appendix 11.1). Indeed, the approach to the house from the access across the site from Oxford Road crosses farmland defined by and adjacent hedgerow to the north, before the approach turns to the north to enter a densely wooded copse, with the overgrown pond present on arrival at the west of the house (which likely fed the moat). This enclosure is reinforced by the natural topography of the area, with the farmstead sitting within a hollow. This sheltered setting makes a positive contribution to these assets, as it serves to enclose them well from the wider landscape. Consequently, it is from the immediate private garden surroundings that the heritage significance of the buildings is best 'experienced', there being limited opportunities to appreciate it from the wider landscape.

11.4.24 The enclosed nature of the listed buildings was confirmed during the site visit, with mature trees and dense vegetation present to the west, north and east of the property. The northern boundary of the farmstead is defined by an orchard, which is an historic feature (as noted in the Second Edition OS 1899 map in Appendix 11.1) which spans the full width of the farm complex and which the northern frontage of the farm house addresses. The orchard may once have been larger, perhaps extending to Water Eaton Copse to the north (now replaced as arable fields, and perhaps further to the west into the land within the site. The southern aspect of the farm house's garden is more open, and a shallow, curving ditch affords outward views southwards across a pasture field, comprising the purported moat and Deserted Medieval

Village (DMV) site.

11.4.25 However, these views are significantly curtailed by the rising topography, nonetheless, the intervisibility with this pasture field makes a positive contribution to the farm house's heritage significance, as there is a visual link with the site of the deserted medieval settlement, with which the farmstead (or an earlier version of) likely formed a focus. However, there are no physical features or earthworks in this pasture field that reveal the presence of any such historic features to the casual observer.

11.4.26 The St Frideswide's farm house was likely constructed by the 16th century, and was remodelled in the 17th century as a two-storey building with a through-passage plan. It was extended to the (rear) north with a 20th century wing and a 17th or 18th century lean-to extension, returning from the right end. Records and field names suggest that the surrounding farmland (including the southern extents of the site) was primarily in use as an arable and grass farm for grazing livestock, particularly sheep (Baggs et al 1990, p. 314-320). Gradually, the focus of the farm switched from pastureland to arable fields. There was a copse of woodland to the north-west of the farm house (Water Eaton Copse), which was later replaced by arable fields.

11.4.27 The access track to the farm house and the public right of way that crosses the site to the south and heads towards the farm were certainly present in the 19th century and remain today as the main historical approaches to the farm from the west and south.

11.4.28 Historic mapping shows that the farmyard was fully developed by the late 19th century, featuring a long east-west range of stone barns, with flanking stone buildings running north-south and opposite east-west forming a square yard. These buildings are of a mid-late 19th century date and are therefore of limited historic interest. There were additional smaller 19th century outbuildings of brick and stone to the west of the yard. The farmyard had its own separate entrance split from the same drive from Oxford Road as St Frideswide's Farm albeit separated from the farm house by the pond ringed by vegetation.

11.4.29 An access to the associated farm buildings to the south from the curtilage of the farm house is also obtained through a set of stone gate piers to the immediate south of the farm house (east of the pond). The farmyard was later added to in the 20th century with a large Dutch barn inserted to the south, now in poor condition and partially demolished. Similarly, the range of brick built buildings in the south-west of the farm complex closest to the site boundary, appear to be early 20th century additions that have fallen into disrepair.

11.4.30 There is limited intervisibility between the farm house and its (later) associated agricultural buildings to the south-west, due to the enclosing vegetation, save for a single barn which has been significantly modified to form a workshop. As such, the wider farmstead complex (which is in various states of disrepair and is not contemporary with the main farm house), makes a limited contribution to the significance of the listed buildings, albeit the recognisable agricultural character of this group of buildings, and their broadly vernacular material and form do contribute to an appreciation of the listed building's historical agricultural origins and an understanding of the farm house's historical role as the principal focus of the farmstead which has evolved around it.

11.4.31 It is considered that the primary setting of St Frideswide's Farm House and its associated wall as listed buildings, is restricted to the immediate surrounding gardens in which they are experienced, including the pond to the south-west, as well as the small orchard to the north and the garden extending into the open pasture field to the south, where the DMV is situated - neither of which location falls within the site boundary. The later buildings of the farmyard complex to

the south-west of the farm house, which are deliberately separated from the farm house curtilage both physically and visually, form a secondary element of the immediate setting of the farm house, which contributes less to the significance of the asset for the reasons set out above.

11.4.32 By virtue of its topographic hollow location and well-vegetated grounds, the farm house and garden wall have minimal presence in the landscape and consequently only views of the upper storey and roofline of the house are visible from within the southern part of the site. However, there is no real appreciation of its special architectural or historic interest in these views. The listed wall is all but entirely screened from beyond the curtilage of the main house.

11.4.33 From Oxford Road, there is a single access to St Frideswide's; the direct route via the trackway leading east to the farm complex; the bridleway to the north does not provide a route to the farm complex. The experience of the listed building via the trackway is extremely limited as views of its built form are masked by trees and vegetation in combination with the building's low-lying position relative to its surrounding farmland to the west. Access to the building itself beyond the trackway through the site is via a curved lane which also shields the visitor's views. The farmyard and gable end of the westernmost stone barn and brick outbuildings are more obvious from the trackway, as they are not shielded by vegetation. There is no tangible experience of the farm house from the northern bridleway through the site, as views of the house are also obscured by a tall hedgerow south of the bridleway and enclosing vegetation around the farm house, even in winter.

11.4.34 The farm house, as a functional building, would not typically have designed views outwards over the landscape. Rather as a residential building at the heart of the working farm, the modestly proportioned windows were principally designed for ingress of light, instead of for opportunities for outward views. The house is also aligned north-west/south-east to take full advantage of the passage of the sun during the day and therefore is not orientated on an alignment that offers views outwards onto the land within the site, aside from the very southeast fields of the site. The enclosing vegetation and low-lying position of the farm house further militates against any views of the land within most of the site from the farm house.

11.4.35 As a listed farm house St Frideswide's will inevitably have had a functional association with the surrounding farmland/agricultural fields. Indeed, the southern parcels of the site comprise part of the wider setting of St Frideswide's that also retain a functional association having formed part of the agricultural landscape farmed under the control of this historic farmstead. However, overwhelmingly across the site there is no opportunity to appreciate this relationship as the farm house is only experienced from the northern edge of the fields directly south of the farmstead.

11.4.36 Nonetheless, it is acknowledged that the land within the site forms a part of the surrounding agricultural land that has been farmed continually from the farm house since its establishment in the 16th century. Similarly, the southern extents of the site continue to function as part of the wider agricultural context to the farm house and surrounding farm complex as one approaches along from Oxford Road to the east along the trackway bordered by a hedgerow to the north.

11.4.37 Furthermore, as the Assessment and the site visit established that the site does play a role in the setting or 'experience' of the listed buildings in an agricultural landscape when experienced in the approach to the farmstead from the lower-lying landscape to the east, where the eastern extents of the site south of the farm house provide an undeveloped backcloth of fields in these views. Such views to and from the farm house across this agricultural landscape have been experienced since the late Medieval period, notwithstanding the modern outbuildings of the surrounding farm complex and the presence of modern infrastructure and built form in the wider landscape.

11.4.38 As such, the loss of part of the associated agricultural land within the asset's wider setting (i.e. the land within the site) and the encroachment of built form onto historically agricultural open land within the immediate environs of the listed farm house has the potential to affect the heritage significance of the listed buildings at St Frideswide's Farm through change to their settings.

11.4.39 The Grade II* St Frideswide's Farm house is deemed to be a heritage receptor of high sensitivity and the Grade II Garden Wall a heritage receptor of medium sensitivity based on the criteria set out in Table 11.1

Water Eaton Manor

Group of Six Listed Buildings at Water Eaton Manor

11.4.40 Water Eaton Manor House (1046562) is listed at Grade II* and is situated c.1.05km north east of the site, close to the River Cherwell. This asset was constructed in c.1586 for William Frere and was enlarged and altered during the late 17th century; then restored in 1881-2 by T.G. Jackson, and again c.1905 by G.F. Bodley.

11.4.41 The building is built of coursed squared limestone with ashlar dressings, and it has Stonesfield-slate roofs with ashlar stacks. The eastern facing front has a central two-storey porch with a four-centred archway, flanked by Doric columns on pedestals, below a plain entablature, above which rise Ionic pilasters. The bay windows and porch are crowned by very shallow gables with obelisk finials.

11.4.42 There are many features surviving within the house which contribute to the asset's significance. These comprise 17th century oak and gilded panelling and doorways, timber framed partitions, ornamental plasterwork in the hall and dining room (Tudor roses, fleur de-lys and arabesques) and Tudor-arched stone doorways and fireplaces throughout.

11.4.43 Immediately to the north east of the manor house is a Grade I listed Chapel (1046563), described as a 'domestic chapel', built c.1600 and restored 1884 by W. Wilkinson and H.W. Moore, and c.1905 by G.F. Bodley. This is built of coursed squared limestone with ashlar dressings and the evidently vernacular Stonesfield-slate roof. The west gable has a small bellcote. The listing citation notes that the chapel is 'a remarkably complete survival of a rare type'.

11.4.44 The remaining four assets at the manor are all located to the east of the main house and chapel and comprise a north pavilion (1046565), a south pavilion (1369721), wall and gateway (1046564) and a dovecote (1046566); listed at Grade II, and make up a wider part of Water Eaton Manor's significance.

11.4.45 The two pavilions may have comprised guesthouses and were built in the early 17th century of coursed squared limestone with ashlar dressings and Stonesfield-slate roofs. The main gateway lies approximately 30m east of the manor house and dates to the late 17th or early 18th century. The square limestone ashlar piers have hanging faces with scrolled tops. Stone ball finials are supported on moulded bases and the wrought iron gates were likely added during the 20th century. The 17th century dovecote is also built of coursed squared limestone with ashlar dressings and a Stonesfield-slate roof. It is of a square plan with pyramid roof and a pyramid-roofed glover.

11.4.46 The presence of a 'fine' eastern gateway would suggest that the main entrance to the manor house was originally designed to be approached from the east and has since fallen out of use. There is no evidence to suggest these buildings possess any 'artistic interest'.

11.4.47 The significance of these listed buildings is primarily derived from the special architectural and historic interest of their physical fabric which include local, (and high status) vernacular materials including limestone ashlar, Stonesfield slate and an array of ornamental features.

11.4.48 The elements of these assets' settings that contribute to their significance are principally defined by their surrounding spacious landscaped (and walled) garden grounds and their physical relationship and historic association with each other, although principally their relationships as part of a Manor complex, subservient to the main house.

11.4.49 The main focus of views from the manor house is to the east (away from the site) and this appears quite intentional, with the river Cherwell being located in this direction, c.100m east of the complex. The presence and location of the river contributes to the significance of the assets as it was undoubtedly chosen as a settlement site due to the proximity of the water course and it has provided the manor's namesake.

11.4.50 The areas of pasture that surround the complex to the north and east contain substantial earthworks relating to former farming regimes (ridge and furrow) and water management, in the form of drainage channels for water meadows. These elements positively contribute to the significance of the assets and there is a direct visual link with the former landscape that supported the manor.

11.4.51 As noted in Appendix 11.1, it was determined during the site visit, that due to distance and intervening vegetation, the listed buildings at Water Eaton are not visible or discernible from within the Site. Rather, it is only from the east of the manor complex (such as at Sparsey Bridge) that distant views of the site may be possible, and these would be in 'combination' with the manor complex, as opposed to comprising any clear or direct visual link 'by design'.

11.4.52 The views are very much long-distance, and any proposed residential development may only be visible on account of the ridgeline, however any 'in-combination' views with the assets here would be experienced in the context of an existing urban fringe, already comprising built form, sports pitch lighting, pylons and a park and ride complex associated with the modern expansion of Oxford.

11.4.53 In this regard, whilst the site does form a very small part of the wider setting of the Water Eaton listed buildings (in as much as it comprises part of the distant and much wider backcloth of agricultural landscape), the very limited experience of the site in combination views with the assets, does not contribute to their significance. This significance, or rather their 'architectural and historic interest', is only appreciable at close distance, and particularly from the south, east and north, where there are pasture fields and less boundary vegetation in direct proximity to the listed buildings.

11.4.54 Nonetheless, there is evidence for historic links between the site and Water Eaton Manor, through the northern extents of the site forming part of its former landholding. There is also an extant bridleway (PRoW 229/9/30) noted in the 1899 Second Edition Ordnance Survey mapping which linked the now demolished Water Eaton Lodge off the Oxford Road through the site and connected to Water Eaton Manor from the west; the lodge is no longer present within the site and therefore no longer functions to control access to the wider manor estate. However, despite these historical associations, the site visit established that, in reality, there is no tangible experience of the listed buildings at Water Eaton as one traverses along the bridleway as it passes through the site.

11.4.55 In light of the above, it is considered that there is no potential for development of the form proposed in the site to result in change to the elements of these asset's setting that contribute

to their special architectural and historic interest. Therefore, their significance, and the ability to appreciate that significance, is likely to remain undiminished. As such and considering the definition of setting as "the surroundings in which a heritage asset is experienced" (Annex 2 NPPF), it is in this way that the Site does not form part of the setting of the listed buildings at Water Eaton Manor.

11.4.56 The Grade II* Water Eaton Manor is deemed to be a heritage receptor of high sensitivity and the Grade II group of buildings are considered to be heritage receptors of medium sensitivity based on the criteria set out in Table 11.

Designated Heritage Assets in the Wider Area

11.4.57 The remaining five listed buildings (see Appendix 11.1) comprise two farm houses, a former turnpike tollhouse, a 19th century townhouse, and a turnpike milestone. The character and location of the majority of these buildings indicates that their settings are defined by the fieldscapes and settlements immediately surrounding them and not the wider agricultural land within the site.

11.4.58 The positions of these listed buildings, not only in relation to the site, but also in relation to their surroundings (i.e., street scenes or agricultural landscapes), are such that it is considered highly unlikely that they would experience a loss of significance as a result of the Proposed Development.

11.4.59 In each case, their functions, forms, and locations are such that they clearly do not possess any inter-relationships of potential significance or inter-visibility with the site.

11.4.60 The baseline assessment in Appendix 11.1 has established that during the site visit and visits to its wider environs, that the site does not form part of the surroundings in which these assets are experienced due to intervening built form, topography and/or vegetation (i.e. mature trees and hedgerows). As such it is considered that none of the assets could potentially experience an indirect effect from a development, as a result of change to their 'setting'.

11.4.61 Accordingly, as none of the remaining five listed buildings are considered to have the potential to experience any form of change to their setting, in terms of the form of development proposed within the site, they are not considered further within this assessment report.

11.4.62 These Grade II buildings are deemed to be heritage receptors of medium sensitivity based on the criteria set out in Table 11.1

Non-Designated Heritage Assets

11.4.63 Non-designated heritage assets of relevance to this assessment are discussed in detail in the Archaeological and Heritage Assessment (Appendix 11.1 and shown in Figure 11.2) and are summarised below.

Buildings of Local Interest

11.4.64 The Oxfordshire HER records a post-medieval milestone on the western boundary of the site, adjacent to Pipal Cottage on Oxford Road. The milestone however could not be identified within the site or on the road boundary during walkover surveys and therefore is considered to no longer be extant nor require assessment.

Pipal Cottage and Associated Farm Buildings (Pipal Barns)

11.4.65 Pipal Cottage and its associated farm outbuildings are non-designated heritage assets that lie c800m to the north-west of St Frideswide's Farm, and along the western boundary of the site. They are located on the eastern side of the Oxford Road A4165 and are visible from the

bridleway within the site. The courtyard of farm buildings (Pipal Barns) are within the boundary of the site, although Pipal Cottage itself is outside of the site boundary.

11.4.66 The buildings consist of a rectangular residential house (Pipal Cottage) which has been extended at least twice to the north with further outbuildings within the garden. To the north and east is an L-shaped barn range, which consists of a mixture of combination barn, and shelter sheds, such as cartsheds, and stables (Pipal Barns). The farmyard associated with the Cottage was in place by 1876.

11.4.67 Pipal Cottage is likely to be of late 18th -early 19th century origin, with the courtyard of associated farm buildings to the north developing in the 19th and 20th centuries. The characteristic features of such vernacular architecture include stone walls, bookended by chimney stacks, a symmetrical frontage with a central door flanked by (later) casement windows (Brunskill 2000; 2004: 28).

11.4.68 Pipal Cottage has experienced significant alteration and extension in the 20th century. A large rectangular two storey extension of stone was built to the north of the cottage (matching the dimensions of the original Cottage) with a two-storey link. These were added probably in the 1980s-1990s. There was also a catslide roof added to the west of the property, and a further single-storey flat felted roofed extension and flue added to the west of the property behind the western chimney.

11.4.69 The farmyard was orientated to the west towards the Banbury/Oxford Road, and has mature trees and hedging around it, largely screening it from the majority of the site to the south, while the cottage itself addresses an access off the road to the immediate south, which historically continued past the cottage and through the site to the landscape to the east.

11.4.70 The limited significance of the Pipal Cottage lies in its value as a vernacular cottage of 19th century, key features include the stone walls bookended by chimneys and symmetrical frontage with a central door flanked by (later) casement windows, albeit this character is compromised by the significant modern extensions and alterations that have affected its vernacular proportions and fabric.

11.4.71 The building also derives some significance from its setting on Oxford Road, backdropped by the surrounding agricultural fields within the site, as well as its clear association and relationship with the 19th century and later farmyard to the north. However, again the significant alterations and extensions to the building have to a degree disrupted and obfuscated these relationships.

11.4.72 The limited significance of the buildings that form the disused farmyard lies also in their value as a vernacular agricultural buildings of 19th century origins, albeit this is compromised by the disuse and decay of these buildings, and the alterations to the fabric that they have experienced over time.

11.4.73 These unlisted locally important assets are deemed to be heritage receptors of low sensitivity as defined in table 11.1.

Archaeological Remains

11.4.74 The Oxfordshire Historic Environment Record records the location of two non-designated round barrows (recorded as funerary monuments of prehistoric date) within the site boundary.

11.4.75 The heavily eroded, diffuse earthwork remains of the two round barrows were observed within the site during the site walkover and were later recorded as buried remains during archaeological investigations, as well as showing positively on LiDAR imagery as subtle earthwork features.

11.4.76 The programme of archaeological investigations undertaken across the site to inform this assessment included a geophysical survey and two phases of trial trenching (Appendices 11.2-11.4).

11.4.77 The earliest feature recorded during the archaeological investigations dated to the late Bronze Age and comprised a single pit in the vicinity of the barrows. Within the southern portion of the site a cluster of penannular ring ditches was interpreted as roundhouses forming the remains of a small, unenclosed Iron Age settlement. These prehistoric remains are considered to be of local significance. Therefore, these remains are considered to be receptors of low sensitivity as defined in Table 11.1.

11.4.78 The recorded remains of the two round barrows comprised their surrounding ditches and parts of their internal mounds. Based on the recorded stratigraphy, finds and carbon 14 evidence, the barrows have been dated to the early Anglo-Saxon period. As such, they are a relatively rare phenomenon in Oxfordshire and are consequently considered to be of regional significance. Therefore, these barrows are considered to be receptors of medium sensitivity as defined in Table 11.1.

11.4.79 Evidence of medieval and/or post-medieval agricultural practice, including former field boundaries and the ploughed-out remains of ridge-and-furrow cultivation, was also identified across the site during the archaeological investigations. These remains are considered to be receptors of low or negligible sensitivity as defined in Table 11.1.

11.4.80 In terms of historic landscape character, the Site is considered to be of only low sensitivity, being the result of 19th century enclosure of open field systems and having subsequently experienced a degree of modern reorganisation.

11.5 Potential Effects

11.5.1 The following paragraphs identify and describe each effect that is likely to arise as a result of the Proposed Development on designated and non-designated heritage assets, in the absence of any mitigation. These have been assessed in terms of effects during construction, where direct impacts may be anticipated, and also the operational phase where impacts, in terms of an asset's setting, may be anticipated; and whether these effects are adverse or beneficial.

Construction Phase

11.5.2 The following section provides an assessment of the effects on archaeological and built heritage receptors likely to arise as a result of the construction phase of the project.

11.5.3 It addresses only the direct, physical effects of construction activities contained within the boundary of the Site and does not cover potential changes to the wider settings of heritage assets. These are addressed under the operational phase because, even though it is recognised that they will first arise during construction (with the potential installation of cranes etc.), they will emerge over time and will ultimately reach their fullest extent following the completion of the Proposed Development.

11.5.4 Therefore, whilst the potential for construction activities at the site to have indirect (setting) effects on both designated and non-designated heritage assets is not dismissed, the chapter identifies and assesses them at the operational phase in order to capture the worst-case scenario; in other words when they have reached their maximum extent.

11.5.5 In short, it is expected that any setting effects during construction will either be short-lived because of the temporary nature of the activity or lower magnitude versions of effects which will

be captured and assessed in respect of the completed development anyway.

Designated Heritage Assets

11.5.6 There would be no direct impacts on any designated heritage asset during the construction phase. Any indirect effects are likely to arise through changes within their setting, and as such, are described within the operational impacts and effects section. On this basis, there will be no change and the potential significance of the effect of the construction phase on designated heritage assets has been assessed as neutral and not significant.

Non- Designated Heritage Assets

Archaeological Remains

11.5.7 The primary effect of the Proposed Development on the archaeological remains within the Site, including the two non-designated barrows, could potentially result from direct truncation and/or removal of remains during groundworks, likely to result in change to the significance of these remains so that it is completely altered or destroyed, which would be considered a large magnitude of change.

11.5.8 As previously established, the archaeological features and deposits in the site range from remains of negligible to medium sensitivity. As such a large magnitude of change to the these negligible to medium sensitivity receptors, if left unmitigated, would result in negligible to moderate adverse effect (albeit not significant).

11.5.9 The land use change of the site from open fields to a principally residential development will alter its character. However, the land within the Site is of low to negligible sensitivity in terms of its historic landscape character and those elements of historical value are located on its boundaries, which will remain unchanged by the Proposed Development. As such, the Proposed Development would result in a small magnitude of change resulting in a negligible adverse effect, which is not significant.

Buildings of Local Interest

11.5.10 In terms of buildings of local interest, Pipal Cottage and its associated farm outbuildings are non-designated heritage assets that lie along the western boundary of the site. These unlisted locally important assets are deemed to be heritage receptors of low sensitivity.

11.5.11 Pipal Cottage is not predicted to be affected by the construction phase of the Proposed Development but the changes to its setting are addressed as part of the operational phase below.

11.5.12 The adjacent Pipal Barns are due to be demolished as part of the construction phase of the Proposed Development. As such the large magnitude of change to these low sensitivity receptors, would result in a moderate adverse effect, which is not significant.

Operational Phase

Designated Heritage Assets

St Frideswide's Farm

St Frideswide's Farm House and associated Garden Wall

11.5.13 It has been established that the south-eastern portion of the Site forms part of the setting to the Grade II* listed St Frideswide's Farm House and Grade II Garden Wall and contributes to the asset by forming part of the wider agricultural landscape and functional farmland associated

with the farm house for many centuries. However, the immediate setting of the farm house and its adjacent gardens, including the listed wall to the northeast and pond to the immediate south-west are well-enclosed and sheltered by trees and vegetation, while its associated farm buildings lie to the south, also outside the site.

11.5.14 Nonetheless, it is acknowledged that the land within the site forms a part of the surrounding agricultural land that has been farmed continually from the farm house since its establishment in the 16th century. Similarly, the southern extents of the site continue to function as part of the wider agricultural context to the farm house and surrounding farm complex as one approaches along from Oxford Road to the east along the trackway bordered by a hedgerow to the north.

11.5.15 As such, the loss of part of the associated agricultural land within the asset's wider setting (i.e. the land within the site) and the encroachment of built form onto historically agricultural open land within the immediate environs of the listed farm house will cause a degree of harm to the significance of the heritage asset, and the ability to appreciate its significance.

11.5.16 The Grade II* St Frideswide's Farm House is deemed to be a heritage receptor of high sensitivity and the Grade II Garden Wall a heritage receptor of medium sensitivity. The proposed development will potentially result in a small change to these receptors of high and medium sensitivity resulting in a minor adverse (but non-significant) effect.

Water Eaton Manor

Group of Six Listed Buildings at Water Eaton Manor

11.5.17 Also under consideration in the Assessment is the group of six listed buildings at Water Eaton Manor. Water Eaton Manor House is listed at Grade II*, the one chapel listed at Grade I and the other four buildings, and a wall are listed at Grade II. The Grade II* Water Eaton Manor is deemed to be a heritage receptor of high sensitivity and the Grade II group of buildings are considered to be heritage receptors of medium sensitivity.

11.5.18 However, as noted in Appendix 11.1, it was determined during that due to distance and intervening vegetation, the listed buildings at Water Eaton are not visible or discernible from within the site. Rather, it is only from the east of the manor complex (such as at Sparsey Bridge) that distant views of the site may be possible, and these would be in 'combination' with the manor complex, as opposed to comprising any clear or direct visual link 'by design'.

11.5.19 In this regard, whilst the site does form a very small part of the wider setting of the Water Eaton listed buildings (in as much as it comprises part of the distant and much wider backcloth of agricultural landscape), the very limited experience of the site in combination views with the assets, does not contribute to their significance.

11.5.20 There is evidence for historic links between the site and Water Eaton Manor, through the northern extents of the site forming part of its former landholding. There is also an extant bridleway (PRoW 229/9/30) noted in the 1899 Second Edition Ordnance Survey mapping which linked the now demolished Water Eaton Lodge off the Oxford Road through the site and connected to Water Eaton Manor from the west; the lodge is no longer present within the site and therefore no longer functions to control access to the wider manor estate. However, despite these historical associations, the site visit established that, in reality, there is no tangible experience of the listed buildings at Water Eaton as one traverses along the bridleway as it passes through the site.

11.5.21 In light of the above, it is considered that there is no potential for development of the form proposed in the site to result in change to the elements of these asset's setting that contribute

to their special architectural and historic interest. Therefore it is assessed that there would be no change to the heritage significance of these receptors, resulting in a neutral (and non-significant) effect.

11.5.22 The remaining five listed buildings (see Appendix 11.1) comprise two farm houses, a former turnpike tollhouse, a 19th century townhouse, and a turnpike milestone. The character and location of the majority of these buildings indicates that their settings are defined by the fieldscapes and settlements immediately surrounding them and not the wider agricultural land within the site.

11.5.23 In each case, their functions, forms and locations are such that they clearly do not possess any inter-relationships of potential significance or inter-visibility with the site. Therefore they will not be affected by the Proposed Development. It is assessed that there would be no change to the heritage significance of these Grade II buildings deemed to be heritage receptors of medium sensitivity, resulting in a neutral (and non-significant) effect.

Non- Designated Heritage Assets

Archaeological Remains

11.5.24 The Proposed Development has been designed to retain the barrows preserved in situ in during the operational phase of the Proposed Development. These measures would be considered a minor benefit to the remains of the barrows by arresting their further erosion through ploughing.

11.5.25 All effects on all other non-designated archaeological assets and the historic landscape within the Site will occur during the construction phase; therefore, there are no potential effects anticipated during the operational phase.

Buildings of Local Interest

11.5.26 The operation of the proposed development will have an effect on Pipal Cottage through change to its setting, through the replacement of associated farm buildings to the north and the experience of wider agricultural land to the east with modern built form. This is assessed as a small magnitude of change to the low sensitivity receptor, which would result in a negligible adverse effect, which is not significant.

11.6 Mitigation

11.6.1 The following section principally identifies those assets within and beyond the Site where adverse effects are anticipated, as defined in the sections above, and consequently, where some form of mitigation or compensation, may be required to eliminate, reduce, or offset them.

11.6.2 In addition to mitigation and compensation, this section also identifies any additional enhancement measures that the Proposed Development offers to archaeology and built heritage receptors at the construction and operational phases, as appropriate.

Construction Phase

Designated Heritage Assets

11.6.3 The potential significance of the effect of the construction phase on designated heritage assets has been assessed as neutral and not significant and therefore no mitigation is required in this respect.

Non-Designated Heritage Assets

Archaeological Remains

11.6.4 An Archaeological Mitigation Area has been agreed with the Archaeological Advisor to CDC around the extents of the barrows in the site, where it is proposed the barrows and their earthwork and buried remains would be preserved in-situ. This will exclude construction activities in this area and thereby ensure that the construction phase of the Proposed Development results in no adverse impact on these remains.

11.6.5 Aside from the barrows, mitigation in respect of the other archaeological assets identified within the site will comprise a programme of archaeological investigation and recording to offset the impact of the loss of these remains.

11.6.6 No further mitigation or enhancement to offset or otherwise reduce the negligible adverse effect of the Proposed Development on the historic landscape of the Site is proposed.

Buildings of Local Interest

11.6.7 In terms of the non-designated buildings of local interest, mitigation is proposed in advance of the demolition of Pipal Barns during the construction phase. This mitigation which will comprise an appropriate programme of building recording to secure a record of the buildings in advance of their loss.

Operational Phase

Designated Heritage Assets

St Frideswide's Farm

St Frideswide's Farm House and associated Garden Wall

11.6.8 This section summarises how the Proposed Development has sought to employ mitigation to eliminate/reduce the impact of the Proposed Development on Grade II* listed St Frideswide's Farm House and associated Grade II listed wall.

11.6.9 The mitigation measures are set out below and have been embedded in the design of the Proposed Development:

- Retention of the eastern edge of the site as open space to allow the continuation of the appreciation of the farm house in an open, undeveloped setting;
- Retention and enhancement of woodland along the site's north-east boundary, in the location of the former Water Eaton Copse;
- Retention of the site's south-eastern field as open space, in order to avoid introducing new built form into the views south from the listed building;
- Retention and strengthening of extant field boundaries in proximity to the listed buildings, where they follow historic alignments, in order to retain historic landscape fabric;
- Retention of the alignment of the existing trackway to the farm house across the site, as well as the bridleway to the north and public footpath to the southeast, which together form either the historical approaches to the farmstead or routes within its wider setting that retain a degree of historic integrity;
- Retention and strengthening of existing well-vegetated boundaries around the farm house

curtilage to screen/filter development within the site and retain the sense of enclosure and isolation to the listed building's setting in views from within the site to the west and wider landscape to the east;

- Restriction of building heights to two storeys where development encroaches closest to the farm house, in order to respect its vernacular scale and the appreciation of its role as an historical focal point in the surrounding landscape.

11.6.10 The Proposed Development has therefore been devised to balance the competing heritage interests (specifically in terms of the landscape screening versus openness considerations in respect of St Frideswide's Farm House and associated wall) alongside other planning requirements from Oxfordshire County Council. There is also the opportunity for the specific location, layout, and form of landscape planting across the eastern and southern extents of the Site to be adjusted in agreement with relevant consultees at the Reserved Matters stage of future detailed applications, in order to accommodate any outstanding detailed design concerns.

Non-Designated Heritage Assets

11.6.11 The Archaeological Mitigation Area agreed around the two non-designated barrows will ensure these remains will be preserved in situ during the operational phase of the Proposed Development, with interpretation material provided to enhance public understanding of these assets.

11.6.12 In terms of Pipal Cottage, mitigation can be employed in the detailed design of the Proposed Development in terms of the specific location and layout of new built form and landscape planting within the immediate setting of Pipal Cottage to ensure that adverse effects of the operation of the Proposed Development are minimised.

11.7 Residual Effects

Construction Phase

Designated Heritage Assets

11.7.1 There are not expected to be any adverse residual effects on surrounding designated heritage assets at the construction phase.

Non-Designated Heritage Assets

Archaeological Remains

11.7.2 The implementation of mitigation in the form of the Archaeology Mitigation Area to preserve the buried and earthwork remains of the barrows within the site in situ during the construction phase of the Proposed Development, is predicted to result in no change to these assets and therefore a neutral residual effect that is not significant.

11.7.3 The implementation of mitigation in the form of a programme of archaeological investigation and recording to offset the loss of all other archaeological remains in the site is expected to result in a reduced residual effect identified as neutral (and non-significant), as this mitigation would realise the archaeological potential of these features and make that information available in the public record.

11.7.4 No further mitigation or enhancement to offset or otherwise reduce the negligible adverse effect of the Proposed Development on the historic landscape of the site is proposed. A negligible adverse residual effect will remain.

Buildings of Local Interest

11.7.5 The mitigation to record the non-designated Pipal Barns within the site prior to their removal by construction, is expected to result in a reduced residual effect identified as minor adverse (and non-significant). This is because although the buildings would be destroyed, a permanent record of their heritage interest would be produced and made publicly available.

Operational Phase

Designated Heritage Assets

11.7.6 It is considered that while the Proposed Development will incorporate the design mitigation set out above to limit adverse impacts of the operational phase on the Grade II* listed St Frideswide's Farm House, and the adjacent Grade II listed garden walls, there will still be a residual adverse effects upon the assets. This will arise from the loss of part of the associated agricultural land within the asset's wider setting (i.e. the land within the site) and the encroachment of built form onto historically agricultural open land within the immediate environs of the listed buildings. The residual effect is therefore expected to remain as a minor adverse, non-significant effect upon each asset.

Non-Designated Heritage Assets

11.7.7 The maintenance of the Archaeological Mitigation Area agreed around the two non-designated barrows to preserve them in situ during the operational phase of the Proposed Development, is expected to result in a negligible beneficial change to these assets by arresting any further plough damage and by providing interpretation material to enhance public understanding of their heritage interest. The residual effect is therefore predicted to be negligible beneficial and non-significant.

11.7.8 In terms of Pipal Cottage, any mitigation employed in the detailed design of the Proposed Development within the immediate setting of Pipal Cottage to ensure that adverse effects of the operation of the Proposed Development are minimised is considered unlikely to notably change the significance of effect. The residual effect is therefore expected to remain as a negligible adverse and non-significant effect upon this asset.

11.8 Cumulative Effects

Designated Heritage Assets

11.8.1 The effects on designated heritage assets predicted to arise from the Proposed Development are limited to the listed buildings at St Frideswide's Farm to the immediate east of the site. There is not expected to be any cumulative or in-combination effects on these assets arising from consideration of any other schemes in in the geographical area identified as relevant cumulative schemes.

Non-Designated Heritage Assets

11.8.2 Effects on non-designated heritage assets resulting from the Proposed Development are confined to the Site and therefore are not susceptible to cumulative change resulting from other identified schemes.

11.9 Implications of Climate Change

11.9.1 The impact of climate change on archaeology and heritage receptors is assessed through consideration of a potential future baseline scenario.

11.9.2 However, for archaeology and heritage, it is anticipated that the future baseline under a climate change scenario would not lead to any greater, or different, effects to those predicted.

11.10 Summary

11.10.1 This chapter assesses the likely significant effects of the Proposed Development in terms of archaeology and heritage and has been prepared by EDP.

11.10.2 A summary of the assessment is set out in Table 11.4.

11.10.3 A baseline assessment, in the form of desk-based assessment and investigative fieldwork (geophysical survey and trial trenching) has identified potentially sensitive archaeological and cultural heritage receptors (heritage assets) within the site and its wider zone of influence.

11.10.4 The assessment established that, while the site contains no designated heritage assets, two such receptors; the Grade II* listed St Frideswide's Farm House and Grade II listed associated wall, are expected to be adversely affected by the operation of the Proposed Development.

11.10.5 Mitigation will be incorporated into the design to reduce the potential adverse impact of the Proposed Development through change to the setting of these assets. Therefore, there is predicted to be, at most, only a minor adverse effect on each of these heritage assets.

11.10.6 The assessment confirms the presence of two round barrows within the site. These are considered receptors of medium sensitivity. Mitigation incorporated into the design of the Proposed Development will ensure these remains are preserved in-situ, within public open space. The residual effect on these remains is therefore expected to be negligible beneficial.

11.10.7 Elsewhere in the site, the other identified archaeological deposits are considered to be of no greater than low sensitivity. The implementation of mitigation in the form of a programme of archaeological investigation and recording to offset the loss of these remains is expected to result in a neutral effect on these assets, as this mitigation would realise the archaeological potential of these features and make that information available in the public record.

11.10.8 Pipal Cottage and its associated farm outbuildings including the Pipal Barns are non-designated heritage assets and buildings of local interest that lie along the western boundary of the site.

11.10.9 The loss of the Pipal Barns through the construction of the Proposed Development will be mitigated by a programme of building recording in advance of demolition. This is expected to result in a residual effect identified as minor adverse. This is because although the buildings would be destroyed, a permanent record of their heritage interest would be produced and made publicly available.

11.10.10 The change to the setting of the Pipal Cottage that would arise from the operation of the Proposed Development, is expected to result in a negligible adverse effect upon this asset.

11.10.11 Therefore, in general terms, the implementation of the construction and operational phases of the Proposed Development, incorporating mitigation, is predicted to have at most a minor adverse effect on the designated and non-designated heritage assets identified within the site and wider study area.

11.10.12 None of the predicted adverse effects on designated or non-designated archaeology and

heritage assets, either during the construction or operational phases of the Proposed Development, are deemed to be of greater than minor significance and, therefore, are not considered to be 'significant' in EIA terms.

11.10.13 In policy terms, the potential adverse effects on the designated heritage assets at St Frideswide's Farm identified in this ES Chapter (i.e. the permanent minor adverse effects on the Grade II* St Frideswide's Farm House and Grade II wall) each equate to 'less than substantial harm' to each asset at the low end of this scale of harm.

11.11 References

Baggs, A.P; Blair, W J., Chance, E., Colvin, C., Cooper, J. Day, C. J. Selwyn, N., and Townley, S. C., 'Wolvercote: Economic history', in A History of the County of Oxford: Volume 12, Wootton Hundred (South) Including Woodstock, ed. Alan Crossley and C R Elrington (London, 1990), pp. 314-320. British History Online http://www.british-history.ac.uk/vch/oxon/vol12/pp314-320 [accessed 23 November 2021].

Chartered Institute for Archaeologists (CIfA), 2020. Standard and Guidance for Historic Environment Desk-based Assessments. Reading.

Cherwell District Council, 1996. Cherwell Local Plan. Banbury.

Cherwell District Council, 2016. The Cherwell Local Plan 2011 – 2031. Part 1 Adopted 20 July 2015 (incorporating Policy Bicester 13 re-adopted on 19 December 2016). Banbury.

Cherwell District Council (CDC). Partial Review of the Cherwell Local Plan 2011-2031 - Oxford's Unmet Housing Need.

CA 2021 Phase 2, North Oxford Triangle East, Oxfordshire: Written Scheme of Investigation for an Archaeological Evaluation. Cotswold Archaeology unpublished client report.

Cotswold Archaeology. 2021. Phase 2, North Oxford Triangle East, Oxfordshire: Archaeological Evaluation. CR0660.

EDP 2018 The North Oxford Site. Archaeological and Heritage Assessment. Unpublished client
document

Department for Communities and Local Government (DCLG) 2021 The National Planning Policy Framework. London.

English Heritage, 2008. Conservation Principles – Polices and Guidance for the Sustainable Management of the Historic Environment. London.

Historic England (HE), 2017. Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets 2nd Edition.

Table 11.4 Summary of effects

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
Construction phase					
All Designated Heritage Assets Beyond the Site	High	None	None	Neutral	Not significant
Non-designated Barrows within the Site	Medium	Large	An area of preservation, including a buffer of 5m around the buried and earthwork remains of the barrows	Neutral	Not significant
Non-designated Archaeological Assets within the Site	Low	Large	Programme of archaeological investigation and recording	Neutral	Not significant
Non-designated buildings of local interest within the Site (Pipal Barns)	Low	Large	A programme of building recording prior to demolition	Minor Adverse	Not Significant
Non-designated buildings of local interest outside of the Site (Pipal Cottage)	Low	None	None	Neutral	Not Significant
Historic Landscape	Low	Small	None	Negligible Adverse	Not significant
Operational phase					
St Frideswide's Farm House Grade II* listed building and Grade II listed wall	High/Medium	Small	Variety of mitigation measures including vegetation buffer, enhancement of orchards, open spaces, retention of existing trackways, and restriction of building heights to two storeys where development encroaches closest to the listed building	Minor Adverse	Not significant
All Other Designated Heritage Assets Beyond the Site	High/Medium	None	None	Neutral	Not significant
Non-designated Barrows within the Site	Medium	Negligible	An area of preservation, including a buffer of 5m around the buried and earthwork remains of the barrows	Negligible Beneficial	Not significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
Non-designated Archaeological Assets within the Site	Low	None	None	Neutral	Not significant
Non-designated buildings of local interest within the Site (Pipal Barns)	Low	None	None	Neutral	Not Significant
Non-designated buildings of local interest outside of the Site (Pipal Cottage)	Low	Small	Provision of an offset and landscaping	Negligible adverse effect	Not significant

12 Lighting

12.1 Introduction

12.1.1 The assessment detailed within this chapter should be read in conjunction with the following detailed reports prepared by Hoare Lea for the Proposed Development of Water Eaton:

- Lighting Baseline Survey (Appendix 12.1) - this is based on measurement taken to establish the lighting conditions currently found on the Application Site area and adjacent areas;
- Lighting Parameters (Appendix 12.2) - this provides guidance on the illuminance levels required for a safe and comfortable environment within the scheme to identify an illustrative lighting design using typical types of luminaire and nominal mounting heights;
- Lighting Impact Assessment (Appendix 12.3) – this provides an assessment of the changes that the exterior lighting would have at the Site and the surrounding areas.

12.1.2 This chapter has been prepared by Savills as a summary of the appended technical assessments prepared by Hoare Lea.

12.2 Policy and guidance

12.2.1 The documents referenced below provide guidance on providing sufficient and appropriate lighting for vehicular, cycle and pedestrian passage, as well as visual interest. These are:

- British Standard 5489-1:2020;
- British Standard EN 13201-2:2015;
- International Commission on Illumination (CIE) 136:2000;
- Institution of Lighting Professionals (ILP) Guidance on Lighting for cycling infrastructure (PLG 23);
- Chartered Institution of Building Services Engineers (CIBSE) Lighting Guide 6: The Outdoor Environment 1992;
- CIBSE Lighting the Environment: A guide to good urban design;
- Secure by Design - Lighting Against Crime.

12.2.2 The following set out the best practise and guidance on reducing the visual and environmental impact of external lighting in relation to light pollution. These are:

- CIE Technical Report - CIE 150: 2017;
- ILP Guidance Notes for the Reduction of Obtrusive Light 2021 (GN01/21);
- Bat Conservation Trust;
- ILP Guidance Note 08/18 Bats and artificial lighting in the UK.

12.2.3 In addition to being part of good scheme design, the use of these standards is required to control the artificial light pollution emitted from premises (which can represent a statutory nuisance under The Clean Neighbourhoods and Environmental Act, 2005).

12.3 Assessment methodology

12.3.1 Tables 12.1 and 12.2 define the parameters for evaluating change to the Site and surrounding areas. Table 12.1 defines the sensitivity that is given to each particular receptor. Table 12.2 defines the percentage rates of change from baseline that has been used to establish the magnitude of effect. Table 12.3 brings together sensitivity and magnitude in a matrix table which

is used to define the assessed level of effect in EIA terms. These tables are based upon the guidance set out in the Design Manual for Roads and Bridges, published by National Highways.

Table 12.1 Sensitivity

Sensitivity	**Definition**
High	The receptor has little ability to absorb change in artificial light conditions without fundamentally altering its present character, or is of international or national importance.
Moderate	The receptor has moderate capacity to absorb change in artificial light conditions without significantly altering its present character, or is of high importance.
Low	The receptor is tolerant of change in artificial light conditions without detriment to its character, or is of low or local importance.

Table 12.2 Magnitude

Magnitude	**Horizontal and vertical light trespass (Lux)**	**Direct sky glow ULR%**	**Glare luminaire source intensity**
	Percentage change between 'baseline value' and 'baseline value + development'	Percentage increase over guidance limits for the environmental zone (baseline value not available)	Percentage increase over guidance limits for the environmental zone (baseline value not available)
High	75-100%	75-100%	75-100%
Medium	45-75%	45-75%	45-75%
Low	10-45%	10-45%	10-45%
Negligible	0-10%	0-10%	0-10%

Table 12.3 Definition of effect

Magnitude	**Sensitivity**		
	High	**Moderate**	**Low**
High	Major adverse / beneficial	Moderate adverse / beneficial	Moderate adverse / beneficial
Medium	Moderate adverse / beneficial	Moderate adverse / beneficial	Minor adverse / beneficial
Low	Moderate adverse / beneficial	Minor adverse / beneficial	Negligible
Negligible	Minor adverse / beneficial	Negligible	Negligible

12.3.2 For the assessment of lighting effects, the sensitive receptors that have been assessed are:

- Natural receptor – Direct Sky Glow (SG1);
- Natural receptor – Direct & Indirect Sky Glow (SG2);
- Human receptors.

12.4 Baseline conditions

Current Baseline

12.4.1 A site survey was undertaken in May 2021 to review the artificial lighting which is currently experienced at the application Site and the surrounding area.

12.4.2 To the north of the Proposed Development is the Oxford Parkway Park & Ride facility with illumination alongside Oxford Parkway station. Land to the east of the Site is open space and agricultural fields. South of the site is the residential area along Banbury Road, and a floodlit sports facility. To the west of Oxford Road / Banbury Road is a golf course, residential properties, and Jordan Hill business park.

12.4.3 This immediate area around the Site is lit with a mixture of lighting column heights between 6m to 16m with a variety of discharge and “flat bed” LED fittings. In the adjoining suburban areas there are a mixture of fitting types and styles.

12.4.4 The Site and surrounding area was initially visited during the daytime to assess site conditions, access, and safety. During this time photographs and notes were made. Measurements were then taken in the night between 9.40 pm and 12.30 am at 45 locations both within the Site and around the local area shown in Figure12.1 (Appendix 12.3, Figure 3.0). Light meter readings were taken at ground level (horizontal) and at a height of 1.5m (vertical) (Appendix 12.1).

Figure 12.1 Survey points

12.4.5 The survey was undertaken following the guidelines provided by the International Dark-Sky Association. During the survey, cloud coverage was approximately 70%, no moon was visible

in the sky. The readings taken are representative of the conditions at the time of the survey and therefore provide an indicative baseline for the assessment.

12.4.6 The survey found that the majority of the Site is classified as 'E1' environmental zone classification, which denotes areas that are regarded as '*natural, dark, relatively uninhabited rural areas*' (Appendix 12.3, Figure 4.0). A small area along the northern boundary of the Site close to the Park & Ride, and in the south of the Site nearest to the outdoor sports pitches are classified as 'E3', which denote areas that are representative of '*medium district brightness, well inhabited rural and urban settlements*'.

12.5 Potential effects

12.5.1 The assessment of light impacts has been considered at forty-five surveyed locations (Figure 12.1); for eight nearby existing and future residential properties; and for direct and indirect sky glow.

Survey locations

12.5.2 In order to present a proportionate assessment in this chapter, only those survey locations that could potentially experience moderate adverse effects have been summarised, which are the three locations shown above on Figure 12.1 using yellow markers, numbered 18, 23 and 29.

12.5.3 Receptor 24, the location of the Oxford Golf Club car park, is predicted to receive a negligible change in light level at ground level, but a change at 1.5 m above ground level, which is assessed as minor adverse, which is not significant.

12.5.4 All of the remaining 41 locations considered are predicted to experience negligible change in the level of light.

12.5.5 Whist light impacts have been recorded individually for horizontal (ground level) and vertical (1.5 m above ground level), given that the significance of effect is classified as the same for each, they have been considered together for each of the survey locations where adverse impacts may occur.

12.5.6 Survey location 18 is footpath/bridleway number 229/9/30, which runs through the centre of the Site from east to west and can be seen in photoviewpoints 4 and 5 of the Landscape and Visual Impact Assessment (LVIA, Appendix 10.4). The predicted change in light level at the footpath location has been assessed as a moderate adverse level of effect.

12.5.7 Survey location 23 is the St Frideswide's Farm access track, which can be seen in photoviewpoint 12 of the LVIA (Appendix 10.4). The effect in this location has been classified as a moderate adverse level of effect.

12.5.8 Survey location 29 is in the southern part of the Site, close to the floodlit sports pitches located to the south of the Site. The predicted change in this location has been classified as a moderate adverse level of effect.

12.5.9 The potential effect of the Proposed Development on the environmental zone classification of the Site is considered to change the majority of the Site from E1 to E2. This denotes a change from a rural dark area to a relatively dark suburban area in accordance with its proposed change of use from unlit, to lighting for residential areas. This assessment is based upon calculations undertaken with reference to guidance informing a suitable lighting specification for the Proposed Development in the type of light fittings, spacings between luminaires, coupled with vertical illumination and visibility of outdoor lit areas.

Residential properties

12.5.10 The potential effect of lighting has also been considered at the locations of residential properties (existing, and those with planning permission but not yet built), Figure 12.2. The analysis undertaken by Hoare Lea demonstrates that future light levels at all of these receptors are predicted to experience minimal change from baseline conditions, and meet the applicable guidance[1] in both illuminance to windows and brightness.

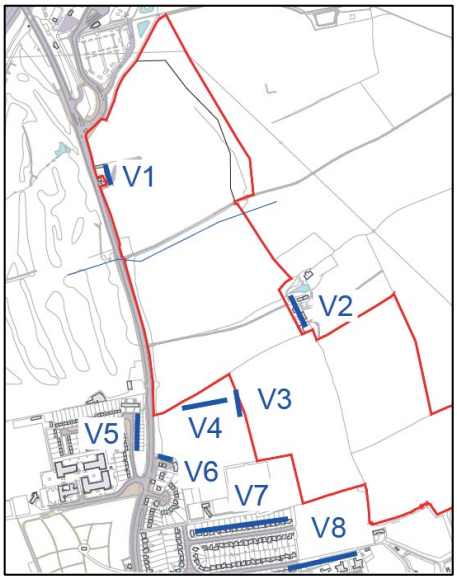

Figure 12.2 Residential receptors

Sky glow

12.5.11 Sky glow results from poorly designed luminaires being directed up into the sky rather than towards the ground where it can have a useful function. It can also have an ecological impact as it can disturb the natural cycles of wildlife. For the purposes of assessment and the detailed design of a lighting scheme, the total upward light spill, both direct and reflected, can be calculated. The lighting assessment calculations prepared by Hoare Lea predict that when developed, the sky glow effects associated with Water Eaton will be within the guidelines for an E2 Environmental Zone ('rural, low district brightness sparsely inhabited rural area, village or relatively dark outer suburban location').

12.6 Mitigation

During construction

12.6.1 During construction, it is likely that the site will use temporary site lighting for safety and site security. It is assumed that the main impacts could arise from spill of light and luminous intensity. Lighting will be needed where work is required to take place during the hours of diminishing ambient lighting levels. Security lighting may be required to deter crime in proximity to compounds and in areas where equipment and materials are stored.

12.6.2 Mitigation of the effects of the lighting installation on people and animal species during construction will be set out in the CEMP, which will use a combination of the following according to the location within the site:

- Specifying working hours, use of lighting, location of temporary floodlights in the construction compound. Lighting to be switched off when not required specifically for health and safety or security.
- Adhere to best practice measures as recommended by the Institution of Lighting Professionals (ILP), Health & Safety Executive (HSE) and CIE (International Commission on Illumination) guidance. Lighting solutions will be selected to reduce light pollution.
- Luminaires will be selected to minimise upward spread of light. The optics in the lanterns will control the distribution of light to avoid overspill, sky glow and glare.
- Glare will be kept to a minimum by ensuring the main beam angle of all lights directed towards any potential observer is not more than 70°. Higher mounting heights allow lower main beam angles, which can assist in reducing glare.

[1] Institution of Lighting Professionals Guidance Note 1 for the reduction of obtrusive light 2021

- Restrict lighting to the task area using horizontal cut-off optics and zero tilts.
- Minimise the duration of any lighting (switch off or part-night dimming).

Proposed Development

12.6.3 In order to minimise potential obtrusive light from the Proposed Development, the following mitigation measures can be employed in the preparation of the detailed lighting design for the Proposed Development.

- In response to the latest research, the specific colour temperatures used could be chosen to minimise potential impact on bat species;
- Appropriate lighting controls should be employed so that, when not required, and subject to safety requirements, non-essential lighting is dimmed / switched off in order to further reduce the light impact. Controls such as photocells, motion detectors and time-clock could be adopted;
- Building to reduce light spill on sensitive receptors;
- Appropriate use of shields, louvres and baffles as required locally;
- Careful selection and consideration of placement of luminaires;
- Careful selection and consideration of column heights to ensure lighting is focused on thoroughfares, minimising light spill to existing and proposed ecology and vegetation;
- Careful selection of luminaire control gear, to ensure light outputs can be dimmed;
- Adopting lamps / LEDs with correlated colour temperatures to reduce visual disturbance;
- Use of LED luminaires with specific optical control to minimise the potential for obtrusive light due to their light distribution; and
- Optimising luminaire angle, output, and position, to minimise light spill.

12.6.4 The detailed design stage will require careful consideration of the luminous source intensity of luminaires visible from residential locations, using luminaires approved by the highways authority with the objective of achieving compliance with the Institution of Lighting Professionals guidelines. Aspects related to minimising the effects on ecological receptors are covered below.

Lighting and ecology receptors

12.6.5 Site surveys of bats have recorded low to moderate levels of foraging and commuting bat activity across the Site. The species diversity is considered to be moderately high, with at least nine bat species/species groups recorded, as is typical for an urban edge site.

12.6.6 It is proposed that proposed street lighting should adhere to the Bat Conservation Trust recommendation to use light source correlated colour temperature of 3000k within areas sensitive for ecology where this is compatible with highway lighting specification requirements.

12.6.7 The street lighting should be designed with consideration to flight paths, feeding patterns, nesting and mating areas to minimise adverse effects on wildlife in this area, and in order to avoid impacts on bats, badgers, barn owl and other nocturnal species where in close proximity to retained habitats (ES paragraph 9.6.50).

12.7 Cumulative Effects

12.7.1 The cumulative projects considered relevant to this lighting assessment comprise the PR6b site to the west, and the approved Croudace development (21/01449/FUL) scheme adjacent to the Site.

12.7.2 The PR6b site is classified as currently being environmental zone E1, representative of its existing use as a golf course. The assessment has projected that its environmental zone is likely

to change to E2 following development being progressed on the site. This will be comparable to the existing area to the south, and also the Proposed Development.

12.7.3 The area of the 21/01449/FUL scheme is projected to be classified as E2 following completion of the development. Lighting levels at this scheme are likely to be comparable to the Proposed Development.

12.8 Implications of Climate Change

12.8.1 The impact of climate change on the lighting of the Proposed Development, and adjacent development, is not considered likely to alter any effect on lighting conditions.

12.9 Summary

12.9.1 Of the forty-five surveyed locations, three are assessed to experience change that would result in a moderate adverse effect. These are all located within the Site boundary and therefore will experience a change related to being incorporated within the Proposed Development. Effects at other surveyed locations adjacent to the Proposed Development and on public rights of way within the rural area to the east are assessed as negligible.

12.9.2 Survey positions 16, 20, 21and 22 are locations in the green corridor on the eastern part of the Site. Future lighting levels in all of these locations are predicted to experience negligible change from baseline condition due to the lighting scheme. Position 20 is calculated to experience an additional 0.01 lux from baseline conditions. Positions 16, 21 and 22 would experience no additional illuminance from the site.

12.9.3 The potential effect of lighting has also been considered at the locations of residential properties (existing, and those with planning permission but not yet built). The analysis undertaken by Hoare Lea demonstrates that future light levels at all of these receptors are predicted to experience minimal change and will meet the applicable guidance for illuminance and glare.

12.9.4 The lighting assessment indicates that the sky glow effects associated with Water Eaton will be within the guidelines for an E2 Environmental Zone (‘rural, low district brightness sparsely inhabited rural area, village or relatively dark outer suburban location’).

13 Population and economic effects

13.1 Introduction

13.1.1 This chapter provides an assessment of the population and economic effects of the Proposed Development in relation to the Partial Review Policy PR6a allocation for the Land east of Oxford Road in The Cherwell Local Plan Partial Review.

13.1.2 This chapter comprises the following sections:

- An overview of the approach adopted and the policy context used for this assessment.
- Baseline conditions: the prevailing conditions in the study area in terms of demographic profile, economic activity/unemployment and social infrastructure.
- Inherent mitigation and appropriate enhancement measures.
- Assessment against the policy context and a statement of residual effects at the construction and operational stages

13.2 Assessment methodology

Predicting effects

13.2.1 There is no principal guidance that sets out a methodology for assessing the likely population and economic effects of development proposals. Receptor sensitivity and the predicted magnitude of effect is ascribed one of four levels, as shown in the tables below.

Table 13.1 Receptor sensitivity

Receptor identified	Receptor value / sensitivity	Descriptor
People in the housing market area seeking new housing. Residents in the study area seeking Primary school education. Residents in the study area seeking Secondary school education.	High	Receptors with a low ability to absorb change without fundamentally altering present character / receptors of social/economic importance or a policy priority.
Local people that could work on the construction project. Residents using or seeking health services. Residents using or seeking open space, sports or leisure facilities.	Medium	Receptors with a moderate capacity to absorb change without significantly altering present character / receptor has some social/economic value / may be referenced in policy.
n/a	Low	Receptors able to absorb change without significantly altering present character / demonstrates an above average social/economic performance relative to comparator areas / may be referenced in policy.
n/a	Negligible	Receptors resilient and adaptable to change / has a strong performance relative to comparators / may not appear in policy or be considered a priority.

13.2.2 Magnitude of impact, based on the change that the Proposed Development would have upon the resource/receptor, is considered within the range of high, medium, low, negligible. Consideration is given to scale, duration of impact/effect (e.g. for construction, short-term for 1-2 years, medium-term for 3-5 years, long-term for 5 years and greater, and permanent, dependent upon project timeframes) and extent of Proposed Development with reference to the definitions in the Table below.

Table 13.2 Magnitude of impact

Magnitude	Description
High	Impact likely to affect large numbers of people and/or businesses over the long term.
Medium	Impact likely to affect a moderate number of people and/or businesses over a medium duration.
Low	Impact likely to affect to a small number of people and/or businesses over a short duration.
Negligible	Impact does not result in variation beyond baseline conditions, and is unlikely to measurably affect people and/or businesses.

13.2.3 The predicted level of effect is based upon the consideration of magnitude of impact and sensitivity of the resource/receptor to come to a professional judgement of how important this effect is. Effects identified can be beneficial or adverse, the EIA must give appropriate weight to both types of effects.

Table 13.3 Level of effect

Receptor Sensitivity	Magnitude of Impact			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Negligible
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

13.2.4 The level of effect predicted through this process is then reviewed using professional judgement and modified where considered necessary. For the purposes of this assessment, any effect that is of moderate level or greater is considered to be significant in EIA terms.

Consultation

13.2.5 The key issues considered in the assessment have been guided by the EIA scoping opinion adopted by CDC in 2021, and cover the predicted effects of the proposal in relation to the:

- demand on social infrastructure, including primary healthcare (principally GPs), Primary and Secondary education;
- formal open space, sports and leisure provision;
- contribution towards addressing housing needs;
- employment likely to be supported by the proposal.

13.2.6 Comments received from the public consultation indicated that people wished for scheme design to consider the inclusion of a dentist and GP within the Proposed Development, and queried how the funding of services would be achieved.

Assumption and Limitations

13.2.7 The estimates in this chapter are based on good practice, but by their nature, estimates of change in economic and employment impacts are always subject to an element of uncertainty.

When considering impacts, an allowance within a range of +/- 20% should be assumed to account for uncertainty. Numbers given for estimates may be rounded to the nearest 5.

Planning Policy

Cherwell Local Plan (2011-2036) Part 1

13.2.8 The key policies from Part 1 of the Local Plan, in relation to the proposed development are Policies:

- BSC4 (Housing Mix): states that the mix of housing must be negotiated having regard to the Council's most up-to-date evidence on housing need and available evidence on local market conditions.
- BSC7 (Meeting Education Needs): sets out that development should ensure provision of pre-school, school, community learning and other facilities. Co-location of other services and facilities should be considered to create community hubs.
- BSC8 (Securing Health and Well-Being): states that health facilities should be provided in sustainable locations which contribute towards health and well-being.
- BSC9 (Public Services and Utilities): supports new or improved public services and utilities if required to enable successful delivery of a site. All development will be expected to include provision for connection to Superfast Broadband.
- BSC10 (Open Space, Outdoor Sport and Recreation Provision): states that partnership working will be encouraged to ensure that sufficient quantity and quality of, and convenient access to open space, sport and recreation provision is secured.
- BSC11 (Local Standards of Provision – Outdoor Recreation): states that development proposals should contribute to the provision of open space, sport and recreation with arrangements for management and maintenance.
- BSC12 (Indoor Sport, Recreation and Community Facilities): supports the provision of community facilities where the development generates the need for sport, recreation and community facilities which cannot be met by existing provision.

Cherwell Local Plan Partial Review - Oxford's Unmet Housing Need

13.2.9 The Site falls under the Cherwell Local Plan Partial Review allocation PR6a, which allocates the site for development including the following:

- Construction of at least 690 dwellings, 50% of which are allocated as affordable housing.
- Provision of a two-form entry Primary school
- Provision of a local centre to include A1, A2, A3 and B1(a) use classes.
- Provision of formal sports facilities, play areas and allotments.
- Provision of public open green space and a green infrastructure corridor.

13.2.10 The allocation is one part of a wider strategy that is design to meet Oxford's unmet housing need, which it is not possible solely within the City, due to highly constrained development space. Therefore nearby local authorities agreed a plan to provide a portion of the unmet housing need on Oxford City Council's behalf. The Strategic Housing Market Assessment detailed requirements for 4,400 homes to be fulfilled within the jurisdiction of Cherwell District Council, which prompted the preparation and adoption of the Partial Review Plan which set out potential sites for allocation towards the target. The Proposed Development is located within Partial Review Site PR6a.

Material considerations

PR6a Land East of Oxford Road Development Brief

13.2.11 The PR6a development brief was prepared in accordance with the requirements of the Local Plan Partial Review Policy PR6a. The development brief was adopted at Planning Committee on 8th September 2022.

13.2.12 The development brief was jointly prepared between Cherwell District Council, Oxfordshire County Council, Oxford City Council, landowners and key stakeholders. The main objectives of the development brief are to create a site specific vision to guide future development, to provide a development framework and clear set of site specific principles, to improve the efficiency of the planning and development process, and to raise the standard of design and to create exemplary places.

13.2.13 The development brief contains key plans such as the Development Framework Plan (Figure 1), and various plans to supplement the site context, site appraisal, vision and objectives and development principles.

Developer Contributions SPD (2018)

13.2.14 In accordance with Local Plan policy requirements and SPD guidance on Developer Contributions within Cherwell District and the application site, the applicants have commenced discussions with Cherwell District Council and Oxfordshire County Council to establish draft Heads of Terms for a S106 Agreement. The applicants will progress detailed discussions with both Councils as the determination of the application progresses in order to complete the identification of planning obligations to be captured within a S106 legal agreement.

The Cherwell Residential Design Guide SPD

13.2.15 This SPD was adopted by the Council in July 2018 and seeks to inform the design of residential development proposals to ensure high quality design that protects the amenity of existing and new residents. It is limited in its application as an informative in relation to an outline planning application, such as for Water Eaton PR6a.

National Planning Policy Framework (NPPF)

13.2.16 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England, and how these should be applied. It provides a framework within which locally-prepared plans for housing and other development can be produced, and is underpinned by the presumption in favour of sustainable development, with a clear objective of supporting the supply of homes and economic growth. The NPPF must be taken into account in preparing development plans, and is a material consideration in planning decisions.

13.2.17 The following paragraphs of the NPPF are of relevance to the assessment of population and economic effects. In relation to delivering a sufficient supply of homes, the NPPF states at Paragraph 60:

'It is important that a sufficient amount and variety of land can come forward where it is needed, that the needs of groups with specific housing requirements are addressed and that land with permission is developed without unnecessary delay'.

13.2.18 The NPPF also states that a range of homes should be delivered, which incorporate a mix of housing to meet local needs including the provision of affordable homes (Paragraph 62).

13.2.19 In relation to the promotion of healthy and safe communities, the NPPF states at Paragraphs 92, 93, and 95:

92. 'Planning policies and decisions should aim to achieve healthy, inclusive and safe places which:
a) Promote social interaction, including opportunities for meetings between people who might not otherwise come into contact with each other – for example through mixed-use developments, strong neighbourhood centres, street layouts that allow for easy pedestrian and cycle connections within and between neighbourhoods, and active street frontages;
b) Are safe and accessible, so that crime and disorder, and fear of crime, do not undermine the quality of life or community cohesion – for example through the use of clear and legible pedestrian routes, and high quality public space, which encourages the active and continual use of public areas; and
c) Enable and support healthy lifestyles, especially where this would address identified local health and well-being needs – for example through the provision of safe and accessible green infrastructure, sports facilities, local shops, access to healthier food, allotments and layouts that encourage walking and cycling'.
93. 'To provide the social, recreational and cultural facilities and services the community needs, planning policies and decisions should:
a) Plan positively for the provision and use of shared spaces, community facilities (such as local shops, meeting places, sports venues, open space, cultural buildings, public houses and places of worship) and other local services to enhance the sustainability of communities and residential environments;
b) Take into account and support the delivery of local strategies to improve health, social and cultural well-being for all sections of the community; and
e) Ensure an integrated approach to considering the location of housing, economic uses and community facilities and services'.
95. 'It is important that a sufficient choice of school places is available to meet the needs of existing and new communities. Local planning authorities should take a proactive, positive and collaborative approach to meeting this requirement, and to development that will widen choice in education. They should:
a) Give great weight to the need to create, expand or alter schools through the preparation of plans and decisions on applications; and
b) Work with schools promoters, delivery partners and statutory bodies to identify and resolve key planning issues before applications are submitted'.

13.2.20 In relation to open space and recreation, the NPPF states at Paragraph 98 that access to a network of high quality open spaces and opportunities for sport and physical activity is important for the health and wellbeing of communities.

13.3 Baseline conditions

13.3.1 The local baseline study area is comprised of four super output areas; Cherwell 017, Cherwell 018, Cherwell 019 and Oxford 001 (see Figure 13.1). The area covered is broadly analogous with the Wards of Kidlington East, Wolvercote and Summertown, as used in the Health Impact Assessment submitted with the planning application. They are entirely within the 8 km cycling distance from the Site shown on Figure 5.2.

13.3.2 The baseline assessment sets out the current profile of the population living and working in the Cherwell District and North Oxford area, compared to regional and national data for context:

- Population profile, age structure, growth rates;
- Levels of employment activity;
- Average income;
- Qualifications and skills; and,
- Relative levels of deprivation.

13.3.3 Given the proposed residential use, the baseline analysis includes an identification of health care infrastructure (e.g. GP surgeries), schools (Primary schools and Secondary schools),

connections, and the access to open space and recreation.

13.3.4 Baseline information on the underlying conditions is taken from a variety of sources, which include: National Census and other ONS-produced sources; NOMIS labour market statistics; and the documentation supporting the CDC Local Plan.

Population Demographics

13.3.5 According to 2021 Census data[1], the population in the local study area is approximately 25,160 (Kidlington, Begbroke, Yarnton, Wolvercote, Cutteslowe). Oxford is the largest urban centre nearby, with an population of some 162,100 people. The population in Cherwell District is projected to rise by 10% between 2020-2040.

Age Structure

13.3.6 The largest age group resident within the study area is 50-64 years, making up an average of 20.6% of the population which correlates to 5,193 people. This is followed closely by ages 35-49, with 19.4% of the population.

13.3.7 The average (mean) age is slightly above the regional and national average, with an age of 42 compared to 40 in the South East and 39.3 in England. This correlated with the slightly higher percentage of over 65's shown in Table 13.4, with 22.8% compared to 19.4% and 18.4% for the South East and England respectively.

Table 13.4 Age Comparison (ONS Census, 2021[2])

Age Group	Study Area	South East	England
0-15	16.9%	18.6%	18.6%
16-64	60.3%	61.9%	63.0%
65+	22.8%	19.4%	18.4%

Qualifications and Skills

13.3.8 Understanding the local skills profile gives a good indication of a labour force's ability to support economic growth in different sectors and occupational groups. The proportion of those with Level 4 qualifications and above in the study area is 6.0% higher than the South East region, while Level 2 and Level 3 are 2.9% and 2.5% lower respectively.

Health Profile

13.3.9 The health of the people of Cherwell is generally better than the average across England. Life expectancy for both men and women is longer than the national average, with 81.0 and 83.5 compared with 79.6 and 83.2 respectively. Health inequalities are more of an issue in Cherwell with life expectancy being 7.4 years and 6.7 years lower for men and women respectively in the most deprived areas of Cherwell[3].

13.3.10 The health of the people in Oxford is comparatively better than the national average, with Oxfordshire County being one of the 20% least deprived authorities in England. Life expectancy in Oxfordshire is 80.7 for men and 84.1 for women, compared to the national average of 79.6 and 83.2, respectively. Health inequalities are an issue with life expectancy being 6.2 and 4.0

[1] https://www.nomisweb.co.uk/query/select/getdatasetbygeog.asp?cat=8&geogtype=297&theme=75
[2] Office for National Statistics – Official Labour Market Statistics: https://www.nomisweb.co.uk/sources/census_2021
[3] PHE Local Authority Health Profile 2019 – Cherwell:https://fingertips.phe.org.uk/static-reports/health-profiles/2019/E07000177.html?area-name=Cherwell

years lower for men and women respectively in the most deprived areas of Oxfordshire[4].

Economic Profile

Employment

13.3.11 In 2020, of the 13,287 people who are economically active, 12,756 are in employment, making up 82% of those aged between 16-64. Additionally, 3.4% of those classified as economically active are classed as unemployed. When compared to the national average, the study area has a 7% higher employment rate and a 1.5% lower unemployment rate.

Income

13.3.12 Analysis of data from ONS (2019) shows that the median gross weekly pay of full-time workers in the study area as £628.30, compared to £631.80 in the South East and £587.10 across the UK.

Deprivation

13.3.13 The Indices of Multiple Deprivation published by the government is made up of a series of indicators which are used to score deprivation in defined geographic areas known as 'Lower Super Output Areas' (LSOAs). The 2019 Index of Multiple Deprivation shows that Cherwell is ranked 220th out of 317 local authorities in England and therefore falls within the least deprived half of districts. However, there are a number of LSOA's in Cherwell that are in the 20% most deprived in the country, these are predominantly concentrated around the Banbury area and so are not considered relevant to the study area. Despite Oxford having 70% of its neighbourhood areas in the least deprived half of the ranking, it has a proportion of area in the most deprived 30% in England. Key aspects of relative deprivation recorded in Oxford 001 LSOA (Cutteslowe) relate to low income, and the living environment in the west of the LSOA (Wolvercote/Godstow).

Housing Need

13.3.14 The Oxford City Strategic Housing Market Assessment (SHMA) (2014) sets out the housing need for the area up to 2031. The report defines the housing market as the area within the local authorities of Oxford, Cherwell, West Oxfordshire, Vale of White Horse and South Oxfordshire. The SHMA identifies a need for 1,400 dwellings per year to be built in Oxford, however due to constrained capacity of 10,000 dwellings in Oxford's jurisdiction, neighbouring Local Authorities will contribute a total of 14,300 dwellings towards Oxford's housing need, 4,400 of which would be within Cherwell, in addition to the 1,140 dwellings per year housing requirement already identified for Cherwell district.

Social Infrastructure

Schools

13.3.15 The tables below show Primary and Secondary schools within the study area. When considering demand for and supply of pupil places, the education authority advises that a 95% occupancy rate allows for some flexibility, such as accommodating pupils as they transfer between schools at times other than at the beginning of the academic year. The information shown approximates the current situation. However, school occupancy is dynamic and will differ over years to come as the proposed development is progressively occupied and the related demand for school places alters, along with that from other Partial Review sites that will be developed..

[4] PHE Local Authority Health Profile 2019 – Oxfordshire: https://fingertips.phe.org.uk/static-reports/health-profiles/2019/E10000025.html?area-name=Oxfordshire

Table 13.5 Primary Schools [5]

Primary/Infant Schools	Capacity	95% occupancy	Pupils on roll	Spare Capacity?
Cutteslowe Primary School	420	399	357	Possible
St Thomas More Catholic	210	199	206	Unlikely
Edward Feild Primary School	386	366	320	Possible
William Fletcher Primary School	315	299	270	Possible
North Kidlington Primary School	315	299	299	Unlikely
West Kidlington Primary and Nursery School	475	451	363	Possible

Table 13.6 Secondary Schools

Secondary Schools	Capacity	95% occupancy	Pupils on roll	Spare Capacity?
The Cherwell School	1850	1757	2077	-
Gosford Hill School	1100	1045	794	Possible
The Swan School	1260	1197	236	Possible

13.3.16 The tables above indicate that there is potential capacity for pupils at Edward Feild Primary school and Gosford Hill Secondary school which include the Water Eaton location within their catchment area, as well as capacity within other schools in the Oxford area such as Cutteslowe Primary school which can be accessed from the Site via footpaths.

13.3.17 There are four schools catering for Special Education Needs within 5 km of the Site, and also 11 independent schools in the area.

Healthcare Infrastructure

13.3.18 The table below shows a list of GP practices within 5 miles of the Proposed Development. The Proposed Development is located within the Oxfordshire Clinical Commissioning Group (CCG), which has merged into the Buckinghamshire, Oxfordshire and Berkshire West Integrated Care System. Looking at the overall number of patients registered, and assuming that 1,800 patients per GP is a desirable list size, local practices are not likely to be in a position to accommodate the additional demand from new residents of Water Eaton.

Table 13.7 Healthcare infrastructure

Practice Name	Number of GP's	Number of patients registered
Wolvercote Surgery	7	18,241
Banbury Road Medical Centre	3	9,786
Summertown Health Centre	7	18,241
Cutteslowe Surgery	7	18,241
Gosford Hill Medical Centre	4	7,299
The Key Medical Practice	5	13,154
Observatory Medical Practice	5	12,106
Hedena at Marston Pharmacy	9	28,792
Islip Surgery	3	6,397
27 Beaumont Street Medical Practice	4	7,245
28 Beaumont Street	3	5,733
19 Beaumont Street Surgery	9	16,344
Dr Williamson	5	13,585
KES @ Northgate	2	5,912

[5] https://www.compare-school-performance.service.gov.uk/find-a-school-in-england

Practice Name	Number of GP's	Number of patients registered
Botley Medical Centre	5	13,585
Luther Street Medical Centre	2	453
Manor Surgery	10	19,146
St Clements Surgery	2	5,507
Oxford Brookes Medical Centre	9	21,326
St Bartholomew's Medical Centre	9	20,585
Hedena Health Ltd at Bury Knowle Health Centre	9	28,792
Cowley Road Medical Practice	5	10,789
Bartlemas Surgery	5	9,541
Hedena Health Ltd at Barton Surgery	9	28,792
South Oxford Health Centre	9	21,326
Donnington Medical Partnership	6	12,889
Eynsham Medical Group	6	15,442
Hedena Health Ltd at Wood Farm Health Centre	9	28,792
Temple Cowley Medical Group	3	8,323
Hollow Way Medical Centre	7	8,939
Dr Turner and Partners	4	9,335

Open space, sports and leisure provision

Open space

13.3.19 The Cherwell Open Space and Play Areas Strategy 2020 sets out the requirements for open space provision within the authority area. The requirements for green space are set out below:

Table 13.8 Open space standards[6]

Green space component	Urban, recommended quantity (ha per 1,000 population)	Rural, recommended quantity (ha per 1,000 population)	Access requirement
Parks & gardens	0.48	No provision	1,200 m
Amenity green space	1.23	0.94	400 m
Natural and semi natural green space	0.69	1.8	800 m
General green space	**2.4**	**2.74**	

13.3.20 The strategy states "*The study makes an assessment of future needs to 2031, consistent with the timescale of the adopted Cherwell Local Plan 2011-2031 (Part 1) (2015) (Cherwell District Council, 2015), and the Cherwell Local Plan 2011-2031 (Part 1) Partial Review - Oxford's Unmet Housing Need Submission Plan 2018 (Cherwell District Council, 2017)*".

13.3.21 The table below shows areas of open space in the vicinity of the Site.

Table 13.9 Open space provision

Open space name	Distance from site
Cutteslowe Park	Adjacent south
Sunnymead Park	650 m south
Port Meadow Country Park	1.75 km south west
Orchard Recreation Ground	2.35 km north
Ron Groves Community Park	1.47 km north west
Wolvercote Goose Green	1.58 km south west

[6] Cherwell Open Space and Play Areas Strategy 2020: https://www.cherwell.gov.uk/info/112/evidence-base/848/local-plan-review---environmental-and-energy-evidence/3#:~:text=Cherwell%20District%20Council%20requires%20this,policy%20and%20best%20practice%20advice.

Sport

13.3.22 There are a number of sports facilities available in the area, as listed below:

- North Oxford Lawn Tennis Club (250 m south)
- Oxford Hawks Hockey Club (250 m south)
- Wolvercote Cricket Club (adjacent south)
- North Oxford Golf Club (adjacent west)
- Kidlington Cricket Club (800 m north west)
- Cherwell Horse Riding Competition Centre (1.4 km south east)
- Kidlington & Gosford Leisure Centre (1.5 km north)

Leisure

13.3.23 The nearest allotment provision within Cherwell District is in Kidlington to the north. Kidlington has four allotment sites, located at Hazel Walk, Blenheim Road, Yarnton Road and Station Fields.

13.3.24 Oxford has a number of allotment sites, with the nearest being Cutteslowe Park to the south of the Site. There are also four allotment sites within and surrounding Port Meadow country park 2 km south west of the Site.

Access and connectivity

13.3.25 Oxford Road benefits from continuous shared footway/cycleways on both sides of the carriageway. This network allows for pedestrian and cyclist movements to the north for Oxford Parkway Park and Ride, and to the south, connection with the Cutteslowe neighbourhood as well as Oxford City Centre (5 km).

13.3.26 The nearest railway station to the site is Oxford Parkway, approximately 350 m northwest of the Site boundary. Parkway Station provides a connection to Oxford Railway Station, located within the City.

13.3.27 There are good public transport linkages from the Site via bus with regular services to Woodstock, Gosford, Kidlington, Bicester and Oxford City. The nearest bus stops are located approximately 200 m northwest of the site boundary at Oxford Parkway and in the vicinity of the southwestern part of the Site at the junction of Jordan Hill on Oxford Road. Further bus stops are also located further south on Oxford Road.

13.3.28 The Site is crossed by two Public Rights of Way. PRoW 229/9/30 is a bridleway leading east from Oxford Road, and PRoW 229/8/10 is a footpath that crosses the southern part of the Site. Both paths lead towards Water Eaton, approximately 1.2 km north-east of the Site. On the western side of Oxford Road, footpath 229/10/30 crosses North Oxford golf course to a footbridge over the railway.

Future Baseline

13.3.29 The trends influencing the future baseline have been summarised in order to understand how the condition of the local area is likely to change going forward if recent population and economic trends continue.

Population Profile

13.3.30 ONS data indicates that the population of Oxford is predicted to fall by 5,349 (3.5%) during the period 2018-2028, while Cherwell is predicted to rise by 10,393 (7.0%). In comparison, Aylesbury Vale and Vale of White Horse are predicted to rise by 11.9% and 13.0% respectively through the same period, while Wycombe and West Berkshire are predicted to fall by 1.5% and

0.3% respectively. The variation in population growth rates reflects a mixed regional population forecast.

13.3.31 ONS population projection data suggests that the primary demographic change within Cherwell will be within the 65+ age group, which is predicted to rise by 16,053 (37%) during the period 2018-2043, while other age groups remain stable. In Oxford the pattern differs, with age groups 0-15 and 16-64 declining by 5,929 (28%) and 9,874 (10%) respectively, while the 65+ age group is predicted to rise by 6,959 (27%) through the same period [7].

13.3.32 The future development of PR6b Partial Review site on the opposite side of Oxford Road will introduce an additional population of 1,675 residents.

Economic Activity

13.3.33 The Oxford Local Plan (2036) Employment Land Assessment sets out the future requirements for employment floorspace within the area. The assessment found that between 2016 and 2036 there is a need for 135,004 m^2 of additional employment floorspace, 113,535 m^2 of which being B1A/B/C floorspace and 21,470 m^2 being B2/B8 floorspace. In Cherwell, the employment floorspace requirement between 2011 and 2031 is 324,837 m^2, 122,062 m^2 of which being B1 floorspace, 202,775 m^2 being B2/B8.

Housing

13.3.34 The housing delivery targets for Cherwell District Council have been identified in the Oxfordshire Strategic Housing market Assessment (SHMA) 2014, which details a need for 1,142 dwellings per year during the period 2011-2031. The SHMA also identifies a need for 1,400 dwellings per year to be built in Oxford, however due to constrained capacity of 10,000 dwellings in Oxford's jurisdiction, neighbouring Local Authorities agreed to contribute a total of 14,300 dwellings towards Oxford's housing need, 4,400 of which would come from Cherwell.

13.3.35 There is also a demand for family accommodation in the local area and a lack of family housing within Oxford. The mix of housing which needs to be delivered also has to address the requirement to include First Homes.

13.3.36 Alongside PR6a, the future development of new homes within the PR6b Partial Review site on the opposite side of Oxford Road will introduce an additional 670 dwellings. These are part of the overall strategy of the Local Plan Partial Review to deliver a housing supply of 4,400 homes on the edge of Oxford, and at Kidlington, Begbroke and Yarnton to meet Oxford's unmet need.

Education

13.3.37 Alongside PR6a, other Partial Review sites are covered by policy to include school provision in their development layouts, and/or, provide a financial contribution towards increasing the availability of pupil places. On-site provision of new schools is focussed at PR8 in the Yarnton area and an extension of an existing Primary school with the development of PR9.

Healthcare Infrastructure

13.3.38 Alongside PR6a, the future development of new homes within the PR6b Partial Review site on the opposite side of Oxford Road will introduce an additional 670 dwellings with a notional resident population of 1,675 residents.

[7] ONS Population Projections - https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/datasets/localauthoritiesinenglandz1

Open space, sports and leisure provision

13.3.39 The table below shows the open space, sports and leisure provision associated with the partial review sites in the local plan. PR6c is the allocation of Land at Frieze Farm which is reserved for a golf course to replace the Oxford golf course when it is developed with the PR6b scheme.

Table 13.10 Partial review sites open space, sports and leisure provision

Partial Review Site	Open space, sports and leisure provision
PR6b	Sports facilities, allotments and play areas to be provided.
PR6c	Existing golf course from PR6b to be re-sited elsewhere.
PR7a	11 ha of sports facilities and green infrastructure
PR7b	5.3 ha nature conservation area and "green link" to PR8
PR8	29.2 ha Local Nature Reserve (LNR) 12.2 ha conservation area 23.4 ha Public Open Space (POS)
PR9	24.8 ha POS and LNR 7.8 ha community woodland

Access and connectivity

13.3.40 When the Croudace Homes development (21/01449/FUL) is implemented it will include a connection to Footpath 229/8/10 in the southern part of the Site.

13.4 Mitigation

Construction Phase

Population

13.4.1 The increase in the local population would increase as the new housing is occupied, and with regard to development being phased, this will be planned in such a way to ensure that essential infrastructure and services are delivered to ensure that those who occupy the development in the early phases are adequately serviced.

13.4.2 The potential for people to be adversely affected by construction operations would be controlled and managed through implementation of the Construction and Environment Management Plan (CEMP). This will be prepared to control construction activities on site and the contractors will adhere to the Considerate Constructors Scheme. The CEMP will set out how the works will be constructed and implemented to ensure amongst other things, the protection of local amenity and the connectivity of pedestrian, cycle and bridleway access whilst construction takes place.

13.4.3 Should further mitigation measures be identified as necessary for the construction phase, the CEMP can be a method for the implementation of these. The CEMP will be secured by planning condition and agreed with the Council prior to commencement of works at the site: the appointed contractor will be required to comply with the CEMP.

Economic activity

13.4.4 A Employment, Skills and Training Plan, agreed with the Council, would be implemented.

Operational Phase

Population

13.4.5 The potential effect on the population of developing new housing without the provision of associated community facilities, school capacity, open space and recreation amenities would not be acceptable: the mitigation relating to these is set out in the following sections.

13.4.6 .

Housing

13.4.7 In line with Local Plan policy, 50% of the housing will be affordable, including a variety of different tenures, such as first homes, social/ affordable rent, and shared ownership properties.

13.4.8 The design input leading to the site layout has considered the capacity requirements of the Strategic Housing Market Assessment (SHMA), and the housing mix will be confirmed in detail at the reserved matter stage. When refining this, consideration will be given to the significant changes that have been experienced in the housing market since the SHMA was published. The change is due to the strong demand for larger properties that allow for home working and space in response to changing life/work patterns as more people now work regularly from home. The mix of housing to be delivered will also address the requirement to include First Homes.

Education

13.4.9 Land (2.2 ha) is identified for the provision of a two-form entry Primary school and associated facilities. The location of the school and its layout has been subject of discussion with the education authority and feedback from the consultation process.

Healthcare infrastructure

13.4.10 Planning policy requires Water Eaton to deliver a local centre which could include local convenience retail (food store, pharmacy, post office), business space for professional uses; a café or restaurant, and floorspace for community uses such as healthcare and community / social use.

13.4.11 The local centre will provide space that can be used for health facilities and also the opportunity to provide social/childcare facilities as part of a community building.

13.4.12 Further detailed consideration will be given to the provision of housing for particular needs (such as wheel-chair accessibility and accommodation designed for older people). The specific details in respect of this housing will be addressed via reserved matters likely to be required by planning condition, and secured by the Council as part of a legal obligation before planning permission is issued.

Open space, sport, leisure

13.4.13 The parameter plan shows the extent of the land identified for the provision of open space and planting. An area of 11 ha of public open space would be provided in accordance with the requirement of Policy PR6a. It has been devised as an extension to Cutteslowe Park, and is intended to be designed with a ‘naturalistic’ setting with mown paths for access and wet areas with boardwalks. The provision of play space and facilities will be detailed in reserved matters applications in accordance with the quantum required that is set out in the PR6a Land East of Oxford Road Development Brief. This requires Water Eaton to provide two local areas of play (LAPs) with a minimum area of 100 sq.m.; one local equipped play area (LEAP) of minimum 400 sq.m.; one combined LAP/ LEAP area of at least 500 sq.m.; and one NEAP/ MUGA play area of 2,400 sq.m. with play equipment and a hard surfaced area set within a landscaped area.

13.4.14 The provision within Water Eaton as described above will be supplemented to meet the requirement for formal sport provision by way of a financial contribution towards formal outdoor and indoor sports provision off-site (including formal sports pitches at Site PR7a).

13.4.15 A green corridor extends over 8 ha along the eastern side of the scheme. This will include pedestrian and cycle routes to join with Cutteslowe Park and promote connections to the PRoW network to the east.

Access and connectivity

13.4.16 Planning policy requires Water Eaton to deliver a local centre which can provide for the day to day needs for the residents of PR6a and PR6b as well as being in a convenient location alongside a key route connecting Kiddlington and the north part of Oxford. It is intended to include local convenience retail (food store, pharmacy, post office), ancillary business development and/ or financial and professional uses such as banks or estate agency; a café or restaurant; and a community building for healthcare and community/social use.

13.4.17 The Primary school would be co-located with the local centre in a layout that enables local trips for residents who can accompany children to school in morning (or pickup in afternoon) at the same time as carrying out local shopping, or use of community facilities. By maximising accessibility by walking and cycling, active travel is encouraged, as detailed in Chapter 5.

13.4.18 The existing St Frideswide's Farm and Water Eaton tracks from Oxford Road would be closed to vehicular traffic and will be used as a pedestrian / cycle route, with the retention and improvement of bridleway 229/9/30 towards the Water Eaton Estate. A toucan crossing of Oxford Road would be provided to facilitate the connection between the Water Eaton bridleway and the footpath across the golf course to the west (through the PR6b site). The proposed site access has been designed to be compatible with the future development of PR6b to the west of Oxford Road (See Figure 15.2).

13.4.19 A pedestrian / cycle access connection will be made with the Croudace Homes development of new dwellings to the south of the Site (Oxford City Council (OCC) ref. 21/01449/FUL). This will connect through the PR6a scheme on the current alignment of the footpath, which then leads east past St Frideswide's Farm and on to the wider network of paths around the River Cherwell.

13.4.20 During the Enquiry by Design event and public consultation, a potential cycle link from the southern edge of the Site through Cutteslowe Park to connect with the existing pedestrian / cycle bridge over the A40 (near Cutteslowe Primary School) was identified. Whilst noting at the moment cycling is prohibited, the suggested link was explored further, and a potential route is being reviewed. Should the City Council wish to take forward the scheme then the Applicants can make a proportional contribution secured in a S106 agreement. This would have the benefit of facilitating a continuous safe cycling connection between the Site and Cherwell School.

13.5 Residual effects

Construction Phase

Economic activity

13.5.1 A survey for the House Builders Federation (HBF) and the Construction Industry Training Board[8] indicates that, on average, the construction of a new dwelling requires the input of 1.5 people in the construction workforce each year. If it is assumed that an average of 100 new dwellings at Water Eaton are completed each year, then the housing development would directly support 150 full time equivalent jobs in construction over the delivery period.

13.5.2 For construction of the local centre and Primary school, an estimate of the number of construction workers required can be made using information published by Homes England, formerly The Homes & Communities Agency (HCA). The HCA used a range of sources to derive coefficients for the number of workers required over one year to deliver £1.0 million of construction investment.

[8] http://www.hbf.co.uk/fileadmin/documents/barker/CITB_REPORT.pdf

13.5.3 For private commercial development, a coefficient of 16.6 jobs per £1 million was given (the HCA based this on 2011 prices). Adjusted to 2022 prices using the ONS Construction Output Price Indices, this gives an inflation-adjusted figure of some 13 jobs per £1 million.

13.5.4 Detailed development costs have not yet been calculated for the Proposed Development, so an initial estimate of £15 million has been used in this projection[9].

13.5.5 A total construction cost of £15 million could therefore support c.195 'worker years'. Assuming a construction period of 2 years for the local centre and the school, the development would therefore support a further c.100 jobs in the construction industry alongside the housing delivery.

13.5.6 Delivery of these would sustain jobs in construction and related services over the delivery period. This is a generalisation because the intensity of overall worker input varies according to the stage of building and the rate of delivery.

13.5.7 The delivery of the housing would represent the most sustained support for employment, capable of providing support for a range of occupational levels from the unskilled to more senior positions. The resources required will fluctuate with the extent of construction underway at any point in time over the delivery.

13.5.8 By necessity, construction site workers are highly mobile, travelling between sites as contracts require. Research for the Construction Industry Training Board indicates that in the South East Region, 55% of construction personnel work in the region where they are resident[10]. By necessity, construction site workers are highly mobile, travelling between sites as contracts require. Research for the Construction Industry Training Board indicates that 19% of site workers travel up to 20 miles, and 33% up to 50 miles from their home. Some 7% of workers in the South East stay in temporary accommodation for work. This would suggest that a substantial proportion of the jobs in construction would be retained within the Regional economy.

13.5.9 In addition, business in the local, and regional economy, would benefit from the trade linkages that would be established to construct the development, meaning that further indirect jobs would be supported in the supply of construction services, materials and equipment. Local businesses would generally also benefit to some extent from temporary increases in expenditure as a result of the direct and indirect employment effects of the construction phase, for example, as construction workers use local shops, accommodation and other facilities.

13.5.10 The population receptor for construction employment is judged to be Medium and the magnitude of impact is Moderate because whilst it is long-term, it will not be permanent, leading to an assessment of a Moderate beneficial residual effect, which is Significant.

Operational Phase

Population

13.5.11 Based on an average occupancy rate of 2.5 people per dwelling, Water Eaton development of 800 new dwellings would accommodate approximately 2,000 residents.

Housing

13.5.12 Delivery of the new housing would provide a substantial contribution towards meeting the District's housing requirements, comprising 18% of the total housing requirement in the Local Plan Partial Review.

[9] Primary school cost of £11M from CDC pre-application advice & Local Plan Infrastructure Update 2021
[10] https://www.citb.co.uk/media/th1cj2si/18-19-workforce-mobility-skills-south-east.pdf

13.5.13 It is considered that the provision of additional dwellings will have a beneficial impact at the District level, as a contribution to meet housing needs in the form of open market and affordable housing.

13.5.14 The population receptor for housing is judged to be High and the magnitude of impact is Medium as it is permanent at the District scale, leading to an assessment of a Major beneficial effect, which is Significant.

Economic activity

13.5.15 The proposal could accommodate a range of people who can be employed in, and support, the local economy. When completed and occupied, a development of 800 homes could be expected to accommodate some 2,000 people, 1,200 of which could be expected to be of working age. Around 80% of those working-age people could be expected to be economically active (working or seeking work). Some 960 people would therefore represent an extra input in the work force.

13.5.16 There will also be the indirect effects associated with economic activity of residents related to the goods and services that are sourced from within the local economy. Based on average weekly household spending figures recorded by the ONS[11], the household spending input to the local economy could amount to some £19 million annually, at present day value.

13.5.17 Using the Employment Density Guide published by the Home and Community Agency, it is estimated that the local centre could directly support between 55 and 63 jobs. For a 2-form entry Primary school, approximately 42 FTE teaching and support staff would be required, plus staff for cleaning, catering, and lunchtime supervision.

13.5.18 The population receptor for economic activity is judged to be Medium and the magnitude of impact is Medium, and permanent at the local scale, leading to an assessment of a Moderate beneficial effect, which is Significant.

Education

13.5.19 Land is included in the layout for the provision of a two-from entry Primary school. This could include early-years provision, and/or space for childcare could also be accommodated in a community centre part of the local centre building.

13.5.20 Secondary education and Special Educational Needs and Disability (SEND) provision would be provided off-site. The detail would be confirmed by OXCC, taking into account the wider situation of population growth in and around the area. As well as the potential to upgrade/ expand an existing school, such as Gosford Hill Secondary, the Partial Review identifies the provision of a new Secondary school as part of the PR8 Begbroke scheme to meet the needs of the Cherwell Local Plan sites. The approach to provision will be defined as the timescales of the different developments become clearer, and whether any of the need generated can be met on existing school sites. Financial contribution would be contributed in a proportionate amount for the Water Eaton scheme for Secondary school places and for SEND.

13.5.21 The population receptor for educational requirements is judged to be High and the magnitude of the mitigated impact is Negligible, a residual effect of a Negligible beneficial effect, which is Not Significant.

Healthcare infrastructure

13.5.22 The population receptor for healthcare and wellbeing is judged to be Medium and the magnitude

[11] Family spending workbook 3: expenditure by region. Table A33.
https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances

of impact is considered to be Low, leading to an assessment of a Minor beneficial effect, which is Not Significant

Open space, sport, leisure

13.5.23 The provision within Water Eaton as described above will be supplemented to meet the requirement for formal sport provision by way of a financial contribution towards formal outdoor and indoor sports provision off-site (including formal pitches at Site PR7a).

13.5.24 The population receptor for access to open space, leisure and sports facilities is judged to be Medium and the magnitude of impact is considered to be Medium, leading to an assessment of a Moderate beneficial effect, which is Significant.

Access and connectivity

13.5.25 The provision of new homes, local facilities, extensive green space and access to a wide network of paths connecting with local facilities and open countryside will combine together to bring beneficial effects, in a location that is established as suitable in terms of local air quality and the ambient noise environment (ES chapters 6 and 7).

13.5.26 The population receptor for access to the facilities is judged to be Medium and the magnitude of impact is considered to be Medium, leading to an assessment of a Moderate beneficial effect, which is Significant.

13.5.27 A report that brings together the various information presented within the ES that relates to the effects on people that may be walking, cycling or riding a horse within a 1km study area around the Site is included at Appendix 13.1.

13.6 Implications of Climate Change

13.6.1 The Committee on Climate Change advises the government on the impacts of climate change and produces a risk assessment for the UK (Climate Change Risk Assessment (CCRA2) 2017). The CCRA includes urgency scoring tables, which seek to identify and reduce the risks from climate change, one of the key indicators is 'people and the built environment' ('PB'). Measures that have been incorporated into the design of Water Eaton, or should be considered in the detailed design to increase resilience against the relevant risks to the new residents, have been identified in the table below and is subject of specific consideration in Chapter 14.

Table 13.11 CCRA Risks and adaptation measures

PB1: Risks to health and wellbeing from high temperatures	Ensure that the dwellings are resilient to future increase in summertime temperature and more comfortable under heat wave scenarios, consider the inclusion of a reduced glazing g-value on the South and West facades; horizontal overhangs and operable louvres for ventilation in all kitchens/living spaces.
PB3: Opportunities for increased outdoor activities from higher temperatures	All new residential units will comply with the national housing standards and have access to amenity space. The development will provide a range of high quality open spaces across the site including landscaped amenity areas and children's play space which are conveniently accessible.
PB5: Risks to people, communities and buildings from flooding	The proposed development has a low risk of flooding and surface water runoff from the development can be managed sustainably to ensure that flood risk is not increased elsewhere.
PB9: Risks to health and social care	The building design and management will provide residents with appropriate living conditions that promote a comfortable environment.

delivery from extreme weather	

13.6.2 It is not considered that climate change (projected under UKCP18) will alter the effects predicted in this chapter. However, direct impacts will arise as a result of climate change, so the design of the development will need to take this into account to maintain the wellbeing of the people of all ages living, working and attending school in future years at Water Eaton.

13.7 Cumulative effects

13.7.1 See Chapter 15.

13.8 Summary

13.8.1 A summary of the assessment is set out in Table 13.12.

Table 13.12 Summary

Population Receptor	Sensitivity	Nature of impact	Proposed mitigation	Residual effect	Significance
Construction phase					
Economic activity	Medium	Employment	None required. Enhancement via Employment, Skills and Training Plan	Moderate beneficial	Significant
Operational phase					
Housing	High	Housing provision	Agreement of housing mix	Major beneficial	Significant
Economic activity	Medium	Economic activity	None required	Moderate beneficial	Significant
Education	High	Available school places	Financial contribution	Negligible beneficial	Not Significant
Healthcare facilities	Medium	Available services	Financial contribution	Minor beneficial	Not Significant
Open space	Medium	Access to open space	Inherent, none required	Moderate beneficial	Significant
Formal sports off-site	Medium	Availability of facilities	Financial contribution	Moderate beneficial	Significant
Access and connectivity	Medium	Access to the above	Inherent, none required	Moderate beneficial	Significant

14 Climate change and greenhouse gas emissions

14.1 Introduction

14.1.1 This Chapter reports the outcome of the assessment of likely significant environmental effects arising from the Proposed Scheme (as set out in Chapter 3, Scheme Description) in relation to Climate Change.

14.1.2 The Chapter describes the technical consultation that has been undertaken during the EIA, the scope of the assessment and assessment methodology, and a summary of the baseline information that has informed the assessment.

14.1.3 In line with Chapter 4: Approach to EIA, the assessment reports on the likely significant environmental effects, the further mitigation measures required to prevent, reduce or offset any significant adverse effects, or further enhance beneficial effects. The conclusions are provided both in terms of the residual effects and whether these are considered significant. The assessment of effects takes into consideration both Primary and Tertiary mitigation (see Chapter 4: Approach to EIA for further details) and is informed by the EIA Scoping process (Appendix 2.1 - 2.2) and iterative scoping process where applicable.

14.1.4 This Chapter is intended to be read as part of the wider ES with particular reference to the introductory Chapters of this ES (Chapters 1 – 5), as well as Chapter 8, Drainage and Flood Risk, and Chapter 9, Biodiversity. The Chapter also draws on supporting information from the planning application including the Sustainability and Energy Statement.

14.1.5 In addition, this Chapter should be read in conjunction with Chapter 15: Cumulative Effects Assessment.

14.1.6 This Climate Change Assessment has been prepared following guidance set out by IEMA. After the introductory sections, the Assessment Process described in this chapter is split into two sections; firstly an assessment of Climate Resilience and Adaptation, followed by an assessment of the Proposed Scheme's Greenhouse Gas emissions.

14.1.7 The terms "carbon", "carbon dioxide (CO_2)", "carbon dioxide equivalent (CO_2e)" and "greenhouse gases (GHGs)" are used interchangeably depending on the terminology of referenced documents.

14.2 Legislative Framework, Policy, and Guidance

14.2.1 The following legislation and policy has informed the assessment of effects within this Chapter.

National Policy

14.2.2 The *Town and Country Planning (Environmental Impact Assessment) Regulations 2017*[1] require the consideration of contributions from projects to climate change through the release of GHG emissions and how such effects will be reduced ("climate change mitigation").

14.2.3 The *Climate Change Act 2008*[2] which sets a legally-binding target for the UK to reduce its CO_2 emissions, was updated in 2019 to amend the target to reduce emissions to net zero by 2050.

14.2.4 *National Planning Policy Framework (July 2021) (NPPF)*[3], paragraph 8(c) recognises the key role planning has to mitigating climate change and supporting the transition to a low carbon economy.

14.2.5 The Government's *Future Homes Standard*[4] (FHS) Interim standard came into force in 2022,

requiring homes to achieve a 31% improvement beyond Part L 2013 and from 2025 this is anticipated to increase to at least a 75% improvement.

14.2.6 The Government's *Future Buildings Standard*[5] (FBS) Interim standard came into force in 2022, requiring non-residential development to achieve an aggregated 27% improvement beyond Part L 2013, form 2025 this is anticipated a similar improvement as noted in the 2025 FHS will be required.

Local Policy

14.2.7 Cherwell Local Plan 2011-2031 (2016)[6] - contains strategic planning policies for development and the use of land:

- Policy ESD1 'Mitigating and Adapting to Climate Change' - sets out measures that will need to be taken to mitigate the impact of development within the District on climate change.
- Policy ESD2 'Energy Hierarchy and Allowable Solutions' - seeks to achieve carbon emissions reductions through the use of an energy hierarchy.
- Policy ESD3 'Sustainable Construction' - requires new developments to incorporate sustainable design and construction technologies to achieve wider net zero carbon goals.
- Policy ESD4 'Decentralised Energy Systems' - encourages the use of decentralised energy systems.
- Policy ESD5 'Renewable Energy' - sets out the expectation to use renewable and low carbon energy sources where possible.
- Cherwell District Council Policy PR6a - aims to meet the unmet housing needs of Oxfordshire to 2031.

14.2.8 Cherwell District Council Climate Action Framework 2020[7] - describes how the Council will aim to deliver lower carbon outcomes.

Guidance

14.2.9 BS EN 15978 (2011) Sustainability of Construction Works[8] - provides the calculation method to assess the environmental performance of a building, based on life cycle assessment (LCA) for both new and existing buildings.

14.2.10 RIBA 2030 Climate Challenge Version 2 (RIBA, 2021) – sets out targets for operational energy and embodied carbon for new development.[9]

14.3 Assessment Methodology

Overarching Methodology

14.3.1 The assessment of Climate Change includes consideration of both the impacts of the Proposed Scheme on climate change, i.e. GHG emissions, as well as the potential effects of climate change on the Proposed Scheme, Climate Change Resilience.

14.3.2 In this context the Climate Change Assessment has been prepared following guidance set out by IEMA, including:

- EIA Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA, 2022)[10];
- EIA Guide to: Climate Change Adaptation & Resilience (IEMA 2020)[11].

14.3.3 Details of the assessment methodology used to assess climate resilience and GHG emissions are set out in the following sections of this chapter.

Summary of Consultation

14.3.4 The Council's scoping response included the need to scope in a Climate Change chapter to consider the likely impact of the project on climate and the vulnerability of the project to climate change. Details of the scoping response are set out in Chapter 4. Feedback to community consultation included comments hoping that the Proposed Development could act as an example for sustainable building practices in order to address the clime change.

Scope of the Assessment

14.3.5 An EIA Scoping Report was submitted to Cherwell District Council in April 2021, as presented in Chapter 4, noting the plan to include a Climate Change chapter as part of the Environmental Statement (ES). The EIA Scoping Opinion was received in June 2021 agreeing a Climate Change chapter should be included, and that it should include the following.

14.3.6 **Climate Change Adaptation –** *'When undertaking the assessment, you will need to include a climate change resilience assessment and climate change impact assessment and climate change must be integrated into the design process and evident in design decisions.'*

14.3.7 Section 14.4 of this chapter sets out the measures incorporated into the design of the Proposed Development which provide climate resilience and adaptation.

14.3.8 **Flood risk –** *'The Flood Risk Assessment must also have regard to climate change and the impact of possible flooding on the site as a consequence of the development and the area of land within Flood Zone 3. The potential hydrological effects of the development include changes to the availability of water resources and water quality, the potential to pollute water and changes to water dynamics in terms of flow and source control with reference to flood potential.'*

14.3.9 Chapter 8, Drainage and Flood Risk includes details of the Flood Risk Assessment carried out in support of the application. This includes consideration of climate change in line with national guidance. A short summary is provided in Section 14.4 describing the potential impacts of flooding and climate change allowances used in assessment.

14.3.10 **Water Efficiency –** The Scoping Report set out that the Proposed Development will be constructed to meet the water consumption standards of the Building Regulations Part G. *'However, Policy ESD3 of the adopted Cherwell Local Plan requires a higher level of water efficiency that this development must accord to.'*

14.3.11 Section 14.4 includes details of water efficiency mitigation proposed which align with the requirements of Policy ESD3.

14.3.12 **Energy and Carbon Strategy – '***The ES must address Policies ESD1-5 of the adopted Cherwell Local Plan 2011-2031 and include a feasibility assessment and energy assessment in respect of mitigating and adapting to climate change, renewable energy, sustainable construction, decentralised energy systems and renewable energy. This should include an assessment of the principles of energy hierarchy set out in Policy ESD2 and how these have been applied; energy efficiency design measures as required by Policy ESD3; summary of proposed heating and cooling systems with regard to Policy ESD4 and choice and impact of renewable energy choices with regard to Policy ESD5.'*

14.3.13 Section 14.5 provides a summary of the energy and carbon strategy proposed, including key

mitigation to be included as part of the development to reduce carbon emissions. The Sustainability and Energy Statement submitted in support of the application provides further details on how the energy and carbon strategy proposed aligns with the requirements of the Local Plan.

Defining the Study Area

14.3.14 The Site and Proposed Scheme forms the principal study area for the Climate Change assessment, however the effects of climate change on the Proposed Scheme and site are linked to climatic changes which are a global phenomenon and result from GHG emissions. Additionally the GHG emissions from the Proposed Scheme include off-site emissions such as those associated with the manufacture and transport of construction materials, and those associated with the generation (e.g. at a power station) of grid electricity consumed by the operational development are also included, although it is not possible at this stage to predict the off-site locations where these emissions will occur.

Background Studies to Inform the ES / Establishing the Baseline

14.3.15 A number of studies support the planning application for the Proposed Scheme, including a Sustainability and Energy Statement which sets out the energy and carbon strategy for the proposed development and informs the GHG assessment in this Chapter.

14.4 Climate Change Resilience and Adaptation

Assessment Methodology

14.4.1 The following approach is proposed for the climate change resilient assessment in accordance IEMAs EIA Guide to Climate Change Adaptation & Resilience, including:

- Establish baseline climate conditions (e.g. monthly and annual average temperature and rainfall) for the Site area from long term monitoring data from the closest Met Office automatic weather station.
- Review the Met Office's latest climate projections (UKCP18)[12] for the Site area to establish predicted changes to baseline temperature, rainfall and sea level for the 2020s (construction period) and 2050s (future operational period) under the "high emissions scenario" (RCP8.5) in accordance with IEMA's guidance.
- Consideration of mitigation inherent to the design of the Proposed Scheme either required by legislation or guidance, or included as part of a best practice design process.

14.4.2 The climate resilience assessment will consider the demolition, construction, and operational phases of the Proposed Scheme.

Reporting of the Environmental Effect and Significance Criteria

14.4.3 The assessment of likely significant environmental effects as a result of the Proposed Scheme has taken into account the demolition/construction and operational stage. The following sections define the approach adopted within the assessment for the determination of sensitivity (or value/importance), magnitude of change (or impact), the level of effect and significance.

Determining Sensitivity of Receptor

14.4.4 The sensitivity of affected receptors has been considered on a scale of high, medium, low or negligible.

14.4.5 In the case of the Proposed Scheme the most sensitive receptors are considered to be those where any impact may lead to a risk or injury to humans or that may constitute safety critical

infrastructure.

Table 14.1 Sensitivity of Receptor

Sensitivity of Receptor	Description
High	Receptor has a high sensitivity to the climate effect and potential impacts, and/or, receptor includes safety critical infrastructure which if damaged could result in significant risks to people and/or property.
Medium	Receptor has a medium sensitive to the climate effect and potential impacts and mitigation will need to be provided to protect infrastructure or building/site occupants.
Low	Receptor has a low sensitivity to potential climatic effects and mitigation unlikely to be required, although could be used to improve resilience.
Negligible	Receptor not sensitive to climatic effects and mitigation not required.

Determining the Magnitude of Change

14.4.6 The magnitude of change has been considered as the change experienced from the current baseline conditions at the sensitive receptor and has been considered on a scale of large, medium, small or negligible.

Table 14.2 Magnitude of change

Magnitude of change	Description
Large	Ongoing annual impact with the potential for extreme events to cause operational or structural damage. For example, higher temperatures causing a major failure in structures or buildings with the potential for injury.
Medium	Seasonal impact with the potential for climatic events to cause operational or structural damage. For example, increased summer maximum temperatures could affect structures through the movement of materials, foundations etc., or impact on building occupants through overheating.
Small	Increased maintenance required to mitigate annual operational impacts. For example, increased winter rainfall could cause damage to drainage systems resulting in additional maintenance requirements.
Negligible	Minimal impact, either positive or negative and likely to be mitigated through resilience measures included through regulatory or best practice.

Determining the Level of Effect

14.4.7 The level of effect has been informed by the magnitude of change due to the Proposed Scheme and the evaluation of the sensitivity of the affected receptor. The level of effect has been determined using professional judgement and Table 14.3 has been a tool which has assisted with this process.

14.4.8 Whilst Table 14.3 provides ranges, the level of effect is confirmed as a single level and not a range, informed by professional judgement. For each effect, it has been concluded whether the effect is '*beneficial*' or '*adverse*'.

Table 14.3 Matrix to Support Determining the Level of Effect

		Sensitivity (or value / importance)			
		High	**Medium**	**Low**	**Negligible**
Magnitude of Change	Large	Major	Moderate to Major	Minor to Moderate	Negligible
	Medium	Moderate to Major	Moderate	Minor	Negligible
	Small	Minor to Moderate	Minor	Negligible to Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

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

- **Major effect**: where the Proposed Scheme 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.;
- **Moderate effect**: where the Proposed Scheme 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.;
- **Minor effect**: where the Proposed Scheme 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 where the Proposed Scheme is likely to cause 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; and
- **Negligible**: where the Proposed Scheme 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.

14.4.10 The duration of the effect has been assessed as either 'short-term', 'medium-term' or 'long-term'. Short-term is considered to be up to 1 year, medium-term is considered to be between 1 and 10 years and long-term is considered to be greater than 10 years.

Determining Significance

14.4.11 For each effect, a statement has been made as to whether the level of effect is 'Significant' or 'Not Significant'. This determination has been based on professional judgement and/or relevant guidance/legislation where applicable.

14.4.12 Significance has only been concluded for residual effects (i.e. following the identification of secondary mitigation).

Baseline Conditions

Current Baseline Conditions

14.4.13 Table 14.4 shows the current baseline climate data for the site taken from the nearest Met Office long term observation stations at Oxford[1], approximately 5.5km to the north of the site.

[1] https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gcpn7mp10

Table 14.4 Baseline climate data (1981-2010 monthly averages)

Month	Max temperature (°C)	Min temperature (°C)	Rainfall (mm)
January	7.98	2.38	59.57
February	8.63	2.32	46.77
March	11.29	3.64	43.16
April	14.41	5.29	48.65
May	17.68	8.17	56.91
June	20.71	11.14	49.69
July	23.06	13.09	52.5
August	22.5	13	61.66
September	19.44	10.65	51.87
October	15.09	7.95	73.18
November	10.88	4.85	71.47
December	8.23	2.59	66.12
Annual	*15.02*	*7.12*	*681.55*

Future Baseline Conditions

14.4.14 For the UK climate change is expected to lead to increasing annual temperatures, increasing winter rainfall and decreasing summer rainfall.

14.4.15 Future baseline climate conditions for the site area have been obtained from the Met Office's UKCP18 climate projections[2] for the 25 km grid square within which the site is located (562500, 212500) as presented in Table 14.5.

14.4.16 These projections comprise predicted changes to baseline conditions for the UKCP18's "high emissions scenario" (known as RCP8.5) as recommended by IEMA's EIA guide to: Climate Change Resilience & Adaptation (2020). 50th percentile values are reported which means there is considered to be equal probability of a higher or lower observed value for that projection. As such these projections are considered to represent a reasonable worst case for the purposes of the EIA climate resilience assessment work.

14.4.17 Projections are provided for both the 2050s and 2080s in order to inform future baseline climate conditions broadly relating to the long term operational phase of the proposed scheme.

Table 14.5 UKCP18 projections

Climate factor	2050s	2080s
Maximum summer temperature (°C)	2.9	5.7
Annual max temperature (°C)	2.1	4
Winter rainfall (%)	11%	22%
Summer rainfall (%)	-22%	-36%

14.4.18 The effects of climate change are set out in the UKCP18 Climate Projections, the projections for the Site are shown in Table 14.6 next to the current average climatic data. This demonstrates the key effects noted in the Climate Projections, which include increasing annual temperatures, increasing winter rainfall and decreasing summer rainfall. In addition, the Climate Projections

[2] https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index

note the potential for increasing weather extremes, i.e. intense rainfall events or heat waves exacerbated by climate change.

Table 14.6 Future baseline

	Current climate data	2050	2080
Summer mean temp (°C)	22.1	24.6	27.1
Annual mean temp (°C)	15.0	17.0	18.7
Winter rainfall (mm)	57.5	63.8	70.1
Summer rainfall (mm)	54.6	42.6	35.0

Potential Effects

14.4.19 The UK Climate Risk Assessment[13] sets out potential climate change risks and opportunities across five categories, identifying a range of specific climate risks. Table 14.7 sets out those risks which are relevant to the Proposed Scheme.

14.4.20 Table 14.8 sets out the potential climate change effects and receptors drawn from a review of the Council's Scoping Opinion, climate projections and review of the UK Climate Risk Assessment.

Table 14.7 Climate Risks

Risk Category	Identified Climate Risks
Natural Environment and Assets	Risks to terrestrial species and habitats from changing climatic conditions and extreme events, including temperature change, water scarcity, wildfire, flooding, wind, and altered hydrology (including water scarcity, flooding and saline intrusion).
	Risk to soils from changing climatic conditions, including seasonal aridity and wetness.
Infrastructure	Risks to infrastructure services from river, surface water and groundwater flooding
	Risks to subterranean and surface infrastructure from subsidence
	Risks to public water supplies from reduced water availability
Health, Communities and the Built Environment	Risks to health and wellbeing from high temperatures
	Risks to people, communities and buildings from flooding
Business and industry	Risks to businesses from flooding
	Risks to business from water scarcity
International Dimensions	N/A

Table 14.8 Potential effects and receptors

Climate Hazard	Potential Effect	Sensitive Receptor
Construction stage		
Precipitation	Decreasing summer rainfall	Construction operations
	Increasing winter rainfall	Materials Workforce Site compounds Site habitats and species Construction operations
Temperature	Increasing annual and maximum summer temperatures	Workforce Plant and equipment Air Quality
Operational stage		
Temperature and Precipitation	Ground stability	Structures
	Changing climate space	Site habitats and species
Precipitation	Increasing winter rainfall	Structures Infrastructure End users
	Decreasing summer rainfall	End users
Temperature	Increasing summer temperatures	End users

Mitigation

Construction Stage

14.4.21 The following primary and tertiary mitigation has been evaluated as part of the construction stage assessment, based on the potential effects set out in Table 14.8.

Table 14.9 Increasing annual and maximum summer temperatures

Effect	Increasing annual and maximum summer temperatures	**Applicable Development Phase (C / O)**	C	**Receptor**	Workforce Plant and equipment Air Quality
Discussion of Effect					
Increasing summer temperatures may lead to health and safety risks for construction employees, overheating issues for plant and construction equipment, and impact on local air quality through increased dust generation.					
Primary and Tertiary Mitigation					
A Construction Environmental Management Plan (CEMP) will be prepared to support the construction of the Proposed Scheme and will set out climate change adaptation and measures to reduce potential risks from increasing temperatures, including: • Protecting human health from overheating such as provision of shaded refuges and potable water supplies during construction. • Consideration of plant and construction equipment working temperature ranges. • Enhancement of dust suppression systems to account for potential increased summer temperatures.					

Table 14.10 Increasing winter rainfall

Effect	Increasing winter rainfall	**Applicable Development Phase (C / O)**	C	**Receptor**	Materials Workforce Site compounds Site habitats and species Construction operations
Discussion of Effect					
Increasing winter rainfall may increase the risk of flooding which may impact on site construction activities, increase the potential for construction site flooding and damage to materials, and potential harm to nearby habitats and species, including local water courses.					
Primary and Tertiary Mitigation					
The CEMP will set out climate change adaptation and measures to protect the Site from increased risk of flooding, during construction compounds will include appropriate measures, which may include raised levels and temporary drainage; protection of the Site and wider area from an increased risk of flooding and potential pollution effects through the provision of appropriate drainage and pollution prevention systems.					

Table 14.11 Decreasing summer rainfall

Effect	Decreasing summer rainfall	**Applicable Development Phase (C / O)**	C	**Receptor**	Construction operations
Discussion of Effect					
Decreasing summer rainfall may lead to a reduction of water supply impacting on construction stage operations.					
Primary and Tertiary Mitigation					
The CEMP will set out climate change adaptation and measures to reduce water use during construction. This will include the monitoring and setting of targets for water reduction.					

Operational Stage

14.4.22 The following primary and tertiary mitigation has been evaluated as part of the operational stage assessment, based on the potential effects set out in Table 14.8.

Table 14.12 Ground stability

Effect	Ground stability	**Applicable Development Phase (C / O)**	O	**Receptor**	Structures
Discussion of Effect					
Changes to future climate including temperature and rainfall may cause ground conditions to change impacting on building foundations and structures.					
Primary and Tertiary Mitigation					
The Building Regulations[14] require new development to consider the impact of ground movement in foundation design. Changes to future climate including temperature and rainfall may cause ground conditions, therefore the development will be designed in accordance with current guidance and best practice, and this will include the consideration of changing climate on stability of the ground conditions, influencing foundation design as necessary.					

Table 14.13 Changing climate space

Effect	Changing climate space	**Applicable Development Phase (C / O)**	O	**Receptor**	Site habitats and species
Discussion of Effect					
Changes to future climate including higher winter and summer temperatures and a decrease in summer rainfall could impact site habitats and species					
Primary and Tertiary Mitigation					
Plans for Water Eaton involve the creation of a network of green spaces and habitats, retaining and enhancing local biodiversity. Homes and green spaces will be connected, ensuring that residents can easily access green spaces throughout the development: The development will achieve Building with Nature accreditation across the site with a pre-assessment at the submission of the outline application. This is to make high quality green infrastructure integral to placemaking in Water Eaton, maximising benefits for both citizens and the natural world. This includes aiming to exceed the Defra biodiversity net gain metric, targeting a 20% improvement. Overall, the green infrastructure strategy is expected to achieve a significant net gain in biodiversity. This will help mitigate the anticipated impacts of climate change in accordance with the England Biodiversity Strategy[15] and Natural England Climate Change Adaptation Manual[16]. This will include the selection of climate change tolerant species as part of the projects' biodiversity strategy.					

Table 14.14 Increasing Winter Rainfall

Effect	Increasing winter rainfall	**Applicable Development Phase (C / O)**	O	**Receptor**	Structures Infrastructure End users
Discussion of Effect					
Increasing winter rainfall could increase the risk of surface water flooding impacting on site structures, infrastructure and posing risks to site end users.					
Primary and Tertiary Mitigation					
In accordance with national guidance the Flood Risk Assessment sets out how climate change has been considered for the Proposed Scheme and mitigation measures put in place to adapt to climate change. This includes surface water drainage designed to accommodate a 1 in 100 year rain event including a 40% allowance for climate change.					

Table 14.15 Decreasing summer rainfall

Effect	Decreasing summer rainfall	**Applicable Development Phase (C / O)**	O	**Receptor**	End users
Discussion of Effect					
Decreasing summer rainfall could result in a reduced water availability affecting the operation of the site and end users.					
Primary and Tertiary Mitigation					
To reduce water use and provide resilience to reducing summer rainfall the development will include residential elements to achieve a water consumption rate of 110 litres per person per day, in line with the Building Regulations high water efficiency standard[17] and the requirements of Policy ESD2. In addition non-residential development will be required to achieve the equivalent of 2 BREEAM Water Efficiency Wat01 credits.[18]					

Table 14.16 Increasing summer temperatures

Effect	Increasing summer temperatures	**Applicable Development Phase (C / O)**	O	**Receptor**	End users
Discussion of Effect					
Increasing summer temperatures may lead to building overheating, adversely affecting the health and well-being of occupants and end users.					
Primary and Tertiary Mitigation					
In accordance with the Building Regulations updated in June 2022 residential buildings will undergo an overheating assessment to assess and reduce the risk of summer overheating taking into account future climate scenarios. Non-residential buildings will include an overheating assessment using thermal dynamic modelling, taking into account future climate scenarios. Where overheating risks are identified, measures will be provided to reduce the risk of overheating in accordance with the cooling hierarchy.					

Residual Effects

14.4.23 This section sets out the assessment of potential effects, further residual mitigation (if required) and the residual effects in relation to climate change.

Construction Stage

Increasing annual and maximum summer temperatures

14.4.24 Increasing summer temperatures may lead to health and safety risks for construction employees, overheating issues for plant and construction equipment, and impact on local air quality through increased dust generation. Provision of measures as part of the CEMP are proposed to reduce the potential for adverse risks.

14.4.25 The sensitivity of potential receptors is considered to be low. The magnitude of change is considered to be small. Therefore, there is likely to be a direct, temporary, short-term, adverse effect which is considered to be negligible.

14.4.26 Secondary Mitigation or Enhancement - No secondary mitigation or enhancement is required/has been identified.

14.4.27 Residual Effects - In the absence of secondary mitigation the residual effects remain the same as identified above.

14.4.28 Significance - This effect is considered to be Not Significant.

Increasing winter rainfall

14.4.29 Increasing winter rainfall may increase the risk of flooding which may impact on site construction activities, increase the potential for construction site flooding and damage to materials, and potential harm to nearby habitats and species, including local water courses. Provision of measures as part of the CEMP are proposed to reduce the potential for adverse risks.

14.4.30 The sensitivity of receptors is considered to be low. The magnitude of change is considered to be medium. Therefore, there is likely to be a direct, temporary, short-term, adverse effect which is considered to be minor.

14.4.31 Secondary Mitigation or Enhancement - No secondary mitigation or enhancement is required/has been identified.

14.4.32 Residual Effects - In the absence of secondary mitigation the residual effects remain the same as identified above.

14.4.33 Significance - This effect is considered to be Not Significant.

Decreasing summer rainfall

14.4.34 Decreasing summer rainfall may lead to a reduction of water supply impacting on construction stage operations. Provision of measures as part of the CEMP are proposed to reduce the potential for adverse risks.

14.4.35 The sensitivity of potential receptors is considered to be low. The magnitude of change is considered to be small. Therefore, there is likely to be a direct, temporary, short-term, adverse effect which is considered to be negligible.

14.4.36 Secondary Mitigation or Enhancement - No secondary mitigation or enhancement is required/has been identified.

14.4.37 Residual Effects - In the absence of secondary mitigation the residual effects remain the same as identified above.

14.4.38 Significance - This effect is considered to be Not Significant.

Operational Stage

Ground stability

14.4.39 Changes to future climate including temperature and rainfall may cause ground conditions to change impacting on building foundations and structures. The development will be designed in accordance with current guidance and best practice, and this will include the consideration of changing climate on stability of the ground conditions, influencing foundation design as necessary.

14.4.40 The sensitivity of structures is considered to be low. The magnitude of change is considered to be medium. Therefore, there is likely to be a direct, temporary, short-term, adverse effect which is considered to be minor.

14.4.41 Secondary Mitigation or Enhancement - No secondary mitigation or enhancement is required/has been identified.

14.4.42 Residual Effects - In the absence of secondary mitigation the residual effects remain the same as identified above.

14.4.43 Significance - This effect is considered to be Not Significant.

Changing climate

14.4.44 Changes to future climate including higher winter and summer temperatures and a decrease in summer rainfall could impact site habitats and species. The green infrastructure proposed is expected to achieve a significant net gain net gain in biodiversity, helping mitigate the effects of climate change.

14.4.45 The sensitivity of site habitats and species is considered to be low. The magnitude of change is considered to be small. Therefore, there is likely to be a direct, permanent, long-term, adverse effect which is considered to be negligible.

14.4.46 Secondary Mitigation or Enhancement - No secondary mitigation or enhancement is required/has been identified.

14.4.47 Residual Effects - In the absence of secondary mitigation the residual effects remain the same

as identified above.

14.4.48 Significance - This effect is considered to be Not Significant.

Increasing Winter Rainfall

14.4.49 Increasing winter rainfall could increase the risk of surface water flooding impacting on site structures, infrastructure and posing risks to site end users. The Proposed Scheme is at a low risk of flooding. The drainage strategy includes a range of Sustainability Drainage Systems designed to accommodate 1 in 100 year rain event including a 40% allowance for climate change.

14.4.50 The sensitivity of potential receptors is considered to be low. The magnitude of change is considered to be medium. Therefore, there is likely to be a direct, temporary, long-term, adverse effect which is considered to be minor.

14.4.51 Secondary Mitigation or Enhancement - No secondary mitigation or enhancement is required/has been identified.

14.4.52 Residual Effects - In the absence of secondary mitigation the residual effects remain the same as identified above.

14.4.53 Significance - This effect is considered to be Not Significant.

Decreasing summer rainfall

14.4.54 Decreasing summer rainfall could result in a reduced water availability affecting the operation of the site and end users. Measures will be incarnated into the design of building to reduce water consumption.

14.4.55 The sensitivity of end users is considered to be low. The magnitude of change is considered to be small. Therefore, there is likely to be a direct, temporary, long-term, adverse effect which is considered to be negligible.

14.4.56 Secondary Mitigation or Enhancement - No secondary mitigation or enhancement is required/has been identified.

14.4.57 Residual Effects - In the absence of secondary mitigation the residual effects remain the same as identified above.

14.4.58 Significance - This effect is considered to be Not Significant.

Increasing summer temperatures

14.4.59 Increasing summer temperatures may lead to building overheating, adversely affecting the health and well-being of occupants and end users. Buildings will undergo overheating assessment to identify potential overheating risks, with mitigation measures provided as appropriate prioritising passive design measures.

14.4.60 The sensitivity of end users is considered to be low. The magnitude of change is considered to be medium. Therefore, there is likely to be a direct, temporary, long-term, adverse effect which is considered to be minor.

14.4.61 Secondary Mitigation or Enhancement - No secondary mitigation or enhancement is required/has been identified.

14.4.62 Residual Effects - In the absence of secondary mitigation the residual effects remain the same as identified above.

14.4.63 Significance - This effect is considered to be Not Significant.

Limitations and Assumptions

14.4.64 To ensure transparency within the EIA process, the following limitations and assumptions have been identified.

14.4.65 The UK climate projections are dependent on future GHG emission assumptions. UKCP18 uses scenarios for future GHGs that are based on assumptions on future population, economic development and the mitigation of GHG emissions towards international targets. The real world may follow a different pathway altogether and the scientific community cannot reliably place probabilities on which scenario of GHG emissions is most likely. For the purposes of scoping the 2080s RCP8.5 scenario has been considered as a worst case.

Summary

14.4.66 **Table 14.17** provides a summary of the effects, receptors, residual effects and conclusions of significance considered within the Chapter.

14.4.67 The table only provides a summary of the residual effects identified within the assessment and details of all primary, secondary and tertiary mitigation that has been taken into account is set out in detail within the Chapter and summarised within the Schedule of Mitigation included within Chapter 16: Summary of ES and Schedule of Mitigation.

Table 14.17 Summary of Residual and Significant Effects

Effect	Receptor	Residual Effect	Is the Effect Significant?
Construction Stage			
Increasing annual and maximum summer temperatures	Workforce Plant and equipment Air quality	Negligible	No
Increasing winter rainfall	Materials Workforce Site compounds Site habitats and species Construction operations	Minor Adverse	No
Decreasing summer rainfall	Construction operations	Negligible	No
Operational Stage			
Ground stability	Structures	Minor Adverse	No
Changing climate space	Site habitats and species	Negligible	No
Increasing winter rainfall	Structures Infrastructure End users	Minor Adverse	No
Decreasing summer rainfall	End users	Negligible	No
Increasing summer temperatures	End users	Minor Adverse	No

14.5 Climate Change Mitigation

Assessment Methodology

14.5.1 To assess the significance of an effect it is necessary to establish the magnitude of the effect occurring i.e. the changes to the existing baseline conditions as a result of the Proposed Scheme, and the sensitivity or importance of the receiving environment or receptor.

14.5.2 There is at present no single accepted methodology for the assessment of GHG emissions within EIA. The proposed assessment methodology outlined below is therefore based on application of the 2022 IEMA guidance, together with professional judgement.

14.5.3 Determining the magnitude and significance of climate change effects (GHG emissions or savings) from new development remains an emerging practice and is complex given the local scale at which GHG emissions typically occur in contrast to the global and transboundary nature of climate change.

14.5.4 The approach taken in this assessment is to estimate GHG emissions resulting from the construction and operation of the Proposed Scheme and to evaluate these emissions within the context of GHG emissions at a range of geographical scales including recent emissions from the local area (Oxfordshire & South East) and to future carbon budgets for the South East and UK as a whole.

14.5.5 Furthermore, and in accordance with the latest IEMA guidance on GHGs in EIA, consideration is also given to the contribution of the Proposed Scheme to a science-based net zero trajectory in line with the 2015 Paris Agreement's 1.5°C pathway. In order to evaluate the contribution of the Proposed Scheme to this net zero pathway, its construction and operational stage performance is evaluated against the RIBA Climate Challenge[19] target metrics for 'embodied carbon' and 'operational energy' respectively. Operational emissions performance is assessed in terms of compliance with the requirements of the Future Homes Standards.

14.5.6 The methodology comprises the following components:

- Review of legislation, planning policy and guidance relating to GHG emissions / climate change mitigation;
- Establish GHG assessment scope and boundaries;
- Establish current and future baseline conditions in respect of GHG emission;
- Calculate GHG emissions from the construction and operational stages of the proposed buildings;
- Consider legislative and policy requirements and wider opportunities for GHG emissions reductions through appropriate mitigation measures in accordance with IEMA's GHG management hierarchy[20];
- Evaluate residual GHG emissions following mitigation within the context of baseline site, local and regional GHG emissions and also future carbon budgets to establish their context, magnitude and significance; and
- Determine whether the Proposed Scheme makes an appropriate contribution to the UK's net zero trajectory.

Reporting of the Environmental Effect and Significance Criteria

14.5.7 The assessment of likely significant environmental effects as a result of the Proposed Scheme has taken into account the demolition/construction and operational stage. The following sections define the approach adopted within the assessment for the determination of sensitivity (or

value/importance), magnitude of change (or impact), the level of effect and significance.

Determining Sensitivity of Receptor

14.5.8 GHG emissions affect the global climatic system which, in accordance with IEMA guidance, is considered potentially sensitive to any additional GHG emissions. This sensitivity may, however, vary depending on the future global response to climate change, for example should a significant global reduction in GHG emissions (compared with the currently increasing emissions) be achieved over time. Within this context IEMA's latest EIA guide to climate change adaptation and resilience recommends the use of the Met Office UKCP18 high emissions scenarios (known as "RCP8.5"), unless the case can be made for using a different, lower emissions scenario. The RCP 8.5 scenario is considered most appropriate for this assessment and as a result the sensitivity of the global climate system is considered to be high.

Determining the Magnitude of Change

14.5.9 The magnitude of change has been considered as the change experienced from the current baseline conditions at the sensitive receptor and has been considered on a scale of large, medium, small or negligible.

14.5.10 There are currently no published or agreed significance criteria for evaluating GHG emissions in EIA. Therefore, the magnitude of change of GHG emissions estimated from the Proposed Scheme is determined by establishing their scale relative to baseline GHG emissions from Oxfordshire and South East England, and also to future UK and South East England carbon budgets as, together with professional judgement.

Table 14.18 Determining Magnitude of Change

Magnitude of Change	**Description of Change**
Large	A large increase / decrease in GHG emissions (e.g. ≥10%) relative to baseline local/regional emissions and/or future carbon budgets
Medium	A medium increase / decrease in GHG emissions (e.g. 5% to <10%) relative baseline local/regional emissions and/or future carbon budgets
Small	A small increase / decrease in GHG emissions (e.g. 1 to <5%) relative to baseline local/regional emissions and/or future carbon budgets
Negligible	A negligible increase / decrease in GHG emissions (e.g. <1%) relative to baseline local/regional emissions and/or future carbon budgets

Determining the Level of Effect

14.5.11 The level of effect has been informed by the magnitude of change due to the Proposed Scheme and the evaluation of the sensitivity of the affected receptor. The level of effect has been determined using professional judgement and Table 14.19 has been a tool which has assisted with this process.

14.5.12 Whilst Table 14.19 provides ranges, the level of effect is confirmed as a single level and not a range, informed by professional judgement. For each effect, it has been concluded whether the effect is '*beneficial*' or '*adverse*'.

Table 14.19 Matrix to Support Determining the Level of Effect

		Sensitivity (or value / importance)			
		High	**Medium**	**Low**	**Negligible**
Magnitude of Change	**Large**	Major	Moderate to Major	Minor to Moderate	Negligible
	Medium	Moderate to Major	Moderate	Minor	Negligible
	Small	Minor to Moderate	Minor	Negligible to Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

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

14.5.14 The magnitude of net GHG emissions (or savings) from a project, how this effect changes (or otherwise) baseline conditions at the local, regional and national level are important components when establishing the magnitude of change which feeds into determining the level of effect. However, how the project contributes (or otherwise) to the UK's net zero trajectory is a critical additional component as recognised by the latest IEMA Guidance. The following terms have therefore been used to define the level of effect:

- **Major adverse**: GHG mitigation measures are not in line with a science-based 1.5°C aligned transition to net zero for that project type, and net GHG emissions equate to a large increase (e.g. ≥10%) relative to baseline local/regional/national emissions and/or future local carbon budgets. A project with major adverse effects is locking in GHG emissions and does not make a meaningful contribution to the national trajectory to net zero. This effect is significant.
- **Moderate adverse:** GHG mitigation measures are partly in line with a science-based 1.5°C aligned transition to net zero for that project type, and net GHG emissions equate to a medium increase (e.g. >5%) relative to baseline local/regional/national emissions and/or future local carbon budgets. A project with moderate adverse effects complies with some up-to-date policy and good practice but is locking in some emissions and makes only a partial contribution to the national trajectory to net zero. This effect is significant.
- **Minor adverse:** GHG mitigation measures are in line with a science-based 1.5°C aligned transition to net zero for that project type, and net GHG emissions equate to a small increase (e.g. <5%) relative to baseline local/regional/national emissions and/or future local carbon budgets. A project with minor adverse effects complies with up-to-date and emerging policy and good practice reduction measures and makes a contribution to the national trajectory to net zero. This effect is not significant.
- **Negligible**: GHG mitigation measures are in line with a science-based 1.5°C aligned transition to net zero for that project type, with minimal residual emissions. A project with negligible effects complies with up-to-date and emerging policy and best practice and plays a part in achieving the rate of transition required by nationally set policy e.g. net zero. This effect is not significant.
- **Beneficial:** net GHG impacts are below zero and the project results in a reduction in atmospheric GHG concentrations, whether directly or indirectly, compared to the without-project baseline. A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact.

14.5.15 Carbon dioxide equivalency (CO_2e) is a quantity that describes, for a given mixture and amount of GHG, the amount of CO_2 that would have the same global warming potential (GWP), when measured over a specified timescale (generally, 100 years). In view of this timescale and the

findings of the recent Intergovernmental Panel on Climate Change (IPCC) 1.5°C report that some effects from climate change may be long-lasting or irreversible, the duration of effect is assumed to be long term.

Determining Significance

14.5.16 For each effect, a statement has been made as to whether the level of effect is 'Significant' or 'Not Significant'. This determination has been based on professional judgement and/or relevant guidance/legislation where applicable.

14.5.17 Significance has only been concluded for residual effects (i.e. following the identification of secondary mitigation).

Baseline Conditions

Site GHG Emissions

14.5.18 The Site comprises a series of agricultural fields. While there are likely to be some GHG emissions as a result of current activities for the purposes of the GHG emissions assessment, baseline GHG emissions from the Site are assumed to be zero to help ensure a reasonable worse case approach regarding the net GHG effects of the Proposed Scheme.

Local & Regional GHG Emissions

14.5.19 Table 14.20 presents the most recent (2020) baseline GHG emissions for Oxfordshire and South East England taken from the *UK Local Authority & Regional Carbon Dioxide Emissions National Statistics*[21]. Assumed baseline GHG emissions from the Site are also presented. This baseline data is used to contextualise GHG emissions from the Proposed Scheme and determine the magnitude of effect.

Table 14.20 Current Baseline GHG Emissions

Geographical Area	**2020 GHG Emissions (tonnes CO_2)**
Site	0 (assumed)
Oxfordshire	3,890,000
South East	40,399,600

Future Baseline

14.5.20 The UK carbon budgets are effectively a future baseline of national GHG emissions required to achieve net zero by 2050. The *Climate Change Act 2008* requires the Secretary of State to set for each succeeding period of five years (beginning with the period 2008 to 2012) an amount for the net UK carbon account (the "carbon budget") and to ensure the net quantity of emissions does not exceed the carbon budget.

14.5.21 The UK's *Sixth Carbon Budget*[22] was published in April 2021, enshrining in law a new target to reduce GHG emissions by 78% by 2035 and for the first time incorporating the UK's share of international aviation and shipping emissions.

14.5.22 The Tyndall Centre has worked with the South East England to set future carbon budgets for their region. *Setting Climate Commitments for the South East*[23] proposes carbon budgets for the South East up to the year 2100. It should be noted that these budgets relate to emissions from the energy system only.

14.5.23 Table 14.21 sets out the future carbon budgets for the UK and the South East which, together with current baseline GHG emissions reported above, are used to help determine the magnitude

of GHG emissions resulting from the Proposed Scheme.

Table 14.21 UK & South West Carbon Budgets

Period	GHG Emissions (tonnes CO_2)	
	UK	South East
2018 – 2022	2,544,000,000	187,200,000
2023 – 2027	1,950,000,000	94,600,000
2028 – 2032	1,725,000,000	46,400,000
2033 – 2037	965,000,000	22,700,000
2038 – 2042	Not yet set	11,200,000
2043 – 2047	Not yet set	5,500,000
2048 - 2100	Not yet set	5,300,000

14.5.24 Assuming an even spread of emissions across each budget's five years, the total carbon budget across the construction stage (2024-31) is estimated to be 2,940,000,000 tCO_2e (UK) and 112,800,000 tCO_2e (South East), and across the assessed operational stage (2031-37) is estimated to be 1,655,000,000 tCO_2e (UK) and 41,260,000 tCO_2e (South East).

Trajectory towards Net Zero

14.5.25 In order to determine whether the Proposed Scheme is aligned with the UK's trajectory to net zero it is necessary to provide context for the magnitude of GHG emissions. RIBA Climate Challenge targets for embodied carbon and operational energy use take into account the latest recommendations of the Green Construction Board to ensure the construction industry delivers the significant reductions necessary by 2030 in order to have a realistic prospect of achieving net zero for the whole UK building stock by 2050.

14.5.26 Table 14.22 sets out the RIBA targets for embodied carbon and operational energy use for residential buildings, which have been applied to the residential elements of the Proposed Scheme, noting these make up the majority of the Scheme and therefore the majority of the GHG emissions.

Table 14.22 RIBA Climate Challenge Target Metrics for Domestic Buildings

Climate Challenge Metrics	Business As Usual	2025 Targets	2030 Targets
Operational Energy $kWh/m^2/year$	120	< 60	< 35
Embodied Carbon (A1-C4) $kgCO_2e/m^2$	1200	<800	<625

Potential Effects

14.5.27 Potential effects comprise the release of GHG emissions which have the potential to impact on the Global Climatic System, increasing the impact of Climate Change.

Mitigation

Construction Stage

14.5.28 The following primary and tertiary mitigation has been evaluated as part of the construction stage assessment.

14.5.29 As part of the construction stage the Proposed Scheme will look to reduce GHG emissions through a range of measures summarised below.

14.5.30 Embodied carbon – New homes and buildings will be built targeting the embodied carbon targets set out in the RIBA 2030 challenge, with a Life Cycle Assessment (LCA) carried out as part of future Reserved Matters applications to demonstrate how these targets are met. At this time the non-residential targets do not extend to all of the use classes proposed. Where a direct target is not available, as a minimum the LCA will demonstrate how the building will achieve a 10% reduction in embodied carbon.

Table 14.23 RIBA Climate Challenge Target Metrics for Domestic Buildings

Climate Challenge Metrics	**Embodied Carbon Targets (A1-C4) $kgCO_2e/m^2$**		
	Business as Usual	**2025 Targets**	**2030 Targets**
Residential	1,200	<800	<625
Offices	1,400	<970	<750
Schools	1,000	<675	<540

14.5.31 Construction operations – As part of the construction the CEMP will set out considerations for reducing construction stage operational emissions, for example:

- Use of biofuels in site vehicles which has a lower emissions factor than diesel;
- Use of hydrogen or electric site vehicles and equipment;
- Use of temporary energy storage systems;
- Requiring the contractors to purchase renewable energy; and
- Use of renewable energy generating systems such as PV cells on construction buildings.

Operational Stage

14.5.32 The following primary and tertiary mitigation has been evaluated as part of the construction stage assessment.

14.5.33 New residential and non-residential homes will meet the requirements of the 2025 Future Homes Standard (FHS) and Future Buildings Standard (FBS).

14.5.34 The 2025 FHS is anticipated to require new residential development to achieve as a minimum a 75% reduction in carbon emissions beyond Part L 2013. While it has not yet been consulted upon it is anticipated that the FBS will require non-residential development to achieve a similar carbon reduction.

14.5.35 For the purposes of this assessment, and to take account of a worst-case scenario, the GHG

assessment will assume new residential and non-residential development will meet the requirements of the Interim FHS and FBS. It is anticipated this will include:

- An all-electric development, with no fossil fuels onsite.
- Provision of 100% low energy lighting;
- Use of low carbon renewable energy, including heat pumps and Solar PV to reduce operational emissions.

Residual Effects

GHG Assessment Scope

14.5.36 The proposed development will give rise to various sources of GHG emissions across the project's lifecycle stages, namely:

(a) product stage (the manufacture and transport of construction materials),

(b) the operation of plant and equipment during the construction phase),

(c) transport and disposal of waste from construction activities,

(d) land use change

(e) maintenance, repair, replacement and refurbishment

(f) operational energy

(g) operation water use

(h) end-user emissions

(i) decommissioning and disposal

14.5.37 Based on professional judgement in the context of the development proposed it is not intended to assess matters (c), (d), (e), (g) and (i) as the likely emissions effects are not considered to be large (c), (d) and (g), the effects are not a significant component of the operational phase (e) or the stages are so far in the future there is insufficient certainty to determine the likely effects (i).

Assessment Timeframe

Table 14.24 Assessment Timeframe

	Timeframe	Assessment period	Methodology
Construction	2024-2031	2024-2031	The construction stage GHG emissions are estimated across the construction period using the embodied carbon targets outlined in the previous section
Operation	Completed 2031	2025 – 2037	To provide a worst-case scenario the operational stage assessment assumes the completion of all homes in 2025 (the date from which the full FHS comes into force), assessing through to 2037, the date of the currently available UK carbon budgets.

Construction stage Emissions

14.5.38 The tables below present the construction stage GHG emissions.

14.5.39 Table 14.25 presents the product stage emissions of the Proposed Scheme, i.e. the embodied carbon. These figures are based on the Proposed Scheme meeting the embodied carbon targets set out in the RIBA 2030 challenge. As not all of the building types proposed are covered by these targets emissions factors have been assumed based on the nature of the proposed buildings, or taken from the 2014 RICS embodied carbon calculation methodology.[24]

Table 14.25 Embodied carbon GHG emissions

	GHG emissions (tCO_2e)
Baseline	88,503
Proposed Scheme	58,474
Reduction	30,029

14.5.40 In addition to the embodied carbon of the Proposed Scheme an estimate has been made of the GGH emissions from the operation of plant and equipment during the construction phase. It is estimated these emissions total approximately 1,568 tonnes CO_2e.

14.5.41 Table 14.26 presents the total estimated construction GHG emissions of the Proposed Scheme.

Table 14.26 Construction stage GHG emissions

Development Phase and Emissions Source		**Proposed Development CO_2e Emissions (tonnes/annum)**	
		Annual	**Total**
Construction	Embodied Carbon	7,309	58,474
	Site activities	196	1,569
Total		7,505	60,043

14.5.42 Table 14.27 presents these construction GHG emissions as a percentage of baseline GHG emissions from Oxfordshire and the South East, and also future South East and UK carbon budgets. Annual construction emissions are used for comparison with baseline Oxfordshire and South East emissions (given these are also annual emissions), whilst total construction emissions are compared with UK and South East carbon budgets.

Table 14.27 Contextualised Construction GHG Emissions

Context	**Construction Stage GHG Emissions (as a %)**
UK carbon budget (2024 – 2031)	<0.01%
South East carbon budget (2024 – 2031)	0.05%
South East 2020 GHG Emissions	0.02%
Oxfordshire 2020 GHG Emissions	0.19%

14.5.43 Annual construction emissions of 7,505 tCO_2e equate to circa 0.19% of Oxfordshire baseline emissions and 0.05% of South East baseline emissions. Total construction emissions of 60,043 tCO_2e equate to circa 0.05% of South East carbon budget for 2024-2031 and less than 0.01% of UK carbon budget for this period.

14.5.44 It should be noted that the South East carbon budget proposed by Tyndall Centre relate to

emissions from the energy system only, whilst construction GHG emissions from the Proposed Scheme will largely comprise emissions from the manufacture and transport of construction products and materials. Construction GHG emissions are therefore not readily comparable given a significant proportion of these emissions are likely to occur outside the geographical and/or temporal boundary of the South East carbon budget.

14.5.45 Table 14.28 presents average construction phase (embodied carbon) emissions estimated for the Proposed Scheme residential units within the context of the RIBA climate challenge target metrics, noting that emissions from these buildings make up the majority of the embodied carbon emissions from the Proposed Scheme.

Table 14.28 Embodied Carbon GHG Emissions & RIBA Climate Challenge Targets

RIBA Climate challenge metric	Business As Usual	2025 Targets	2030 Targets	Proposed Scheme
Embodied Carbon (A1-C4) $kgCO_2e/m^2$	1200	<800	<625	806

14.5.46 Average embodied carbon emissions of 806$kgCO_2e$ per sqm estimated for the Proposed Scheme buildings is aligned with the RIBA2030 climate challenge targets taking into consideration the construction timeline of 2024-2031.

14.5.47 The sensitivity of the climate system is considered to be high. The magnitude of change is considered to be negligible. The Proposed Scheme's construction GHG emissions are considered to comprise current and emerging good practice and contribute to the UK's net zero trajectory. Therefore, there is likely to be a direct, temporary, long- term, adverse effect which is considered to be minor.

14.5.48 Secondary Mitigation or Enhancement - No secondary mitigation or enhancement is required/has been identified.

14.5.49 Residual Effects - In the absence of secondary mitigation the residual effects for insert the receptor is that same as that reported in the pre-mitigation scenario.

14.5.50 Significance - This effect is considered to be Not Significant.

Operational Stage Emissions

14.5.51 The operation of the Proposed Scheme will result in GHG emissions from the generation and consumption of energy for the buildings. An estimate of annual operational energy demand and associated CO_2 emissions for the Proposed Scheme is reported in the Sustainability & Energy Strategy together with underlying assumptions at this outline application phase.

14.5.52 Table 14.29 presents estimated operational GHG emissions based on data from the Energy Strategy for the Proposed Scheme including annual emissions as well as total operational GHG emissions over the assessed operational period (2025 – 2037). The emissions for the operational period take into account decreasing annual carbon emissions factors prepared by the Government which take into account the anticipated decarbonisation of the electricity network.[3]

[3] https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal

Table 14.29 Table 14.5.11: Operational GHG Emissions

	GHG Emissions [tCO_2e]
Annual GHG emissions	395
Total GHG emissions (2025-2037)	1,656

14.5.53 Table 14.30 reports the above operational GHG emissions as a percentage of baseline (2020) GHG emissions from Oxfordshire and South East region, and also future South East and UK carbon budgets. Annual operational GHG emissions are compared with baseline emissions (given these are also annual data), whilst total operational GHG emissions are compared with the South East and UK carbon budgets for the same 2025-2037 period.

Table 14.30 Operational GHG Emissions in Context

Context	Operational Stage GHG Emissions (as a %)
UK Carbon Budget (2025-2037)	0.0001%
South East carbon budget (2025 – 2037)	0.004%
South East Baseline GHG Emissions 2020	0.001%
Oxfordshire Baseline GHG Emissions 2020	0.01%

14.5.54 Annual operational emissions of 395 tCO_2e equate to circa 0.01% of Oxfordshire baseline emissions and 0.001% of South East baseline emissions. Total operational emissions for the assessed period (2025-2037) of 1,656 tCO_2e equate to circa 0.004% of South East carbon budget for 2025-2037 0.0001% of UK carbon budget for that period.

14.5.55 Estimated operational GHG emissions are based on the Proposed Scheme being in full operational in 2025, with emissions taking account of the decarbonisation of the UK electricity grid across the operational stage.

14.5.56 Table 14.31 compares operational energy demand for the Proposed Scheme with the RIBA climate challenge target metric for operational energy for domestic buildings. The years refer to when the design is undertaken hence a 2022 target has been estimated by Turley assuming an even spread of annual reductions between Business As Usual and the 2025 target.

Table 14.31 Operational Energy Demand & RIBA Climate Challenge Targets

RIBA Climate challenge target	Business As Usual	2025 Target	2030 Target	Proposed Scheme
Operational Energy $kWh/m^2/year$	120	< 60	< 35	43

14.5.57 Estimated annual operational energy demand of 43 kWh/m^2 for the Proposed Scheme is below the RIBA 2025 target.

14.5.58 The Proposed Scheme will be built out in accordance with the anticipated requirements of the FHS and FBS. This operational energy performance is considered to accord with the current and emerging good practice design standards sought by IEMA for a conclusion of minor adverse GHG impact.

14.5.59 The sensitivity of the climate system is considered to be high. The magnitude of change is considered to be negligible. The Proposed Scheme's operational energy performance is

considered to comprise current and emerging good practice and therefore contribute to the UK's net zero trajectory. Therefore, there is likely to be a direct, temporary, long-term, adverse effect which is considered to be minor.

14.5.60 Secondary Mitigation or Enhancement - No secondary mitigation or enhancement is required/has been identified.

14.5.61 Residual Effects - In the absence of secondary mitigation the residual effects remain the same as identified above.

14.5.62 Significance - This effect is considered to be Not Significant.

In-combination Construction and Operational GHG Emissions

14.5.63 Table 14.32 presents estimated construction and operational GHG emissions of the Proposed Scheme.

Table 14.32 Construction and Operational GHG Emissions

	GHG Emissions [tCO_2e]
Annual GHG emissions (2025)	7,900
Total GHG emissions (2025-2037)	61,699

14.5.64 Table 14.33 reports the above construction and operational GHG emissions as a percentage of baseline (2020) GHG emissions from Oxfordshire and South East region, and also future South East and UK carbon budgets. Annual operational GHG emissions are compared with baseline emissions (given these are also annual data), whilst total operational GHG emissions are compared with the South East and UK carbon budgets for the same 2025-2037 period.

Table 14.33 Construction and Operational GHG Emissions in Context

Context	**Operational Stage GHG Emissions (as a %)**
UK Carbon Budget (2025-2037)	0.001%
South East carbon budget (2025 – 2037)	0.04%
South East Baseline GHG Emissions	0.02%
Oxfordshire Baseline GHG Emissions 2019	0.20%

14.5.65 Annual operational and construction emissions (2025) of 7,900 tCO_2e equate to circa 0.2% of Oxfordshire baseline emissions and 0.02% of South East baseline emissions. Total operational and construction emissions for the assessed period (2025-2037) of 61,699 tCO_2e equate to 0.04% of South East carbon budget for 2025-2037 and 0.001% of UK carbon budget for that period.

14.5.66 The sensitivity of the climate system is considered to be high. The magnitude of change is considered to be negligible. The Proposed Scheme's operational energy performance is considered to comprise current and emerging good practice and therefore contribute to the UK's net zero trajectory. Therefore, there is likely to be a direct, temporary, long-term, adverse effect which is considered to be minor.

14.5.67 Secondary Mitigation or Enhancement - No secondary mitigation or enhancement is required/has been identified.

14.5.68 Residual Effects - In the absence of secondary mitigation the residual effects remain the same

as identified above.

14.5.69 Significance - This effect is considered to be Not Significant.

Limitations and Assumptions

14.5.70 To ensure transparency within the EIA process, the following limitations and assumptions have been identified.

14.5.71 Embodied Carbon - The RIBA 2030 challenge embodied carbon targets do not cover all of the proposed building types, assumptions have been made as to how closely other building types align with those available, with alternative benchmarks from the RICS 2014 Embodied Carbon methodology used. The RIBA Challenge targets and RICS benchmark estimates of embodied carbon associated with construction materials for various building types which may not wholly reflect the Proposed Scheme at detailed design. Nevertheless, in the absence of more detailed guidance, these factors are considered well-suited to this assessment of likely embodied carbon.

14.5.72 Transport emissions – It is not possible to model the direct impact of operational transport emissions as a result of the Proposed Scheme. There are difficulties in modelling trips generated by the development which are 'new', i.e. those trips which are wholly new and not diverted from other areas of the transport network as residents move to the area. This data is not available and therefore a quantitative assessment is not possible. However, qualitatively there are measures being put in place through national policy which aim to reduce the GHG emissions of transport.

14.5.73 The Government's Transport Decarbonisation Plan[25] sets out the Government's approach to reducing emissions form all forms of transport. This includes ending the sale of new diesel and petrol cars from 2030 and ensuring all vehicles from 2035 are 100% zero emissions at the tailpipe. Switching to electric vehicles means these to benefit from the decarbonisation of the electricity network and this is a core strategy for the Government on decarbonising transport. This is supported by changes to the Building Regulations in 2022 which set new requirements of EV charging, including the provision for an EV charge point to be installed on every home.

14.5.74 In this context it is anticipated that emissions from transport from the Proposed Development will reduce over time, supported by the decarbonisation of the electricity network.

14.6 Summary

14.6.1 Table 14.34 provides a summary of the effects, receptors, residual effects and conclusions of significance considered within the Chapter.

Table 14.34 Summary of Residual and Significant Effects

Effect	Receptor	Residual Effect	Is the Effect Significant?
Construction Stage			
Effects on the global climate system from the release of greenhouse gas (GHG) emissions.	Global climate system	minor adverse	No
Operational Stage			
Effects on the global climate system from the release of greenhouse gas (GHG) emissions.	Global climate system	minor adverse	No
In-combination Construction and Operational Stage			
Effects on the global climate system from the release of greenhouse gas (GHG) emissions.	Global climate system	minor adverse	No

[1] HM Government (2017) - The Town and Country Planning (Environmental Impact Assessment) Regulations 2017. Available at: https://www.legislation.gov.uk/uksi/2017/571/contents/made [Accessed 20/06/22]

[2] UK Government (2008) - Climate Change Act 2008. Available at: Climate Change Act 2008 (legislation.gov.uk)

[3] MHCLG (2019) - National Planning Policy Framework. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf [Accessed 20/06/22]

[4] HM Government (2021) - Future Homes Standard. Available at: The Future Homes Standard: changes to Part L and Part F of the Building Regulations for new dwellings - GOV.UK (www.gov.uk) [Accessed 20/06/22]

[5] HM Government (2021) - Future Homes Standard. Available at: The Future Homes Standard: changes to Part L and Part F of the Building Regulations for new dwellings - GOV.UK (www.gov.uk) [Accessed 20/06/22]

[6] Cherwell District Council (2016). Cherwell Local Plan 2011-2031. Available at: https://bit.ly/311xCqj

[7] Cherwell District Council (2020). Climate Action Framework 2020. Available at: https://bit.ly/3xk7Iuc

[8] British Standards Institution (2011). BS EN 15978:2011 Sustainability of construction works. Assessment of environmental performance of buildings. Available at: https://bit.ly/3cNkZSr

[9] RIBA 2030 Climate Challenge. Available at: https://www.architecture.com/-/media/files/Climate-action/RIBA-2030-Climate-Challenge.pdf [Accessed 11/03/22]

[10] IEMA (2022) - EIA Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance. Available at: https://www.iema.net/resources/blog/2022/02/28/launch-of-the-updated-eia-guidance-on-assessing-ghg-emissions [Accessed 20/06/22]

[11] IEMA (2020) – EIA Guide to: Climate Change Adaptation & Resilience. Available at: https://www.iema.net/resources/reading-room/2020/06/26/iema-eia-guide-to-climate-change-resilience-and-adaptation-2020 [Accessed 20/06/22]

[12] Met Office (2018) UK Climate Projections. Available at https://www.metoffice.gov.uk/research/approach/collaboration/ukcp

[13] Met Office (2021) UK Climate Change Risk Assessment (CCRA3). Available at: https://www.ukclimaterisk.org/wp-content/uploads/2021/06/Technical-Report-The-Third-Climate-Change-Risk-Assessment.pdf

[14] HM Government (2022) The Building Regulations 2010. Available at: The Building Regulations 2010: The Merged Approved Documents (publishing.service.gov.uk)

[15] HM Government (2011). Biodiversity 2020. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69446/pb13583-biodiversity-strategy-2020-111111.pdf

[16] Natural England (2020) Climate Change Adaptation Manual. Available at: http://publications.naturalengland.org.uk/publication/5679197848862720

[17] HM Government (2016) Approved Document G, Sanitation, hot water safety and water efficiency. Available at: https://www.gov.uk/government/publications/sanitation-hot-water-safety-and-water-efficiency-approved-document-g

[18] BRE (2022) BREEAM New Construction. Available at: https://bregroup.com/products/breeam/breeam-technical-standards/breeam-new-construction/#NC-tech-manual

[19] 2030 Climate Challenge (architecture.com)

[20] Special Report: Greenhouse Gas Management & Reporting; IEMA; 2010

[21] BEIS (2021). UK Local Authority and Regional Carbon Dioxide Emissions National Statistics: 2005 to 2019. Available at: https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-to-2019 [Accessed 22/06/2022].

[22] BEIS (2021). Press Release: UK enshrines new target in law to slash emissions by 78% by 2035. Available at: https://www.gov.uk/government/news/uk-enshrines-new-target-in-law-to-slash-emissions-by-78-by-2035 . [Accessed 27/04/2022].

[23] Tyndall Centre (2022). Setting Climate Commitments for the South West. Available at: https://carbonbudget.manchester.ac.uk/reports/SW/ . [Accessed 26/06/2022].

[24] RICS (2014) Methodology to calculate embodied carbon of materials. Available at: https://www.igbc.ie/wp-content/uploads/2015/02/RICS-Methodology_embodied_carbon_materials_final-1st-edition.pdf

[25] HM Government (2021) Transport Decarbonisation Plan. Available at: https://www.gov.uk/government/publications/transport-decarbonisation-plan

15 Cumulative effects

15.1 Introduction

15.1.1 This Chapter provides a summary of the assessment of cumulative effects undertaken for the Proposed Development.

15.1.2 Schedule 4(5)(e) of the 2017 EIA Regulations requires a description of the likely significant effects of the development on environment resulting from '*the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources*'.

15.1.3 In respect of potential cumulative effects with other development, national planning practice guidance advises that '*Each application (or request for a screening opinion) should be considered on its own merits. There are occasions, however, when other existing or approved development may be relevant in determining whether significant effects are likely as a consequence of a Proposed Development. The local planning authorities should always have regard to the possible cumulative effects arising from any existing or approved development.*' (ID 4-024-20170728).

15.1.4 The EIA Scoping Opinion (Appendix 4.2) states that "*the ES should include an impact assessment to identify, describe and evaluate the effects that are likely to result from the development in combination with other developments*" and that the cumulative assessment "*should be as an independent chapter*".

15.1.5 A list of other development and planning applications has been compiled from a search of the relevant planning registers (Date 18.08.2022). The table below identifies schemes within 2 km of the Allocation Site that comprise 150 or more dwellings and/or 10,000 m^2 of new employment floor space. The locations are shown on Figure 15.1 Cumulative Map (Date 18.08.2022).

Table 15.1 Cumulative Schemes

Map Reference	Cumulative Scheme	Description
1	Policy PR6b	Land West of Oxford Road
2	Policy PR6c	Land at Frieze Farm
3	Policy PR7a	Land South East of Kidlington Planning application 22/00747/OUT is under consideration for up to 370 homes, public open space, sports pitches and pavilion, drainage and engineering works, with all matters reserved except for vehicular and emergency accesses to Bicester Road.
4	Policy PR7b	Land at Stratfield Farm
5	Policy PR8	Land East of the A44
6	Policy PR9	Land West of Yarnton
7	Kidlington 1A	Langford Lane / Oxford Technology Park / London-Oxford Airport
8	Kidlington 1B	Begbroke Science Park
9	Policy SP52	Oxford University Press Sports Ground
10	Policy SP28	Pear Tree Farm

Map Reference	Cumulative Scheme	Description
11	Northern Gateway 18/02065/OUTFUL approved 2021	Scheme comprises the construction of employment space, community space, use classes A1, A2, A3, A4 and A5 floorspace, up to a 180 bedroom hotel and up to 480 houses, installation of an energy sharing loop, a link road between the A40 and A44, open space, landscaping.
12	Land at Old Marston 20/03034/FUL approved 2022	Scheme comprises demolition of existing buildings and construction of 159 residential units (comprising 8 two bedroom houses, 22 three bedroom houses, 44 four bedroom houses, 23 one bedroom flats, 62 two bedroom flats), associated roads and infrastructure, sustainable urban drainage system and landscaping.
13	Land South West Of St Frideswide's Farm 21/01449/FUL approved 2022	Full planning permission for 134 dwellings (use class C3), informal open space including community pavilion, seating and children's play areas, hard and soft landscape and sustainable drainage areas, access, associated roads and infrastructure, car and cycle parking, bin storage, pumping station, substation and associated engineering works.

15.1.6 Each of the assessment chapters considers which other developments have the potential for cumulative effects when the construction and/or operational phases could be concurrent, and where there are sensitive receptors common to both developments within the Area of Influence.

15.2 Transport and access

15.2.1 As agreed with OXCC, the North Oxford VISSIM model has been used to assess the cumulative impact of traffic resulting from committed development sites, the relevant Local Plan Partial Review sites, and also allows for planned infrastructure. In addition to PR6a, the other PR sites and their associated infrastructure included in the traffic model are:

- Policy PR6b – 670 dwellings;
- Policy PR7a – Land South East of Kidlington- 430 dwellings;
- Policy PR7b – Land at Stratfield Farm - 120 dwellings;
- Policy PR8 - Begbroke New Urban Neighbourhood 1,950 dwellings with primary and secondary schools; and
- Policy PR9 - Land West of Yarnton - 540 dwellings.

15.2.2 The future year assessment of 2031 considers all planned and committed development as well as the PR sites and with the infrastructure that will be implemented alongside these. The mitigation proposed leads to traffic reduction and redistribution and a betterment in terms of the operation of the junctions on the Oxford Road corridor including Kiddlington and Cutteslowe roundabouts. The existing Park and Ride junction and the junctions proposed on the Oxford Road Banbury Road will operate within their theoretical capacity. As such, the residual cumulative impacts on driver delay are not significant and modal shift may assist in some areas.

15.2.3 At all of the highways links assessed, the Proposed Development would result in less than 10% increase in total traffic flows (Table 5.7). All effects relating to community severance, driver delay, pedestrian delay, pedestrian amenity, and accidents and safety will be negligible. In terms of fear and intimidation, the effects predicted will range from moderate beneficial along the Site frontage, to minor adverse on the other sections of Oxford Road / Banbury Road (Table 5.9).

15.3 Air quality

15.3.1 Cumulative effect assessment for air quality has used traffic flows derived from the model discussed above with the committed developments.

15.3.2 During the construction phase, consideration has been given to potential effects of dust deposition arising in combination with other development within 350m of the Proposed Development, such as Scheme 13 (Figure 15.1), should the construction of the development's occur simultaneously. This found that the implementation of mitigation measures as suggested in **Error! Reference source not found.**, as well as nearby sites adhering to equivalent Dust Management Plans, will ensure that cumulative effects as a result of concurrent construction activities are negligible, and not significant.

15.3.3 The assessment has considered the effect of the Proposed Development in conjunction with traffic generation as a combined effect of committed developments and the Proposed Development, using traffic flows as provided by i-Transport the appointed Transport Consultant for the scheme. Predicted impacts of air pollutants as a result of Water Eaton are predicted to be negligible at all sensitive receptor locations assessed.

15.4 Noise and vibration

15.4.1 As above, cumulative effect assessment has used traffic flows derived from the model discussed above with the committed developments.

15.4.2 Changes in noise levels have been assessed at twelve locations within the local road network by comparing the modelled traffic flows in 2025 and 2031, with and without the Water Eaton development in place. The results of the assessment shown in **Error! Reference source not found.**, indicate a negligible change in the level of noise, with no significant effects

15.4.3 Noise levels in external areas used for amenity within the development of Water Eaton are predicted to be less the upper design target level of $L_{Aeq,16h}$ 55 dB in all cases, and below the lower design target level of 50 dB in most places. Sound levels can be further reduced by the screening effect of the new buildings, i.e., those fronting Oxford Road in particular, and the installation of garden fences/balustrades to external amenity spaces where necessary, which will be confirmed at the detailed design stage.

15.5 Drainage and flood risk

15.5.1 This section considers the cumulative effects with other relevant projects. With respect to drainage and flood risk, the following sites are relevant as they are located within the same drainage catchment as the Site

- Cherwell District Council Local Plan Partial Review - Site Allocation Policy PR6b; and
- Land South West of St Frideswide's Farm, Banbury Road (Oxford CC ref. 21/01449/FUL).

15.5.2 Cherwell Site Allocation PR6b (herein referred to as PR6b) is located to the West of Oxford Road and the Site (Figure 15.1, map reference 1). The allocation is for the construction of 670 dwellings and provision of facilities for sports, play areas and allotments.

15.5.3 The Land South West of St Frideswide's Farm (hereafter referred to as Site 13, shown on Figure 15.1) is located to the East of Oxford Road and adjoining the south-western boundary of the Site. Oxford City Council has granted planning permission for the development of 134 dwellings, pumping station, substation and associated works (Croudace Homes).

15.5.4 Both PR6b and Site 13 are located upstream of the Site and a number of drainage routes, both formal (e.g. drainage ditches) and informal (overland flow paths) pass through the Site and downstream to the River Cherwell.

Flood Risk (On-Site)

15.5.5 Both PR6b and Site 13 will address issues related to flood risk within their own sites. A number of drainage routes, both formal (e.g. drainage ditches) and informal (overland flow paths) pass through the Site and downstream to the River Cherwell. These drainage routes will be maintained through the Proposed Development. Where drainage routes are required to be amended in order to facilitate the Proposed Development (such as culverting of ditches or channelisation of overland flow routes) their design will provide sufficient capacity to convey the predicted flows. Therefore, the Proposed Development will ensure that there is no increase in flood risk to PR6b, Site 13 or other areas upstream of the Site, as well as within the Site itself.

Flood Risk (Off-Site)

15.5.6 Both PR6b and Site 13 will address issues related to off-site flood risk within their own sites; in-line with relevant national and local planning policy and guidance, flood risk off-site should not increase as a result of these developments. Therefore, there would be no cumulative increase in flood risk downstream of the Site, i.e., St Frideswide's Farmhouse.

Surface Water and Groundwater Quality

15.5.7 Both PR6b and Site 13 developments will address issues related to surface water and groundwater quality within their own sites.

Groundwater Table

15.5.8 Both PR6b and Site 13 developments will address issues related to the groundwater table within their own sites.

Foul Water

15.5.9 Both PR6b and Site 13 developments will increase the foul water discharge into the Thames Water network. Other developments being brought forward which have not been specifically listed may also be located within the same foul network catchment as the Site. Although all promoters/developers will liaise with Thames Water separately regarding network capacity, Thames Water consider all developments being brought froward which will affect their foul water network. This will ensure that the cumulative effects of these developments are taken into account.

Water Resources

15.5.10 The development of PR6b and Site 13 sites will increase the potable water demand on the Thames Water network. Other developments being brought forward which have not been specifically listed may also be located within the same potable water network catchment as the Site. Although all promoters/developers will liaise with Thames Water separately regarding network capacity, Thames Water consider all developments being brought froward which will affect their network and potable water supply. This will ensure that the cumulative effects of these developments are taken into account.

15.6 Biodiversity

15.6.1 The schemes listed below have been included within the assessment of cumulative effects due to their proximity to the Proposed Development.

- Policy PR6b, Land West of Oxford Road – 670 homes
- Policy PR6c, Land at Frieze Farm – land reserved for the construction of a golf course
- Policy PR7a, Land South East of Kidlington – 230 homes
- Policy PR7b, Land at Stratfield Farm – 100 homes
- Policy PR8, Land East of the A44 – 1,950 homes
- Policy PR9, Land West of Yarnton – 530 homes
- Kidlington 1A – employment
- Kidlington 1B – employment
- Site 13, St Frideswide's Farm – 134 homes
- Policy SP52, Oxford University Press Sports Ground – allocation for 130 homes
- Policy SP28, Pear Tree Farm – allocation for 122 homes
- Site 11, Northern Gateway (18/02065/OUTFUL) – employment, hotel and 480 dwellings.

15.6.2 In total, the allocated and approved development listed above will result in the construction of 4,616 new homes.

15.6.3 The potential cumulative impacts of these committed developments and the Proposed Development are assessed in terms of potential air quality at Oxford Meadow SAC or Cothill Fen SAC, and recreation impacts at Oxford Meadow SAC (Appendix 9.2).

Potential air quality effects at Oxford Meadow SAC or Cothill Fen SAC

15.6.4 The Local Plan HRA considers developments within the district and adjacent planning districts, concluding that no significant effects are likely to occur from the proposals within the Local Plan when the appropriate mitigation is implemented for each project. Any impacts through degradation of air quality are not considered to have a likely significant effect, either alone or in-combination, on the Oxford Meadow SAC or Cothill Fen SAC.

Recreation effects at Oxford Meadows SAC

15.6.5 In summary, the provision of semi-natural and formal green space across nearly half of the Application Site and access to nearby paths and recreation area is considered likely to accommodate the vast majority of daily pedestrian recreation activity arising from Water Eaton.

15.6.6 Development in Cherwell District on the northern edge of Oxford is separated from the SAC by the A40, and from the western units of the SAC also by the A34. This, combined with the lack of car parking around most of the SAC is considered to be a deterrent to pedestrians accessing the SAC. Port Meadow within Wolvercote, offers the most accessible opportunity for recreational activity. Oxford City Council has set out guidance for members of the public to adhere to whilst visiting this section of the SAC.

15.6.7 Any potential impacts through an increase in recreation visits to Oxford Meadow SAC are not considered to have a likely significant effect in-combination with the sites above.

Potential effects on habitats

15.6.8 Habitats outside of the Site have not been assessed and their baseline value is not known. It is assumed that the detailed design of each development listed above will follow the mitigation hierarchy (avoid-minimise-restore-offset) and will result in a net gain to biodiversity in line with

national and local policy. As all residual effects on habitats are considered to be negligible/beneficial, the Proposed Development is considered to contribute a net positive effect to the balance of any cumulative effects.

Potential effects on species

15.6.9 Populations of species outside of the Site have not been assessed and their baseline is not known. It is assumed that the design of the projects outlined above and relevant mitigation will take protected species into account. As all residual effects on species are considered to be negligible/beneficial, the Proposed Development is considered to contribute a net positive effect to the balance of any cumulative effects.

Nearby proposed sites

15.6.10 The adjacent future developments at St Frideswide's Farm and PR6b (Land West of Oxford Road) are, combined, likely to result in effects roughly equivalent to the Proposed Development. These sites have been included in the cumulative assessment above. Given the conclusions of the Air Quality assessment (Chapter 6) and the above assessment of recreational impacts on designated sites, the provision of public open space within the Site and adjacent sites, no significant effects are anticipated in combination.

15.7 Landscape effects and visual amenity

15.7.1 Five development sites are considered to be within the context of the Site, for which the likely cumulative effects are described below.

Policy PR6b

15.7.2 In landscape terms, the PR6b site has limited value due to its recreational use as a golf course and the highly managed character of the landscape features within it. It is contained by a railway line to the north-west and west, Oxford Road to the north-east and east and the settlement edge of Oxford to the south.

15.7.3 In visual terms, PR6b is relatively enclosed due to existing vegetation on the boundary and within the area. PVP EDP 1, which forms part of the visual assessment, is taken from the western edge of PR6b where there would be visibility of proposals within this location in the foreground. Views along Oxford Road would include PR6b and the Site at the same time, which would amplify potential urbanising effects as a result of proposed residential and mixed use development.

15.7.4 Overall, PR6b and the Site would have correlating effects in landscape and visual terms if both locations are developed. This would mainly affect close-range views along Oxford Road, where both allocated sites would be visible. Beyond this there would be limited or no cumulative effects. The landscape character along the settlement edge would change, but the wider landscape character in the local area would remain the same.

Policy PR6c

15.7.5 The allocated Policy PR6c site lies to the north-west of the Site, beyond the A34 and the A4260. Due to the extensive vegetation along the A34 and the Oxford Parkway Park and Ride to the north of the Site, there would be no intervisibility between the sites. As a result there would be no significant cumulative effects in landscape and visual terms between the Site and the allocated PR6c site.

Policy PR7a

15.7.6 The allocated Policy PR7a site lies to the north of the Site, beyond the A34 and is for residential development. Due to the extensive vegetation along the A34 and the Oxford Parkway Park and Ride to the north of the site, there would be no intervisibility between the sites. The landscape strategy within the Site proposes extensive vegetation in the northern part of the Site, which would add to this visual screening effect. As a result there would be no significant cumulative effects in landscape and visual terms between the Site and the allocated PR7a site.

Policy PR7b

15.7.7 The allocated Policy PR7b site lies to the north-west of the site, beyond the A34 on the settlement edge of Kiddlington and is for residential development. Due to the extensive vegetation along the A34 and the Oxford Parkway Park and Ride to the north of the Site, there would be no intervisibility between the sites. The landscape strategy within the site proposes extensive vegetation in the northern part of the Site, which would add to this visual screening effect. As a result there would be no significant cumulative effects in landscape and visual terms between the Site and the allocated PR7b site.

20/03034/FUL

15.7.8 The site, allocated for residential development, lies to the south-east of the Site, along the A40 Northern Bypass Road. While there is no intervisibility between the sites, views from the wider landscape looking west or south-west towards Oxford may have views of both the PR6a site and the 20/03034/FUL site. Beyond this there would be no significant cumulative effects in landscape and visual terms.

15.8 Heritage

Designated Heritage Assets

15.8.1 The cumulative effect on designated heritage assets predicted to arise from the Proposed Development is limited to the listed buildings at St Frideswide's Farm to the immediate east of the site. There is not expected to be any cumulative or in-combination effects on these assets arising from the other identified cumulative schemes.

Non-Designated Heritage Assets

15.8.2 Effects on non-designated heritage assets resulting from the Proposed Development are confined to the Site and therefore are not susceptible to cumulative change resulting from other identified schemes.

15.9 Population and economic effects

15.9.1 The principal scheme for the consideration of potential cumulative effects between Water Eaton and the Partial Review sites is its relationship with Policy PR6b site on the west side of Oxford Road with which the Water Eaton proposal would form the new North Oxford neighbourhood as set out by the Local Plan Partial Review.

Construction

15.9.2 If it is assumed that an average of 100 new dwellings are completed each year on the PR6b site, then for the period when the construction coincides with Water Eaton, together the housing developments would directly support 300 full time equivalent jobs in construction over the relevant period. In addition, business in the local, and regional economy, would benefit from the trade linkages that would be established to construct the development, meaning that further

indirect jobs would be supported in the supply of construction services, materials and equipment. Local businesses would generally also benefit to some extent from temporary increases in expenditure as a result of the direct and indirect employment effects of the construction phase, for example, as construction workers use local shops, accommodation and other facilities.

Population

15.9.3 The future development of PR6b Partial Review site on the west side of Oxford Road could accommodate a population of some 1,675 residents, so when complete and occupied, together with Water Eaton the population could be some 3,675 people.

Housing

15.9.4 Alongside PR6a, the future development of new homes within the PR6b Partial Review site on the opposite side of Oxford Road will introduce an additional 670 dwellings. Delivery of the new housing to the west and east of Oxford Road would provide a substantial contribution towards meeting the housing needs, comprising 33% of the housing requirement in the Local Plan Partial Review.

Economic activity

15.9.5 As a measure of the new local population that could be employed in, and support, the local economy, the working-age people that could be expected to be economically active (working or seeking work), would be some 1,764 people that could represent an extra input in the work force.

15.9.6 There will also be the indirect effects associated with economic activity of residents related to the goods and services that are sourced from within the local economy. Based on average weekly household spending figures recorded by the ONS[1], the household spending from Water Eaton and PR6b in the local economy could amount to some £35 million annually, at present day value.

Education

15.9.7 The Primary school on the Water Eaton development is to also cater for the school places of children living in the PR6b development.

15.9.8 Alongside PR6a, other Partial Review sites are covered by policy to include school provision in their development layouts, and/or, provide a financial contribution towards increasing the availability of pupil places. On-site provision of new schools is focussed at PR8 in the Yarnton area and an extension of an existing Primary school with the development of PR9.

Healthcare infrastructure

15.9.9 Water Eaton will deliver a local centre to meet the day to day needs of the new residents of the neighbourhood. The local centre will provide space that can be used for health facilities and also the opportunity to provide social/childcare facilities as part of a community building.

Open space, sports and leisure provision

15.9.10 The table below shows the open space, sports and leisure provision associated with the Local Plan Partial Review sites. PR6c is the allocation of Land at Frieze Farm which is reserved for a golf course to replace the Oxford golf course when it is developed with the PR6b scheme.

[1] Family spending workbook 3: expenditure by region. Table A33.
https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances

Table 15.2 Partial review sites open space, sports and leisure provision

Partial Review Site	Open space, sports and leisure provision
PR6a	11 ha Public Open Space (POS), allotments and play areas
PR6b	Sports facilities, allotments and play areas to be provided.
PR6c	Existing golf course on PR6b to be re-sited.
PR7a	11 ha of sports facilities and green infrastructure
PR7b	5.3 ha nature conservation area and "green link" to PR8
PR8	29.2 ha Local Nature Reserve (LNR) 12.2 ha conservation area 23.4 ha POS
PR9	24.8 ha POS and LNR 7.8 ha community woodland

Access and connectivity

15.9.11 Planning policy requires Water Eaton to deliver a local centre which can provide for the day to day needs for the residents of PR6a and PR6b as well as being in a convenient location alongside a key route on the north edge of Oxford. It is intended to include local convenience retail (food store, pharmacy, post office), ancillary business development (B1 (a)) and/ or financial and professional uses (A2) such as banks or estate agency; a café or restaurant (A3); and a community building for healthcare and community/social use. The Primary school would be co-located with the local centre in a layout that enables local trips for residents by active travel using the new routes that would be provided along Oxford Road (Figure 15.2).

15.10 Interaction of effects on receptors

15.10.1 The potential for effects caused by a combination of impacts from the Proposed Development on a particular receptor, acting together, may cause a more significant beneficial or adverse impact collectively than individually. For interaction between effects to be possible, there would need to be an identifiable residual effect from one or more environmental aspects after considering the mitigation proposed.

15.10.2 Tables 15.3 and 15.4 identify where there could be potential for adverse effects through the construction phase and when completed and occupied.

15.10.3 During the construction phase, there are effects relating to the visual appearance and the proximity of public paths to the activities taking place, although these are temporary aspects that will be managed through a CEMP, and offset to some extent by the progressive implementation of open space/habitat enhancement. Furthermore, during the construction phase there are also beneficial effects from economic activity related to employment opportunities. During construction there are effects related to separate landscape receptors.

15.10.4 Upon completion, the residual effects relating to the character of the Site and to the surrounding landscape types are reduced, although as these are separate receptors, the effects do not combine to produce a more significant interaction effect. During operation there is also major, moderate and minor beneficial effects relating to socio-economic factors such as open space and housing provision, in context of the visual change that would gradually occur from the existing baseline as the development is progressed.

15.10.5 Based upon the conclusions presented in the preceding technical chapters, and taking into account mitigation measures proposed, interaction effects are considered likely during the construction phase and upon completion.

Table 15.3 Effects during Construction

	Population	Ecology Receptors	Landscape	Water Environment	Heritage Features
Pedestrians (proximity to traffic)	Minor adverse	-	-	-	-
Water quality	-	-	-	Minor adverse	-
Groundwater table	-	-	-	Minor adverse	-
Habitats and vegetation	Moderate beneficial	Moderate beneficial	-	-	-
Fauna	-	Moderate beneficial	-	-	-
Site character and context	-	-	Major/moderate adverse	-	-
Vale farmland LT	-	-	Moderate/minor adverse	-	-
Otmoor Lowland	-	-	Minor adverse	-	-
Visual effects	Major adverse	-	-	-	-
Economic activity	Moderate beneficial	-	-	-	-
Non-designated building Pipal Cottage	-	-	-	-	Minor adverse
Lighting effects on sensitive habitats	-	Minor adverse	-	-	-
Climate change effects	Minor adverse	-	-	-	-

Table 15.4 Effects during Operation

	Population	Landscape	Water Environment	Heritage Features
Pedestrians (proximity to traffic)	Minor adverse	-	-	-
Water quality	-	-	Minor adverse	-
Flood risk	-	-	Major beneficial	-
Groundwater table	-	-	Minor adverse	-
Site character and context	-	Year 15: Moderate adverse	-	-
Vale farmland LT	-	Year 15: Minor adverse	-	-
Otmoor Lowland	-	Year 15: Minor/negligible adverse	-	-
Visual effects	Major adverse	-	-	-
Housing provision	Major beneficial	-	-	-
Economic activity	Moderate beneficial	-	-	-
Healthcare provision	Minor beneficial	-	-	-
Open space, sports and access provision	Moderate beneficial	-	-	-
St Frideswide's Farmhouse Grade II*, and Grade II wall	-	-	-	Minor adverse
Lighting effects on residents and road users	Minor adverse	-	-	-
Climate change effects	Minor adverse	-	-	-

16 Summary of mitigation and residual effects

16.1 Introduction

16.1.1 This Chapter provides a summary of the proposed additional mitigation and residual effects for the Proposed Development. The summary of proposed mitigation measures is provided to assist the planning authority formulate conditions and clauses of the legal agreement, to ensure that the measures contained and assessed in this ES are implemented.

16.1.2 If planning consent is granted, it is likely to include a condition ensuring that the development takes place in accordance with the parameter plans and therefore secures the implementation of the inherent mitigation measures. Additional mitigation is not generally capable of being shown on assessment parameter plans and other planning application drawings. It is this additional mitigation that is detailed below.

16.1.3 These measures together with other elements of the planning application demonstrate the Applicants' commitment to the implementation of necessary mitigation measures in agreement with the local planning authority.

16.2 Transport and access

16.2.1 A Construction Environmental Management Plan (CEMP) and Construction Traffic Management Plan (CTMP) will be subject to a planning condition, which will secure mitigation for construction related effects.

16.2.2 The Proposed Development will assist in bringing forward new walking and cycling routes through a proportional contribution secured in a S106 agreement. The submitted Framework Travel Plan aims to reduce the amount of travel by car from the Proposed Development during operation. A Framework Innovation Plan will be submitted which aims to futureproof the transport and access aspects of the Proposed Development.

16.2.3 Residual effects following the consideration of mitigation are shown in the table below.

Receptor	Residual Effect	Significant?
Construction		
Community Severance	Negligible	Not significant
Driver Delay	Negligible	Not significant
Pedestrian Delay	Negligible	Not significant
Pedestrian Amenity	Negligible	Not significant
Accidents and Safety	Negligible	Not significant
Fear and Intimidation	Negligible	Not significant
Operation		
Community Severance	Negligible – moderate beneficial	Not significant
Driver Delay	Negligible – moderate beneficial	Not significant
Pedestrian Delay	Negligible – moderate beneficial	Not significant
Pedestrian Amenity	Negligible – moderate beneficial	Not significant
Accidents and Safety	Negligible – moderate beneficial	Not significant
Fear and Intimidation	Minor adverse – moderate beneficial	Not significant
Cumulative		
Community Severance	Negligible – moderate beneficial	Not significant

Driver Delay	Negligible – moderate beneficial	Not significant
Pedestrian Delay	Negligible – moderate beneficial	Not significant
Pedestrian Amenity	Negligible – moderate beneficial	Not significant
Accidents and Safety	Negligible – moderate beneficial	Not significant
Fear and Intimidation	Minor adverse – moderate beneficial	Not significant

16.3 Air quality

16.3.1 Mitigation measures are required to protect existing receptor location as a result of fugitive dust emissions and road vehicle exhaust emissions generated by the construction and operational phase of the Proposed Development.

16.3.2 A selection of measures are proposed to mitigate the effects of dust emissions on air quality during the construction phase. These include site management methods, such as recording dust complaints, soft strip demolition techniques and methods such as wheel washing to reduce trackout.

16.3.3 Operational air quality mitigation relates to reducing vehicular trips and the resulting emissions, as covered in Chapter 5. Whilst significant effects on air quality have not been identified, a comprehensive offsetting strategy is for every home with dedicated parking to have an Electric Vehicle charger (Building Regulations, Part S), public charging points will also be available. The Site will also provide dedicated cycle parking for dwellings with regard to OXCC's best practice requirements and guidance.

16.3.4 Residual effects are shown in the table below.

Potential impact	**Residual effect**	**Significant?**
Sensitive Receptors - Construction Dust emissions	Negligible	Not Significant
Sensitive Receptors - Construction Vehicle road emissions	Negligible	Not Significant
Sensitive Receptors - Operational development Road Traffic emissions	Negligible	Not Significant
Sensitive Receptors – Proposed Future occupants	Negligible	Not Significant

16.4 Noise and vibration

16.4.1 A Construction Environmental Management Plan (CEMP) will be produced prior to the commencement of the construction works on site. This proposed CEMP will be a working document within which suitable procedures and methods will be specified to protect noise sensitive receptors. This will include specific method statements identifying methods of working and controls to address the noise and vibration effects of the development's construction.

16.4.2 All other mitigation measures are inherent to the design of the scheme and are therefore not detailed here.

Potential impact	**Residual effect**	**Significant?**
Construction noise and vibration	Negligible	Not significant
Noise from operational development		
Road Traffic Noise	Negligible	Not significant

16.5 Drainage and flood risk

16.5.1 The CEMP would include measures to manage surface water run-off during the construction stage. The CEMP would also mitigate any potential effects on the groundwater table and will manage the use of freshwater resources during the construction phase. Other mitigation measures will include modelling and reinforcement of the Thames Water foul drainage and potable water networks.

16.5.2 All other mitigation measures are inherent to the design of the scheme and are therefore not detailed here.

Receptor	Residual effect	Significant?
Construction phase		
Flood Risk (on site)	Negligible	Not significant
Flood Risk (off site)	Negligible	
Surface Water and Groundwater Quality	Minor	
Groundwater Table	Minor	
Water Resources	Negligible	
Completed Development		
Flood Risk (on site) Site users	Major Beneficial	Significant
Flood Risk (on site) Structures/drainage system	Minor Beneficial	Not significant
Flood Risk (off site)	Major Beneficial	Significant
Surface Water and Groundwater Quality	Minor	Not significant
Groundwater Table	Minor	
Foul water drainage	Negligible	
Water Resources	Negligible	

16.6 Biodiversity

16.6.1 An Ecological Construction Method Statement (ECMS) for each phase of the development will set out in detail the measures to be implemented to protect Important Ecological Features (IEFs) during the construction phase of the Proposed Development, based on the principles set out in the Biodiversity Improvement Management Plan (BIMP). It is proposed that the implementation of the ECMS will be overseen by an appointed Ecological Clerk of Works (ECoW). This document will cross reference with the CEMP, where relevant, and a detailed Arboricultural Method Statement (AMS) which will set out measures to protect trees and hedgerows during the construction phase.

16.6.2 The Proposed Development incorporates areas informal/natural green space and formal/amenity green space. A detailed Soft Landscape Scheme (SLS) will be prepared for these areas. A Landscape and Ecological Management Plan (LEMP) will be prepared for each phase of development based on the principles set out in the BIMP. This will set out in detail the measures to be implemented to ensure the successful establishment/installation of new habitats/features and the long-term maintenance and management of both existing and new habitats/features proposed as part of the soft landscape scheme.

16.6.3 Residual effects are set out in the Table below, none are categorised as significant in the EIA.

Receptor	Residual effect	Significant?
Construction		
Habitats and vegetation	Negligible	Not significant
Fauna	Negligible	
Operation		
Designated sites	Negligible	Not significant
Habitats and vegetation	Negligible	
Fauna	Negligible	

16.7 Climate change

16.7.1 As part of the construction the CEMP will set out considerations for reducing construction stage operational emissions, for example:

- Use of biofuels in site vehicles which has a lower emissions factor than diesel;
- Use of hydrogen or electric site vehicles and equipment;
- Use of temporary energy storage systems;
- Requiring the contractors to purchase renewable energy; and
- Use of renewable energy generating systems such as PV cells on construction buildings.

16.7.2 The GHG assessment is based on the new residential and non-residential development meeting the requirements of the Interim Future Homes Standard and Future Buildings Standard, i.e.,

- An all-electric development, with no fossil fuels onsite;
- Provision of 100% low energy lighting;
- Use of low carbon renewable energy, including heat pumps and Solar PV to reduce operational emissions.

Impact	Residual effects	Significant?
Construction GHG emissions	Minor adverse	Not significant
Operational GHG emissions	Minor adverse	Not significant
In-combination climate change effects	Minor adverse	Not significant

16.8 Landscape effects and visual amenity

16.8.1 There is limited landscape mitigation as part of the scheme which is applicable to the construction phase. Key components of this phase are the retention of existing landscape features of note where feasible, such as hedgerows and trees within the site. Beyond this a Construction Environmental Management Plan (CEMP) will be provided which ensures there are limited effects on the environment as a result of the construction phase.

16.8.2 Landscape mitigation during operation is all considered inherent to the design of the Proposed Development. This includes elements such as tree planting and allotment provision.

16.8.3 This additional mitigation is considered in the evaluation of residual effects recorded in the tables below.

Landscape resource	Residual effects	Significant?
Construction		
Site Character and Context	Major/moderate adverse effect.	Significant
Vale Farmland LT	Moderate/minor adverse effect	Significant
Otmoor Lowland	Minor adverse effect	Not significant
Operation		
Site Character and Context	Year 1: Major/moderate adverse Year 15: Moderate adverse	Significant
Vale Farmland	Year 1: Moderate/minor adverse Year 15: Minor adverse	Not significant
Otmoor Lowland	Year 1: Minor adverse Year 15: Negligible adverse	Not significant

Visual receptor	Residual effects	Significant?
Construction		
Photoviewpoint 2	Major/moderate adverse	Significant
Photoviewpoint 3	Moderate adverse	Significant
Photoviewpoint 4	Major adverse	Significant
Photoviewpoint 5	Moderate adverse	Significant
Photoviewpoint 6	Moderate adverse	Significant
Photoviewpoint 7	Moderate adverse	Significant
Photoviewpoint 8	Moderate adverse	Significant
Photoviewpoint 9	Minor adverse	Not significant
Photoviewpoint 11	Minor adverse	Not significant
Photoviewpoint 12	Moderate adverse	Significant
Photoviewpoint 13	Major adverse	Significant
Photoviewpoint 14	Moderate/minor adverse	Not significant
Photoviewpoint 15	Moderate/minor adverse	Not significant
Photoviewpoint 16	Moderate adverse	Significant
Operation		
Photoviewpoint 2	Moderate adverse	Significant
Photoviewpoint 3	Year 1: Moderate adverse Year 15: Minor adverse	Year 1: Significant Year 15: Not significant
Photoviewpoint 4	Year 1: Major adverse Year 15: Major/moderate adverse	Significant
Photoviewpoint 5	Year 1: Moderate adverse Year 15: Moderate/minor adverse	Year 1: Significant Year 15: Not significant
Photoviewpoint 6	Year 1: Moderate adverse Year 15: Moderate/minor adverse	Year 1: Significant Year 15: Not significant
Photoviewpoint 7	Year 1: Moderate adverse Year 15: Moderate/minor adverse	Year 1: Significant Year 15: Not significant
Photoviewpoint 8	Year 1: Moderate adverse Year 15: Moderate/minor adverse	Year 1: Significant Year 15: Not significant
Photoviewpoint 9	Minor/negligible adverse	Not significant
Photoviewpoint 11	Year 1: Minor adverse Year 15: Minor/negligible adverse	Not significant
Photoviewpoint 12	Year 1: Moderate adverse Year 15: Moderate/minor adverse	Year 1: Significant Year 15: Not significant
Photoviewpoint 13	Year 1: Major adverse Year 15: Major/moderate adverse	Significant
Photoviewpoint 14	Year 1: Moderate/minor adverse Year 15: Minor adverse	Not significant
Photoviewpoint 15	Year 1: Moderate/minor adverse Year 15: Minor adverse	Not significant
Photoviewpoint 16	Year 1: Moderate adverse Year 15: Moderate/minor adverse	Year 1: Significant Year 15: Not significant

16.9 Heritage

16.9.1 An Archaeological Mitigation Area has been agreed with the Archaeological Advisor to CDC around the extents of the barrows in the site, where it is proposed the barrows and their earthwork and buried remains would be preserved in-situ. This will exclude construction activities in this area and thereby ensure that the construction phase of the Proposed Development results in no adverse impact on these remains. During operation, the remains will remain preserved in situ, with interpretation material to enhance public understanding.

16.9.2 Mitigation in respect of the other archaeological assets identified within the site will comprise a programme of archaeological investigation and recording to offset the impact of the loss of these remains.

16.9.3 In terms of the non-designated buildings of local interest, mitigation is proposed in advance of the demolition of Pipal Barns during the construction phase. This mitigation will comprise an appropriate programme of building recording to secure a record of the buildings in advance of their loss.

16.9.4 This additional mitigation is considered in the evaluation of residual effects recorded in the table below.

Receptor	Residual effects	Significant?
Construction		
All Designated Heritage Assets Beyond the Site	Neutral	Not significant
Non-designated Barrows within the Site	Neutral	
Non-designated Archaeological Assets within the Site	Neutral	
Non-designated buildings of local interest within the Site (Pipal Barns)	Minor Adverse	
Non-designated buildings of local interest outside of the Site (Pipal Cottage)	Neutral	
Historic Landscape	Negligible Adverse	
Operation		
St Frideswide's Farmhouse Grade II* listed building and Grade II listed wall	Minor Adverse	Not significant
All Other Designated Heritage Assets Beyond the Site	Neutral	
Non-designated Barrows within the Site	Negligible Beneficial	
Non-designated Archaeological Assets within the Site	Neutral	
Non-designated buildings of local interest within the Site (Pipal Barns)	Neutral	
Non-designated buildings of local interest outside of the Site (Pipal Cottage)	Negligible Adverse	

16.10 Lighting

16.10.1 In order to minimise potential obtrusive light from the Proposed Development, the following mitigation measures can be employed in the detailed lighting design for the Site.

- In consultation with latest research, the specific colour temperatures used around the thoroughfare crossing, could be chosen to minimise potential impact on specific bat species;
- Appropriate lighting controls should be employed so that, when not required and subject to Health and Safety requirements, non-essential lighting is dimmed / switched off in order to further reduce the light impact. Controls such as photocells, motion detectors and time-clock could be adopted;
- A curfew operation of lighting to minimise energy use and to limit the periods of potential intrusive light exposure can be used where appropriate;
- Buffers, planting, banks, fences and reduced building heights, to reduce spillage and not compromise the required light levels on sensitive receptors;
- Appropriate use of shields, louvres and baffles as required locally;
- Careful selection and consideration of placement of luminaires;
- Careful selection and consideration of column heights to ensure lighting is focused on thoroughfares minimising light spill to existing and proposed ecology and vegetation;
- Careful selection of luminaire control gear, to ensure light outputs can be dimmed;
- Adopting lamps / LEDs with similar correlated colour temperatures to reduce visual disturbance;
- Use of LED luminaires with specific optical control to minimise the potential for obtrusive light due to their light distribution; and
- Optimising luminaire angle, lumen package (light output) and position to minimise light spill and night time visibility.

Receptor	Residual effects	Significant?
Footpath/bridleway 229/9/30	Moderate adverse	Not Significant
St Frideswide's access	Moderate adverse	Not Significant
Field adjacent to sports pitches	Moderate adverse	Not Significant

16.11 Population and economic effects

16.11.1 To enhance the positive aspects of the construction process, an Employment, Skills and Training Plan would be implemented for people to acquire skills that can be used in the long-term, after the Water Eaton development is complete. The potential for people to be adversely affected by construction operations would be controlled and managed through implementation of the Construction and Environment Management Plan (CEMP).

16.11.2 An indicative housing mix based on the requirements of the Strategic Housing Market Assessment (SHMA) this will be confirmed in detail at the reserved matter stage.

16.11.3 The requisite additional Primary school capacity will be accommodated within Water Eaton. The addition of new education infrastructure, built to modern standards will create an overall improvement in the quality of education provision.

16.11.4 For Secondary education, detailed analysis will be undertaken to review and agree the details of additional provision in discussion with the education authority. Appropriate mitigation will be

undertaken and/or provided for through a legal obligation for necessary financial contributions to ensure school place capacity can be delivered as required.

16.11.5 In relation to healthcare services, appropriate mitigation will be provided for through delivering additional capacity where required for consulting space.

16.11.6 In accordance with the quantum set out in the PR6a Land East of Oxford Road Development Brief, Water Eaton will provide two local areas of play (LAP), one local equipped play area (LEAP), one combined LAP/ LEAP and one neighbourhood equipped play area (NEAP/ MUGA) with play equipment and a hard surfaced area set within a landscaped area.

16.11.7 In addition, the requirement for formal sport provision will be met by way of a financial contribution towards formal outdoor and indoor sports provision off-site (including formal sports pitches at Site PR7a).

Receptor	**Residual effects**	**Significant?**
Construction Employment Economic activity	Moderate beneficial	Significant
Completed development		
Housing	Major beneficial	Significant
Economic activity	Moderate beneficial	Significant
Education	Negligible beneficial	Not Significant
Healthcare facilities	Minor beneficial	Not Significant
Open space	Moderate beneficial	Significant
Formal sports off-site	Moderate beneficial	Significant
Access and connectivity	Moderate beneficial	Significant

Table 16.1 **Mitigation Summary Table**

Identified receptor	Type and purpose of additional mitigation measure (prevent, reduce, offset, enhance)	How mitigation may be secured	To be delivered by	Auditable by
Transport				
Construction				
Population	Suitably worded planning condition for a Construction Environment Management Plan and Construction Traffic Management Plan - prevent	Condition	Developer	CDC / OXCC
Operation				
Road users	Containment of journeys within site 20 minute neighbourhood and access to public transport - prevent, reduce, offset, enhance	Delivering the development – condition / legal agreement	Developer	CDC / OXCC
Cyclists	Oxford Road / Banbury Road cycle superhighway and cycle friendly access arrangements along the site frontage	Condition / legal agreement	Developer	CDC / OXCC
	Contributions to Oxford Road / Banbury Road cycle superhighway	Legal agreement	OXCC	OXCC
Population	Contributions to other sustainable IDP measures	Legal agreement	OXCC	OXCC
	Framework Travel Plan	Condition / legal agreement	Developer	CDC / OXCC
	Framework Innovation Plan	Condition / legal agreement	Developer	CDC / OXCC
Air quality				
Construction				
Sensitive Receptors - Construction Dust emissions	Prevent and reduce fugitive dust emissions	CEMP through Planning Condition	Principal Contractor/Site Management	CDC
Sensitive Receptors - Construction Vehicle road emissions	Proposed Development will incorporate the specific construction phase mitigation measures outlined in the IAQM guidance.	CEMP and Construction Traffic Management Plan	Principal Contractor/Site Management	CDC
Operation				
Operational development Road Traffic emissions	Reduce in line with best practice.	Travel Plan / Planning condition	Developer	CDC
Proposed Future occupants				

Identified receptor	Type and purpose of additional mitigation measure (prevent, reduce, offset, enhance)	How mitigation may be secured	To be delivered by	Auditable by
Noise				
Construction				
Residential Receptors	Prevent and reduce potential noise and vibration effects due to fixed and/or mobile plant, and construction traffic movements.	Implementation of CEMP	Construction contractor	CDC
Operation				
Residential Receptors	Glazing specification to achieve noise criteria (BS8233 & WHO)	Suitably worded planning condition	Developer	CDC
School teaching spaces	Design of school layout and glazing specification to achieve noise criteria (BB93)	Suitably worded planning condition	Developer	CDC/ OXCC
Drainage and flood risk				
Construction				
Flood risk (on-site); Flood risk (off-site); Surface Water and Groundwater Quality; Groundwater Table; and Water Resources	Construction Environmental Management Plan to mitigate effects of construction on flood risk and drainage.	Planning condition	Construction contractors	CDC
Operation				
Flood risk (on site)	Strategy for the management of overland flow routes	Planning condition	Applicant	CDC
Flood risk (off-site); Surface Water and Groundwater Quality; and Groundwater Table	Surface water drainage strategy to manage quality of run-off.	Planning condition	Applicant	CDC
Foul Water Drainage; and Water Resources	Modelling and reinforcement of Thames Water foul drainage and potable water network.	Planning condition	Applicant	CDC

Identified receptor	Type and purpose of additional mitigation measure (prevent, reduce, offset, enhance)	How mitigation may be secured	To be delivered by	Auditable by
Biodiversity				
Construction				
Habitats and vegetation	Soft Landscaping Scheme (SLS); Arboricultural Method Statement (AMS); Landscape and Ecological Management Plan (LEMP); Construction Environmental Management Plan (CEMP); and Ecological Construction Method Statement (ECMS)	Planning condition	Applicant / Contractor	CDC
Fauna	LEMP; CEMP; ECMS; and NE Licence (if required)	Planning condition	Applicant / Contractor	CDC
Operation				
Designated sites	Surface water drainage system (SuDS features)	Planning condition	Applicant	CDC
Habitats and vegetation	SLS and LEMP	Planning condition	Applicant	CDC
Fauna	LEMP, SLS and Sensitive lighting design	Planning condition	Applicant	CDC
Landscape effects and visual amenity				
Construction				
All receptors	CEMP	Planning Condition	Main contractor	CDC
Operation				
Landscape and visual receptors	CEMP	Planning condition	Developer	CDC
Landscape and visual receptors	Landscape Strategy Plan used to guide the detailed design of the tree replacement strategy and Green Infrastructure to be implemented and maintained to such standards that it meets the objectives of the plan and consequently reduces identified adverse effects.	Planning condition	Developer	CDC

Identified receptor	Type and purpose of additional mitigation measure (prevent, reduce, offset, enhance)	How mitigation may be secured	To be delivered by	Auditable by
Heritage				
Construction				
All Designated Heritage Assets Beyond the Site	None	N/A	N/A	N/A
Archaeological Mitigation Area around two non-designated barrows	Prevent and Enhance- An area of preservation, including a buffer of 5m around the buried and earthwork remains of the barrows	Planning Condition	Developer	OXCC
Non-designated Archaeological Assets within the Site	Offset- A phased programme of archaeological investigation and thorough record made	Planning Condition	Developer	OXCC
Non-designated buildings of local interest within the Site (Pipal Barns)	Offset - A programme of building recording prior to demolition	Planning Condition	Developer	CDC
Non-designated buildings of local interest outside of the Site	None	N/A	N/A	N/A
Historic Landscape	None	N/A	N/A	N/A
Operation				
St Frideswide's Farmhouse Grade II* listed building and Grade II listed wall	Reduce - Variety of mitigation measures including vegetation buffer, enhancement of orchards, open spaces, retention of existing trackways, and restriction of building heights to two storeys where development closest to the listed building	Planning Condition	Developer	CDC
All Designated Heritage Assets Beyond the Site	None	N/A	N/A	N/A
Non-designated buildings of local interest outside of the Site	Reduce - through detailed design	Planning Condition	Developer	CDC

Identified receptor	Type and purpose of additional mitigation measure (prevent, reduce, offset, enhance)	How mitigation may be secured	To be delivered by	Auditable by
Population and economic effects				
Construction				
Employment	Enhancement via Employment, Skills and Training Plan	Planning condition	Developer	CDC
Operation				
Housing	Agreement of housing mix	Planning condition	Developer	CDC
Economic activity	None required.	N/A	N/A	N/A
Education	Financial Contributions to cover the additional demand for Primary school places.	Legal obligation	Developer	CDC
Healthcare facilities	Financial Contributions to cover the additional demand for health facilities.	Legal obligation	Developer	CDC
Open space	None required.	N/A	N/A	N/A
Formal sports facilities off-site	Financial Contributions to cover the additional demand.	Legal obligation	Developer	CDC
Access and connectivity	None required.	N/A	N/A	N/A
Climate change effects				
Construction				
Climate	CEMP / Site Waste Management Plan	Planning condition	Developer	CDC
Operation				
Climate	Detailed design	Planning condition	Developer	CDC

Glossary and abbreviations

µg/m^3	micrograms per cubic metre
2FE	2 Form Entry
AA	Appropriate Assessment
AADT	Annual Average Daily Traffic
ADMS	Atmospheric dispersion modelling system
AMS	Arboricultural Method Statement
AQ	Air Quality
AQLV	Air Quality Limit Values
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Strategy
BBOWTR	Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust Reserves
BGS	British Geological Survey
BIMP	Biodiversity Improvement and Management Plan
BRE	Building Research Establishment
CBGS	Cherwell Green Belt Study
CCG	Clinical Commissioning Group
CCT	Correlated Colour Temperature
CDC	Cherwell District Council
CDLA	Cherwell District Landscape Assessment 1995
CDWS	Cherwell District Wildlife Site
CEMP	Construction Environment Management Plan
CIfA	Chartered Institute for Archaeologists
CIRIA	Construction Industry Research and Information Association
CMS	Central Management System
CSM	Conceptual Site Model
CTMP	Construction Traffic Management Plan
Cumulative	An increase in an overall effect as a result of multiple additions/sources
DAS	Design and Access Statement
Decision Notice	Formal grant of planning permission and planning conditions
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DLUHC	Department for Levelling Up, Housing and Communities
DMRB	The Design Manual for Roads and Bridges – a comprehensive manual system of current standards, advice notes and published documents relating to the design, assessment and operation of trunk roads and motorways
DMV	Deserted Medieval Village
DRP	Design Review Panel

EA	Environment Agency
ECMS	Ecological Construction Method Statement
Economically Active	People who are either in employment or without a job and seeking work
ECoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EIA Regulations	The Town and Country Planning (Environmental Impact Assessment) Regulations 2017
EPS	European Protected Species
EPUK	Environmental Protection UK
ES	Environmental Statement. The document reporting the process and outcomes of the EIA. The ES reports the likely significant environmental effects of a project.
ETRO	Experimental Traffic Regulation Order
EU	European Union
EV	Electric Vehicle
EVC	Electric Vehicle Charging
Exceedance	a period of time when the concentration of a pollutant is greater than, or equal to, the relevant air quality standard
FBS	Future Buildings Standard
FDUA	Foul Drainage and Utilities Assessment
FHS	Future Homes Standard
FIP	Framework Innovation Plan
FRA	Flood Risk Assessment
FTE	Full time equivalent job (a measure of employment)
FTP	Framework Travel Plan - information to facilitate a reduced reliance on private car travel
GHG	Greenhouse Gas
GIS	Geographical Information System
GWP	Global Warming Potential
ha	Hectare – 1ha is an area equal to 10,000 square metres (2.47acres)
Habitats Directive	Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora
Habitats Regulations	Conservation of Habitats and Species Regulations
HBF	House Builders Federation
HCA	Homes and Communities Agency
HDV / HGV	Heavy Duty Vehicle / Heavy Goods Vehicle
HE	Highways England
HE	Historic England
HER	Historic Environment Record
Highways Works	The highways works proposed as part of the Application
HPI	Habitat of Principal Importance
HRA	Habitats Regulations Assessment

HSE	Health and Safety Executive
IAQM	Institute of Air Quality Management
IDP	Infrastructure Delivery Plan
IEA	Institute of Environmental Assessment
IEEM	Institute of Ecology and Environmental Management
IEF	Important Ecological Feature
IEMA	Institute of Environmental Management and Assessment
Illustrative [plan]	Not submitted for planning approval
ILP	Institute of Lighting Professionals
IMD	Index of Multiple Deprivation - made up of a series of indicators published by the Government for defined geographic areas (SOAs)
Impact/Effect	The term impact is used to describe a change in conditions. The term effect is used to describe an environmental response resulting from an impact, or series of impacts.
IPCC	Intergovernmental Panel on Climate Change
JNCC	Joint Nature Conservation Committee
km	Kilometre = 1,000 metres / or imperial = 1.6093 miles
l/s/ha	Litres per second per hectare (a measure of flow rate)
LAQM	Local Air Quality Management
LAQM PG	Policy guidance to support Local Air Quality Management
LAQM TG	Technical guidance to support Local Air Quality Management
LCA	Life Cycle Assessment
LDV	Light Duty Vehicle
LEAP	Local Equipped Area for Play
LEMP	Landscape and Ecological Management Plan
LinSig	A computer programme used to assess signal controlled junctions
LLFA	Lead Local Flood Authority
LNR	Local Nature Reserve
LPA	Local Planning Authority
LSOA	Lower Super Output Area
LT	Landscape Type
LTCP	Local Transport and Connectivity Plan
LVIA	Landscape and Visual Impact Assessment
LWS	Local Wildlife Site
m	Metre
m^2	square metre (area)
m^3	cubic metre (volume)
MAGIC	Multi-Agency Geographic Information for the Countryside
Magnitude	A combination of the nature, size, extent and duration of an effect
MHCLG	Ministry for Housing, Communities and Local Government
Mitigation	Measures introduced to avoid or reduce a significant effect of a proposal

MSOA	Middle Super Output Area- a geographic area used by the ONS to report statistics - each has a minimum size of 5,000 residents and 2,000 households (the average population size is 7,500)
NCA	National Character Area
NCN	National Cycle Network
NE	Natural England
NERC	Natural Resources and Environment Act 2006
NH	National Highways
NO_2	Nitrogen dioxide
NOMIS	Nomis is a service provided by the Office for National Statistics, ONS, to give the most detailed and up-to-date UK labour market statistics from official sources
NOx	Oxides of Nitrogen
NPPF	National Planning Practice Framework
NPPG	National Planning Practice Guidance
NTS	Non-technical summary (of the ES)
OCC	Oxford City Council
OCWS	Oxford City Wildlife Site
ONS	Office for National Statistics
OXCC	Oxfordshire County Council
Outline planning application	Seeks to establish whether the scale and nature of a proposed development would be acceptable to the local planning authority, before a fully detailed proposal is put forward
Parameters	Defines the amount / extent of development / land uses assessed
PC	Process Contribution
pCDWS	Proposed Cherwell District Wildlife Site
PEC	Predicted Environmental Concentration
PIA	Personal Injury Accident
Pipal Barns	a combination of barn, shelter sheds and stables
pLWS	Proposed Local Wildlife Site
PM_{10}	Particulate Matter – of a diameter 10 micrometres (0.00001 metre) or less
$PM_{2.5}$	Particulate Matter – of a diameter 2.5 micrometres (0.000025 metre) or less
Pollution	The contamination of air, water, or soil by substances that can occur naturally or as the result of human activities
POS	Public Open Space
ppb	Parts per billion (units of pollution in every billion (10^9) units of air)
PPC	Pollution Prevention & Control
PPG	Planning Practice Guidance
PPG	Pollution Prevention Guidance (Environment Agency)
ppm	Parts per million (units of pollution in every million (10^6) units of air)
PR	Partial Review (allocated sites)
PR6a	Cherwell District Council Local Plan Partial Review Site 6a

ProPG	Professional Practice Guidance
Public Rights of Way (PRoW)	A footpath, byway or bridleway over which the public have a right of access.
PVP	Photoviewpoint
Qualitative	The subjective quality of something rather than its quantity
Quantitative	Can be measured and expressed as a quantity
Reserved Matters	Aspects of a proposed development which an applicant can choose not to submit details of with an outline planning application
Residual effects	The significant environmental effects remaining following mitigation
SAC	Special Area of Conservation (see SSSI)
Scoping opinion	Defines what the LPA considers should be covered by an EIA
Section 278 Agreement	Under s278 of the Highways Act 1980, a local highways authority can enter into a legal agreement with a developer (in order to facilitate development) for the developer to either pay for or make alterations or improvements to the highway.
Section106 Agreement	Mitigation may be secured in an agreement made pursuant to s106 of the Town and Country Planning Act 1990.
SEND	Special Educational Needs and Disability
SFRA	Strategic Flood Risk Assessment
SHMA	Strategic Housing Market Area
SI	Site Investigation
Site	Means the land within the planning application boundary
SLS	Soft Landscaping Scheme
SM	Scheduled Monument
SPA	Special Protection Area
SPD	Supplementary Planning Documents complement policies in the Local Plan
SPI	Species of Principal Importance
SPZ	Source Protection Zone
SRN	Strategic Road Network
SSSI	Sites of Special Scientific Interest
SuDS	Sustainable Drainage Systems
SWMP	Site Waste Management Plan
TA	Transport Assessment
the Allocation Site	Extent of land covered by Partial Review Policy PR6a
the Applicants	Bellway Homes Limited and Christ Church, Oxford
The Site	extent of the planning application proposals by Bellway Homes Ltd and Christ Church, Oxford
VISSIM	Traffic flow model
WHO	World Health Organisation
WTR	Woodland Trust Reserve
ZTV	Zone of Theoretical Visibility
µg	microgram = one millionth of a gram

Water Eaton

Environmental Statement

Peter Traves
Associate Director

ptraves@savills.com

Rhys Williams
EIA Consultant

rhys.williams@savills.com